Student Poster Abstracts

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 2-001

Poster Title: Effectiveness of pharmacist-led motivational interviewing interventions: A systematic review and meta-analysis

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Purpose: Motivational interviewing (MI), a collaborative communication style for strengthening motivation and commitment to change, can facilitate positive health behavior change and address medication nonadherence. Pharmacists are key health care providers who are in a position to counsel nonadherent patients using MI. However, the effectiveness of MI is uncertain and no systematic reviews currently exist that evaluate the efficacy of pharmacist-led MI interventions. This systematic literature review and meta-analysis explore the effectiveness of pharmacist-led MI interventions in improving health behaviors in patients.

Methods: The databases PubMed and Ovid MEDLINE were searched to identify studies that involved pharmacists providing MI as an intervention in any disease state. One reviewer assessed the relevance of citations based on the inclusion and exclusion criteria. Studies were included if they were in English and included an intervention that involved pharmacists providing MI. Studies were excluded if they were not clinical trials; systematic reviews, case reports, and other nonclinical trials were not reviewed. Details of the included studies were collected by one reviewer using a standardized data extraction form developed for the review. Data collected included study location and setting; study publication date; disease state studied; specifics about the intervention, including format, length, and any pharmacist training involved; participant demographics and count; outcome measures; and results. When multiple studies examined a common endpoint, meta-analyses were conducted using a fixed-effects model.

Results: Fourteen studies were identified, eight of which were randomized controlled trials. MI did not significantly improve outcomes in the following disease states compared to control: immunization rates, methadone use for substance abuse, alcohol abuse, rheumatoid arthritis,

chronic obstructive pulmonary disease, pneumonia, and recent stroke or transient ischemic attack. MI did significantly improve outcomes in hypercholesterolemia. In diabetic patients, MI resulted in a higher proportion of adherent patients compared to control, although the statistical significance of this difference was not assessed. MI also improved readiness to quit in a smoking cessation intervention and increased adherence in patients with human immunodeficiency virus or acquired immunodeficiency syndrome, although there was no independent control group for either study. Three studies assessed hypertension, with one having significant improvement of outcomes with MI compared to control and the other two had no significant difference. Meta-analyses found pooled risk differences for the impact of MI on adherence was -0.042 (95 percent CI, -0.073 to -0.011), and the impact of MI on blood pressure was -2.2 mmHg (95 percent CI, -4.0 to -1.4).

Conclusion: The evidence in this review was insufficient to determine the effectiveness of pharmacist-led MI interventions. The majority of the disease states discussed were represented by only one study, and many of the studies included were small, exploratory in nature, or lacked an independent control group, which severely limited analysis. Meta-analyses did find a benefit on medication adherence when pharmacists provided MI to patients. Pharmacists were able to help patients modestly lower blood pressure was well. Further large randomized controlled trials are needed to fully elucidate the role of pharmacist-led motivational interviewing.

Submission Category: Oncology

Submission Type: Descriptive Report

Session-Board Number: 2-002

Poster Title: Evaluation of a continuing education certificate program designed to educate pharmacists on colorectal cancer risks and screening

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Purpose: Colorectal cancer (CRC) is the third most commonly diagnosed type of cancer and third leading cause of death due to cancer. CRC screening has been shown to be highly effective at identifying cancer yet according to the National Health Interview Survey in 2010, only 59% of people for whom screening is recommended are tested. This project was designed to evaluate the use of a continuing education program intended to educate pharmacists on CRC so that they may in turn educate patients on the risks associated with disease and the benefits of screening.

Methods: An Accreditation Council for Pharmacy Education (ACPE)-accredited continuing education certificate program was designed as part of a larger study developed to evaluate the feasibility of pharmacists as a means to educate patients on various topics including risks of CRC and benefits of cancer screening. The program had two portions: a 10-hour didactic component and a 5-hour practice component. The didactic component was designed to cover the basics of cancer screening and CRC risks in addition to various health disparities in CRC and communication skills for health behavior change. The program also included lectures on collaborative practice agreements and screening statistics. The practice component included a workshop which reviewed the material from the online lectures, discussed any questions the participants had about the material, and included a role-playing element which encompassed a CRC risk discussion with a patient, motivational interviewing, and brainstorming potential barriers to CRC screening. To assess the knowledge of the pharmacists who participated in this program, a pre-test was required before listening to the online lectures in each module as well as a post-test after completion. These tests were scored out of 100 and feedback from the practice component of the module was also collected. The participating pharmacists evaluated

each module after completion using a Likert scale and several open-ended questions asking for specific feedback. Descriptive statistics were used to analyze the data.

Results: Ten pharmacists completed the program, each pharmacist completed 9 pre-tests and 9 post-tests corresponding to the 9 modules. Therefore, a total of 90 pre-test scores and 90 post-test scores were evaluated. The median pre-test score was 50% (range, 13-100%) with one 100% achieved. The median post-test score was 84% (range, 38-100%) with 24 100% scores attained. Setting a passing threshold at 75% or above, before completion of the modules 15 passing scores (16%) were reported compared with 66 passing scores (73%) after completion of the modules. Increases in score on the pre- vs. post-test ranged from 10% to 80% after pharmacists completed the program. Evaluation of individual questions scores showed 15 out of 75 total post-test questions (20%) had an increased score of 50% or greater. Eighty-percent or more of pharmacists answered strongly agree or agree to evaluation questions asking if the modules were presented in a fair and unbiased manner, met learning objectives, and were organized in presentation. Evaluation comments from the pharmacist participants revealed the modules were informative and well taught (e.g., “[presentation] was enlightening as to the role pharmacists can play in patient care” and “very well presented and added to my knowledge base”).

Conclusion: This certificate program was effective at educating pharmacists on CRC and cancer screening as evidenced by increased post-test scores compared with pre-test scores. Additionally, pre-and post-test scores as well as evaluations were able to successfully identify strengths and weaknesses of the certificate program. The information gathered from this descriptive report can be used to help update future CRC education programs for pharmacists, which may be useful for pharmacists who wish to gain a better understanding of cancer screening and prevention and apply this to their practice.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 2-003

Poster Title: Valganciclovir dose and cytomegalovirus infection increase the risk of neutropenia in patients post-renal transplant

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Purpose: The risk factors for neutropenia post-renal transplant are not well characterized. Several factors have been implicated in reducing neutrophil counts including recipient age greater or equal to 65, post-transplant viral infections, the type of induction agents used, and the use of valganciclovir (VAL) and mycophenolate mofetil (MMF). The objective of this study was to determine risk factors associated with the development of neutropenia in renal transplant patients.

Methods: A single center retrospective chart review was performed during the period of March 2014 to February 2016 and included patients age 18 years and older who received a kidney transplant and were followed up for six months. Patients were excluded from this analysis if they received a multi-organ transplant, had an incomplete medical record, or were lost to follow up. The primary outcome was to evaluate the correlation of the following factors with the development of neutropenia: recipient age, gender, type of induction agent used, average MMF dose, VAL dose, and the presence of infection by cytomegalovirus (CMV) and/or BK polyomavirus prior to or at the same time as neutropenia. The type of induction agents evaluated were alemtuzumab, rabbit anti-thymocyte globulin, and basiliximab. Neutropenia was defined as an absolute neutrophil count of less than or equal to 500 cells/mm3. Secondary outcomes include evaluating the frequency of dose adjusting MMF and/or VAL and the use of filgrastim. All categorical data was evaluated using a two-tailed Fisher's exact test. All continuous data was evaluated using an unpaired t test. A p value of less than 0.05 was required to be considered statistically significant.

Results: A total of 183 patients were screened where five patients were excluded due to less than six months of follow up. Of the 178 patients included in this analysis, 19 were in the neutropenia group and 159 were in the non-neutropenic group. There were no differences seen in the following risk factors: mean age, gender, induction agent used, MMF dose, and BK polyomavirus. The following risk factors were significant: CMV infection (7 patients versus 7 patients, p equals 0.0001) and VAL dose (615.8 milligrams versus 355.4 milligrams, p equals 0.0004). In the neutropenic group, 94.7 percent of patients received filgrastim. Dose adjustments of VAL and/or MMF occurred in 21.1 percent of patients prior to filgrastim, 57.9 percent had dose adjustments with filgrastim, 15.8 percent received only filgrastim, and 5.3 percent only had dose adjustments. In the non-neutropenic group, 12 patients received treatment to increase neutrophil counts. Of these, 91.7 percent received filgrastim where 8.3 percent had a dose adjustment prior to filgrastim, 50 percent had dose adjustments with filgrastim, 33.3 percent received only filgrastim, and 8.3 percent only had dose adjustments.

Conclusion: Patients post-renal transplant who developed neutropenia were more likely to have a CMV infection and be exposed to higher doses of VAL. Further studies are needed to evaluate this correlation.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 2-004

Poster Title: Antimicrobial stewardship restricts the inappropriate use of ertapenem

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Purpose: The appropriate use of antimicrobial agents is essential to prevent the development of multi-drug resistant organisms and to reduce overall cost of care. The Joint Commission recently proclaimed that antimicrobial stewardship is a new medication management standard for hospitals. Carbapenem antibiotics have activity against many gram-negative organisms including those that produce extended spectrum beta-lactamases. These antibiotics are rarely indicated as first-line therapy for prophylaxis or treatment of infection. This project was developed to discover inappropriate use of broad-spectrum carbapenems in a non-profit hospital.

Methods: This study investigated the frequency of inappropriate antibiotic use of ertapenem. The study was conducted in Day Kimball Hospital in Putnam, Connecticut. The investigators included a medical doctor with advanced training in infectious disease and two pharmacy students. Patients were included in the investigation if he/she received at least one dose of ertapenem over the 30-day time period (07/15/16-08/15/16). There were no exclusion criteria. The information was collected using the electronic medical record of the hospital. The data gathered included dosage, duration of therapy, microbiology results if applicable, and indication for therapy for each patient. The medical doctor determined if usage was appropriate with the help of the pharmacy students by referencing the Infectious Diseases Society of America (ISDA) guidelines.

Results: Pharmacy students recorded that twenty-seven patients were administered ertapenem intravenously over the thirty-day-period. The medical doctor and two pharmacy students reviewed each patient case together and determined the use of ertapenem was appropriate in four out of the twenty-seven cases (14.8 percent). Over the thirty-day-period ertapenem was administered for prophylaxis of shoulder surgery (7), prophylaxis of knee

surgery (2), cellulitis with negative microbiology cultures (2), gastrointestinal bleeding (1), appendectomy (2), laparoscopic cholecystectomy (2), exploratory laparotomy (1), peri-rectal abscess draining (1), abscess (2), post-surgical pain and tenderness (1), perforated bowel (1), cholecystitis (1), urinary tract infection (2), and colon resection (2). The appropriate cases included treatment of the complicated urinary tract infections and the colon resection.

Conclusion: Antimicrobial stewardship is an essential implementation in healthcare systems of all sizes. Utilizing antimicrobial stewardship in this small non-profit hospital may lead to decreases in inappropriate antibiotic usage, cost savings, formulary changes, and education of healthcare professionals. Collaboration between pharmacists and medical doctors in antimicrobial stewardship may lead to better health outcomes and lower resistance rates in the community.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 2-005

Poster Title: Evaluation of an anti-activated factor ten pilot protocol versus a partial thromboplastin time protocol in patients receiving continuous unfractionated heparin infusions

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Purpose: Unfractionated heparin (UFH) infusions play a major role in anticoagulation therapy for thrombotic disorders in the hospital setting. Because of its low therapeutic index, it requires monitoring usually via a partial thromboplastin time test (PTT). Anti-activated factor X (anti-Xa) monitoring detects the therapeutic effect of the drug faster and more precisely than conventional PTT, thus reducing dose adjustments and frequency of monitoring. The purpose of this study was to determine whether dosing UFH infusions using an anti-Xa protocol was as safe and effective compared to the previous dosing strategies that utilized a PTT protocol at our institution.

Methods: The institutional review board approved this single-center, prospective, observational study using the anti-Xa protocol and its comparison to a retrospective PTT cohort. Patients who were less than 18 years old or who did not receive a continuous UFH infusion for at least 24 hours were excluded in both cohorts. The prospective cohort included patients who were admitted to specific cardiology pilot units, and received UFH infusions following the new anti-Xa protocol. Patients in the prospective cohort were excluded if they received UFH therapy based on the PTT protocol anytime during the same admission. The retrospective cohort was selected randomly from patients who received UFH infusions at our institution from January 1, 2014 to March 15, 2015 using the PTT protocol. A convenience sample of 100 patients was chosen: 50 patients in each cohort. Data on demographics, diagnosis, baseline comorbidities, concurrent medications, laboratory parameters, and clinical outcomes were collected. Continuous variables are expressed as mean plus/minus standard deviation and were

compared using the Student's t-test. Categorical variables are listed as percentages and compared using the Chi-squared test; however in instances where less than five data points were available, the Fischer's Exact test was used. A P value less than 0.05 was considered statistically significant.

Results: Four patients in the anti-Xa cohort were transferred from the predetermined pilot units to another floor, where they received UFH therapy based on the PTT protocol and were therefore excluded from our analysis. This resulted in 46 patients in the anti-Xa group and 50 patients in the PTT group. The patients in the anti-Xa group were older (69.96 plus/minus 11.60 vs. 63.38 plus/minus 15.10, p = 0.019), and had more chronic kidney disease (39.1 percent vs. 20 percent, p = 0.046) than the patients in the PTT group. There were no differences in the incidence of bleeding (21.8 percent vs. 18 percent, p = 0.798), or thrombosis development (4.3 percent vs. 2 percent, p = 0.606) while receiving UFH. No other significant differences were noted between the two groups.

Conclusion: Anti-Xa activity measurement has emerged as a potential new standard of care for inpatient monitoring of continuous UFH infusions. Our study demonstrated no significant differences in the rates of bleeding or thrombosis between the anti-Xa and the PTT-monitored groups, and that the new anti-Xa protocol is just as safe and effective as the previously utilized PTT protocol. These data support the use of anti-Xa measurements as a safe and effective way to monitor UFH administration.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-006

Poster Title: Characterization of alvimopan prescribing at a tertiary academic medical center

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Purpose: Alvimopan is a peripherally acting mu-opioid antagonist used to accelerate recovery time and prevent post-operative ileus (POI) following bowel resection surgery. When used with enhanced recovery after surgery (ERAS) protocol, alvimopan was shown to reduce length of stay (LOS) and hospital costs. However, if dosed inappropriately benefits may be outweighed by high cost. The recommended dosing regimen is 12 mg administered orally 30 minutes to 5 hours pre-operatively, followed by 12 mg orally twice daily until discharge or a maximum of 15 total doses. The purpose of this study was to characterize the use of alvimopan and evaluate post-operative outcomes.

Methods: This medication use evaluation is a quality improvement project and therefore exempt from approval by the Institutional Review Board. A medication administration report generated in the electronic health record identified all patients who received at least one dose of alvimopan between December 1, 2015 and May 31, 2016. This retrospective chart review evaluated type of surgery, LOS, number of pre-operative doses given, number of post-operative doses given, incidence of POI, opioid use for 7 consecutive days prior to surgery, and history of myocardial infarction (MI). LOS was defined as the total number of days between the date of surgery and the date of hospital discharge. Discharge summaries were utilized to determine the incidence of POI and the prior to admission medication list was reviewed for opioid use prior to surgery. A total of 34 patients were reviewed.

Results: Patients underwent one of the following surgeries: total colectomy, partial colectomy, ileostomy reversal, proctectomy, ileostomy, proctopexy, or whipple. Appropriate pre-operative doses were administered to 31 of the 34 total patients. Ten of these patients also received post-operative doses.

Three of the 34 patients only received post-operative doses. A total of 100 pre-operative and post-operative doses were administered during the six-month period, resulting in an average of 3 doses per patient. Six patients (17.6%) developed POI. Five of these patients received the recommended pre-operative dose; two also received post-operative doses (one received a total of 5 post-operative doses; one received 12 post-operative doses). The patient who received five post-operative doses received one 12 mg capsule orally once daily, as opposed to the recommended twice-daily dosing regimen. The average number of post-operative doses and average LOS were higher in the POI group when compared to the total study population. There were no patients who experienced an MI or had used opioids for seven consecutive days prior to surgery.

Conclusion: Alvimopan may reduce post-surgical LOS, decrease the incidence of POI, and reduce overall healthcare costs. Utilizing this medication appropriately with the ERAS protocol can benefit patients undergoing bowel resection surgery. It is important to reinforce the dosing of one 12 mg oral pre-operative dose followed by 12 mg orally twice daily until discharge or until reaching the maximum of 15 doses.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 2-007

Poster Title: Evaluating presentation of medication risk and its association with patient understanding and clinical decision-making

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Purpose: Medication risk and benefit information is often presented to patients quantitatively. Recent research suggests that icon arrays, matrices of discrete icons representing at-risk populations, may increase understanding in subjects low in health numeracy. However, icon arrays have not been found to improve understanding in subjects both low in numeracy and graphical literacy. This study seeks to determine whether presenting data in a continuous, "spinner" format will further increase risk understanding, compared to the standard numerical or graphical formats. The study additionally assesses the impact of an increased risk understanding on clinical decision-making.

Methods: This study was submitted to the Yale Institutional Review Board and determined to be exempt. Surveys were collected in an outpatient primary care clinic and oral consent was obtained prior to participation. Subjects were presented clinical scenarios and risk information in three different formats: numbers only, icon arrays, and probability spinners. Participants were told of two equally efficacious pills. Pill A was associated with a 10 percent chance of nausea and vomiting and a 0.6 percent chance of serious infection requiring hospitalization; Pill B was associated with a 20 percent chance of nausea and vomiting and a 0.2 percent chance of serious infection requiring hospitalization. They were then asked to evaluate the risks and choose either Pill A or Pill B. Subjects were also asked to rate how much they liked their format of the risk presentation on a Likert scale. At the end of each survey a Subjective Numeracy Scale questionnaire, assessing the baseline numeracy of each participant, as well as a demographic questionnaire were completed. ANOVA and chi-squared analyses were used to compare groups, and multivariate linear and logistic regression were used to adjust for differences in baseline characteristics between groups.

Results: A total of 151 subjects (56.4 percent female, average 41.7 years) participated. There was a significant relationship between format and risk understanding. Those with spinner and icon array formats were able to answer more questions related to adverse events correctly compared to the numbers only format (b equals 0.33, P equals 0.044 and b equals 0.54, P equals 0.001 respectively). For clinical decision-making, subjects who received the spinner presentation were more likely to choose Pill A than the numbers only format (OR equals 3.96, P equals 0.006). There was no statistically significant difference in preference for Pill A in subjects that received icon arrays compared to numbers only (OR equals 1.56, P equals 0.33). Spinner and icon array groups rated their satisfaction of the presentation higher than the numbers alone group (b equals 0.91 and b equals 0.62 respectively, P less than 0.05).

Conclusion: Patients receiving spinners or icon arrays understood risk better and preferred these formats to those that received numbers only. Those who received spinners were more likely to "correctly" choose Pill A suggesting that these formats positively influenced clinical decision-making. Future research will incorporate spinners into clinical practice in order to help patients make complex decisions.

Submission Category: I.V. Therapy/ Infusion Devices/ Home Care

Submission Type: Evaluative Study

Session-Board Number: 2-008

Poster Title: Syringe infusion pump safety in the neonatal intensive care unit

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Purpose: Inadvertent clamping or occlusions can lead to clinically significant delays in therapy in vulnerable patient populations such as neonates when occlusion detection is delayed. The purpose of this study is to measure the sensitivity of the Medfusion 4000 syringe infusion pump of detecting an occlusion to enhance medication administration safety in the neonatal intensive care unit.

Methods: In this study, the Medfusion 4000 Wireless Syringe Infusion Pump was assessed utilizing BD syringe sizes of 10, 30, and 60 milliliters. The syringes were filled to a volume of 10, 25, and 50 milliliters respectively using Dextrose 10%. Microbore tubing was clamped shut at the end to mimic an occlusion at the site of entry to the patient. Each syringe size was trialed using two different Medfusion pumps under infusion rates of 0.1, 0.2, 0.5, and 1 mL/hr. The relative pressure setting of the pump, under which each syringe size and infusion rate were tested, was set at three occlusion detection limits; Normal (12psi/83kPa), Low (8psi/55kPa), and Very Low (4psi/28kPa).

Results: Time to occlusion detection was categorized into four groups based on infusion rate (0.1 mL/hr, 0.2 mL/hr, 0.5 mL/hr, 1 mL/hr). Variables evaluated were syringe size and occlusion detection limit. Across all groups, syringe size demonstrated a direct relationship with time to occlusion detection; as syringe size decreased time to occlusion detection decreased. When the occlusion detection limit was manipulated, notable differences were seen amongst groups. When calibrated to the most sensitive setting, very low (4psi/28kPa), occlusion detection occurred on average within one minute of beginning the infusion across all groups; changes in syringe size and infusion rate did not have an effect. At a given infusion rate, the 10 mL syringe showed the least difference in time to occlusion detection when set to normal or low detection limits. However, the 30 and 60 mL syringes showed a two to three fold difference in time to

occlusion detection when changed from the normal to the low-pressure settings, with more pronounced differences at lower infusion rates.

Conclusion: Changing the pressure setting, syringe size, and infusion rate of an intravenously administered medication via syringe infusion pump can result in changes in the time to occlusion detection. When infusions are set to flow at a certain rate due to clinical needs and properties of certain medications, changing occlusion detection limits are more effective than changing syringe size in occlusion detection. In an effort to maximize syringe pump efficacy in occlusion detection, pressure settings should be set to the lowest pressure setting available to detect an occlusion.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 2-009

Poster Title: Clinical evaluation of proper 4-factor prothrombin complex concentrate (4-F PCC) use in adult patient

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Purpose: Four-factor prothrombin complex concentrate (4-F PCC), indicated for urgent reversal of coagulant factor deficiency induced by a vitamin K antagonist therapy with acute major bleeding or the need for urgent surgery, was added to the Baystate Medical Center drug formulary in January 2016. Its desirable pharmacokinetic profile including fast onset and effective decrease of International Normalized Ratio (INR) in an emergent situation allows for potential misuse, incomplete documentation, and/or inadequate monitoring. This study will assess prescribing patterns and provider monitoring of 4-F PCC in adult patients. These patterns will then be used to design interventions to guide appropriate use.

Methods: This quality improvement project will use data collected from a drug utilization evaluation which consists of a retrospective chart review of all adult patients who received 4-F PCC from January 2016 to May 2016 at Baystate Medical Center or Baystate Franklin Center. The following data will be collected: indication for 4-F PCC (active bleed vs. procedural vs. high bleed risk), source of bleed, reversing anticoagulant therapy, international normalized ratio (INR) levels before and after administration, timing of INR levels, vitamin K administration, free frozen plasma (FFP) administration, and medical service ordering 4-F PCC. Collected data will be analyzed to determine the following: 1. Type of anticoagulant reversal; 2. Prescribing patterns of indication for use; 3. Appropriate monitoring of INR before and after 4-F PCC administration; 4. Appropriate adjunctive vitamin K administration. The analysis will be used to guide future discussions about restrictions, need for education, and changes to the distribution process regarding appropriate 4-F PCC use. This study was excluded from needing Institutional Review Board approval because it is for quality improvement.

Results: A total of 44 patients were administered four-factor prothrombin complex concentrate (4-F PCC). Forty-two patients were on warfarin, one patient on apixaban, and one patient on no oral anticoagulant therapy. Average initial INR was 3.3 (range 1.1 to 9.6), with four patients

with an initial INR below 2.0. Twenty-five patients were indicated with an active bleed, 16 patients with a procedural INR reversal, and 10 patients with a high risk of bleed with an elevated INR. Forty-three percent of patients administered 4-F PCC had incomplete monitoring of INR and/or lacked adjunctive vitamin K administration. Twenty six 4-F PCC orders were completed by the emergency and trauma team, twelve were ordered by a surgical team, and five were by an intensive care team.

Conclusion: Four-factor prothrombin complex concentrate (4-F PCC) has been used in a diverse patient population including those who are not indicated for its use. Incomplete therapy and monitoring have also been shown. Continued education, especially with the emergency and trauma team, and development of an institutional algorithm for 4-F PCC use is recommended to ensure consistent methods of therapy and complete overall treatment.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 2-010

Poster Title: De-escalation of vancomycin in patients with neutropenic fever

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Purpose: The Infectious Diseases Society of America (IDSA) and National Comprehensive Cancer Network (NCCN) guidelines recommend the addition of vancomycin as empiric therapy in neutropenic fever (NF) patients with pneumonia, catheter-related infections, severe mucositis or who are hemodynamically unstable. To reduce the risk of resistance developing, the guidelines recommend that vancomycin be discontinued after 48 hours if resistant Gram-positive bacteria are not cultured from the patient. The purpose of this study is to assess the incidence of vancomycin discontinuation at 48 hours in NF patients if no resistant Gram-positive organisms are identified.

Methods: This retrospective chart review looked at a sample of patients between September 1, 2015 and January 1, 2016 who met criteria for neutropenic fever and received an antipseudomonal agent with vancomycin. Patients were excluded if they were < 18 years old, did not meet the criteria for neutropenic fever, or if they received aztreonam and vancomycin. Baseline information that was collected included diagnosis, chemotherapy regimen, prior history of methicillin-resistant Staphylococcus aureus (MRSA), collection of MRSA swab, positive cultures, discontinuation of vancomycin at 48 hours, duration of vancomycin past the 48 hours, whether vancomycin was restarted after initial discontinuation, recommendations from the infectious disease team or the antibiotic stewardship team (AST), and if recommendations were followed. This was a quality improvement project within our department which is exempt from IRB approval.

Results: A total of 78 admissions were assessed. Twenty admissions (4 without fever, 15 without neutropenia, 1 receiving aztreonam/vancomycin) failed to meet criteria and were excluded. Vancomycin was appropriately discontinued at 48 hours in 57% (33/58) of admissions. Of the 43% (25/58) of admissions who were continued > 48 hours, 12 received vancomycin for < 5 days, 3 for 5 days, 5 for 6-7 days, 3 for 8-10 days, and 2 for > 10 days. Multiple reasons were cited for continuation, persistent fevers being the most common. MRSA swabs were collected in 71% (41/58) of admissions. Of these, 2 swabs were positive for MRSA, neither of which translated into positive blood cultures. Six patients were restarted on vancomycin for fever after discontinuation, with 4 patients restarted once and two patients restarted twice. Infectious Diseases was consulted on 17 patients, with recommendations followed on 15 patients and no vancomycin recommendation made on 2 patients. AST recommended discontinuation of vancomycin on 5 patients, all of which were accepted.

Conclusion: Based on the results of this study, there is an opportunity for improvement in discontinuation of vancomycin at 48 hours in NF patients at our institution. To improve our rates, clinical pharmacists will assess all vancomycin ordered for NF at 48 hours. In conjunction with AST, notes will be placed in the chart providing recommendations to de-escalate vancomycin in patients that do not meet criteria for continued vancomycin usage.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 2-011

Poster Title: Comparison of insulin glargine 300 units/ml versus insulin glargine 100 units/ml – A systematic review

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Purpose: To review the available evidence on the clinical efficacy and safety of a more concentrated insulin glargine [rDNA origin] injection 300 units/ml compared to insulin glargine 100 units/ml in patients with type 1 and type 2 diabetes mellitus.

Methods: The following electronic databases were searched: PubMed and MEDLINE (using Ovid platform), Scopus, BIOSIS, and Google Scholar through June 2016. Conference proceedings of the American Diabetes Association (ADA; 2015-2016) were reviewed. We also manually searched reference lists of pertinent reviews and trials.

Results: A total of 6 pivotal phase 3 randomized controlled trials known as the EDITION series were reviewed. All of these trials (n=3500) were head-to-head comparisons evaluating the efficacy and tolerability of glargine 300 units/ml versus glargine 100 units/ml in a diverse population with type 1 and type 2 diabetes mellitus. These trials were of six months duration with a 6-month safety extension phase.

Conclusion: Glargine 300 units/ml was as effective as Glargine 100 units/ml for improving glycemic control over 6 months in all studies, with a lower risk of nocturnal hypoglycemia significant only in insulin-experienced patients with type 2 diabetes. Overall, patients on glargine 300 units/ml required 10% to 18% more basal insulin, but with less weight gain compared with glargine 100 units/ml.

Submission Category: Critical Care

Submission Type: Case Report

Session-Board Number: 2-012

Poster Title: Conversion of intrathecal to oral baclofen after a surgical site infection following intrathecal pump placement

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Purpose: This case report describes a method of rapid conversion of intrathecal baclofen to oral baclofen in a patient with multi-site infection necessitating intrathecal pump removal. Significant past medical history included cerebral palsy with spastic quadriplegia complicated by seizures and joint contractures. Motor symptoms were well controlled with intrathecal baclofen pump insertion approximately five years prior to presentation in the setting of insertion site infection. As abrupt discontinuation of baclofen has resulted in withdrawal symptoms including death, careful taper of intrathecal baclofen with appropriate monitoring is paramount. Monitoring during the conversion included use of the modified Ashworth grading scale to characterize spasticity and monitoring for baclofen withdrawal syndrome, including vital signs and creatine kinase. The multidisciplinary team planned to decrease intrathecal dose by 15-25 percent per day over five days while overlapping with titration of oral baclofen. Baseline intrathecal baclofen daily dose was 912.8 micrograms (mcg) with a modified Ashworth grade of 3. Oral baclofen was initiated on day one of intrathecal baclofen taper at a dose of five milligrams (mg) three times daily. On day two, daily dose of intrathecal baclofen was decreased to 701 mcg and oral baclofen was increased to 10 mg three times daily. On day three, the intrathecal baclofen dose was decreased to 553.1 mcg daily. However, the patient experienced tachycardia around 120 beats per minute and systolic blood pressure of 156 mm Hg hours after intrathecal baclofen dose reduction. To mitigate signs of baclofen withdrawal syndrome, intravenous (IV) diazepam was initiated with good response. The patient's heart rate and blood pressure returned to baseline values. Following day four taper of daily intrathecal baclofen dose to 350 mcg, both heart rate and blood pressure increased similarly to the previous day. Increased spasticity was noted on day four as evidenced by a measured modified Ashworth

grade of 4. IV diazepam was utilized to ameliorate withdrawal symptoms with moderate response. However, due to labile blood pressure and tachycardia suggesting baclofen withdrawal syndrome, intrathecal baclofen taper on day five was interrupted to allow for further up-titration of oral baclofen dose to 30 mg three times daily. Daily dose of intrathecal baclofen was decreased to 175 mcg on the following day as oral baclofen dose was increased to 35 mg three times daily. Patient appeared to be stable upon further assessment of withdrawal symptoms. Intrathecal baclofen was discontinued on day seven with continuation of oral baclofen 35 mg three times daily and IV diazepam as needed for spasticity. Despite the high risk of withdrawal symptoms associated with abrupt discontinuation of baclofen, there is a lack of guidance on how to successfully discontinue this agent. This case illustrates a multidisciplinary approach in rapid discontinuation of intrathecal baclofen in the setting of surgical site infection. Other clinicians may follow a similar approach in the event an urgent discontinuation of intrathecal baclofen is warranted.

Methods:

Results:

Conclusion:

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 2-013

Poster Title: Barriers to delivering comprehensive medication therapy management services implemented in Connecticut community pharmacies

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Purpose: There are countless barriers to patients receiving comprehensive healthcare. Community pharmacists are the most accessible healthcare professionals, and therefore have the ability to provide services to their patients effectively and efficiently. This project demonstrated the benefit of community pharmacists' involvement in delivering comprehensive medication therapy management (MTM) services for patients with hypertension and diabetes. An evaluation of pharmacists' opinions was conducted after the first cohort of pharmacies engaged in the project to determine any changes that can be made for the next cohort to improve efficiency and success.

Methods: A partnership between the state department of health, the University of Connecticut School of Pharmacy, and statewide independent pharmacies created a network of providers to deliver MTM services to underserved patients in Connecticut. Pharmacists completed a practice-based certificate program through the School of Pharmacy to provide MTM services for patients with diabetes and hypertension. Each pharmacist met with ten patients and documented demographics, monitoring parameters, medications, drug therapy problems, and interventions. Pharmacists documented adherence at the first and last visit by using the Morisky Scale. The pharmacists had up to four patient encounters over 12 months with a goal of improving drug therapy outcomes, adherence, and clinical outcomes. The first cohort of five pharmacists was interviewed to determine the strengths and weaknesses of the project's methodology before inclusion of the next cohort of pharmacists. A uniform survey with multiple choice answers was presented to the pharmacists in a twenty minute phone interview. The pharmacists addressed physical, logistical, and patient-related barriers, and were encouraged to elaborate on how to improve the process in these categories. Specifically,

pharmacists were asked about barriers such as transportation, incentivizing return, access to medical providers and medical information, ease of use of documentation form, confidence in their delivery of the service, disruption of workflow logistics, and patient language and health literacy.

Results: The MTM service was conducted in low-income, urban areas in Connecticut, so transportation was a common issue among all pharmacists. Patients often relied on public transportation, friends and family members, or walked to attend appointments. The pharmacists provided up to 40 dollars per patient to incentivize visit retention. Pharmacists were allowed discretion on how to divide the budget, and overall felt it was effective. All pharmacists reported difficulty in obtaining lab values from doctors' offices; however, some were patient self-reported. Pharmacists suggested sending a letter to medical offices prior to patient visits to ensure participation of providers and request pertinent information. Pharmacists reported difficulty in carving out time to provide an efficient service. Most pharmacists felt comfortable providing MTM services, but would benefit from periodic conference calls from project coordinators to discuss barriers. The most common patient-related barrier was health literacy, leading to a misunderstanding or indifference about their health and medications.

Conclusion: As community pharmacists become more involved in direct patient care, it is important to determine potential obstacles to delivering effective care. In underserved populations, providers encounter barriers in transportation and health literacy when meeting with patients and educating about personal health goals. In community pharmacies, barriers exist in sharing information with other providers due to privacy laws and lack of standardized health records. Improving efficiency of pharmacist time management and patient scheduling will optimize the ability of community pharmacies to provide comprehensive MTM services, leading to improved patient outcomes.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 2-014

Poster Title: Hemodynamic effects of dexmedetomidine compared to propofol in neurocritical care

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Purpose: Adequate sedation in neurocritical care is usually achieved with sedatives such as propofol and dexmedetomidine. Propofol (PRO) is limited by severe hemodynamic adverse effects and may accumulate with prolonged use leading to hypertriglyceridemia, cardiac failure, metabolic acidosis, renal failure, and rhabdomyolysis. Dexmedetomidine (DEX) allows patient arousal for frequent neurologic examinations without interruption of treatment. DEX is also associated with hemodynamic adverse effects. Despite the perceived benefits, the tolerability of DEX in neurocritical care patients has not been well described. The purpose of this study was to evaluate the hemodynamic effects of dexmedetomidine compared to propofol in neurocritical care patients.

Methods: Patients greater than or equal to 18 years old who received either dexmedetomidine or propofol in the neurointensive care unit were included in this study. Due to restrictive use criteria for DEX at the study institution, patients who were initiated on DEX over a period of 14 months were identified for inclusion. Based on that sample size, an equal number of patients started on propofol were included using a computerized randomization model. The primary outcome measures were the incidence of hypotension (SBP less than 90 mm Hg), hypotension requiring vasopressor intervention and bradycardia (HR less than 60 mm Hg). Secondary outcome measures including mean duration of mechanical ventilation, mean duration of continuous infusion sedation and the median duration of ICU length of stay.

Results: A total of 70 subjects (35 patients in each arm) participated in the study. The mean age (years) between the DEX and PRO arm did not differ significantly (51.1 vs. 57.4, P equals 0.08). There was no statistically significant difference in hemodynamic adverse events between DEX

and PRO treatment arms: hypotension (23 percent vs. 17 percent, P equals 0.77), hypotension requiring vasopressor (9 percent vs. 9 percent, P equals 1) or bradycardia (49 percent vs. 34 percent, P equals 0.33). Duration of mechanical ventilation did not vary between the PRO group or the DEX group (9.3 days vs. 8.6 days, P equals 0.29). There was no difference in the mean duration of sedation between the DEX and PRO groups (43 hours vs. 37 hours, P equals 0.21), median duration of ICU length of stay (9 days vs. 9 days respectively) or mean in-hospital mortality (6 percent vs. 15 percent, respectively P equals 0.43). One patient in the PRO group experienced objectively defined propofol related infusion syndrome.

Conclusion: This retrospective study showed no statistically significant differences in hemodynamic effects between DEX when compared to PRO in neurocritical care patients. This study was likely underpowered to detect a statistically significant difference in hemodynamic effects between treatment arms. The majority of evidence supporting the use of DEX for sedation in the neurocritically ill is limited to prospective observational studies with small samples sizes and case reports. More studies assessing the hemodynamic effects of dexmedetomidine are needed in this patient population.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 2-015

Poster Title: Evaluation of isavuconazole, a new triazole antifungal, in the solid organ transplant population: a systematic review

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Purpose: Solid organ transplant (SOT) recipients are at an increased risk for invasive fungal infections due to use of immunosuppressive therapies. Managing antifungal therapy in the post-transplant setting is particularly challenging due to the adverse effect profiles and high propensity for drug interactions with available agents. These issues are further confounded by differing spectrums of activity among licensed antifungal agents. Isavuconazole is the active moiety of isavuconazonium sulfate, which is a newly approved triazole antifungal for treatment of invasive aspergillosis and mucormycosis. The purpose of this evaluation is to assess the use of isavuconazole in the SOT population.

Methods: Preclinical in vitro studies, clinical trials, and review articles were identified through a systematic MEDLINE search on June 5, 2016 using search terms “ISAVUCONAZOLE”, “BAL4815”, “BAL8557”, “ISAVUCONAZONIUM”, “RO-0098557”, and “RO-094815” for all dates in the database. The search was only restricted to those in the English language. In order to capture all relevant material for this recently approved drug, no disease specific modifying terms were used for exclusion.

Results: A total of 150 articles were identified through this search. The oral formulation has a bioavailability of 98% and absorption is not saturated at clinically relevant dosing. This property allows for conversion to oral dosing as soon as the patient is able to tolerate oral medications. Isavuconazole is a broad-spectrum antifungal agent with in vitro activity against clinically relevant fungi in the transplant population, including Candida species, Aspergillus species, and

non-Candida yeast, non-Aspergillus moulds, including mucormycetes, and dimorphic fungi. Immunosuppressed patients, mostly hematologic malignancies, were included in phase II and phase III clinical trials that demonstrated non-inferiority to fluconazole and voriconazole for the treatment of candidiasis and aspergillosis respectively. Separate trials demonstrated efficacy for the treatment of mucormycosis, cryptococcosis, and dimorphic fungi in humans in limited data sets. Phase III trials indicated less hepatobiliary and ocular effects compared to voriconazole. Through moderate inhibition of cytochrome-P450 3A4 and inhibition of uridine diphosphate-glucuronosyltransferases, isavuconazole can increase the levels of related substrates. Isavuconazole increases the area under the curve of cyclosporine, tacrolimus, and sirolimus by 1.29, 2.25, and 1.84 fold respectively. Voriconazole increases these three drugs by 1.7, 3-10, and 7-11 fold, while posaconazole increases them by 1.33, 3.6, and 7.9 fold respectively.

Conclusion: Although not studied specifically in SOT patients, isavuconazole has demonstrated treatment efficacy in severely immunosuppressed patients suggesting it could have a role in both treatment and prophylaxis in the appropriate SOT population. Isavuconazole has been shown to have less adverse reactions that lead to discontinuation of study drug in phase III trials compared to voriconazole. Additionally, isavuconazole has a similar drug interaction and adverse effect profile to fluconazole; however, it is considered to have a significantly improved drug interaction profile compared to that of voriconazole and posaconazole.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 2-016

Poster Title: Assessing the potential role of the community pharmacist in lowering blood pressures in underserved communities

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Purpose: About 75 million American adults have high blood pressure and only 54 percent of people with this diagnosis have achieved adequate blood pressure control. Pharmacists, as one of the most accessible health care professionals in the community, have a unique opportunity to help these patients reach their blood pressure goals. This study, as part of the Association of State and Territorial Health Official's "Million Hearts Initiative" investigated how community pharmacists can engage underserved populations to help lower blood pressure through various services including patient outreach, blood pressure monitoring, and medication therapy management (MTM).

Methods: This study investigated the utility of three different approaches to engaging the community in an effort to reduce the prevalence of high blood pressure. The study was conducted in a community pharmacy in Bridgeport, Connecticut, and services were performed by pharmacy students under the supervision of a licensed pharmacist. Patients were selected through a database screening of those on antihypertensive medications including beta-blockers, angiotensin converting enzyme inhibitors, angiotensin II receptor blockers, diuretics, and calcium channel blockers. Patients were then contacted via telephone to discuss blood pressure control and medication use. At the end of the conversation, patients were offered the opportunity for a blood pressure measurement and MTM. Recommendations were communicated to patients' physicians, and patients scheduled a follow-up appointment with the pharmacy for a second blood pressure reading and consultation. As a second recruitment strategy, fliers were created and attached to prescription bags of those with hypertension

encouraging them to speak to a pharmacist for help in managing blood pressure. Thirdly, pharmacy students were partnered with community health workers to measure blood pressure in public areas (such as libraries, barber shops, and food pantries) and assessed community attitudes regarding the pharmacist's potential role in helping to manage blood pressure.

Results: Pharmacy students initiated 387 phone calls and successfully reached fifty patients via telephone over a twenty-four-day period. Fifteen patients had concerns regarding their blood pressure and medications. Concerns included side effects, efficacy, and dosage. Of the fifty patients spoken to, sixteen came into the pharmacy for a blood pressure reading and MTM session. Drug therapy problems identified during MTM sessions were medication nonadherence (5 patients), undesirable side effects (5 patients), and high blood pressure readings as defined by JNC-8 guidelines (7 patients). A total of nineteen interventions were made for nine patients. Interventions included changing medications (4), providing pill boxes (4), scheduling doctor appointments (7), and medication administration counseling (3). Only 3 patients returned to the pharmacy for their scheduled follow-up, and all 3 had reductions in blood pressure. Of the patients spoken to with the community health workers, 95.6 percent believed pharmacists and physicians should be working together to manage health conditions and medication use.

Conclusion: Most patients are receptive to having a pharmacist involved in monitoring blood pressure. Utilizing blood pressure monitors in the pharmacy, offering MTM to patients, and actively collaborating with patients' physicians may lead to better health outcomes. Collaboration between pharmacists, community health workers, and other healthcare professionals, can have a large impact on hypertension control in underserved populations.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 2-017

Poster Title: Identification of patient risk factors for trimethoprim-sulfamethoxazole resistant Staphylococcus aureus infections

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Purpose: The spread of antibiotic resistance is a major threat to public health. Staphylococcus aureus infection is an increasingly common cause of both hospital and community-acquired infections. Many of these infections are treated with trimethoprim-sulfamethoxazole as it has potent and reliable activity against gram-positive pathogens (including methicillin-resistant S. aureus). Sulfamethoxazole-trimethoprim has historically been used in a variety of healthcare settings due to advantages such as patient tolerance, low expense and ease of administration. We evaluated possible risk factors for trimethoprim-sulfamethoxazole resistant S. aureus infections, as resistance to this medication removes one of the preferred oral options for treating these infections.

Methods: This was an institutional review board approved retrospective case-control study conducted at UConn John Dempsey Hospital. Case patients were admitted from 2012 to 2016 and were infected with trimethoprim-sulfamethoxazole resistant S. aureus. The control group consisted of patients who were admitted within 1-2 days of case patients, and who had trimethoprim-sulfamethoxazole sensitive S. aureus infections. Cases were matched 1:2 with controls in order to improve the power of this study. Data were collected on a total of 27 potential risk factors. These risk factors were chosen based on prior published studies as well as pertinent comorbidities which have proven to increase the risk of antibiotic-resistant infections. Two study investigators collected data independently using information from the hospital's electronic medical record. Descriptive statistics, univariate and multivariate statistical analysis were performed using Minitab and SPSS statistical software. Independent risk factors were considered statistically significant if the P-value was less than 0.05. Binomial multivariate logistic regression analysis was performed to determine the odds ratios for risk factors and to

control for covariance and confounding variables. Risk factors with P-values of < 0.2 on univariate analysis were included in the multivariate analysis.

Results: Twenty-two cases of trimethoprim-sulfamethoxazole resistant S. aureus infections were matched with 44 control cases of trimethoprim-sulfamethoxazole sensitive S. aureus infections. Baseline characteristics for cases and controls, respectively, were; mean age in years (58.6, 58.5), male gender (68.2%, 68.2%), caucasian (77.3%, 79.5%), BMI greater than 30 (18.2, 36.2), and mean length of stay (13, 9.5 days). The most common infection sites for case and control arms respectively included tissue (31.8%, 38.6%), blood (18.2%, 25%), lung (38.1%, 27.3%). Trimethoprim-sulfamethoxazole resistant S. aureus had significantly higher resistance to oxacillin, cefazolin, clindamycin, gentamicin, levofloxacin, and tetracycline. Most cases (73%) were identified in 2013-2014, and an increase in resistant infection prevalence over time was not observed.The following risk factors displayed statistically significant P values (less than 0.05) upon univariate analysis: urinary tract infection, HIV infection, previous trimethoprim-sulfamethoxazole therapy in the past 1 or 6 months, and admission from community or a correctional facility. In multivariate analyses, only urinary tract infection (OR=28, 95% Cl 3-294) and previous trimethoprim-sulfamethoxazole in the last 6 months remained statistically significant (OR=14, 95% CI 1.2-179).

Conclusion: Multivariate analyses of data from our patients indicated that only urinary tract infection and previous trimethoprim-sulfamethoxazole use in the last 6 months were statistically significant risk factors for trimethoprim-sulfamethoxazole resistant S. aureus infections. Although recognition of these patient factors will be important to improve the treatment of patients at our institution, larger studies across other cohorts of hospitalized and/or community patients may help identify a more comprehensive list of risk factors.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 2-018

Poster Title: Coexistence of advanced age, chronic kidney disease, and reduced body weight in patients with atrial fibrillation

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Purpose: Novel oral anticoagulants (NOACs) have standard and reduced dose regimens for stroke prevention in atrial fibrillation (AF) patients. Determination of NOAC dosing requires that clinicians assess patients for the presence of advanced age, decreased renal function, and reduced body weight (either as separate components or as part of the calculation for creatinine clearance). Little is known about the frequency in which these dose reduction criteria occur in patients with AF. The purpose of this study was to quantify the prevalence of comorbid advanced age, moderate-severe chronic kidney disease (CKD), and reduced body weight among patients with AF.

Methods: This retrospective claims analysis was performed in the Agency for Healthcare Research and Quality's 2012 National Inpatient Sample (NIS). The NIS, designed to approximate a 20 percent stratified sample of United States community hospitals, is the largest all-payer inpatient database in the United States and contains all discharge data from more than 1200 hospitals across 44 states. Adult patients were included if they had a diagnosis of AF (indicated with the presence of an International Classification for Diseases, ninth-edition, Clinical Modification (ICD-9-CM) code of 427.31 in any position). Only patients with an ICD-9 code indicating BMI (V85.0 to 85.4) were included in this analysis. CKD was identified by the presence of ICD-9 codes ranging from 585.1 to 585.9 as well as procedural codes for dialysis or kidney transplant, and was categorized into stages 1 through 5. Patients were then characterized into the following categories: advanced age (greater than or equal to 80 years), moderate-severe CKD (defined as stages 3, 4, or 5), and underweight (BMI less than 19 kilograms per meter

squared). The proportion of AF patients with zero, one, or multiple characteristics that would merit dose reduction were determined and are reported as percentages with 95 percent confidence intervals (CIs).

Results: We identified 751,009 AF patients in the 2012 NIS, of which 37,951 patients had available BMI data and were included in our analysis. Patients' median and 25, 75 percent CHA2DS2-Vasc and ATRIA bleeding scores were 4 (3, 5) and 3 (1, 6), respectively. Median and 25, 75 percent age was 75 years old (66, 83) with 36.4 percent of patients greater than or equal to 80 years of age. The overall prevalence of moderate-severe CKD was 16.2 percent, and 21.6 percent of patients had a BMI less than 19 kilograms per meter squared. Among patients with reported BMI data, 15,920 (41.9 percent) did not have a NOAC dose adjustment risk factor, 13,608 (35.9 percent) had one risk factor, 7,289 (19.2 percent) had two risk factors, and 1,134 (3.0 percent) had all three risk factors. Of patients with 2 NOAC dose adjustment criteria, advanced age plus reduced body weight was the most common, appearing in 3,777 hospitalizations (51.8 percent).

Conclusion: In our current real-world analysis of AF patients, almost a quarter (22 percent) of the patients met two or more of the criteria indicating that NOAC dose reduction may be warranted. Further research is needed to assess the frequency of NOAC dose adjustment and its implications on clinical practice.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 2-019

Poster Title: Title: Cardiovascular safety of glucose lowering drugs (GLD) in patients with type 2 diabetes and cardiovascular disease – a network meta-analysis

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Purpose: This study will assess the extent to which GLDs increase the risk of hospitalization for heart failure (HHF), cardiovascular (CV) death, and all-cause mortality in patients with type 2 diabetes and established cardiovascular disease (CVD).

Methods: Literature Search
Eligible trials were identified through electronic databases performed in PubMed and Scopus for randomized controlled trials available up to September 2016 in the English language. We also manually searched the references of cited articles.
Study design
We performed a network meta-analysis (NMA) using a frequentist model. Network meta-analysis integrates data from direct comparisons of treatments within trials and from indirect comparisons of interventions assessed against a common comparator in different trials to compare all investigated GLDs.
Inclusion
Eligible studies met the following inclusion criteria: 1) Phase III and Phase IV RCTs in type 2 diabetes with established CVD; 2) follow-up > 24 weeks and at least 100 patients per arm; 3) reported the following CV outcomes: HHF, CV death, and all-cause death; 4) comparison of GLDs relative to placebo or another GLD; 5) restricted to full-text publications in the English language.
Outcomes

1) HHF; 2) CV death; and 3) all cause death (includes CV and all-cause deaths that occurred as a primary endpoint event).
Data synthesis
We performed a random-effects network meta-analysis, assuming a common heterogeneity variable for all comparisons. We conducted network meta-analysis with STATA version 13 using the mvmeta command and programmed STATA routines.

Results: Our search identified 846 potentially relevant studies. After excluding duplicates and the initial screening of titles, 85 studies remained for screening. A total of 12 RCTs were eligible for network meta-analysis. Our final analysis included 69394 patients.
For HHF, our NMA results showed that SGLT2i had a significant lower risk compared to placebo (OR 0.65, 0.48 to 0.88), DPP-4i (OR 0.57, 0.41 to 0.80) and TZD (OR 0.46, 0.30 to 0.70). TZDs had a significant higher risk of HHF compared to placebo (OR 1.42, CI 1.07 to 1.89) and GLP1-RA (OR 1.52, 1.09 to 2.11), and SU (OR 2.43, CI 1.20 to 5.0).
For CV death, SGLT2 was associated with a significant lower risk of CV death compared to placebo (OR 0.61, 0.48 to 0.78), DPP-4i (OR 0.61, 0.46 to 0.81), GLP1-RA (OR 0.70, 0.52 to 0.94), and TZD (OR 0.64, 0.45 to 0.90).
For all-cause mortality, both GLP1-RA and SGLT2i had a significantly lower risk compared to placebo (OR 0.89, 0.78 to 1.01 and OR 0.69, 0.56 to 0.85, respectively). SGLT2i was associated with a lower risk compared to DPP-4i (OR 0.67, 0.53 to 0.85), GLP1-RA (OR 0.77, 0.61 to 0.98), and TZDs (OR 0.72, 0.53 to 0.97).

Conclusion: Our network meta-analysis included direct and indirect comparisons of GLDs for risk of cardiovascular events. Our results show that SGLT2i are associated with a lower risk of HHF, CV death, and all-cause death compared to placebo, TZD, DPP4i, and GLP1-RAs. GLP1-RA is associated with a lower risk of HHF compared to TZD and placebo.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-020

Poster Title: An evaluation of the prescribing and monitoring of dabigatran within the Veterans Affairs Connecticut Healthcare System (VACT)

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Purpose: In 2010, dabigatran became the first direct oral anticoagulant (DOAC) to receive FDA approval for stroke risk reduction in patients with non-valvular atrial fibrillation. The Veterans Affairs Pharmacy Benefits Management published the initial dabigatran criteria for use (CFU) document in 2011 for agency use. Since then, three DOACs have received FDA approval. Indications for these agents have increased and the healthcare system's CFU of these agents have been revised several times. As a quality management assessment aimed at improving healthcare provision, this medication use evaluation (MUE) intends to review the appropriate prescribing and monitoring of dabigatran therapy.

Methods: This retrospective chart review will include all patients with active outpatient prescriptions for dabigatran as of September 1, 2016. A comprehensive search found 296 patients, 50 of which were randomly selected for sampling. The following information was collected from the Computerized Patient Record System (CPRS): patient's age; most recent serum creatinine (SCr), complete blood count (CBC), and actual body weight; and date dabigatran was initiated. Patients with objective data that was missing or conflicted with the CFU were labeled as requiring further review.

Results: A total of 50 patient charts were reviewed retrospectively. Of these patients, 50% were identified as requiring further review. The majority of these patients (42%) were found to have met at least one of the criteria for apixaban or rivaroxaban as outlined in the CFU. A small number of patients (6%) met two or more criteria to be eligible to receive apixaban or rivaroxaban. Approximately one-third (34%) of patients were 75 years of age or older, meeting

the DOAC CFU for apixaban use. The most current reported labs in CPRS showed 8% of patients with an elevated SCr of 1.5 mg/dL or greater and 6% of patients with a calculated creatinine clearance between 30-50 mL/min. The DOAC CFU recommends monitoring of the CBC and SCr at least annually or more frequently in certain patient populations, but 14% of patients were found to either not have the necessary labs reported in CPRS or to have gaps in their lab monitoring history greater than 12 months.

Conclusion: After the introduction of the newer DOACs and revisions to the CFU, patients previously initiated on dabigatran were never reassessed under the latest guidance. Furthermore, dabigatran continues to be initiated in patients for whom the CFU recommends apixaban or rivaroxaban. Based on the findings of this MUE it is recommended that the MUE be expanded to review the prescribing and monitoring of all patients receiving dabigatran at VACT. Future recommendations may include expanding the MUE to include all DOACs and providing the necessary education to all prescribers and pharmacists.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 2-021

Poster Title: Integration of a virtual dispensing simulator “MyDispense” in an experiential education program to improve medication safety

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Purpose: Technology is increasingly used within healthcare education. To better equip students with tools and skills to fully integrate into a rapidly advancing field, preceptors must embrace new teaching technologies. Benefits of using technology in experiential settings include allowing learners to safely make errors that do not harm patients and providing immediate feedback to enhance learning. The objective of this study was to evaluate student learning and preparedness for community introductory pharmacy practice experiences (IPPEs) after implementation of an online virtual dispensing software “MyDispense” into experiential education for first-year pharmacy students enrolled at the University of Connecticut (UConn) School of Pharmacy.

Methods: The Institutional Review Board approved this study. Both first-year pharmacy students and their assigned community IPPE preceptors were eligible. After completing a demographic survey, students were stratified into 4 groups based on previous community pharmacy experience and then randomized to complete MyDispense exercises before starting IPPE or after 24-32 hours of IPPE. Groups A and C included students with greater than 50 hours of previous community pharmacy experience; Group B and D students had less than 50 hours. Groups A and B students were granted access to MyDispense at time of rotation assignment and were required to complete 40 exercises before arriving at assigned site. Group B and D students were granted access to MyDispense following completion of preceptor student readiness survey or when preceptor declined to participate. Preceptor participants were blinded to their student’s assigned group and were required to complete a 6-item student

readiness survey after student completed 24-32 IPPE hours. Regardless of preceptor involvement, all student participants were granted 10 hours towards their IPPE requirement, contingent upon completion of all MyDispense exercises. Following completion of exercises, students were asked to complete an anonymous 8- item survey evaluating their performance and use of MyDispense. Study data was then compiled for review. All surveys were administered using Qualtrics. Descriptive statistics were used to characterize data; Mann-Whitney U test was used to calculate P values.

Results: Between November 2015 through April 2016, 88 students and 27 preceptors elected to participate in the study. Groups A and C each contained 18 students and Groups B and D contained 26 students. Of the 88 students, 37 (42%) currently worked or had previously worked in a community pharmacy. Overall, students felt confident in their ability to manage the assigned tasks (gather and organize data, evaluate/process prescription, interpret abbreviations, select product, counsel on self-care and medication) with median scores of 3-4 (5-point Likert scale). All students appreciated that MyDispense offered a safe environment to build skills without bearing potential harm to patients (median score 5, of 5-point Likert scale). Preceptors displayed less confidence in students in their ability to managed assigned tasks with median scores of 2-4 (5-point Likert scale) regardless of previous experience or when MyDispense exercises completed. Specifically preceptors rated students with lower scores on dispensing activities than students ($P < 0.001$), but not counseling activities. However, students who completed the MyDispense exercises before rotation (Groups A/B) received higher scores from preceptors regarding patient counseling than those who did MyDispense exercises after starting rotation (Groups C/D, $P < 0.0047$).

Conclusion: Simulation-based software, such as MyDispense, can be an effective teaching tool for students embarking on community practice rotations, which allows the student to safely make errors and receive immediate feedback. This virtual setting can enhance learner understanding of medication safety. With the increase in community and specialty pharmacies within healthcare systems, MyDispense offers the ability for preceptors to use the software to enhance rotation education and improve understanding of medication safety.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 2-022

Poster Title: From prison to the community: Opportunities for pharmacists to support inmate medication adherence

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Purpose: Over 600,000 inmates are released to the community on an annual basis. Approximately 45% of federal and 56% of state inmates have a mental illness; of these, 40% have a co-occurring chronic illness. Treatment commonly consists of medication therapy, however, lack of adherence results in increased mortality risk and drives health costs. Upon release, inmates are challenged with maintaining adherence while establishing a new care team and facilitating insurance change. Limited research exists on pharmacists' ability to directly address inmate medication adherence. Thus, this study explores inmate perception of medication adherence and management as part of their treatment plan.

Methods: The institutional review board approved this cross-sectional qualitative study. Informed consent for semi-structured interviews was obtained from inmates meeting the following criteria: age 18 or older, receiving treatment for a chronic illness, English speaking, and incarcerated for at least 6 months in a prison or retained in a halfway house. Chronic illnesses included: depression, bipolar disorder, schizophrenia, substance abuse, hypertension, diabetes mellitus, and HIV/AIDS. Illnesses were divided into a physical illness group (hypertension, diabetes mellitus, HIV/AIDS) and a mental illness group (depression, bipolar disorder, schizophrenia, substance abuse). Inmates self-reported their adherence status. Recruitment was facilitated through posted fliers with inmates self-requesting to participate. Interviews were conducted by trained research assistants, audio recorded for transcription, and analyzed using NVivo 11 Pro. Four study questions were selected for thematic analysis: 1) Do you take your medications as prescribed, and why? 2) How do you feel about taking medication for your illness? 3) Are you experiencing any problems or side effects due to your medications and how do you handle this? and 4) Have there been any changes to your medications and how

was this process handled? Responses to each question were coded and reviewed by a second researcher to identify common themes.

Results: All interviews were conducted between January and December 2015. Interviews were conducted with 23 male inmates (n= 7 in prison; n=16 in halfway houses) until saturation was reached. A total of 6 inmates reported non-adherence, 17 reported adherence, 7 had a physical illness, and 16 had a mental illness. For the physical illness group, 1 was non-adherent and 6 were adherent. Among the mental illness group, 5 were non-adherent and 11 were adherent. A total of 16 different themes for the four questions were identified, including: Momentary Disruptions, Timeliness, Personal Beliefs, Patient Education, Tangible Benefits, Potential Risks, Acute Relief, Counseling, Loss of Faith, Lack of Need, Cognitive Side Effects, Therapy-limiting Side Effects, Physical Side Effects, Unmatched Expectations, Limited Provider Access, and Data Use. Patient Education was the only theme identified in multiple questions. Extrapyramidal symptoms (EPS) and weight gain presented as common reasons for medication change among inmates located in prison. On transition to halfway houses, inmates often demonstrated a lack of awareness for available community health resources.

Conclusion: From a group of predominantly adherent mentally ill male inmates, identified themes suggest the benefit of patient education in both the inpatient correctional health setting and outpatient setting on inmates' transition to the community. From the inpatient setting, pharmacists are well suited to perform comprehensive medication therapy management for the psychiatric population. In an outpatient setting, the community pharmacist is poised to supply medication information and additional health guidance to inmates in transition. Overall, the pharmacist's adept medication knowledge and availability allow for medication management and support of inmate medication adherence.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 2-023

Poster Title: Rates of urinary tract infections in renal transplant recipients receiving pentamidine versus sulfamethoxazole-trimethoprim for opportunistic infection prophylaxis

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Purpose: Due to their immunosuppressed state, patients post-renal transplantation should receive prophylaxis against opportunistic infections. Sulfamethoxazole-trimethoprim (SMZ/TMP) 400/80mg orally daily is commonly used to prevent Pneumocystis Jirovecii (PCP) infection as well as reduce the risk of urinary tract infections (UTI). Patients frequently require alternative therapy for many reasons including allergy, hyperkalemia, or drug induced thrombocytopenia. Aerosolized pentamidine 300mg monthly can be used as a prophylactic alternative to SMZ/TMP although it does not provide coverage for UTIs. The purpose of this analysis is to describe the rates of urinary tract infections in patients on pentamidine versus those taking SMZ/TMP.

Methods: A retrospective chart review was conducted on all patients that received a renal transplant during the time period of January 1 to December 31, 2015. Patients were included if they received SMZ/TMP or pentamidine for PCP prophylaxis and were followed for six months post-transplant, our centers duration for PCP prophylaxis. Patients were excluded if they received PCP prophylaxis with a different agent, had an incomplete medical record, or received a multi-organ transplant. The primary outcome assessed was the rate of urinary tract infections confirmed with a positive urine culture with bacterial growth greater than 100,000 colony forming units/mL. Secondary outcomes assessed included the rate of UTIs in all patients that received treatment for a UTI and rate of SMZ/TMP resistance in patients with culture confirmed urinary tract infections. Baseline patient characteristics were also collected and included gender, type of renal transplant, and induction agent.

Results: We screened 94 patients and excluded six patients who received dapsone as PCP prophylaxis. There were 25 patients included in the pentamidine group and 63 patients in the SMZ/TMP. Baseline characteristics were similar between groups. Patients receiving pentamidine experienced significantly more culture confirmed UTIs than patients receiving SMZ/TMP (28 percent versus 6.3 percent, P equals 0.01). The odds of patients experiencing a UTI in the pentamidine group were 5.7 times more likely to occur than those who received SMZ/TMP. The secondary outcome revealed that when treatment was included in the definition of a UTI 36 percent of patients in the pentamidine group experienced a UTI compared to 23.8 percent of patients in the SMZ/TMP group (P equals 0.250). Of the patients that experienced this secondary outcome, 80 percent of patients in the SMZ/TMP group were confirmed through receiving treatment while 22 percent of patients in the pentamidine groups were confirmed through treatment. Although not statistically significant, SMZ/TMP resistance was seen in all patients in the SMZ/TMP group compared to 42.9 percent of patients in the pentamidine group (P equals 0.138).

Conclusion: The use of pentamidine for opportunistic infection prophylaxis post-transplant resulted in more culture-confirmed urinary tract infections compared to patients who received SMZ/TMP. Patients on SMZ/TMP prophylaxis had a trend toward an increased rate of resistant UTIs.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 2-024

Poster Title: Analysis of empiric cefepime utilization and de-escalation practices at UConn Health John Dempsey Hospital

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Purpose: Excessive use of broad spectrum antibiotics such as cefepime increases the risk of developing antibiotic-resistant infections and can increase risk for Clostridium difficile infections. While cefepime can be appropriate for the empiric therapy of many healthcare-associated infections, recent nationwide shortages have made ensuring its judicious use even more critical. The purpose of this study was to assess the current empiric utilization and de-escalation practices for cefepime in a 174-bed suburban teaching hospital with an active antimicrobial stewardship program. Particular attention was devoted to identifying factors such as allergy history and culture results and their possible impacts on subsequent de-escalation practices.

Methods: This was an institutional review board-approved retrospective evaluation of all patients who received intravenous cefepime for at least 48 hours between the months of March and May 2016. Electronic medical records were evaluated to examine whether cefepime therapy was de-escalated at any point and what antibiotics (if any) were used during de-escalation. De-escalation was defined as (1) discontinuation of the initial empiric cefepime regimen or (2) changing to a more narrow spectrum antibiotic with or without supporting culture data. Maintenance on cefepime or a switch to another broad-spectrum agent was deemed clinically appropriate if the pathogen(s) that grew from cultures had no obvious antibiotic de-escalation options (e.g., Pseudomonas aeruginosa). For each patient we also analyzed: concomitant antibiotic use with empiric cefepime, the frequency of obtaining cultures before the first antibiotic dose, types of cultures obtained, frequency of positive culture results, and antibiotic susceptibility patterns.

Results: Seventy-five cefepime courses were included in the data analysis. Median and mean (standard deviation) durations of cefepime therapy were 4 and 4.8 (2.3) days, respectively. Concomitant antibiotics were initiated with cefepime 84 percent of the time; vancomycin was utilized most often (76 percent). De-escalation occurred in 59 of 75 cases (79 percent). Thirteen patients (17 percent) had an allergy to at least one other class of antibiotic, which limited de-escalation possibilities. The mean duration of cefepime therapy was significantly shorter when de-escalation occurred versus when it did not occur (4.2 versus 6.9 days, $P < 0.05$). Cultures were obtained in 97 percent of cases (n=73); 91 percent (n=68) of the time, they were collected before antimicrobial therapy initiation. Blood cultures were most common (done in 84 percent (n=63) of cases prior to antibiotic administration). Only 41 percent (n=31) of cases had a culture specimen grow an identifiable pathogen. The most common sources of positive cultures were urine (n=10) and blood (n=9). De-escalation occurred at approximately the same frequency independent of culture results (81 percent of cases with positive cultures and 79 percent with negative cultures).

Conclusion: Nearly all cultures were taken before the first dose of antibiotics. Despite the high rates of specimen cultures being performed, less than half resulted in positive identification of a pathogen. However, de-escalation still occurred at reasonably high frequencies in patients regardless of whether the cultures were positive or negative. The presence of antibiotic allergies listed in the patient medical record appeared to be a possible factor that limited de-escalation.

Submission Category: Geriatrics

Submission Type: Evaluative Study

Session-Board Number: 2-025

Poster Title: Enhancing Self-Management of Diabetes Mellitus in a Geriatric Population using a Peer Group Structure

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Purpose: Current literature suggests a modest but significant long-term improvement of glycemic control with long-term education in geriatric patients with type 2 diabetes mellitus (T2DM). Short-term education, defined as less than six months, has positive effects on glycemic control, but the long-term impacts of this short-term education remain unclear. This study aims to determine if self-management education delivered through a peer group structure provides adequate intervention to improve diabetes self-management in a geriatric population.

Methods: The University of Connecticut's institutional Review Board approved this pilot research program. After screening for eligibility and providing informed consent, participants aged 65 years and older with T2DM were enrolled in a diabetes self-management education program at the Mansfield, CT Senior Center. The program consisted of 5- 75 minute sessions, one session every other week spanning September 2015 through November 2015 and a 6 month follow up session in May 2016. The program's sessions consisted of a survey, short presentation on the day's topic, and group discussion facilitated by a pharmacy student and pharmacist. The topics were Introduction and Overview; Lifestyle; Medication Management; Nutrition; Appointments, Checkups, and Debrief; and Follow Up. Surveys were used to gauge baseline and final participant knowledge and attitudes about various aspects of T2DM management. Patient reported adherence to any lifestyle changes, including medication adherence, via surveys at the first, last, and 6 month follow up session. Patient-reported hemoglobin A1C (A1c) and/or fasting blood glucose data were collected to determine if there were any indications of a positive clinical effect resulting from attendance at such a program.

Results: Pre-program 5-item survey indicated that 60% of participants self-reported "fair" control of their diabetes and 40% self-reported "average" control. At the last session, 80% reported "very good" control and 20% reported "average" control. Markers of change in self-management, including blood glucose and blood pressure monitoring, engagement in exercise,

and medication adherence saw improvements as well. In participants where pre- and post- A1C and fasting glucose values were available, average pre-program values were 7.5% and 121mg/dL, respectively. Post-program, the values decrease to 7.0% and 112mg/dL, respectively. Patient satisfaction with the program was rated on average a 9 on 10 (best)-point scale.

Conclusion: A peer group structure can be an effective delivery method for engagement in diabetes self-management. Participants' self-reported medication adherence, blood glucose and blood pressure monitoring, and exercise increased. Participants expressed desire to have more sessions focused on diabetes medications. The results of this pilot program are promising, but clinical significance must be determined in trials in which results are not only patient-reported.

Submission Category: Leadership

Submission Type: Descriptive Report

Session-Board Number: 2-026

Poster Title: Pharmacy students' leadership of community outreach initiatives in the University of Connecticut's interprofessional Urban Service Track curriculum

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Purpose: The Urban Service Track (UST) is a unique interprofessional curriculum among six health profession programs (dental medicine, medicine, nursing, pharmacy, physician assistant, and social work) designed to teach students about caring for urban underserved populations. Two core components of the curriculum involve engaging in community outreach projects and the development of team leadership skills. When the curriculum was initially established, the community outreach projects were developed by faculty members. With time, however, pharmacy students also took on the leadership of creating and implementing a variety of outreach projects to help expand the program's impact on underserved communities throughout Connecticut.

Methods: Each year, pharmacy UST students identified vulnerable patient populations not addressed by existing UST community outreach programs. These projects were designed to meet specific healthcare needs unique to target populations, including seniors, smokers, children, the uninsured, first generation immigrants, and populations that are not typically present at existing UST health fairs and other health education and screening events. These pharmacy-led outreach programs established a focus on medication education topics. Pharmacy UST students worked with the pharmacy faculty director to identify relevant topics and populations and design methods to effectively deliver the health information. All health education activities were designed to be interactive in order to actively engage community members. Leadership skills were also developed through the process of collaborating with community partners and coordinating events with healthcare students from six health professions at different education levels. For each project, the pharmacy team leaders designed training programs for student team members (clinical skills primers) so that all are comfortable

with not only the health education topic being presented but also how to provide the information in a health-literacy and culturally-appropriate manner.

Results: UST pharmacy students have developed seven outreach projects over the last five years. The Affording Medications Project provides community members with resources and individualized education on how to decrease the cost of medications. From Wheeze to Breeze is an interactive program that provides information on the pathophysiology and treatment of asthma and chronic obstructive pulmonary disease, with a focus on medications and proper inhaler technique. The Going Beyond Initiative organizes health education presentations for underserved communities not otherwise reached by other UST events. The Immunization Awareness project is designed to not only provide information about the recommended vaccine schedule for adults but also to dispel common myths about immunizations. The Tick-Borne Illness Prevention: Aware and Prepared program focuses on providing practical advice on preventing Lyme disease and other tick-borne conditions with a high prevalence in Connecticut. No Ifs Ands Or Butts is a two-fold project that focuses on smoking cessation in adults and smoking prevention education in children and youths. Lastly, Spring Forward-Don't Fall Back is an interactive program that educates seniors on important fall prevention strategies. Although all are led by pharmacy students, each program incorporates interprofessional teams of students from the six health profession schools.

Conclusion: By maintaining such active involvement in the Urban Service Track's community outreach curriculum, University of Connecticut pharmacy students have emerged as successful leaders in healthcare education to underserved populations throughout Connecticut. New pharmacy-initiated projects continue to emerge each year, providing increasing opportunities for pharmacy students to develop as future professionals who will be active leaders on interprofessional healthcare teams.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 2-027

Poster Title: Evaluation of a pharmacist-driven therapeutic substitution program for cefepime dosing based on renal function and indication for inpatients at UConn John Dempsey Hospital

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Purpose: Antimicrobial stewardship programs seek to minimize incidences of unnecessary or suboptimal antibiotic use. This involves conducting activities including the utilization of patient factors to optimize drug concentrations and minimize adverse effects. In 2015, UConn John Dempsey Hospital implemented a P&T-approved Therapeutic Substitution program where physicians select an initial order for cefepime based on presumed infection and estimated renal function, and then pharmacists automatically adjust the dose and interval from their assessment of those parameters. The goal of this current investigation was to identify if the program yielded any improvements in appropriately administering cefepime for our patients.

Methods: This was an institutional review board-approved retrospective chart review that analyzed 100 inpatients at UConn John Dempsey Hospital. We compared 50 patients who received cefepime from May to July of 2015 (before the dose-adjustment program) with 50 patients who received cefepime in March and April of 2016 (after the program started). We evaluated the initial dosing regimen of Cefepime that patients received and determined the appropriateness by calculating initial renal function and determining the chart-documented clinical indication(s) for use. We performed these analyses for any subsequent changes in the cefepime regimen during each patient's complete course of therapy. We also assessed each patient's renal function for each day of cefepime therapy to determine if interval adjustments were necessary (and if these changes were implemented by the pharmacists). Creatinine clearance was estimated using the Cockcroft-Gault equation with adjustments for obesity as appropriate. We also evaluated the mean duration of therapy for cefepime, the frequency of dose adjustments, the number of occurrences of suboptimal dosing, and the duration that suboptimal dosing persisted. Statistical analyses were conducted using Ministat and SPSS statistical software.

Results: Sepsis was the most common indication for cefepime use (n=16 in the post-dose adjustment group, n=10 in the pre-dose adjustment group). The mean initial creatinine clearance (CrCl) was 63.6 mL/min in the post-dose adjustment program group and 67.7 mL/min pre-dose adjustment program group. The number of patients with a correct initial cefepime dosing regimen was comparable (n=16 in both groups) and the numbers that received correct subsequent doses (after dosing changes) remained comparable. For the patients who had any errors in dosing according to the protocol guidelines, the mean (SD) duration of the incorrect dose was approximately 1 day shorter in the post-dose adjustment program group as compared to the pre-dose adjustment program group (3.1 versus 3.9 days). This difference approached statistical significance (P=0.1). The overall duration of cefepime therapy was significantly shorter in the post-dose adjustment program group as compared to the pre-dose adjustment program group (3.3 versus 5.2 days, P=0.001); this was likely related to concomitant implementation of more active streamlining efforts of the antimicrobial stewardship program in 2016.

Conclusion: The implementation of a pharmacist-driven therapeutic-substitution program for cefepime did not appear to increase the prevalence of initially-appropriate regimens of cefepime. However, patients who have received cefepime after program implementation may have a shorter duration of improper dosing when it occurs. With continued larger sample-size analyses of this newly-approved program, we hope to document the occurrence of further optimized usage of cefepime.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Descriptive Report

Session-Board Number: 2-028

Poster Title: Foreign observer program development at a large health system

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Purpose: Foreign exchange programs are mutually beneficial to both the hosting institution and the observer. Due to an increased demand for these experiences, a need to formalize the process was identified. The purpose of this study was to develop a standardized procedure to support foreign observer rotations in pharmacy at Yale New Haven Health System (YNHHS). Specific aims of this project were to address logistical, administrative, legal and cultural barriers to hosting foreign observers.

Methods: Requests for rotations for foreign observers (students or practicing pharmacists from outside of the United States) raise unique concerns, especially the requests that are not facilitated under an existing university affiliation agreement. These observers are not licensed to provide direct patient care and are not typically covered underneath the hospital health or liability insurance. Due to cultural differences and limited local social support, these observers often require more extracurricular assistance.
Our study is the first description of a standardized process for inpatient pharmacy experiences. A foreign observer standard operating procedure (SOP) was developed in collaboration with human resources, volunteer services, risk management, experiential education staff, and the pharmacy department at YNHHS to facilitate successful foreign observer rotations. Candidate eligibility was defined based upon U.S. Department of State Exchange Visitor Program regulations (22 CFR Part 62), required documentation was identified, and a scaled fee structure was developed based on World Bank Country Classification. An application timeline was delineated. A cost analysis was performed examining program costs and revenue.

Results: In the SOP, candidates are provided with an application toolkit including eligibility criteria, required documents, and the approval process. Once a candidate is accepted, the program provides an official letter describing the rotation purpose, dates and hours, as well as a

paper-based site orientation. Observers must provide a letter of recommendation, evidence of health insurance, vaccine records, tuition fee, rotation preferences, and emergency contact information to the program.

Cultural barriers could exist in curricular and extracurricular activities. The program should be prepared to give instructions on professional demeanor, including dress code and punctuality. A student ambassador preferably with relevant language proficiency is identified who assists the observers acclimate to the local culture.

The application timeline is determined considering the deadline for application materials, observer's date of arrival in the United States, and the start date of program. Additional time may be needed to secure housing, travel, and visa.

From 2014 to 2016, the program has expanded from two to seven observers from a total of five different countries (Brazil, China, Jordan, Philippines, and Spain) with a corresponding revenue increase. Rotations range in duration from two weeks to five months with the implementation of a longitudinal rotation option in 2016.

Conclusion: Expansion of foreign observer rotations is desirable to promote the development of clinical pharmacy services globally, and to support mutual growth and professional development of observers and their preceptors. Logistical, administrative, cultural and legal issues must be addressed when considering hosting foreign observers. This study presents a program that can be used as a model for other institutions who would like to offer this educational service.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 2-029

Poster Title: The diagnostic value of procalcitonin in predicting urinary tract infections among adult patients who present to the emergency department

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Purpose: Urinary tract infections (UTIs) are one of the most common infections encountered in the emergency department. Clinicians must rely on subjective signs and symptoms combined with urinalysis results to make the decision to initiate empiric antibiotics. However, clinical presentation and typical laboratory values are often non-specific for the presence of a bacterial infection. Procalcitonin (PCT) has emerged as a reliable biomarker for detecting bacterial infections and is readily available in the emergency department to guide UTI treatment decisions. The purpose of this study is to investigate the diagnostic value of PCT to determine the likelihood of UTI in adult patients.

Methods: A retrospective study of patients who presented to the emergency department at Saint Francis Hospital and Medical Center (SFHMC) between December 2015 and May 2016. The study was approved by the Institutional Review Board. Patients were eligible for the analysis if they were 18 years or older and presented with the following: at least 1 sign and symptom of UTI (dysuria, hematuria, frequency, urgency, suprapubic pain, confusion, flank pain, temperature greater than 100.4ºF or chills); plus a positive urinalysis and culture or positive blood culture with known uropathogen and a PCT level drawn within 24 hours of initial presentation. Patients were excluded for any of the following: primary infection other than UTI, renal replacement therapy, history of thyroid disorder, kidney transplant, or spinal cord injury. SFHMC's criteria for positive urinalysis to reflex to urine culture is greater than or equal to small leukocyte esterase, moderate occult blood, 6 WBCs, or 4 RBCs; positive for nitrates; or bacteria

present. Sensitivity, specificity, positive, and negative predictive values were calculated for PCT using a threshold greater than or equal to 0.5 µg/L.

Results: 91 patients were evaluated during this time period. Seventy-one patients met inclusion criteria with 43 patients having a PCT level greater than or equal to 0.5 µg/L and 28 with a PCT level less than 0.5 µg/L. Seventy-four percent of patients (32/43) with a PCT level greater than or equal to 0.5 µg/L and 43 percent of patients (12/28) with PCT levels less than 0.5 µg/L had a positive diagnosis of UTI, respectively. The sensitivity and specificity of PCT to predict a positive UTI diagnosis using a threshold level of greater than or equal to 0.5 µg/L and less than 0.5 µg/L were 73% and 59%, respectively. The corresponding positive and negative predictive values were 74% and 57%, respectively.

Conclusion: A PCT threshold greater than or equal to 0.5 µg/L is moderately sensitive and specific at detecting a positive UTI. PCT levels that reach at least 0.5 µg/L within 24 hours of patients' initial presentation may aid clinicians in determining the likelihood of a positive UTI diagnosis during their hospital course. Therefore, elevated PCT levels used in conjunction with other clinical signs and laboratory values may guide appropriate empiric antibiotic use.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-030

Poster Title: Evaluation of novel enaminones as potential anticonvulsant agents

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Purpose: Epilepsy affects a significant number of people worldwide. Anti-epileptic drugs (AEDs) currently in use have significant adverse effects and pharmacodynamic-pharmacokinetic interactions. Thus, there is a need for new anticonvulsant compounds with fewer adverse effects and a wider scope of activity. Enaminones are chemical compounds consisting of an amino group linked through a C=C bond to a keto group and dibromophenyl enaminones make the halogenated enaminone series. The purpose of this project was to synthesize dibromophenyl enaminones and evaluate them for in vitro anticonvulsant activity.

Methods: Three independent routes of synthesis were followed in preparing the beta-hydroxyketo starting material to maximize the yield. The alkyl acrylate (A) was reacted with alkyl acetoacetate (B) in the presence of sodium alkoxide. An acid-base extraction with dichloromethane afforded the tautomers (C) and (D). The tautomer (C) was predominant because stabilization was increased by intermolecular and intramolecular hydrogen bonding. The second synthetic route involved the reaction of an alkylidene ketone (E) with dialkyl malonate (F) in sodium alkoxide to give compounds (C) and (D). The third route involved the reaction of compound (E) and (F) in the presence of potassium carbonate to give the adduct (G) which was cyclized in the presence of sodium alkoxide to compounds (C) and (D). Condensation of the beta-hydroxyketo esters (C) and (D) with 2, 4-dibromoanilines yielded the corresponding enaminones of type (H). UV, IR, NMR, mass spectra and elemental analysis (CHN) confirmed the structures of the dibromophenyl enaminones The dibromophenyl enaminones compounds coded AK1, AK2, AK6, AK7, FA1, FA2, FA4 and E249 were then evaluated for activity on population response in the cell body layer of the Cornu Ammonis 1 (CA1) area of a rat's

hippocampus by recording population spikes in current clamp mode. The effectiveness of these compounds was judged on how much they were able to decrease evoked population spike amplitudes (PSAs) in CA1.

Results: Eight dibromophenyl enaminone analogs were synthesized and fully characterized. Six of the compounds (AK6, E249, FA1, AK7, AK1, and AK2) were anticonvulsant in vitro and they all suppressed PSA in a concentration dependent manner. Two dibromophenyl enaminones (FA2, and FA4) demonstrated pro-convulsant activity. AK6 and E249 had EC50 of 2.1 and 1.9 micromoles respectively. At a 10 micromolar concentration, AK6 and E249 were more efficacious compounds with a PSA depression of 72 percent and 35 percent respectively. FA1, AK7, and AK1 caused 25 percent, 24 percent, and 18 percent PSA depression respectively.

Conclusion: The dibromophenyl enaminones analogs represented a series of novel enaminones that predominantly had anticonvulsant in vitro. In the in vitro evaluations, the most potent anticonvulsant enaminones were AK6 and E249. They were considered desirable lead compounds in the novel enaminone series. Overall, the dibromophenyl enaminones demonstrated potent anticonvulsant activity and are thus promising novel anticonvulsant agents. Further in vivo evaluation has been arranged to be done by the Epilepsy Therapy Screening Program (ETSP) of the National Institute of Health (NIH).

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 2-031

Poster Title: Evaluation of naloxone availability and prescribing habits in primary care and community pharmacies in the Greater New Haven area

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Purpose: The rate of opioid-related overdoses in the United States has quadrupled since 2000, where half of overdoses are due to prescription opioids. Connecticut legislation has recently changed to allow naloxone, a pure opioid antagonist, to be prescribed by certified pharmacists. Naloxone is indicated for the reversal of life-threatening opioid induced central nervous system and respiratory depression. The aim of this study is to assess the rate of naloxone prescribing and the availability of naloxone at community pharmacies in the Greater New Haven community. This study was approved by the Yale University IRB.

Methods: Data assessing the rate of naloxone prescribing was collected via retrospective chart review of adult primary care patients at Yale-New Haven Hospital, Saint Raphael Campus, with a prescription for any opioid in the last 12 months. Prescriptions for codeine, fentanyl, hydrocodone, hydromorphone, methadone, morphine, oxycodone, buprenorphine, tapentadol, and oxymorphone were included. The total daily morphine equivalent (MEQ) was calculated using the maximum strength and quantity prescribed in a 24-hour period. Naloxone prescriptions were considered current if prescribed in the last 12 months.
The availability of naloxone was collected via telephone survey of all community pharmacies in New Haven, Hamden, East Haven, and West Haven. After receiving verbal consent, an eight-item survey was used by researchers to collect rates of and barriers to prescribing, dispensing and stocking rates of naloxone in pharmacies.
All data was analyzed in Excel using means for continuous outcomes and frequency for categorical outcomes.

Results: A total of 367 patients had at least one opioid prescribed within the previous 12 months. Daily MEQ ranged from 1.5 to 1440 (average 129.1), where 179 patients (48.7 percent) had greater than 50 MEQ prescribed per day and 121 patients (32.9 percent) had greater than 100 MEQ prescribed per day. Naloxone prescriptions were current for eight patients (2.2 percent), who had daily MEQ ranging from 180 to 480 per day (average 292.2).
A total of 55 pharmacies were identified for survey in the Greater New Haven area, of which 46 (84 percent) offered verbal consent to participate. Certified pharmacists were available to prescribe naloxone in 26 pharmacies (56 percent), with seven pharmacists reporting having written a naloxone prescription in the last week. The most common pharmacist barriers to prescribing included lack of patient demand, lack of training in the different products and a lack of protocol for prescribing. Naloxone was stocked in 34 pharmacies (74 percent), where pharmacists reported no barriers to stocking the product.

Conclusion: Opioid-related deaths are preventable, and the increasing prevalence of opioid abuse shows the need for greater access to naloxone. The rate of naloxone prescribing at this Adult Primary Care Center, in combination with the rate of community pharmacist prescribing shows that patient access is still a concern. Despite legislative efforts to increase use of the product in Connecticut, education for physicians, pharmacists and patients is still needed. The findings related to naloxone access outlined in this study will be used to guide subsequent local interventions targeted at the identified barriers.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 2-032

Poster Title: Minority inclusion in 2015 new molecular entities (NMEs) approved for psychiatric disorders

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Purpose: In this research study, it is important to analyze the safety and efficacy for psychiatric disorders based on race and ethnicity. Focusing on the demographic subpopulations in pivotal trials for Aristada (Aripiprazole Lauroxil), Rexulti (Brexpiprazole), and Vraylar (Cariprazine HCl), helped determine the safety and efficacy of these medications. This project was designed to show healthcare providers how these medications can be prescribed based on these factors.

Methods: According to the Food and Drug Administration, studies were shown on how it affects the patients quality of life. The center for drug evaluation and research included medication guides, summary reviews, medical reviews, pharmacology reviews, clinical pharmacology biopharmaceutics review and statistical reviews for the listed psychiatric medications. The safety analysis for Rexulti (Brexpiprazole) states in the major depressive disorder program, demographic characteristics for United States and non-United States subjects were similar, with the exceptions of race (almost 100 percent of subjects were white at non-US sites compared with approximately 78 percent at US sites) and body mass index with similar findings for associated characteristics. The efficacy analysis for Rexulti (Brexpiprazole) states subgroup analyses were conducted based on demographic characteristics (sex, race, age, and region of origin) and based on degree of improvement during Phase A (less than 25 percent improvement and greater than 25 percent improvement). Due to the scientific studies, the population was focused on administering these medications to the psychiatric patients.The inclusion factor of this experiment is that these patients must be living with these psychiatric disorders.

Results: No significant subgroup differences were identified in the analysis of race and ethnicity for Aristada (Aripiprazole Lauroxil), Rexulti (Brexpiprazole), and Vraylar (Cariprazine HCl). In Africa, lower CYP2D6 activity in relation to genotype was found, indicating that environmental factors (infections or food constituents) are probably of importance in addition to genetic factors. Studies conducted within or outside the United States should consider the potential

contribution of genotype to drug metabolism or transport pathway, since metabolism of CYP2D6 substrates are poor in approximately 8 percent of Caucasians and 3 to 8 percent of African Americans. The United States National Comorbidity Survey Replication (NCS-R) study reported the prevalence of schizophrenia among African Americans, Hispanics, and Non-Hispanic Whites are similar. There was an increased rate of schizophrenia diagnosis for African Americans compared to Caucasians, ranging from 9 to 32 percent. Whites were more likely to be diagnosed with major depressive disorder (MDD) and bipolar disorder (BD) compared to African Americans, ranging from 7 to 33 percent. While African Americans are less likely than Caucasians to be diagnosed with major depressive disorder (MDD), when they do, it tends to be more chronic and severe.

Conclusion: The medical reviews did not have sufficient information pertaining to the safety and efficacy for the minorities. Based on clinical studies, there is an increase in efficacy for the atypical antipsychotics in African Americans compared to the other medications.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 2-033

Poster Title: Examining the current impact, barriers, and roles pharmacists have in the management of chronic diseases

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Purpose: The purpose of this study was to assess the views of Florida pharmacists on the impact, barriers and roles they currently have in the management of chronic disease states such as diabetes, hypertension, hyperlipidemia, and chronic kidney disease.

Methods: Florida pharmacists were provided a survey either electronically or in-person. The survey assessed the pharmacist's views on the impact and roles they have and the barriers that they currently face in managing and monitoring chronic conditions. The study took place over a period of three months and the data was collected and analyzed utilizing survey monkey.

Results: Sixty one pharmacists completed the survey. Fifty percent (thirty-one) of the pharmacists that completed the survey practice in a retail or community setting. The most frequent disease state seen was diabetes at ninety-one percent (fifty-five). On average, fifty-nine percent (thirty-three) of the pharmacists encourage lifestyle modifications and contact prescribers for patients. These are the top two roles pharmacists have in the management of diabetes, hypertension, hyperlipidemia, and kidney disease. Thirty-six percent (twenty-two) pharmacists felt comfortable in managing these disease states, and thirty-one percent (nineteen) felt slightly comfortable. Sixty-six percent (forty) of the pharmacists revealed that time constraints was as a challenge. Hence, fifty percent (twenty-nine) pharmacists deem that more time will improve their roles in managing the disease states, and forty-four percent (twenty-seven) viewed their current role as being slightly effective. Despite the barriers faced by pharmacists, fifty-three percent (thirty-one) anticipate that their role will increase in managing and monitoring patients with hypertension, diabetes, chronic kidney disease, and

hyperlipidemia. Moreover, all survey participants agree that additional training in pharmacy school and continuing education, more time dedicated to patients, and support form employers will result in an increase in the pharmacists role in managing and monitoring patients with these disease states.

Conclusion: The results of this survey support existing literature and also emphasize the pivotal role that pharmacists must play in chronic disease management. The study was limited because it could not quantify the impact pharmacists have from the role they currently play. Pharmacists can do more to improve patient care outcomes but they need to be provided the opportunity, continuing education and training, and adequate time to efficiently utilize their qualifications to help improve the quality of life for those patients with chronic diseases.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 2-034

Poster Title: Provider gender preference: A patient centered approach

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Purpose: Provider gender preference for medical care and treatment influences many aspects of patient care in the healthcare system. The primary outcome of this study is to determine whether the gender of a physician influences a patient's decision when selecting a provider for medical services. Psychological factors such as sexism, past experiences, and trauma may be aspects that persuade the decision making process. Secondary outcomes will consist of the more preferred gender of physicians among patients and the most common influential psychological factors.

Methods: This study was approved by the Florida Agricultural and Mechanical University Institutional Review Board. Individuals 18 years of age and older living in the United States are eligible to participate in the survey. Prior to completing the survey, informed consent was obtained. Participants will receive surveys that will allow them to respond anonymously either in person (hard copy) or via emails (electronic copy). Surveys will be composed of various structured questions, measured using a Likert Response Scale or free response, to assess each individual's opinion. The survey will encompass a wide variety of questions in order to accurately assess the patients view on this matter. Once surveys are completed, hard copies will be immediately collected by research personnel and electronic copies will be stored utilizing Survey Monkey software. The answers from the surveys will be tallied and analyzed in order to determine if physician gender plays a role in choosing a healthcare provider. Responses to the survey are entirely optional and participants will not receive any compensation. Those excluded from the study include patients less than the age of 18 and individuals with limitations in health literacy or cognitive dysfunction. The data collection

process is expected to take place over a period of 3 months, at which time results will be collected to determine the stated objectives.

Results: Results are currently pending, however we hope to determine an age range and specified genders of participants currently seeking healthcare. Data analyzation will aid in the process of determining the primary and secondary endpoints. We also hope to determine if gender preference truly influences medical care and if psychological factors influence the decision making process. The results will bring awareness to the issue of provider gender being a preference among our current patient population.

Conclusion: While our conclusion is currently pending, we anticipate that gender does play a role in determining which provider is selected due to individual participant comfortability and psychological factors.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 2-035

Poster Title: Do the ads add up: patient perceptions of medication advertisements

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Purpose: The purpose of this study is to evaluate patient's perceptions of direct to consumer (social media, television commercials, magazines, etc.) advertised medications. The study seeks to assess how often participants are exposed to medication advertisements (over-the-counter, prescription, herbal supplements, etc.) as well as their perception of benefits, risks, indicated use, affordability and willingness to use of advertised medication benefits.

Methods: Upon approval of the investigational review board of Florida A&M University (IRB), investigators will solicit eligible research participants who are > 18 years of age. This confidential survey will encompass a variety of questions to assess participant's point of view of mediation advertisements. Research investigators will randomly solicit eligible participants to complete the survey through electronic means (email and social media) by attaching the survey monkey link. In addition, research investigators will pass out hard copy surveys to eligible participants to complete as well. By choosing to complete the survey participants will be providing implied consent. Those who complete a hard copy survey will retain the printed copy of the informed consent letter. Those who complete an electronic copy of the survey will have the option to print a copy of the informed consent letter. Over a 90-day data collection period we hope to obtain data from 300 participants. If the intended number of participants is not reached by this period, we will extend the data collection period for two additional weeks in order to obtain more participation. At the conclusion of the data collection period all hard copy survey data will be inputted into SurveyMonkey® for complete data analyzation. Data will then be compiled, analyzed, and developed into a poster presentation and manuscript to be presented at a professional conference and submitted for publication.

Results: Results for this research are currently pending, however We predict that participants will find medication advertisements lacking appropriate patient education, and participants will likely assume advertisements raise up medication costs. advertisements.

Conclusion: A conclusion will be formulated upon analysis of the results from the study.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 2-036

Poster Title: Modern day students: A correlation between sleep habits and academic performance

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Purpose: The purpose of this research is to evaluate sleep habits among currently enrolled college students, and to determine if there is a correlation between sleep habits and their effect on classroom performance in these students.

Methods: Current Florida A&M University students who are over the age of 18, will be allowed to participate in the survey provided by the research investigators. Participants will be giving implied consent by choosing to complete the research survey, and will retain a copy of the informed consent letter for their records. The study will not include any participant identifiable information. This survey will encompass questions to assess the students' sleep habits and academic performance (such as naps, study habits, procrastination, and GPA). This survey will be sent to college students at Florida A&M University who are over the age of 18 and considered full time students. Full time for fall and spring semesters includes students taking 12 or more credit hours for undergraduate, and 9 or more credit hours for graduate students. Full time for summer includes students taking 9 or more credit hours for undergraduate, and 6 or more credit hours for graduate students. We will distribute surveys on campus and send out a link to the online survey via social media sites and emails. Our goal is to obtain 300 surveys to extrapolate data from. At the end of the research survey period, 90 days, collected data will be tallied, analyzed, and presented at a professional conference, after which, a manuscript will later be developed.

Results: Results are currently pending, however, a positive correlation is expected to be seen between healthy sleep habits and academic performance as supported by previous research.

Conclusion: A conclusion will be formulated upon analysis of the results from the study.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 2-037

Poster Title: Evaluation of drug interaction alerts for QTc prolongation and the use of a risk score scale to predict the likelihood of QTc prolongation occurrences.

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Purpose: QTc prolongation is an adverse event in which pharmacists have to assess the risk factors and drug interactions during medication review and verification. As the number of medications and drug interactions that can contribute to QTc prolongation have increased, the need for a standardized approach to gauge the risk has become more important.

Methods: A retrospective review of 241 random patients who had a drug interaction alert for QTc prolongation between May and July 2016 was conducted to assess the presence of QTc prolongation during admission. Data was collected to assess medications and other contributing risk factors for patients with or without QTc prolongation. Additionally, a risk score tool was utilized to correlate and validate the appropriateness of the drug interaction alerts and assess the ability to predict QTc prolongation occurrences. The risk scores were then compared with additional criteria including the use of known high-risk QTc prolonging drugs, and a medical history significant for electrophysiology involvement.

Results: 241 patient profiles were assessed. 98 profiles were excluded due to an absence of a baseline ECG recording or if a follow up ECG recording was not obtained. Of the patients identified as low risk based on the risk score scale, 24/53(45 percent) experienced QTc prolongation. 49/64 (77 percent) of patients identified as moderate risk also experienced QTc prolongation. Of the 26 patients identified as having high risk, 25(96 percent) experienced QTc prolongation.

Conclusion: The risk score tool was able to accurately identify patients with a low, moderate, and high risk of developing QTc prolongation. Used in conjunction with alerts for drug interactions, the risk score tool may be a valuable tool to identify patients who may require further monitoring prior to the occurrence of QTc prolongation.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 2-038

Poster Title: Relationship between personality traits and stimulant usage at a Historically Black College of Pharmacy

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Purpose: The use of stimulants among college students has significantly increased over the years and continues to rise. Students use stimulants of various forms to stay vigilant, focus, or to improve academic performance among other reasons. Using stimulants in higher doses can be very concerning as it may lead to adverse effects such as increased heart rate, anxiety and insomnia. The aim of this study was conducted to correlate the Mini International Personality Item Pool Five Factor model personality scale with the use of caffeine, energy drinks, and prescription stimulants in pharmacy students at a Historically Black College of Pharmacy.

Methods: After receiving Institutional Review Board approval, convenience sampling was utilized in distributing the questionnaire to pharmacy students. Informed consent was deemed to be given by each student by participating in answering the questionnaire. The Mini International Personality Item Pool Five Factor model personality scale, which included the personality traits of extraversion, openness, agreeableness, neuroticism, and conscientiousness, were correlated with student use of energy drinks, caffeine, prescription stimulant usage, and academic success. Pearson correlation statistics were used to assess the data.

Results: A total of 251 surveys were collected. Among the 251 participants, 69 or 27.5 percent were male and 182 or 72.5 percent were female. The median age at the baseline was 23.2 years. The study generated results which statistically showed the correlations between each of the 5 personally traits and how each relates to various aspects of stimulant, caffeine, and

energy drink usage, at an Historically Black College of Pharmacy. Of the 251 participants, 16 had taken prescription stimulants, 153 had taken caffeine, and 119 had taken energy drinks. Seven or 43.8 percent of the 16 that had taken prescription stimulants concluded it increased their grade point average. Conscientiousness had the strongest correlation, with an increase in academic performance and grade point average. Extraversion had a strong correlation with taking energy drinks.

Conclusion: Based on the results of this study; conscientiousness had the strongest correlations with more factors than any of the five factor personality traits. Extraversion had a strong correlation with taking energy drinks. The study yielded results, which showed statistically significant correlations of each of the five personality traits tested; extraversion, openness, agreeableness, neuroticism, and conscientiousness with various aspects of stimulants, caffeine, and energy drinks used by pharmacy students at a Historically Black College of Pharmacy.

Submission Category: Pain Management

Submission Type: Evaluative Study

Session-Board Number: 2-039

Poster Title: "Evaluation of early ambulation and its impact on the use of opioids in inpatients status-post total hip or total knee arthroplasty"

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Purpose: The purpose of this study is to evaluate the impact that early ambulation has opioid use and length of hospital stay after total knee arthroplasty (TKA) and total hip arthroplasty (THA). Our primary endpoint is to determine if early ambulation (1-24 hours post surgery) leads to decreased opioid use based on an average of morphine equivalents administered to the patient throughout their hospital stay.

Methods: A retrospective chart review was performed on all patients who underwent TKA or THA at a community not-forprofit hospital in Northwest Florida. A sample group of 150 patient charts were reviewed and data were collected on patient demographics, peri- and post-operative opiate use, surgical procedure, time of first ambulation, morphine equivalent administration, and length of hospital stay. The data were analyzed to determine the correlation between first time of ambulation performed by physiotherapists, the total amount of opioid use (calculated into morphine equivalent) and the length of hospital stay. The Student T-test will be performed to compare the group of patients who ambulated early (within 24 hours) versus patients who ambulated after 24 hours post-surgery and the amount of opiate administered in each group.

Results: A total of 50 patients charts were evaluated out of the 150 patient sample size. Thirty-eight patients (76 percent) were found to have started early ambulation therapy within an average of 12 hours post-operative ambulation. On average, these patients received 158mg of morphine from the time they were out of surgery until they were discharged from the hospital. The other 12 patients (24 percent) ambulated, on average, 25 hours after surgery. In these

patients, the average morphine dose was 212mg of morphine during their hospital stay. Based on these preliminary results, despite the lower dose of morphine in patients who started ambulation within 24 hours, it is inconclusive that early ambulation results in lowered dose of morphine administration. All patients included in this review were discharged three to four days after surgery.

Conclusion: The results of this review shows that early ambulation in patients who underwent total hip or knee arthroplasty reduces the total amount of morphine administered per patient on average during their hospital stay. It is inconclusive whether this will potentially lead to a decrease in length of stay in the hospital and/or prevent potential opiate abuse. This review is on-going and final data analysis and recommendations will follow.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 2-040

Poster Title: Impact of early identification using a rapid PCR test with antimicrobial stewardship intervention in patients with blood cultures contaminated by coagulase-negative staphylococci

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Purpose: Blood cultures contaminated with common skin flora such as coagulase-negative staphylococci (CoNS) can complicate clinical interpretation and significantly impact patient care. Delays in organism identification may result in the administration of unnecessary antibiotics, diagnostic testing, and extend hospital length of stay. Rapid diagnostic tests using polymerase chain reaction (PCR) techniques can drastically reduce time to identification of CoNS. The purpose of this study is to determine whether early identification using a rapid PCR test combined with antimicrobial stewardship intervention for contaminated blood cultures can significantly reduce the use of anti-staphylococcal antibiotics and infection-related expenditures at a large community hospital.

Methods: This single-center, IRB-approved, retrospective pre/post study was completed and includes a randomized sample of 100 adult inpatients (50 in each group) with a positive blood culture for CoNS that is determined to be contaminated (defined as growth of CoNS from one blood culture when two or more are obtained). The pre-group (pre-PCR) consisted of patients admitted from January through September 2014 and the post group (post-PCR implementation) consisted of patients from January through September 2015. Exclusion criteria includes age less than 18 years, suspected/confirmed BSI requiring anti-staphylococcal (AS) antibiotics, neutropenia, duplicate or mixed blood cultures, and receipt of AS antibiotics prior to blood draw. The primary outcome measure is percent of patients in each group who receive more than 24 hours of anti-staphylococcal (AS) antibiotic therapy. Secondary outcome measures include percent of patients who do not receive any doses of AS antibiotics, percent of patients

who receive one dose of AS antibiotics, duration of AS antibiotic therapy (hours), time to pathogen identification (hours), total number of blood cultures performed, total number of vancomycin levels performed, percent of patients who have an infectious diseases physician consultation, hospital length of stay (days), and total hospital charges per patient (dollars). Descriptive statistics are used to characterize data and evaluate primary and secondary outcomes.

Results: One hundred patients were included in the final analysis (50 in pre-group and 50 in post-group). For the primary outcome, there was no difference in the number of patients who received anti-staphylococcal (AS) antibiotics for more than 24 hours (24% vs 14%, p=0.203). However, compared to the pre-group, patients in the post-group had a significantly lower number of patients who received AS antibiotics (54% vs 26%, p=0.004), had a shorter median time from positive culture to discontinuation of AS antibiotics (33.1 ±11.2 hours vs 21.7 ±12.2, p=0.019), and a lower percent of patients receiving a single dose of an AS antibiotic (20% vs 2%, p=0.008). In addition, the duration of AS therapy was longer in the pre-group (37.7 vs 27 hours, p=0.088) and time to organism identification was longer in the pre-group compared to identification utilizing rapid PCR testing (23 hours vs 1.88 hours). The median hospital length of stay (3.8 days vs 3.7 days, p=0.404), total number of vancomycin levels performed (2 vs 1), total number of blood cultures collected (140 vs 126), and percent of patients with an infectious diseases physician consult (48% vs 40%, p=0.42) were comparable in each group.

Conclusion: Based on these results, the use of rapid diagnostic tests using PCR techniques and antimicrobial stewardship notification can lead to significant reductions in the number of patients receiving AS antibiotics and time to discontinuation of AS antibiotics. However, length of stay and utilization of additional hospital resources were not statistically significant. Further research should aim at larger, multi-centered clinical study in order to evaluate the true clinical and economic impact of a rapid PCR diagnostic test in conjunction with pharmacist interventions in patients with contaminated blood cultures.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 2-041

Poster Title: Evaluation of empiric antibiotic treatment of febrile neutropenia in oncology patients

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Purpose: In patients with chemotherapy induced neutropenia, fever may be the only sign of an underlying infection. Patients who present with fever and neutropenia are candidates for immediate empiric antibiotic therapy with an anti-pseudomonal beta-lactam. For patients with suspected methicillin-resistant Staphylococcus aureus (MRSA) infection or other resistant gram-positive cocci, treatment with vancomycin, daptomycin, or linezolid is recommended. The aim of this evaluation was to examine the utility and appropriateness of these agents as part of empiric therapy for neutropenic fever.

Methods: This was a retrospective chart review of 35 patient records between October 1, 2015 to September 1, 2016. Patients were included if they were over the age of 18, had a cancer diagnosis and were identified to have neutropenic fever upon admission at one of the four acute care centers of the Lee Memorial Health System, including Lee Memorial Hospital, Gulf Coast Medical Center, Health Park Medical Center, and Cape Coral Hospital. Chart information was obtained via an EPIC generated report that included patients assigned International Classification of Diseases (ICD) codes for Neutropenia, unspecified and Fever presenting with conditions classified elsewhere. Exclusion criteria included patients under the age of 18 and non-oncology patients. For the purpose of this study, febrile was defined as a single temperature ≥38.3°C or >38.0°C for over 1 hour and neutropenia was considered an ANC < 500/mm^3.
The primary objective of the study was to determine the approximate rate at which appropriate empiric therapy for patients presenting with neutropenic fever is initiated. Appropriate therapy

is defined as empiric treatment with one of the following agents: piperacillin/tazobactam, ceftazidime, cefepime, or a carbapenem and addition of gram positive coverage only if the patient had an indication.

Results: There were 35 patients reviewed for initial empiric treatment of febrile neutropenia. Of those examined, 33 were deemed appropriate per the standards outlined above. Vancomycin, linezolid, or daptomycin was administered as early empiric coverage in 24 patients. Of the patients initiated on vancomycin, linezolid, or daptomycin, 2 had positive blood cultures requiring gram positive coverage. Of the 22 patients with negative blood cultures, nine were kept on the medication without an indication for gram positive coverage. One patient was not initiated on any antibiotics and one patient was excluded from the review due to a locked patient file which was not accessible.

Conclusion: With the growing numbers of resistant organisms, antimicrobial management is a critical focus in health care. A balance of appropriate antimicrobial use and adequate patient care is crucial to positive outcomes. While nearly all patients reviewed were treated appropriately, many were overtreated with antibiotics for unknown indications. The findings of this review indicate that there is an area of need in promoting the removal of antibiotics without a clear indication.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 2-042

Poster Title: Strategies to identify patients with community-onset pneumonia caused by methicillin-resistant Staphylococcus aureus.

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Purpose: The imminent elimination of the healthcare-associated pneumonia designation precludes a necessity for the development of strategies to identify patients with community-onset pneumonia who will need broad spectrum empiric antimicrobial coverage due to likely infection with multiple drug-resistant organisms. The purpose of this study was to examine patient-specific risk factors to determine which are most likely associated with methicillin-resistant Staphylococcus aureus infection and the use of the risk factors identified to develop a modified risk scoring tool (based on the tool designed by Shorr et al.) to help identify patients that need empiric treatment with vancomycin.

Methods: This was a single-center, retrospective, case-control study. Patients were selected using a computer-generated search for positive methicillin-susceptible or methicillin-resistant Staphylococcus aureus respiratory cultures via TheraDoc. Patients with positive sputum cultures were included in this analysis if admitted to the hospital from January 2013 to July 2016. Exclusion criteria included direct admission to the intensive care unit. Risk factors used to assess patient profiles were extrapolated from current guidelines and various primary literature resources collected via an extensive literature search. Profiles were analyzed and odds ratios were employed to determine which risk factors were more likely associated with pneumonia caused by methicillin-resistant Staphylococcus aureus versus methicillin-susceptible Staphylococcus aureus.

Results: Risk factors that were identified as being more suggestive of MRSA included extremes of age (< 30 or >79), prior healthcare exposure (≤90 days), recent IV or oral antibiotic therapy (≤90 days), comorbidities (CVA, female with diabetes mellitus, dementia), current or recurrent influenza (≤30 days), current/history of MRSA colonization or infection (≤90 days), structural lung disease prior to admission, and a history of smoking. The modified risk scoring tool was created based on magnitude of odds ratios. No odds ratios related to individual risk factors were statistically significant, however, patients with positive methicillin-resistant

Staphylococcus aureus cultures tended to possess more (≥5) risk factors (OR = 10.5, p = 0.049) and an overall higher (≥6) risk score (OR = 10.5, p = 0.049) than those infected by methicillin-susceptible Staphylococcus aureus. Furthermore, it was found that if patients in this study had been assessed by the modified scoring tool, approximately 70% would have received appropriate empiric antimicrobial treatment, whereas, in actuality, only 35% of patients received appropriate empiric treatment within 24 hours of hospital admission.

Conclusion: The findings in this small study, however inconclusive, help to identify that there is a pertinent need for large, randomized clinical trials to determine risk factors that are associated with community-onset pneumonia caused by methicillin-resistant Staphylococcus aureus. Without a tool like the one developed here, many patients may receive initial antimicrobial therapy that is not optimal, selecting for bacterial resistance and resulting in undesirable therapeutic outcomes.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 2-043

Poster Title: The role of oral biologic agents in the treatment of relapsing-remitting multiple sclerosis

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Additional Author (s):
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Purpose: The purpose of this study is to evaluate available literature relating to the safety and efficacy of oral biologics in the treatment of relapse-remitting multiple sclerosis.

Methods: The following databases were searched: Medline (PubMed), Embase, and Ovid; using the search terms multiple sclerosis, MS, relapse, oral biologic, EDSS, RRMS, and relapsing-remitting.

Results: Four high quality phase III randomized placebo controlled trials were assessed. The research indicated that dimethyl fumarate and teriflunomide were both safe and efficacious therapies in the treatment of relapsing-remitting multiple sclerosis. Statistically significant reductions in absolute risk reduction, preventing relapses at week 108, lowering disability progression, and MRI endpoints were seen with both medications. Common adverse events seen with both therapies included diarrhea and nausea. Serious adverse events were more prevalent with dimethyl fumarate when compared to teriflunomide (17% vs 11%). Events leading to death were seen with both medications but were considered unrelated to the treatment.

Conclusion: Dimethyl fumarate and teriflunomide can both be considered relatively safe and more efficacious when compared to placebo. More studies in the form of head to head trials versus other biologic agents are needed to find their place in the treatment process. Currently both can be considered convenient, safe, and effective agents.

Submission Category: Automation/ Informatics

Submission Type: Evaluative Study

Session-Board Number: 2-044

Poster Title: Detection of emerging research trends by biomedical text mining algorithms

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Purpose: PubMed is the largest database of biomedical literature that contains over 25 million citations. Analyzing this vast number of articles, coupled with rapid rate of publication, presents a challenge to the scientific community. Therefore, there is a need for a high-performing scalable tool to identify emerging novel scientific trends. We hypothesized that analyzing the titles of the scientific articles can assist in identifying emerging research trends. In the present study, text mining algorithms were used to unearth novel and emerging scientific trends using the case study of "obesity as research interest."

Methods: Article titles containing the word "obesity" were downloaded from PubMed. A primary text mining algorithm developed in Visual Basis 6.0 (VB6) was used to calculate word frequency. All words since year 1880 were used to create a data visualization technique known as "word cloud." Words that appeared more frequently were presented larger than words that appeared less frequently. Average percentage increase in word frequency was then calculated for all words over the period of five years (2011-2015) to identify the emerging trends in obesity. A secondary text mining algorithm was developed to filter unique words that appeared for the very first time in 2015 along with the word "obesity" in order to identify the most recent scientific trends.

Results: A total of 58,215 articles containing the word "obesity" were downloaded from PubMed. The primary text mining algorithm found the words with highest frequency were "obesity" (n=39,830), "treatment" (n=3,758), "risk" (n=3,382), and "childhood" (n=3,052). Over the five years from 2011 to 2015, average percentage change found an increase in the terms

"nonalcoholic" by 750%, "placental" by 680%, "microbiome" by 680%, and "dopamine" by 580%. In 2015 alone, the secondary algorithm uncovered over 100 terms that were not previously present. Biomarkers, genes, proteins, etc. were discovered as novel therapeutic targets associated with obesity. These terms represent potential obesity-related novel therapeutic targets that can be used for future research.

Conclusion: This study demonstrates the ability of a text mining algorithms to uncover emerging research trends that would normally be buried under the vast number of publications.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-045

Poster Title: Isoproterenol: reducing cost without increasing heart rate

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Purpose: In 2015, the price of isoproterenol drastically increased from $50 per ampule to the current price of $1,685. Isoproterenol, a nonselective beta receptor agonist, is utilized in both the critical care setting for the treatment of bradycardia as well as the catheterization lab to stimulate arrhythmias during electrophysiology (EP) studies. At The Johns Hopkins All Children's Hospital, the use of isoproterenol was reviewed over a one year time period to determine if drug use could be decreased. In addition, the location and the amount of isoproterenol stocked were evaluated to determine if inventory could be reduced.

Methods: Data were collected from June 2015 through May 2016. Data collected included: patient demographics, if a drip was dispensed and started, number of ampules used, and indication. The location of isoproterenol stock was determined in pharmacy and patient care areas. The amount of ampules purchased during the same time period were determined from purchase orders, and the number of ampules deemed expired were calculated.

Results: A total of 77 orders for isoproterenol drips were identified in the data collection time period. Indications included EP study (56), heart transplant (12), tilt test (5), other (4). Seventy-one drips were dispensed, with 37 drips (52.1%) started. Heart transplant started 27% (3/11) of the drips dispensed, EP Lab 63% (33/52), tilt test 0% (0/4), and other 25% (1/4). The drips not started wasted 54 isoproterenol ampules. In addition to being stocked in pharmacy, 88 ampules of isoproterenol were stocked in transport bags and code cart trays. No isoproterenol was documented being used from a code tray or on transport during the time period. One hundred and fifty-one ampules were purchased by pharmacy and 97 were calculated as being used. An estimated 54 vials were wasted due to expiration. A total of 108 ampules of isoproterenol were calculated to be wasted.

Conclusion: The results reveal an excessive waste of isoproterenol. An action plan was developed and will be presented at Pharmacy & Therapeutics. The committee approved the removal of isoproterenol from code trays, by adding it to the CVICU Pyxis machine for emergencies. A STAT drip will be dispensed if needed. For EP studies and heart transplants, pharmacy and cardiology will develop a process to only dispense a drip when needed. If a drip if deemed necessary prior to heart transplant, the 0.02 mg/mL standard concentration will be dispensed. The recommended action plan would save the hospital approximately $180,000 per year.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 2-046

Poster Title: Impact of pharmacy interns-managed ambulatory epoetin clinic

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Purpose: Anemia secondary to Chronic Kidney Disease (CKD) reduces erythropoietin production and shortens red blood cells (RBC) survival. Due to severe adverse effects associated with use of Erythropoietin alfa (Epo), anemia in CKD is best managed in collaboration with health care professionals familiar with the medication and using a protocol to guide treatment decisions. The purpose of this study was to determine pharmacist/intern impact on management of Epo in patients with anemia secondary to CKD in an outpatient erythropoietin clinic (OEC).

Methods: The institution's ethics committee reviewed and approved this open-label retrospective chart review study that was conducted for patients with anemia in CKD over the age of 18 seen at Desoto Memorial Hospital (DMH) outpatient clinic from September 11, 2015 through September 11, 2016. Patients with active malignancy, cerebrovascular accident within last 12 months as well as or patients with End Stage Renal Diseases (ESRD) were excluded from the review. Based on the clinic protocol, the goal hemoglobin (Hgb) was 10-11g/dL and Epo dose was initiated at either 10,000units subcutaneously once weekly or 20,000units subcutaneously once every 2 weeks. The primary outcome was percent of patients with a mean Hgb at target goal after OEC implementation. Secondary outcomes included the difference in the mean dose of Epo, total time to reach Hgb target goal, and whether or not Iron studies were performed before and after OEC implementation. Mean initial Hgb values before OEC implementation were compared to mean final Hgb values and the patients' therapeutic ranges were also assessed. A retrospective survey was also obtained from each patient to evaluate Quality of Life (QoL).

Results: The mean difference between Hgb values before pharmacy took over and after was 0.11 percent (n equals 11, 95 percent CI, -1.18 percent to 0.95 percent, P equals 0.813). Due to the sample size being too small we did not observe statistical significance, however, we saw significant clinical impact on patients and their QoL. By obtaining a survey where the patients had to answer if their overall QoL and Activities of Daily Living (ADLs) improved, stayed the same, or worsened, ten people answered that their QoL and ADLs were significantly improved and five people said they stayed the same or worsened. Epo doses significantly decreased when pharmacists took over. The difference in mean Epo dose before and after pharmacy assumed control was 13,668 units (n equals 7; 95 percent CI, 503.5 to 26832.6, P equals 0.0441). Dose reduction resulted in substantial savings for the patient. Hospital savings resulted in 46 percent decrease or an average overall savings of 1010 dollars per month.

Conclusion: A pharmacist/intern-managed outpatient erythropoietin clinic plays a significant role in maintaining stable patient Hgb levels, decreasing total Epo doses and improving QoL for patients with anemia secondary to CKD. Future studies with a larger sample sizes are recommended to reach statistical significance.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 2-047

Poster Title: Impact of a pharmacist-managed asthma clinic on rural emergency room visits in Indian Country

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Purpose: In 2010, asthma accounted for 439,400 hospitalizations and 1.8 million emergency department visits, being a significant public health burden in the United States. In October 2014, an Asthma Management Clinic (AMC) was established at Tse'hootsooi' Medical Center (TMC) in Fort Defiance, AZ. The AMC was created to educate patients with persistent asthma on their disease and the medications used to treat their disease, in order improve their asthma control and quality of life, and decrease their hospitalizations and ED visits. This study was conducted to assess the effects of a pharmacy-managed asthma clinic in a rural, tribal hospital.

Methods: The institution's ethics committee reviewed and approved this open-label retrospective chart review study that was conducted for patients with asthma seen in the AMC from October 1, 2014 through September 30, 2015. The items assessed include: ED visits and asthma control test (ACT) scores, and the items to be assessed include: hospitalizations and oral corticosteroid (OCS) use. The number of ED visits one year prior to clinic initiation were compared to the number in the year following clinic initiation, and initial ACT scores were compared to final ACT scores within the designated chart review timeframe.

Results: There were a total of 41 ED visits prior to clinic initiation. After a year of being seen in the AMC, ED visits totaled nine showing a 78% decrease in ED visits. The number of patients with an initial ACT score >19, indicating they are well controlled, were three compared to 12 for those having a >19 final ACT score.

Conclusion: A pharmacy-run asthma management clinic plays a significant role in decreasing asthma-related ED visits and improving asthma control.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 2-048

Poster Title: Evaluation of pharmacist-led smoking cessation patient education and follow-up program on quit rates at an ambulatory care clinic for low-income, medically underserved, uninsured patients

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Purpose: The goal of this study was to determine if participation of low-income, medically underserved, uninsured patients in the pharmacist-led smoking cessation group education classes and follow-up visits at Turning Points One Stop Clinic in Bradenton, Florida increased their likelihood of successfully quitting smoking. Additionally, we aimed to determine areas of performance improvement associated with smoking cessation group patient education classes, motivational interviewing, and the pharmacist and pharmacy student practice model.

Methods: A retrospective chart review was conducted on all patients who participated in a one-time smoking cessation group education class and subsequent bi-monthly follow-up visits at Turning Points One Stop Clinic between January 1, 2010 and August 9, 2016. An ambulatory care specialty pharmacist and final-year pharmacy students conducted smoking cessation classes and patient visits in collaboration. Pertinent patient demographic information including age, gender, race, and socioeconomic status or homelessness was obtained. Patient encounters were assessed for dates and appropriate time frames of follow-up visits, changes in cigarette smoking, types of nicotine replacement therapy (NRT) or other quit method utilized and compliance, adverse effects and other barriers to quitting, and percentage of setting quit dates.

Results: A total of 70 profiles of patients who attended smoking cessation group education classes and follow-up visits between January 1, 2010 and August 9, 2016 were assessed. Among these patients, 22.8% (n=16) were homeless at the time of data collection. Dual NRT therapy (gum + patch or lozenge + patch) was utilized by 64.2% (n=45) of patients and single NRT therapy (gum, lozenge, or patch alone) was utilized in 31.4% (n=22) of patients. A quit date was

set by 44% (n=31) of patients and 48.5% (n=34) of patients adhered to appropriately scheduled follow-up visits. 20% of patients (n=14) were lost to follow-up. 17.1% (n=12) of patients successfully quit smoking and among those who quit, 25% (n=3) were homeless. 91.6% of quitters (n=11) were 1 pack-per-day (ppd) smokers prior to quitting. 1 patient successfully quit with Zyban (bupropion). 100% of quitters who had set quit dates (n=5) achieved their goal quit date. Stress associated with lower socioeconomic status was cited as the most common barrier to quitting, followed by triggers associated with living with or interacting with current smokers. For performance improvement, we determined that the clinic would benefit from streamlining patient interviews and developing more comprehensive patient encounter templates.

Conclusion: Our study found that the quit rate for patients in a pharmacist-led smoking cessation program in the ambulatory care setting is higher than national quit rates. Smoking cessation was also achieved in a significant percentage of homeless patients. Specific factors for success were the use of dual NRT therapy, setting goal quit dates, and adherence to bi-monthly follow-up visits. Areas for performance improvement include motivational interviewing content and documentation within patient encounters. Our ongoing smoking cessation program is an example of successful collaboration between pharmacists and pharmacy students within an ambulatory care clinic.

Submission Category: Critical Care

Submission Type: Case Report

Session-Board Number: 2-049

Poster Title: Benefit of adding carbamazepine to the treatment regimen of a patient with aggressive alcohol needs going through withdrawal

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Purpose: This case report illustrates the benefits of using carbamazepine in managing patients with alcohol withdrawal, as well as the importance of pharmacist recommendations in regards to patient care. The patient presented to the emergency room after being hit by a car while walking in the street and had a blood alcohol concentration of 0.20, altered mental status, tachycardia, tremors and appeared critically ill. He has a significant history of substance abuse, consuming alcohol daily and occasionally smoking tobacco and crack cocaine. CIWA-Ar protocol was initiated for the patient to help control withdrawal symptoms such as seizures and agitation. During the first two days of therapy, his withdrawal was managed with lorazepam, divalproex, gabapentin, midazolam, haloperidol and thiamine. The patient was intubated and the average CIWA-Ar score for day 1 of treatment was 24.29. Benzodiazepines are considered to be the current standard of therapy for alcohol withdrawal treatment given the abundance of literature available to support their use, which is why the clinicians initiated a benzodiazepine. The next five days of therapy the patient was controlled solely on lorazepam and haloperidol, and had an average CIWA-Ar score of 19.27 (min = 2 and max = 40). During the time the patient was on lorazepam and haloperidol, he was able to be extubated and started on a liquid diet. On day 8, the patient had haloperidol removed from his treatment plan and aggressive alcohol needs resulted in the clinicians adding vodka to the patient's regimen to help combat developing delirium tremens. The patient was allowed up to 8 servings (50cc) of vodka daily, which helped the CIWA-Ar score stay around 13.07. Then, on day 15 of treatment, gabapentin was reintroduced with the lorazepam and vodka, as well as 1 beer every 2 hours. This new regimen lasted 8 days and brought the CIWA-Ar average down to 6.25. An attempt to wean the patient off of the alcohol was unsuccessful since he began experiencing seizures. On day 26 of treatment the patient was experiencing anxiety about not being able to be discharged since he is unstable when he stops drinking, and a clinical pharmacist intervened and recommended to

taper down the alcohol intake and initiate carbamazepine 200mg PO TID with CIWA-Ar checks every hour. The new changes to the patient's treatment allowed the patient to be safely discharged 7 days later and brought the average CIWA-Ar score down to 2.2. Recent literature is starting to explore alternative agents to benzodiazepines in patients with alcohol withdrawal and carbamazepine is one of the agents that is getting more attention. Carbamazepine lacks the potential for addiction and abuse that is associated with benzodiazepines, which is just one reason why it may be a desirable option for this patient population since many of them are already battling addiction issues. This case further supports the literature that is out there as it displays the benefits of adding carbamazepine to patient's regimens who are being treated for alcohol withdrawal. In addition, this case is a good example of the importance of advocating for your patients as a pharmacist and not being afraid to make suggestions that might not be familiar to the clinicians. Part of being a clinical pharmacist includes being a self-learner to stay up to date on the current literature so you can practice evidence based medicine to its maximum capacity. The pharmacist in this case noticed a trend in recent literature regarding the use of carbamazepine in patients with alcohol withdrawal compared to benzodiazepines and was able to bring this information to the physicians and help improve the patient's recovery to get him discharged quicker.

Methods:

Results:

Conclusion:

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 2-050

Poster Title: Student pharmacists' clinical interventions on multidisciplinary patient care rounds in a community hospital

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Purpose: Sarasota Memorial Hospital [SMH] is an 819 bed regional medical center and the second largest acute care public hospital in Florida. The pharmacy at SMH practices both a centralized and de-centralized model with clinical pharmacists represented in different areas such as emergency medicine, pediatrics, infectious disease, and oncology. SMH provides students an opportunity to work with other healthcare professionals in these specialties providing clinical recommendations while further developing the students' knowledge and professional growth. The purpose of this study is to illustrate the role of a student pharmacist during multidisciplinary patient care rounds in addition to other student activities.

Methods: This is an institutional review board approved single center, retrospective analysis of patients admitted from June 6th to August 19th, 2016. An interdisciplinary team, including a pharmacy student rounded on all patients admitted on the oncology unit. Patients younger than 18 years of age, pregnant patients, and do not resuscitate patients were excluded. A pharmacy student rounded daily with the nurse manager and the case manager. The student reviewed patient profiles prior to and following patient interviews. Patient interviews focused on open ended questions on side effects, pain management, allergies, and drug therapy both at home and while in the hospital. All student recommendations were verbally discussed with the unit based pharmacist. The pharmacist would then discuss the recommendation with the attending physician if warranted. The student recorded all proposed interventions daily in Quality CompassR, a web based software program designed for structured patient care documentation along with patient's age, sex, length of stay, type of intervention, acceptance or decline of recommendation, physician, brief description, and other activities.

Results: During the 3-month period, 268 patient interviews were conducted. Student pharmacist's acceptance rate was 96 % (77 out of 80 recommendations). Of the 96% accepted interventions 38.9% were patient counseling, 27.2% were drug therapy add on, and the remaining 33.9% consisted of drug discontinuation, non-renal dose adjustments, medication reconciliations, allergy assessments, and drug re-scheduling.

Conclusion: This study demonstrated student pharmacists can be valuable members of a multidisciplinary team in the hospital setting. Student pharmacists provide a valuable service to patient care by identifying and solving drug related problems, including patient counseling, resolving medication discrepancies, allergy assessment, and add-ons to drug therapies.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 2-051

Poster Title: Pharmacy technicians' assistance in pharmacist-delivered medication therapy management: A report from the ACO Research Network, Services and Education (ACORN SEED).

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Purpose: Medication Therapy Management (MTM) is a pharmacist-provided service that improves clinical and economic outcomes. Knowledgeable and effective support staff is critical to the provision of MTM, As administrative support allows the pharmacist to dedicate more time to provide quality patient centered care.. Due to a wide variation in MTM delivery it is unknown how support staff, such as the pharmacy technician, could be best utilized. Therefore, the purpose of this research was to characterize existing literature describing pharmacy technician-provided support for MTM services.

Methods: In August 2016, A PubMed (MEDLINE) literature review was conducted by searching keywords such as pharmacy technician, medication therapy management, follow-up, communication, admission, discharge, patient education, drug therapy problem, motivational interviewing, medication history, disease management, and the MTM Core Elements Version 2.0 (medication therapy review, personal medication record, medication action plan, intervention, referral and documentation). Additional studies were identified by reference analyses. Included articles must have a description of pharmacy technician assistance in at least one MTM Core Element. Articles that described pharmacy technicians' assistance in theoretical scenarios or with mock patients were excluded. After title review, abstracts were independently reviewed by three researchers; researchers consulted on inclusion/exclusion discrepancies until consensus was reached. Descriptions of the pharmacy technician's function were characterized from each article and loaded into Research Electronic Data Capture (REDCap).

Results: A total of 217 articles were retrieved from the PubMed (MEDLINE) search. After duplicates were removed, a 159 abstracts were reviewed. 40 articles met inclusion criteria and were fully reviewed. 57.5% of articles had been published within the last two years. Articles were most likely to describe technician's assistance in MTM by completing medication reconciliation (77.5%). Articles were likely to describe patient education and monitoring (45%), documentation (30%) provider referral and communication (20%). Articles were least likely to describe follow-up (12.5%), patient information gathering (7.5%), personal medication record development (7.5%), and recruitment (2.5%). No articles described technicians' assistance in development of medication action plans.

Conclusion: Pharmacy technicians have most often being utilized to provide medication reconciliation, patient education and provider communication to support pharmacist-provided MTM. As medication action plan development requires precise clinical expertise only held by the pharmacist, it is expected pharmacy technicians would not provide administrative support for that MTM component.. Interventions, such as education and training programs, aimed at pharmacy technicians may improve support staff's efficacy and benefit MTM delivery in the future.

Submission Category: Automation/ Informatics

Submission Type: Descriptive Report

Session-Board Number: 2-052

Poster Title: Stepping into the future: Incorporating chronic disease management into wearable technology

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Purpose: The purpose of our study is to report emerging trends and propose an idea of future blood glucose monitoring technology.

Methods: A literature search was performed using PubMed and EMBASE databases about health fitness trackers. Searches included only English language journals and full text studies published through March of 2016. An online search was conducted to inquire about health monitoring trackers currently available in the market. The search terms used were: heart tracker, monitor heart rate, activity, fitness tracker accuracy, blood sugar and health monitoring. Person interviews were conducted with over 100 people including patients, physicians, and pharmacists to assess interest and possible needs in an innovative health wearable tracker.
Example questions asked to patients: how you feel about having all in one future monitoring tracker that documents your information into one application/program? What are some features that you would like to have in such a product? Would you benefit from having your information automatically updated into a unified electronic system available to your healthcare team?
Questions asked to physicians: how would you benefit from a future product that loads patient's health information automatically into an easy accessible program? Finally, pharmacists were asked: would you benefit from monitoring patients who are on diabetes medications? Would it be easier to counsel patients knowing their glucose levels and medications?

Results: Health tracker devices currently on the market track number of steps, calories burned, distance traveled, and sleep habits. Approximately 69% of adults tracked a health indicator for themselves or loved ones, and 21% of them used technology to track. 40% of adults who track a health indicator, have one chronic condition and 62% have two or more chronic conditions. In order to better manage diabetes and minimize health care costs, a future noninvasive glucose monitor/tracker would be a great intervention for diabetics. Integrating “Reverse Iontophoresis technology”, which uses electric current going through the sensors and collecting glucose samples from body fluids would be the ideal mechanism. Incorporating this technology into a wristband that would monitor patient’s blood glucose, and combining other features such as blood pressure, calories burnt, activity/inactivity time and medication adherence alarm, will drastically impact diabetics lifestyle and future. Furthermore, the interview results showed that all patients, pharmacists, and physicians expressed a high level of enthusiasm regarding a future noninvasive technology tracker that could potentially lower the healthcare cost and prevent future health complications.

Conclusion: The innovation of noninvasive glucose monitoring has the potential to revolutionize diabetes care by improving adherence to blood glucose testing and providing continuous feedback to the patient and their physician. Such technology has the potential to drastically lower healthcare costs by eliminating the need for purchase of test strips, lancets, unnecessary doctor's visits, avoidable urgent care visits, and complications from diabetes.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 2-053

Poster Title: A Retrospective Analysis of the Incidence and the Predictors of Hypoglycemia in Inpatients Receiving Insulin Glargine

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Purpose: Hypoglycemia in the inpatient setting has been correlated to an increased risk of morbidity and mortality when diabetic patients are placed on an insulin regimen. The aim of this analysis is to evaluate incidence of hypoglycemia and related risk factors in a group of patients on insulin glargine admitted inpatient.

Methods: Following Institutional Review Board approval, a retrospective, single center electronic record review was performed on diabetic inpatients receiving insulin glargine during April 1, 2016 to June 30, 2016. Demographic information, feeding status, renal function, home diabetes regimen, fasting and non-fasting glucose levels and admission reason were collected through the electronic medical record. Patients were included in the study if they were diagnosed with diabetes, received at least one dose of insulin glargine, and had at least 24 hours of blood glucose data available. A hypoglycemic glucose level was defined as less than 70 mg/dL.

Results: A total of n=253 patients in the medical center were reviewed. Among those reviewed, 37.5% (n=69) exhibited hypoglycemic events. Among the patients that experienced hypoglycemia, 85.5% (n=59) were above 65 years of age, 89.9% (n=62) had a renal function CrCl< 30 ml/min, 29% (n=20) were NPO, and 77% (n=53) were patients that were continued on their previous home regimen when admitted inpatient.

Conclusion: Hypoglycemia in hospitalized patients with diabetes is associated with continuing home regimen of insulin glargine upon admission, decreased renal function, nutritional feeding status, and age above 65. Identification of patients at increased risk of hypoglycemia may be important for optimally adapting treatment and patient management.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 2-054

Poster Title: Pharmacist's Role in HF patients Transition of Care: RCT

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Purpose: To assess the effectiveness of pharmacist-provided hospital discharge education, for heart failure patients, in improving patients' knowledge and self-efficacy. Also, to assess the impact of this intervention on the rate of hospital readmission and emergency visits at 30-days, 60-days and 90-days after discharge.

Methods: This study is a randomized, interventional, test-retest, control group clinical trial. We will compare HF patient's knowledge and self-efficacy, between a control and intervention groups, at baseline and at different time points after their discharge from the hospital. Both the control and intervention groups will follow the usual and standard care available at West Kendall Baptist Hospital, while the intervention group will receive:
1- A phone call 48h-72h after discharge from the hospital to ensure that the patient filled their prescriptions and started taking their medication.
2- A phone call five to seven days after discharge to reinforce the education using the "teach back technique" . Patients will be asked about their medications, what are they for, how to use them, and what side effects to watch for, based on the education and information that was provided to them at discharge.

Results: In progress

Conclusion: This study has the potential to significantly impact the transitional care of HF patients and positively affect the rate of readmissions for the better, and boost the role of the pharmacist as a key interdisciplinary team member. It also support the role of the pharmacist as a promoter of health and provider of tools to enable HF patients to care for themselves after discharge from the hospital.

If the hypothesis of the study holds true, the results can be shared outside of WKBH and BHSF to affect care of not only HF patients, but patients with other disease conditions.

Submission Category: Leadership

Submission Type: Descriptive Report

Session-Board Number: 2-055

Poster Title: Evaluating the need for interprofessional education among health care professional students

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Purpose: The educational environment is the starting point of strong healthcare systems. In recent publications, the overwhelming need for collaboration amongst healthcare professionals was reported. In order to serve this need, we aim to evaluate the need for interprofessional education through hands on guided learning among a variety of health care professional students at Nova Southeastern University.

Methods: This study was completed at Nova Southeastern University (NSU) Health Professions Division (HPD) between January and March, 2016. Surveys were created by Google Forms © and advertised through social media and personal emails to assess several parameters necessary to incorporate an interprofessional course in each program's curriculum. Surveys were directed towards HPD students, Faculty members, Deans, and Interdisciplinary Curriculum Committee Members. Questions within the survey were strategically created to gather thorough responses regarding the need and feasibility of the course.

Results: More than 400 subjects were targeted and 80 responses were gathered overall. The majority of student responses were significantly in favor of the implementation of an interprofessional course that incorporates hands on training alongside other healthcare disciplines within a patient-centered environment. The responses from the curriculum, faculty, and interprofessional committee encourage the need of such a course, and they provided valuable data on suggestions and guidance for such initiative.

Conclusion: Given the need for an interprofessional course at NSU HPD, we envision building a course that will balance clinical skills as well as interpersonal strengths that will prepare students for their destined profession to ultimately maximize patient care. The key to a successful course will be collaboration between the different colleges within HPD.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 2-056

Poster Title: Effect of Interdisciplinary rounds on Enteral Nutrition in mechanically ventilated ICU patients

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Purpose: The 2016 American Society of Parenteral and Enteral Nutrition (ASPEN) guidelines for the adult critically ill patient recommend that enteral nutrition (EN) to be started within 24-48 hours in patients who are unable to maintain volitional intake. EN maintains the integrity of the gut, modulates stress and attenuates disease severity. Interdisciplinary rounds (IDR) has shown improvement in length of stay in various studies, but not yet in EN starting time in ICU patients. The purpose of the study was to evaluate the effects of IDR in the hospital with regards to its effect on the initiation timing of EN therapy.

Methods: The institutional review board approved this quasi-experimental pre-post study design to evaluate the percentage of mechanically ventilated patients who started EN within 48 hours, before and after the initiation of IDR in the medical and surgical ICU patient population. Patients were included if they were greater than 18 years of age, admitted to the ICU and mechanically ventilated for greater than 48 hours. The “pre” data was collected from January 1 to May 22 of 2016 before the implementation of IDR. The “post” data was collected from May 22, of 2016 to July 29, 2016 after IDR were implemented. Statistical analysis was performed using the Fisher exact test.

Results: 41 patients (29 medical ICU, 13 surgical ICU) were evaluated in the pre group. Demographics: 46% female, 54% male, 39% below the age of 60, 61% above the age of 60, diagnosis: 46% respiratory failure, 27% sepsis, 4.8% cardiac arrest, 4.8% seizure, 4.8% chronic heart failure, 4.8% liver failure, 4.8% gastrointestinal bleeding, 3% coronary artery disease. The percentage of patients who started EN therapy within 48 hours was 27%, while 73% were started beyond 48 hours ($P < 0.05$). 28 patients (17 medical ICU, 11 surgical ICU) were evaluated

in the post group. Demographics: 46% female, 54% male, 29% below the age of 60, 71% over the age of 60, diagnosis: 57 % respiratory failure, 21% sepsis, 18% liver failure, 4% gastrointestinal bleeding. 71% of these patients started EN within 48 hours, 29% were started beyond 48 hours ($P < 0.05$).

Conclusion: Before the start of IDR in the medical and surgical ICU, close to three-quarters of the patients were started on EN beyond 48 hours. After IDR began, more than two-thirds of patients were started on EN within 48 hours. Interdisciplinary rounds significantly improves time to start EN in critically ill mechanically ventilated patients.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 2-057

Poster Title: Innovating diabetic healthcare and mobile monitoring

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Purpose: Diabetic monitoring is a difficult, yet necessary task in young patients. Standard blood glucose monitoring (SBGM) offers accurate, real time measurements, but requires multiple daily finger sticks and bulky, indiscreet equipment. Continuous monitoring systems (CMS) are able to track glucose levels without the use of finger pricking, allow for closer monitoring, and alert when substantial changes in levels are present. However, these are expensive and exhibit limitations in their monitoring capabilities. The objective of this study was to compare current blood glucose monitoring technologies for future development of an affordable, discreet, efficacious mobile application-linked monitoring system for adolescents with diabetes.

Methods: A survey was disseminated using potential stakeholders for the glucose monitoring prototype in order to identify desirable features and designs. Those surveyed included physicians, nurses, pharmacist, hypertensive patients, diabetic adolescents and their parents, and IT personnel. Questions addressed adherence, practicality of a new product, willingness to use a new products, and the estimated cost to make a product. This was followed by a literature review using EBSCOhost and PubMED databases from Nova Southeastern University (NSU) electronic library. The keywords searched were glucometer, diabetes, mobile, health application, continuous glucose monitoring system, bloodless glucose monitoring system, noninvasive, and technology. Inclusion criteria included full-text articles of randomized controlled trials, observational studies, review articles, or case reports written in English from 2000 to 2015. Exclusion criteria consisted of articles related to disease states other than diabetes. The primary objective was to compare the accuracy and efficacy of SBGM and CMS.

Results: Fifty-two articles were found. Of these, 44 articles met inclusion criteria. It was found that CMS provides more information regarding a patient's glucose trends and vital warnings; however, these are not reliable replacements for SBGM as hardware malfunctions have been documented causing false alerts, lag times, and usage difficulties. Current mobile application fell into four categories of available features that they offered: Decision Support (17%), Communication (83%), Patient Health Record (21%), and Education (18%). It was observed that only one mobile application was HIPAA compliant. Primary features of mobile applications included medication reminders, blood glucose monitoring, diet management, and a fitness tracker. Secondary features included education, weight/BMI, blood pressure, communication, social networking, and integration with patient health records.

Conclusion: Current mobile applications are not patient–centered and do not reliably relay blood glucose trends to healthcare providers. A prototype product that links SBGM and a mobile application capable of monitoring, trending, and warning a patient in real time would form a bridge between the two currently used systems to ensure positive outcomes for adolescent patients and their parents. NSU College of Pharmacy students are currently in development of a product, GlucoHealth, to fit these needs.

Submission Category: Automation/ Informatics

Submission Type: Descriptive Report

Session-Board Number: 2-058

Poster Title: Prevention of adverse drug events via a computerized monitoring system following pharmacy student intervention in a tertiary care teaching hospital

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Purpose: Computerized monitoring has effectively detected and prevented adverse drug events in hospitals nationwide. Active daily interventions by a pharmacist are required to help provide optimal patient care. Pharmacy students are a valuable resource to aid in this patient safety initiative; allowing the pharmacist to focus on different aspects within their scope of practice. We assessed the ability of pharmacy students to identify potential adverse drug events in a tertiary care teaching hospital.

Methods: Pre specified safety alerts generated by a commercial surveillance application were prospectively evaluated. We examined predefined alerts based on the hospital's specific needs such as warfarin and international normalized ratio greater than 3, enoxaparin dosing according to creatinine clearance, elevated potassium greater than 5.5 millimoles per liter and culprit medications, and other alerts relating primarily to anticoagulation. The frequency, types of alerts produced, and medical records were examined by the pharmacy students on a daily basis and presented to the pharmacist in charge for evaluation of accuracy and causality. Verified potential adverse drugs events were subsequently presented to the medical team alongside a proposed intervention. All alerts, recommendations, and accepted interventions were documented in the electronic health record to ensure proper follow up. All institutional review board procedures were followed. Data was analyzed using descriptive statistics.

Results: Over a 4 week period 88 patients were screened and the system generated 192 alerts from the pre specified criteria of safety parameters. Among the 192 alerts, 23 (12 percent) were considered significant, warranting recommendations to the medical team. Of the 23 recommendations, 16 (70 percent) were due to warfarin and international normalized ratio

greater than 3, 2 were due to inappropriate concomitant use of warfarin and enoxaparin or heparin, 2 were due to incorrect renal dose adjustments of enoxaparin, 1 was due to the use of warfarin without proper indication, and 2 were related to medication adjustments due to hyperkalemia. Among the 16 patients found to have supratherapeutic international normalized ratio, 4 (25 percent) had an international normalized ratio greater than 4 and 2 patients were found to have significant warfarin drug interactions. All recommendations made were accepted by the medical team resulting in 23 preventable adverse drug events.

Conclusion: Screening for adverse drug events with a computerized monitoring system was effective at identifying these events when used as part of an active surveillance program. Anticoagulation resulted in 91 percent of overall recommendations, confirming a significant need for improvement in this area. Because of the high number of alerts relative to the number of significant interventions, an assessment of alerts will be conducted to disable those not clinically relevant. Due to understaffing coupled with the need to expand knowledge among pharmacy students, the incorporation of students plays an important role in ensuring surveillance programs are utilized to their maximum potential.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 2-059

Poster Title: Improving chronic disease outcomes and lowering healthcare cost with the use of smart assistive technology

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Purpose: As the number of patients with chronic disease states grow, there provides a niche to help patients better manage their diseases with the help of a smart assistive technological tool. We propose said tool to monitor certain vital signs in addition to fall detection, medication and doctor appointment reminders and information storage so as to better target patient therapy.

Methods: A short 10 question closed-ended online survey questionnaire was shared within 7 Social media support groups and 2 Alzheimer's disease website forums. A sample (N=806) was collected

Results: Out of sample of 806, 99% of respondents had a friend or family member with Alzheimer's. The majority (95%) of the respondents were family members that provided care for their loved one afflicted by Alzheimer's disease. 802 (99%) respondents acknowledge Alzheimer's as a progressive disease and knew that it required monitoring. 598 respondents communicated with their family or friend with Alzheimer's disease every hour. 623 respondents are willing to purchase a device that would help monitor vital signs such as blood pressure, heart rate, sleeping patterns, medications, GPS tracking, fall monitoring and all while being recorded in the patient's electronic health record. 18% of respondents would first consider the price of the device before purchasing while 77% would purchase the device regardless of the price

Conclusion: Our short closed-ended question survey demonstrates the demand for a device that is able to monitor a patient's vital signs, location, medication reminders, doctor appointment reminders, sleeping patterns and the ability to detect and monitor falls.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-060

Poster Title: Adverse drug reactions and metabolic differences in patients receiving haloperidol decanoate every two weeks versus every four weeks in a long-term inpatient psychiatric facility

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Purpose: Haloperidol decanoate, an intramuscular injection intended to be administered monthly, is a treatment option for chronically psychotic patients with non-adherence issues. In order to increase ease of administration, psychiatrists at a long-term inpatient psychiatric facility have been prescribing haloperidol decanoate every 2 weeks at half the maximum dose. Our primary objective was to document the differences in the adverse drug reactions for patients stabilized on either haloperidol decanoate 200 - 225 mg IM Q2weeks or 400 - 450 mg IM Q4weeks. Our secondary objective was to evaluate the differences in metabolic outcomes between the two dosing regimens.

Methods: A retrospective chart review was conducted evaluating the medical records between 2011 and 2013 of identified patients initiated on the maximum dose of haloperidol decanoate, 200 – 225 mg IM Q2weeks or 400 – 450 mg IM Q4weeks. Patients were included if they received at least 5 months of treatment on a stable dose of haloperidol decanoate. Demographic variables (age, gender, race and diagnoses) were collected. Per our primary objective, it was documented whether patients experienced one or more adverse events. Adverse events studied were restlessness, tremor, slow/slurred speech, unsteady gait, shuffling gait, mouth/tongue movement, fatigue, weight gain, and dry mouth. The secondary objective for this analysis was to compare the differences in the metabolic outcomes between the two treatment regimens. Liver function tests, hemoglobin A1c, total cholesterol, LDL/HDL, and triglycerides were collected at baseline and after 5 consecutive months on haloperidol decanoate.

Results: Overall, patients on the Q2 week dosing schedule experienced more side effects from haloperidol decanoate than patients on the Q4 week dosing schedule. In addition, more of these patients were treated with the EPS medications diphenhydramine and/or benztropine, which further implies that the movement ADRs were more prevalent in the Q2 week dosing group. In contrast, the Q4 week dosing group had a higher incidence of dry mouth and weight gain. There was no significant difference in metabolic outcomes, which included the average changes in liver function tests, total cholesterol, LDL/HDL and triglycerides.

Conclusion: For patients requiring a maximum dose of haloperidol decanoate, the Q2 week dosing schedule appears to be equivocal to the Q4 week dosing schedule. However, more movement-associated side effects were seen with the Q2 week dosing schedule, while more metabolic side effects were seen with the Q4 week interval. Physiologically based pharmacokinetic modeling is the next step in evaluating these two dosing regimens.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Descriptive Report

Session-Board Number: 2-061

Poster Title: Evaluation of emergency department pharmacist involvement on medication reconciliation in an academic teaching institution

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Purpose: The impact of pharmacist involvement in a multi-disciplinary team has been well documented to improve patient outcomes. Furthermore, supporting research has demonstrated pharmacists conducting medication reconciliations in the emergency department (ED) reduce medication related adverse events and associated healthcare costs. As part of a hospital-wide safety initiative, pharmacy clinical services were incorporated into the emergency department to perform medication reconciliation upon admission. The purpose of this project was to validate the significance of having a pharmacist-led medication reconciliation program in the emergency department and utilize the results to help support the expansion of pharmacy services in the ED.

Methods: Medication reconciliations were completed during the initial triage for all patients by staff nurses. Pharmacists were assigned to the emergency department from 11am to 11pm Monday through Friday and 11am to 7:30pm on weekends. Once there was a disposition for admission, a review of the medication reconciliation was performed by the pharmacist and compared to the existing list. Sources for medication information included but not limited to: the patient, family or caregivers, nursing home or assisted living facility's medication administration record, phone call to patient's primary care provider and/or pharmacy. Updated medication list was placed in the chart before admission orders were given. Interventions were recorded under the following categories: wrong drug, incomplete medication information, medication omission, not on the medication or discontinued by provider, duplication of therapy and incorrect dose and/or frequency. Additionally, total number of medication discrepancies (by drug class) was documented.

Results: During a 6-month period (January 1, 2016 to June 30, 2016), the pharmacist completed medication reconciliation on 3,730 patients in the emergency room. The average number of home medications per patient was 10 (range 0 to 31). A total of 2,143 interventions were documented as follows: medication omission 835 (22.4%), incorrect dose/frequency 538 (14.4%), no longer on medication 395 (11.6%), medication information incomplete 229 (6%), wrong drug 88 (2.4%) and duplication of therapy 58 (1.6%). There was a total of 6,306 medication discrepancies of any kind; an average of approximately 2 per encounter. Top 5 therapeutic classes/ disease state involved were: Cardiovascular 1178 (18.6%), psychiatry/neurology 851 (13.5%), pain management 587 (9.3%), diabetes 452 (7.2%) and asthma/chronic obstructive pulmonary disease 360 (5.7%). Other significant discrepancies were documented with antiplatelet 189, anticoagulants 105, anticonvulsants 60, antineoplastic agents 54 and immunosuppressant 22. Estimated cost avoidance of $1,361,000 based on the average cost of an adverse drug event and the probability of occurring.

Conclusion: Pharmacists working in the emergency department identified medication discrepancies in a timely manner, reducing potential medication adverse events, and expenditures.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 2-062

Poster Title: Assessing appropriateness of parenteral anticoagulants in a large academic tertiary medical center

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Purpose: According to the Centers for Disease Control and Prevention, each year approximately 1 to 2 individuals in 1000 may be affected by venous thromboembolism (VTE). VTE consists of deep vein thrombosis and pulmonary embolism, both of which are correlated with morbidity and mortality. VTE prevention and treatment are quality measures set forth by The Joint Commission together with the Centers for Medicare & Medicaid. The objective of this study was to examine the utilization and appropriateness of fondaparinux and enoxaparin in patients with an indication for VTE.

Methods: This was a retrospective study of 91 patients who received fondaparinux from April 1 to August 20, 2016 or enoxaparin from August 1 to August 31, 2016. At this hospital, fondaparinux is restricted for use in patients who have heparin induced thrombocytopenia (HIT) while enoxaparin may be used when appropriate and at the prescriber's discretion. The data collected was examined for appropriateness based on indication, dosing, frequency, and transitioning to other anticoagulants based on the hospital's protocols as well as clinical guidelines. All institutional review board procedures were followed. Data was analyzed using descriptive statistics.

Results: From the 91 patients assessed, 70 percent received enoxaparin and 30 percent received fondaparinux. Sixty eight percent of patients were male, had an average age of 58 years, and an average weight of 82 kilograms. The primary indication for patients on enoxaparin was VTE treatment which accounted for 63 percent. The predominant indication for fondaparinux was HIT which equated to 93 percent. The majority of anticoagulant orders followed protocols based on weight and renal function. Furthermore, 2 percent of patients on enoxaparin and no patients on fondaparinux experienced episodes of bleeding. Appropriate

duration of overlap for warfarin bridging occurred in 48 percent of patients on enoxaparin and no patients on fondaparinux. Fifty three percent of patients who had not achieved therapeutic INRs did not have a concomitant parenteral anticoagulant documented upon discharge.

Conclusion: Based on these results, we conclude that increased monitoring of patients receiving parenteral anticoagulant therapy would be beneficial in order to ensure correct administration as well as appropriate transition between anticoagulants.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 2-063

Poster Title: Measuring knowledge and attitudes regarding the use of pharmacogenetic testing among physicians

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Purpose: Pharmacogenetic (PGx) testing is a relatively new field in medicine. It has become increasingly significant to enhance patient outcomes. Various studies have recognized the importance of pharmacogenetics in personalized medicine and how the adoption of this new innovation will potentially improve the safety and efficacy of medication use; however, there is a paucity of information about pharmacogenetic testing acceptance among physicians. The objective of this study is to identify and evaluate the impact of physicians' knowledge and attitudes on their adoption of PGx testing as a diagnostic tool in the current clinical settings.

Methods: Nova Southeastern University (NSU) physicians and community physicians (currently involved in medication therapy decisions for patients) were asked to complete an online survey. The survey collected data on socio-demographics, prior experience, perceived need for innovation, and rurality as independent variables related to knowledge about PGx testing. Similarly, relative advantage, compatibility, complexity, triability, and observability were the independent variables that were correlated with attitudes towards PGx testing. A statistical program was utilized to calculate sample size. Using a medium effect size and significance of 0.05, the minimum sample size was determined to be 120. The study protocol has been approved by the NSU's Institutional Review Board (IRB Protocol # 2016-77).

Results: 148 physicians (60 percent male, 40 percent female) from different specialties participated in the study. Nearly 29 percent indicated that they have no time to practice PGx testing. The majority of physicians were uninformed or not sure about the availability of PGx testing, FDA-approved medications with PGx information in their package inserts, and PGx

information in Plavix package insert (90 percent, 49 percent, and 55 percent, respectively). A large percentage of physicians expressed general agreement about the need for PGx testing in 3 specific situations (60.1 percent to 83.8 percent [Mean=74 percent]) and its relative advantage in also 3 specific situations (71.6 percent to 85.1 percent [Mean=80 percent]). Only 19.6 percent, 7.4 percent and 8.1 percent of physicians learned about genetics and genetic testing during their undergraduate courses, graduate school, and residency, respectively. The majority of physicians rated their level of knowledge about PGx testing to be poor, fair, or good (25 percent, 42 percent, and 23 percent, respectively). Only 58 percent of physicians would recommend PGx testing. Self-reported reasons for not ordering PGx testing were concerns about patients' confidentiality (26.7 percent), delay in treatment (40 percent), insurance coverage issues (46.7 percent), and clinical utility of the testing (53 percent).

Conclusion: Several factors influencing the implementation of PGx testing in clinical practice have been identified, including physicians' low familiarity with and lack of knowledge of PGx testing, and their concerns about the clinical utility of PGx testing, patients' confidentiality, and insurance coverage issues. As the number of available FDA-approved drugs with pharmacogenetic information increases, it would be helpful for physicians to receive additional continuing education and training in the field of pharmacogenetics. As such, medical students need to receive coursework in the field of pharmacogenetics so they can learn and develop the necessary skills to effectively implement PGx testing in practice.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 2-064

Poster Title: Association of ACEI/ARB use on cardio-metabolic markers in the US Adult population

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Purpose: Angiotensin converting enzyme inhibitors (ACEI) and Angiotensin receptor blockers (ARB) have been used in clinical practice primarily for their antihypertensive properties. However, there is conflicting evidence on their effects on body mass index (BMI), hemoglobin A1c (HbA1c), waist circumference and fasting blood glucose (FBG). The purpose of this study was to compare these biomarkers in non-diabetic individuals taking ACEI or ARB to those who are taking other antihypertensives excluding ACEI/ARB.

Methods: A secondary data analysis was performed using the cross sectional survey and physical examination from The National Health and Nutrition Examination Survey (NHANES) database which includes health and nutritional status of civilian, non-institutionalized US population. This study included nondiabetic adults with HbA1c < 6.5% who were ≥ 20 years of age who were on antihypertensive treatment at the time of survey screening. The sample was divided into two groups; individuals who were on ACEI or ARB monotherapy (treatment Group) and those on non ACEI/ARB antihypertensive treatment. All estimates are nationally representative of the civilian, non-institutionalized US adult population, meeting the study criteria and have been adjusted for confounding factors and non-response bias. Chi-square test was used to compare the differences in categorical variables such as socio-demographic data (race, age, education, gender and marital status); study outcomes including clinical parameters (FBG and HbA1c) and biometrics (BMI and waist circumference) across study groups. The independent t-test was used to compare outcome differences in average HbA1c, BMI, waist circumference, and average FBG. Data was described using mean, percentage and proportion as is appropriate. A significance level (alpha=0.05%) was used for all comparisons.

Results: Among the subjects included in the study (N=1480), 33% were on ACEI or ARB monotherapy. The majority of respondents were non-Hispanic white. Mean average age was lower in treatment group (58 years) compared to the non-ACEI/ARB group (61 years; $p < 0.05$). Both groups comprised of higher proportion of female individuals and with greater than high school level of education. Marital status showed no significant difference among both groups. Average HbA1c was lower in the treatment group (5.5%) compared to the non-ACEI/ARB group (5.6%; $p=0.047$). No significant difference was observed for average BMI, waist circumference and FBG.

Conclusion: Individuals who were taking ACEI or ARB had significantly lower HbA1c when compared to those who were taking non ACEI/ARB antihypertensive therapy. Considering the limitations of this research, this association could expand the role of ACEI or ARB in not only treating hypertension but reducing specific cardio-metabolic risk factors.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 2-065

Poster Title: Importance of implementing genomic and pharmacogenomic testing by healthcare professionals

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Purpose: Pharmacogenomics is the study of how DNA can affect a person's response to their medication. Most medications are hepatically metabolized by the cytochrome P450 (CYP450) enzyme system. An example is clopidogrel, which is a pro-drug that utilizes CYP2C19 metabolism to convert into its active compound. Utilizing pharmacogenomic testing may identify the patients who are poor metabolizers of the drug and help physicians choose an optimal regimen in order to prevent a potential adverse event from occurring. The purpose of this study was to determine the opinions of various physicians on the topic of pharmacogenomic testing.

Methods: After researching case studies on the importance of pharmacogenomic testing, current available courses offered on pharmacogenetics, insurance information, and legal aspects, a physician survey was conducted. The Institutional Review Board approved a survey that was sent out to fourteen faculty physicians at the Nova Southeastern University College of Osteopathic Medicine in order to gauge their knowledge and utilization of pharmacogenomic tests. The survey focused specifically on CYP2C19 enzyme tests and was developed by referencing a survey that was developed for pharmacy students in Canada. The primary outcome of this assessment was to determine the level of knowledge practicing physicians have in regard to pharmacogenomics testing and how, and if, they apply the testing to their practice. Secondary outcomes included whether or not the practicing physicians would be interested in having a pharmacist help facilitate and read the tests and if they would like additional training in the subject through a continuing education course. The inclusion criteria for physicians to participate in the survey was to be a practicing physician who was faculty at the College of

Osteopathic Medicine. This was conducted as a pilot study in order to assess the results and eliminate any unsuccessful questions before sending it to a larger group of physicians. The survey is intended to be sent to a larger population in the future. Data was analyzed using descriptive statistics.

Results: Out of fourteen surveyed physicians, only three physicians (21.4 percent) were very informed on pharmacogenomic testing and currently utilize it in their practice; six physicians (42.9 percent) were somewhat informed on the field; five physicians (35.7 percent) were not informed at all and wished to expand their knowledge on the subject. The results of the survey demonstrated the need for healthcare professionals to be educated on pharmacogenomics and there is a drastic need to enable collaboration between pharmacists and physicians in order to increase treatment outcome.

Conclusion: There is a drastic need for healthcare professionals to be educated on pharmacogenomics and it is essential to enable collaboration between pharmacists and physicians in order to increase treatment outcomes and decrease adverse events from these medications and improve patient outcomes by individualizing therapy. Based on the survey results, physicians are interested in collaborating with pharmacists for the utilization of pharmacogenomic testing and would like to participate in a continuing education course to learn more about the benefits of this testing. Further surveying is necessary.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 2-066

Poster Title: Belatacept versus tacrolimus as first line immunosuppression maintenance therapy in patients with renal transplant

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Purpose: Belatacept is a novel immunosuppressive drug designed to minimize toxicities associated with calcineurin inhibitors (CNI) like cyclosporine and tacrolimus. Clinical trials had showed first line belatacept based therapy resulting in superior cardiovascular and renal safety profiles but did not compromise graft failure rates as compared to CNI based therapy in renal transplantation. In addition, belatacept was compared against cyclosporine, which is not widely adopted as the CNI of choice. Therefore, the purpose of this study was to compare the difference in the occurrence of graft failure between belatacept and tacrolimus when initiated as first line immunosuppression therapy in renal transplantation.

Methods: A retrospective cohort study was conducted using the Organ Procurement and Transplantation Network (OPTN) database. The OPTN database contains data regarding every organ transplant event occurring in the US since October 1987. The data is collected through collection forms completed by transplant professionals and submitted via an online web application. Inclusion criteria was all renal transplants completed between September 2011 and March 2015 and documented hospital discharge of either belatacept or tacrolimus as immunosuppression therapy. All patients had at least one year of follow up. Exclusion criteria was the transplants with incomplete data on any study measure such as graft failure or other covariates. Univariate analysis between graft failure as defined by OPTN and immunosuppression therapy used was conducted using Pearson Chi-Square. Multiple logistic regression was conducted to compare the occurrence of graft failure after adjusting for potential confounders. Two tailed statistic with p value less than 0.05 was considered statistically significant. All data analysis described was performed using Statistical Analysis System (SAS) software 9.4.

Results: A total of 55,884 renal transplant patients met the study criteria and received either belatacept or tacrolimus. Of which, 521 (0.9 percent) received belatacept and 55,363 (99.1 percent) received tacrolimus. The average age (years old) and body mass index (BMI, kilogram per meter squared) of those receiving belatacept versus tacrolimus were 53.4 plus minus 14.1 versus 49.8 plus minus 15.5 and 28.2 plus minus 5.0 versus 27.6 plus minus 5.6, respectively. Sixty-five percent of males made up those receiving belatacept as compared to 61.3 percent of those receiving tacrolimus. The results from the univariate odds ratio (OR) showed no significant difference in graft failure occurrence between belatacept and tacrolimus (OR equal 0.92, 95 percent confidence interval; 0.69, 1.23). Total days on kidney waiting list, recipient education level at transplant, recipient BMI, primary payment source, recipient functional status at transplant, recipient age, recipient diabetes status at transplant listing, previous malignancy, recipient ethnicity, recipient gender and recipient serum creatinine level at discharge were included into the multiple logistic regression as covariates. After adjusting for potential confounders, the final multiple logistic model still did not show significant difference in the two treatment groups (adjusted OR equal 0.96, 95 percent confidence interval; 0.72, 1.28).

Conclusion: This study is one of few real world observational studies that compared the clinical effects between belatacept and tacrolimus as first line immunosuppression therapy. No significant difference in graft failure occurrence was seen between the two comparators, reinforcing the results of previously conducted clinical trials. It highlighted the potential role of belatacept to play a more important part in immunosuppression for renal transplant patients, as an alternative to the gold standard tacrolimus. Future analyses are needed to further assess the safety profile of belatacept.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 2-067

Poster Title: InfaDose Pro: the ultimate dosing and over-the-counter medication guide for infants

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Purpose: In the midst of complex over-the-counter products and ambiguous labels, children may be dosed inaccurately. Most products do not contain dosing information for children under the age of two. In fact, the most common medication errors in the outpatient pediatric population are due to dosing miscalculations. We designed a product, the InfaDose Pro, with the objective of reducing the risk of over-the-counter dosing errors in the infant population by providing parents with a reliable self-care resource. We modeled the product after the Broselow Tape, which has demonstrated value in preventing dosing errors in the emergency department setting.

Methods: There are about 1.5 million medication-related errors that occur each year of which, approximately one third are occurring in the outpatient setting. A further investigation was conducted by five researchers who found no evidence of a current product to address this need. As a result, interviews were conducted with the following potential stakeholders: consumers of childbearing age, pharmacists and pediatricians. After receiving suggestions and feedback, a prototype was created for an over-the-counter guide to aid parents. Inaccurate estimation of infant weight, can lead to dosing miscalculations. Thus, the researchers used the National Health and Nutrition Examination Survey to create a dosing measurement that accounted for the infant's potential weight. Using World Health Organization infant growth charts, estimated height and weights were calculated and recorded for infants under the age of two. Several sources were consulted to ensure accuracy of drug information and dosing. Doses were acquired and calculated primarily from The Pediatric & Neonatal Dosage Handbook.

Information was then cross referenced with the Handbook of Nonprescription Drugs to ensure safety of the product. Once doses were correct, appropriate, and safe; additional information regarding immunizations, vitamin use, diaper rash, and dosing techniques were collected. The additional information was obtained from the following resources: Center for Disease Control and Prevention immunization schedule, American Academy of Pediatrics, Journal of Clinical Medicine and the Pediatric Dermatology Handbook.

Results: The InfaDose Pro contains the most commonly misused over-the-counter products to treat infants such as acetaminophen, diphenhydramine, and ibuprofen. Additionally, it contains information on common concerns with newborn parents such as immunizations, diaper rash, and vitamins. The product was designed to be portable, educational and user-friendly. It is a double-sided, accordion dosing guide indicated for infants ages two and below which unfolds to approximately 47 inches or 120 centimeters long. Similar to the Broselow tape, the product includes color-coded weight brackets to correspond to an approximate dose for each medication. However, unlike the Broselow tape, which is used for emergency medications, the InfaDose Pro contains information regarding over-the-counter medications. The front side of the InfaDose Pro includes the color-coded measuring guide, along with appropriate estimations for previously mentioned medications. The back side of the InfaDose Pro, contains information on common concerns with newborn parents such as immunizations, diaper rash, and vitamins. Parents will use the InfaDose Pro to measure their infant's height and match it with the appropriate color bracket to estimate their weight. Once the appropriate color is identified, the dose is provided in milliliters and milligrams. Proper administration technique is on the guide to prevent dosing errors.

Conclusion: Eighty-five percent of parents in the United States treat their children with over-the-counter medications before seeking professional care. Pharmacists are the most accessible health-care professional and are responsible for the safety of the community. The InfaDose Pro was designed to address arising issues such as low health literacy and numeracy skills among the general public. The InfaDose Pro has the ability to ensure that parents are dosing their children correctly, thus reducing morbidity and mortality due to dosing errors.

Submission Category: Geriatrics

Submission Type: Evaluative Study

Session-Board Number: 2-068

Poster Title: Association of metformin use and vitamin B12 deficiency, peripheral neuropathy, and cognitive impairment in elderly patients with type 2 diabetes

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Purpose: Metformin is a commonly prescribed medication to treat type 2 diabetes mellitus that has been associated with vitamin B12 deficiency in various studies. Vitamin B12 is involved in neurologic processes and deficiency may contribute to cognitive decline and neuropathic pain. The geriatric diabetic population is at a higher risk for these conditions. The primary objective of this study is to determine the association of metformin use with the presence of vitamin B12 deficiency in adults ages 65 or older with type 2 diabetes mellitus. Secondary objectives included determining if there were more peripheral neuropathy or cognitive impairment with metformin use.

Methods: Data were taken from the National Health and Nutrition Examination Survey (NHANES) using 3 cohorts spanning from 2001-2012. The inclusion criteria for this study were individuals who were ≥ 65 at the time of the NHANES survey screening and were diagnosed with type 2 diabetes mellitus by age ≥ 20. The sample was divided in two study groups: those on metformin and those that were not on metformin. Age, gender, race, household income, level of education, health insurance coverage, and HbA1c were among the descriptors used for sample characteristics. Three outcomes were evaluated: vitamin B12 deficiency (levels < 200ng/mL as a dichotomous variable), vitamin B12 average levels, cognitive decline, and peripheral neuropathy. NHANES data did not have a direct assessment for cognitive decline or peripheral neuropathy therefore use of acetylcholinesterase inhibitors, and pregabalin and gabapentin were used as surrogate markers for these outcomes, respectively. Mean, standard deviation, and percent (frequency) were used to quantify the data. Chi-square and independent

t-test statistical analysis were performed using IBM SPSS version 24 to determine significant differences among the two study groups. An alpha level of 5% was used in this study. Data have been adjusted for complex sample design and non-response bias. The data have been standardized to be representative of the national population.

Results: The study included a total of 491 patients. There were 315 patients in the non-metformin group, and 176 were in the metformin group. The mean age for patients in the non-metformin study group (74.55 +/- 6.094) was significantly higher than those in the metformin study group (72.9 +/- 5.2, p=0.003). The race distribution was significantly different across groups (p=0.031). The HbA1c values were not significantly different between the two groups. All other sample descriptives were the same between the two study groups (p>0.05). Average vitamin B12 levels (metformin 563.9 +/- 35.4 pg/mL; non-metformin 665.6 +/- 43.1 pg/mL; p=0.0018) were significantly lower in the metformin group. The proportion of Vitamin B12 deficiency (metformin 6.7%; non-metformin 4.0%; p-value=0.192) were not significantly different but were lower for the non-metformin group. Use of acetylcholinesterase inhibitors (metformin 1.7%; non-metformin 0.7%; p=0.219), and neuropathic pain medications (metformin 6.7%; non-metformin 5.6%; p= 0.818) was not significantly different.

Conclusion: While study limitations prevent determination of a causal relationship, there was an association found between lower B12 values and metformin use. Additional prospective research is needed to look at the duration of metformin therapy and the trends of B12 levels as this will provide useful clinical information regarding the use of metformin in patients. No significant association was found between the surrogate markers for peripheral neuropathy and cognitive decline in patients on metformin.

Submission Category: Geriatrics

Submission Type: Evaluative Study

Session-Board Number: 2-069

Poster Title: Use of select Beers list medications in white, black, and Mexican American geriatric patients

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Purpose: One-third of all medications prescribed to the elderly may trigger serious adverse effects such as falls, hip fractures, or excess sedation, thus resulting in a lower quality of life and increased healthcare costs. The Beers drug list compiles medications that are potentially inappropriate for the geriatric population. While a few studies have quantified their use none have evaluated whether there are differences across race/ethnic groups in the United States. The objective of this study was to compare the use of commonly prescribed medications meeting Beers criteria across geriatric patients self-reporting as white, black, or Mexican-American.

Methods: This was a secondary database analysis using data from the National Health and Nutrition Examination Survey (NHANES) 2005-2012 cohorts. NHANES samples approximately 5,000 non-institutionalized U.S. civilians yearly through a series of cross-sectional studies comprising interviews and physical examinations. Subjects were included in the study if they were 65 years of age or older at the time of survey interview and who self-reported to be non-Hispanic white, non-Hispanic black, or Mexican-American. The main outcome was being on either long-acting benzodiazepines including clorazepate, chlordiazepoxide, clidinium-chlordiazepoxide, clonazepam, diazepam, flurazepam, and quazepam, the barbiturate agent butalbital, or pain medications such as meperidine and ketorolac. Sociodemographic, clinical, and medication and outcome data were compared across race/ethnic groups using chi-square and one-way analysis of variance (ANOVA) tests for categorical and continuous variables, respectively (alpha= 0.05). IBM SPSS Version 22 was used to conduct data manipulation and analysis. This study was exempt from institutional review board (IRB) review.

Results: Among the 4770 patients meeting inclusion criteria, the mean age was 73 (range: 72-75 across race/ethnic groups). Whites were more likely to be older and have higher income, show better renal function and were more likely to have 4 or more hip fractures than blacks and Mexican Americans ($p < 0.05$). Use of select Beers list drugs was low overall but significantly different across race/ethnic groups ($p < 0.011$). Use among whites was 2% (n=62), and 1.1% (n=10) and 0.5% (n=3) for blacks and Mexican Americans, respectively. Among those taking a Beers list drug, all (100%) were taking only one medication of interest. Clonazepam was the most used medication (0.84%, n=40) followed by diazepam (0.46%, n=22), chlordiazepoxide (0.15%, 7), clorazepate (0.10%, 5) and ketorolac (0.02%, 1). None were taking the other Beers drugs of interest.

Conclusion: Results indicated that the overall use of select Beers list drugs among a sample of geriatric patients was low but should ideally be zero. We also found their use to be highest in the non-Hispanic white group which was the most affluent group. Prescribers must be aware of the dangers of using these medications in a frail population and how it may be different across race/ethnic groups.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 2-070

Poster Title: Review of tenofovir/emtricitabine for HIV pre-exposure prophylaxis in adolescent patients

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Purpose: According to Centers for Disease Control and Prevention, in the United States in 2014, youth ages 13-23 accounted for 22% of new HIV diagnoses; as such, adolescents are a critical target to prevent the spread of HIV. Tenofovir/emtricitabine (TDF/FTC) is approved by the US Food and Drug Administration for use as pre-exposure prophylaxis (PrEP) in combination with safer sex practices to reduce the risk of sexually acquired HIV in high risk HIV-uninfected adults. When taken every day, PrEP reduces HIV infection in adults by more than 90%. While approved for adults, PrEP is not approved for use in adolescents.

Methods: To investigate efficacy and safety of PrEP use in HIV-uninfected adolescents, a literature review was conducted from inception through September 2016 in PubMed along with conference abstracts from International AIDS Society, Conference on Retroviruses and Opportunistic Infections, Infectious Disease Society of America, and International AIDS Conference. Terms used in the search included “PrEP,” “pre exposure prophylaxis,” “adolescents,” “young adults,” “TDF/FTC,” “TDF”, “tenofovir,” “Truvada,” and “uninfected.”

Results: Two studies were identified on efficacy and safety of PrEP use in HIV-uninfected adolescents. The Plus Pills study followed 148 adolescents between 15-19 years of age (66% female, median 18) on PrEP with TDF/FTC for 12 weeks. At week 12, 72% of participants were adherent(pill count > 6 doses per week), and 76% were adherent (plasma TDF > 40 ng/mL). 15% of patients reported adverse effects, (mild headache and gastrointestinal side effects). No participants became infected with HIV during the study. 85% of patients continued PrEP after study conclusion. In the PrEPare (ATN 113) study, 79 adolescent men who have sex with men

(MSM) 15-17 years of age (mean 16.5) were provided PrEP with TDF/FTC and followed for 48 weeks. Adherence, defined by tenofovir level, was 60%(week 4), 55%(week 12), and dropped to 31.5%(week 24). Three participants (4%) seroconverted to HIV positive within the study, all with subtherapeutic tenofovir levels. The most serious adverse event attributed to use of TDF/FTC was weight loss of 10-19%, observed in 2.5% of patients. Compared to adherent subjects, non-adherent participants were more likely to cite concerns that others would think they are HIV-positive due to need to take pills ($p = 0.03$).

Conclusion: Use of PrEP in high risk adolescents appears safe and effective, however they should be monitored frequently to ensure adherence to optimize efficacy. Adherence was a key factor discussed in both studies, and in PrEPare in young MSM, when follow up frequency changed from monthly to every three months, PrEP adherence dropped over 20%. PrEPare found that youth need more frequent follow ups and supplemental reminders to enhance their adherence. Data on use of PrEP in adolescents for prevention of HIV infection is limited and additional studies should be conducted to illustrate its safety and efficacy specifically in this population.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 2-071

Poster Title: Impact of monotherapy or combination use of antiarrhythmics and antimicrobials agents on hospitalization rates in adults.

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Purpose: Certain antiarrhythmic and antimicrobial agents have been linked with the potential of inducing QT prolongation. Consequently, some have been removed from the market or relabeled with warnings. However, there is a lack of quantifiable data measuring the association of these medications and hospitalization rates. There are case studies suggesting that the risk is minimal unless the individual has other risk factors. For example, electrolyte imbalance, increasing age, and concomitant QT prolonging medications. The purpose of this study is to assess the association of monotherapy or combination use of antiarrhythmics and antimicrobials agents on hospitalization rates in adults.

Methods: A secondary database analysis was conducted using cross-sectional data from the National Health and Nutrition Examination Survey (NHANES) database collected through interviews and surveys. Adults greater than or equal to 40 years of age from cohorts 2005 to 2006, 2007 to 2008, 2009 to 2010, and 2011 to 2012 were included in this study. Subjects were divided into two different study groups 1) subjects on either QT prolonging antiarrhythmics or antimicrobial agents, either as monotherapy or in combination and 2) subjects not on either medication class. Study outcomes included whether or not subjects were hospitalized and the number of annual hospitalizations visits. Results were generalized to the United States population. Descriptive and inferential statistics using chi-square and independent t-test analysis were performed using IBM SPSS statistics, version 24, to compare differences amongst the sociodemographic and hospitalization data across the two groups. Results were described using number (n), percent, means, and standard deviation where appropriate. An alpha level of 5 percent was used to determine significance.

Results: Of the 136,323,852 subjects included in the study, 878,388 were on QT prolonging antiarrhythmic or antimicrobial agents, as monotherapy or in combination, while 135,445,464 subjects were not on either medication class. The average age for those in the study group was 60.30 years in comparison to 57.29 years in the control group. Of the 878,388 subjects in the study group taking the specified medications, 44 percent were females. A higher prevalence of congestive heart failure, coronary heart disease, and other comorbidities was seen in the study group when compared to the control group. A statistical association was determined between QT prolonging antiarrhythmic and antimicrobial agents, either as monotherapy or in combination, and hospitalization rates. Specifically, yielding 203,095 (23.4 percent) hospitalizations and 16,799,509 (12.4 percent) hospitalizations in the study and control group, respectively (p equals 0.012). Furthermore, there was also clinical significance in the number of annual hospitalization visits, where the study group had more reoccurring hospitalizations in comparison to the control group despite there being no statistical significance (p equals 0.408).

Conclusion: Antiarrhythmic and antimicrobial use as monotherapy or in combination was significantly associated with hospitalization rates. Subjects were twice as likely to be hospitalized compared to those not on either medication class. There was no significant association with the number of annual hospitalization visits. Limitations included the inability to establish a direct temporal cause and effect relationship due to it being a cross-sectional analysis. Others include, potential for self-report bias, QT prolonging risk factors or comorbidities that were not controlled for, and reasoning behind hospitalizations being unknown. This study opens room for future studies on drug-induced QT prolongation.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 2-072

Poster Title: Evaluating costs of influenza vaccines and the incentives offered for cash paying consumers at community pharmacies

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Purpose: Currently, 11.5 percent of the United States adult population is uninsured. Average annual influenza complications have been attributed to approximately 2.5 million outpatient visits, 32,000 hospitalizations, and 680 deaths among adults. Lack of coverage may pose a significant barrier to influenza vaccination. For cash paying consumers, the cost and array of incentives to receive an influenza vaccination varies by pharmacy. Pharmacists providing medication therapy management services may find it difficult to provide information regarding the most cost effective influenza vaccination. Therefore, the primary objective was to investigate the cost of influenza vaccines and incentives offered by traditional and non-traditional pharmacies.

Methods: Online searches were conducted and data for influenza vaccine ("flu shot") costs were pulled from multiple pharmacy websites and/or online resources. Inclusion criteria included four traditional chain pharmacies (i.e., CVS, Navarro, Target-CVS, Walgreens) and six non-traditional pharmacies, located in supermarkets, big box department stores, or membership-only warehouse clubs (i.e., Costco, K-Mart, Publix, Sam's Club, Walmart, Winn-Dixie) common in south Florida. The costs of three different inactivated influenza vaccine formulations (two trivalent and one quadrivalent) offered from the various pharmacies were included. We excluded Fluzone High-Dose since this is reserved for older adults who may be receiving government coverage (e.g., Medicare). Various incentive programs were also included and evaluated for the aforementioned pharmacies and used to determine the most cost effective vaccine(s) offered. Descriptive statistics were used to evaluate the data.

Results: The cost of Fluvirin, a trivalent influenza vaccine, had the lowest price at an average of $21.25 and was available at four pharmacies. There are no incentives offered by Costco or Sam's Club but Fluvirin had the lowest cost at $14.99 and $20, respectively. Winn Dixie charges $25 for Fluvirin but offers a free "flu shot" on certain weeks, if the customer purchases $50 worth of groceries. Walgreens charges $32 for Fluvirin but may be reduced to $25 if the customer is a member of the Prescription Savings Club (PSC), which costs $20 a year. Afluria, a trivalent influenza vaccine, had an average cost of $30 and was available at three pharmacies. Publix and Walmart did not offer incentives; however, K-Mart offers $10 in reward points if a person fills 5 prescriptions at the pharmacy ("flu shots" count towards this prescription fill count). Fluarix was the only quadrivalent vaccine formulation offered by five pharmacies at an average cost of $38. However, Sam's Club offered Fluarix at $30 making it the lowest priced among the pharmacies evaluated. Overall, 40 percent of the pharmacies offered some form of incentive for consumers ranging from 20 percent off store coupons to $5 gift cards.

Conclusion: Many Americans are without coverage and may not be able to afford influenza vaccination. At this time, cash paying consumers may find their best option for influenza vaccination is Costco. Despite being a membership-only warehouse club, Costco does not restrict public access to their pharmacies and a non-member can simply approach the pharmacy and pay $15 for a "flu shot". Winn Dixie may be a better option only if the weekly special of spending $50 on groceries to receive a free "flu shot" is available and the consumer is willing to purchase this amount of goods from the store.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 2-073

Poster Title: Outcomes of counseling patients with chronic obstructive pulmonary disease as part of a new transition of care program

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Purpose: Patients with Chronic Obstructive Pulmonary Disease (COPD) are at a higher risk for hospital readmission which, in turn, increases the risk of mortality. One of the principal causes of readmission is medication non-adherence. Identifying the key healthcare barriers such as socioeconomic status, language, and literacy are also vital. This program seeks to assess if patients with COPD can benefit from transitional care counseling and help decrease the rate of readmission.

Methods: University of Miami Hospital is a 560-bed academic teaching hospital. This review has been submitted to the hospital's IRB. Patients were identified as having COPD by case managers who would then communicate a daily list to the multidisciplinary team. During the month of July 2016, patients were counseled for an average of 3 days. Fourth year pharmacy interns assessed home medications, health care barriers, current adherence, provided side effect counseling for new medications, and discharge counseling. A health confidence screening tool was used to assess patient's adherence and knowledge upon first encounter and at discharge. Based on the patient's knowledge and adherence to medications, a self-rated score was provided then utilized by the intern to facilitate which points to target during counseling. These scores, together with readmission data, were reviewed to determine potential impact of pharmacy involvement in patients with COPD.

Results: A sample size of n=19 consisted of patients with a diagnosis for COPD. Using a health confidence screening tool, the average patient baseline score upon admission was 5.21. Upon discharge, the health confidence average score was 6.89. Patients with a baseline score less than 5 were classified as high risk. Approximately, there was an increase in 1.68 points in

patients confidence score. UMH readmission data was collected a month prior and one month after the pilot program began, to serve as a comparison tool for the program outcome. The July readmission number was 7 patients and for August the readmission number was 3 patients.

Conclusion: On average, the health confidence screening score of patients increased by 1.68 points when comparing their baseline and discharge score. Effective use of patient medication, disease counseling in COPD patients, and other multidisciplinary efforts resulted in a 42.85% decrease in hospital readmission one month after beginning the program. COPD transitional care counseling is an effective tool that can used to reduce the rate of readmission and increase therapy adherence for this patient population.

Submission Category: Pharmacy Law/ Regulatory/ Accreditation

Submission Type: Evaluative Study

Session-Board Number: 2-074

Poster Title: Exploring the dual doctor of pharmacy/physician assistant degree: comparison and assessment of curricula

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Purpose: The movement for pharmacists' ability to prescribe has been met with resistance at varying levels. Several Doctor of Pharmacy (PharmD) programs offer varying forms of dual degrees. A dual PharmD/Physician Assistant (PA) degree may be beneficial to obtain prescriber status. Traditionally, PA programs range between 2-3 years and grant graduates prescribing authority as established providers. While one program offers a five-year dual PharmD/PA degree, not all pharmacy programs possess the same infrastructure. The objective of this study was to assess curricula between PharmD and PA programs. Secondary objectives were to identify opportunities for tailoring curricula for dual PharmD/PA degrees.

Methods: The 2016 US News and World Report top 25 ranked PharmD and PA programs were included. The authors reviewed program websites including course syllabi and descriptions. Authors independently identified course credit hours dedicated to pharmacology, pharmacotherapy, physical assessment, diagnosis, and clinical rotations. Data were reviewed by a secondary author (e.g., PA faculty member for PA programs) for accuracy. Schools without specific descriptions or lack of data were excluded. Descriptive statistics and independent t-test ($p < 0.05$) were performed.

Results: Twenty nine PharmD and 23 PA programs were included. PharmD curricula averaged a total of 151.3 credits vs. 123.4 credits for PA curricula ($p < 0.01$). Pharmacology credit hours were statistically greater for PharmD curricula (12.8 vs 4.3, $p < 0.01$). Physical assessment credit hours (6.1 vs 0.9, $p < 0.01$) and diagnosis credit hours (4.1 vs. 0, $p < 0.01$) were significantly

greater for PA curricula. Clinical rotation credit hours were also statistically greater for PA curricula (45.9 vs. 40.5, p< 0.044). Of note, average elective credit hours for PharmD curricula were 8.96 (± 4.8).

Conclusion: PA curricula appear to have an additional 10.2 credit hours of physical assessment and diagnosis combined. While the average PharmD curriculum has approximately one hour of physical assessment, the nine hours of elective credit hours may be utilized for physical assessment and diagnosis. Additional clinical rotation credit hours may be needed or clinical rotations modified to fulfill both accrediting body requirements. Study limitations include the lack of analysis of all existing programs and overall different focuses of the curricula. However, these data serve as a starting point for discussion into dual degree options and offering pharmacists the opportunity to prescribe.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 2-075

Poster Title: Lumacaftor and ivacaftor for the treatment of cystic fibrosis in patients with homozygous F508del mutation.

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Purpose: To evaluate the efficacy of the combination therapy of lumacaftor with ivacaftor at week 24 in participants aged 12 years and over with cystic fibrosis who are homozygous for the F508del mutation.

Methods: Two phase 3, randomized, double-blind, placebo-controlled clinical trials were conducted to assess the effects of therapy of lumacaftor in combination with ivacaftor. Both drugs work on the cystic fibrosis transmembrane regulator, lumacaftor works as a corrector and ivacaftor as a potentiator. The population on both trials consisted of patients 12 years of age or older who had cystic fibrosis and were also homozygous for the F508del mutation in the cystic fibrosis transmembrane regulator. In both studies, patients were randomly assigned to receive a 24 weeks treatment. Treatments consisted of 3 arms, either lumacaftor at doses of 600 mg daily or 400 mg twice a day, in combination with ivacaftor 250 mg every 12 hours, or a matched placebo pill. The primary objective of the trials was the absolute change from baseline in the percentage of predicted forced expiratory volume in 1 second (FEV1) at week 24. Secondary outcomes included, absolute change from baseline in body mass index (BMI), absolute change from baseline in Cystic Fibrosis Questionnaire-Revised (CFQ-R), respiratory score, and number of pulmonary exacerbations.

Results: A total of 1,122 patients, 553 from TRANSPORT trial and 559 from TRANSIT trial, were randomized to receive study drugs. The mean baseline FEV1 was 61% of the predicted value. In both studies, there were significant improvements in the primary end point in both lumacaftor–ivacaftor dose groups. In both studies, FEV1 improvements were observed as early as day 15

and were sustained through 24 weeks in both lumacaftor–ivacaftor dose groups. The difference between active treatment and placebo with respect to the mean absolute improvement in the percentage of predicted FEV1 ranged from 2.6 to 4.0 percentage points ($P < 0.001$). Pooled analyses showed that the rate of pulmonary exacerbations was 30 to 39% lower in the lumacaftor–ivacaftor groups than in the placebo group. The rate of events leading to hospitalization or the use of intravenous antibiotics was lower in the lumacaftor–ivacaftor groups as well. The incidence of adverse events was generally similar between the lumacaftor–ivacaftor and placebo groups. Finally, the rate of discontinuation due to an adverse event was 4.2% among patients who received lumacaftor–ivacaftor versus 1.6% among those who received placebo.

Conclusion: Both TRANSPORT and TRANSIT clinical trials show evidence that lumacaftor in combination with ivacaftor provided a benefit for patients with cystic fibrosis homozygous for the F508del CFTR mutation. Combination therapy with lumacaftor–ivacaftor has shown to improve FEV1, decrease pulmonary exacerbations and hospitalizations, as well as an improvement in patient's IBM in patients who suffer from cystic fibrosis.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 2-076

Poster Title: Effect of heart rate reduction on outcomes in heart failure using ivabradine

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Purpose: Chronic heart failure is a disease associated with high morbidity and mortality. Elevated resting heart rate is a known risk factor for adverse outcomes in heart failure. Despite the mortality and morbidity benefit with beta blocker use in heart failure patients, a majority of patients in clinical practice are below the therapeutic beta blocker target dose thereby, limiting their beneficial effects. The purpose of this study was to assess the effect of heart rate reduction on outcomes in heart failure with the use of the selective sinus-node inhibitor, ivabradine.

Methods: The institutional review board approved this randomized, double-blind, placebo-controlled, parallel-group study. Patients 18 years and older were eligible if they had symptomatic heart failure and left-ventricular ejection fraction of 35 percent or lower, in normal sinus rhythm with a heart rate of 70 beats per minute or greater, previously hospitalized for heart failure within the previous year, and on stable background maintenance therapy including a beta blocker if tolerated. Those with congenital heart disease, recent myocardial infarction, atrial fibrillation, and symptomatic hypotension were excluded. Patients were randomly assigned to receive ivabradine titrated to a maximum of 7.5 mg twice daily or placebo. A total of 3268 patients were randomly assigned ivabradine and 3290 received placebo. The primary endpoint was the composite of cardiovascular death or hospitalization for worsening heart failure. Secondary endpoint was the composite of cardiovascular death or hospitalization for worsening heart failure for patients receiving at least 50 percent of target daily dose of a beta blocker. It was determined that 1600 first events were needed to provide 90 percent power with a treatment effect of 15 percent relative risk reduction for ivabradine. Time-to-event curves were estimated using the Kaplan-Meier method. A Cox proportional-hazards model was used to estimate the treatment effect.

Results: The major finding of this study showed 24 percent of patients receiving ivabradine and 29 percent of those taking placebo had a primary endpoint event (hazard ratio 0.82, 95 percent CI, 0.75 to 0.90, P less than 0.0001). The primary effects were mainly hospitalization and death due to heart failure, with 21 percent in the placebo group versus 16 percent in the ivabradine group (hazard ratio 0.74, 0.66 to 0.83, P less than 0.0001). There was no difference in cardiovascular deaths between groups, however deaths due to heart failure was significantly reduced (hazard ratio 0.74, 95 percent CI, 0.58 to 0.94, P is equal to 0.014). Serious adverse events were more frequently associated with the placebo group versus the ivabradine group (P is equal to 0.025). Five percent of patients in the ivabradine group had symptomatic bradycardia compared with 1 percent in the ivabradine group (P is less than 0.0001). Visual side effects were more frequently reported in the ivabradine group than placebo (3 percent versus 1 percent, P is less than 0.0001).

Conclusion: Study results support the use of ivabradine for the reduction of cardiovascular events or hospitalization for worsening heart failure. Ivabradine is a well-tolerated and safe add-on treatment for stable and symptomatic heart failure patients with a heart rate of 70 beats per minute or greater despite optimized heart failure therapy with a beta blocker, angiotensin converting enzyme inhibitor and aldosterone antagonist.

Submission Category: Leadership

Submission Type: Evaluative Study

Session-Board Number: 2-077

Poster Title: Successful Strategies of Maintaining a Mentorship Program for Pharmacy Students

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Purpose: Most students feel there is a need for a mentor, but do not know how to initiate a relationship within the pharmacy field. Realizing the need for pharmacy mentors, a program was initiated of faculty and alumni members of Palm Beach Atlantic University to mentor students. The Mentor Match Program was started and is being developed to serve as a beneficial connection between the two parties.

Methods: This research took place from September 2013 –April 2016. A preliminary survey was given in September of 2014 and 2015 to the P2 students from the classes of 2016 and 2017 of Palm Beach Atlantic University. One hundred eleven students chose to participate and filled out a survey consisting of methods students used to contact mentors. Students who did not have contact with their assigned mentor were excluded from the study. After evaluation, the students were then matched, based on the results, with faculty and alumni in similar interests. A notification of contact information was given to each mentee and instructed to contact their mentor with their CV to start their relationship. Mentors were instructed to guide the mentee in their needs. A follow-up survey was given in April 2016 to reassess the relationship.

Results: There was 65% success rate of maintaining a mentor-mentee relationship when having at least 2 different means of contact. When only a single mean of contact was used, only 24% of relationships lasted after in as little as a year. Electronic communication, which included social media and email, had the lowest success rate of only 32% compared to face-to-face and verbal contact of 68%. The Mentor Match program most commonly allowed students to have guidance in jobs, curriculum vitae assistance, residency assistance, and future career plans. Alumni mentors have shown to have more of a lasting relationship over time than faculty mentors.

Conclusion: Providing pharmacy students with a matched mentor had most success in maintaining a relationship by using more than one mean of contact. Despite the growth of social media relationships, face-to-face and verbal contact was still shown to be more successful for the student's relationship. As the program grew, alumni who chose to be mentors allowed the students a more diverse group of mentors, aside from faculty members, which led to more information being discussed and longevity of the relationship. In the future, a goal of growing the program of alumni would allow for more targeted matches and even more opportunities.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-078

Poster Title: Cardiovascular outcomes of semaglutide in patients with type 2 diabetes

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Purpose: Cardiovascular disease is associated with high morbidity and mortality in patients with type 2 diabetes. The use of glucagon-like peptide 1 analogue, liraglutide, showed improved cardiovascular outcomes in type 2 diabetes patients. The purpose of this study was to evaluate the cardiovascular safety of glucagon-like peptide analogue, semaglutide, for the treatment of type 2 diabetes, which was shown to have an extended half-life of approximately one week.

Methods: The institutional review board approved this randomized, double-blind, placebo-controlled, parallel-group study. Eligible patients included those with type 2 diabetes and a glycated hemoglobin level of 7 percent or greater, with or without previous antihyperglycemic treatment or received treatment with no more than two oral antihyperglycemic agents, with or without basal or premixed insulin. Patients included were aged 50 years or older with established cardiovascular disease, chronic heart failure, chronic kidney disease, or aged greater than 60 with at least one cardiovascular risk factor. A total of 3297 patients with type 2 diabetes were randomized in a 1:1:1:1 ratio received either 0.5 mg or 1.0 mg of once-weekly subcutaneous semaglutide or placebo for 104 weeks, with a 5-week follow-up period. The primary composite outcome was the first occurrence of death from cardiovascular causes, nonfatal myocardial infarction or nonfatal stroke. The primary hypothesis was for non-inferiority for the primary outcome. The non-inferiority margin was 1.8 for the upper boundary of the 95 percent confidence interval of the hazard ratio. It was determined that 3260 patients were required to provide a power of 90 percent to reject a hazard ratio of at least 1.80 at a pre-specified 0.05 level of significance.

Results: The primary composite outcome occurred in 6.6 percent (108 of 1648 patients) in semaglutide group versus 8.9 percent (146 of 1649 patients) in the placebo group (hazard ratio 0.74, 95 percent CI, 0.58 to 0.95, P is less than 0.001 for non-inferiority). Nonfatal myocardial

infarction occurred in 2.9 percent (47 patients) in semaglutide group versus 3.9% (64 patients) in placebo group (hazard ratio 0.74, 95 percent CI, 0.51 to 1.08, P equals 0.12). Nonfatal stroke occurred in 1.6 percent (27 patients) in semaglutide versus 2.7 percent (44 patients) in placebo group. The rate of cardiovascular death reported was 2.7 percent (44 patients) in the semaglutide group versus 2.8% (46 patients) in the placebo group (hazard ratio 0.98, 95 percent CI, 0.65 to 1.48, P equals 0.92). Adverse events associated with semaglutide use included gastrointestinal side effects such as nausea, vomiting and diarrhea.

Conclusion: The study results concluded that semaglutide had significantly lower rate of cardiovascular death, nonfatal myocardial infarction, or nonfatal stroke than patients receiving placebo with high cardiovascular risk. The risk reduction observed was similar with both doses of semaglutide. In addition, the study concluded that semaglutide was statistically noninferior to placebo for the rate of cardiovascular death.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 2-079

Poster Title: The use of monoclonal antibodies for the prevention of recurrent Clostridium difficile infection: a systematic review of the use of bezlotoxumab.

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Purpose: To evaluate the efficacy and safety of bezlotoxumab for the prevention of CDI recurrence during the 12-week (day 85 ± 5 days) follow-up period after a clinical cure of the baseline CDI episode was established.

Methods: The terms “bezlotoxumab”, “MK 6072”, “Clostridium difficile” and “Clostridium difficile toxin B monoclonal antibody” were utilized to conduct a systematic literature search using PubMed, OVID MEDLINE, FDA.gov and ClinicalTrials.gov. Two phase III trials were found (P001 and P002), reviewed and evaluated.

Results: The P001 and P002 studies were randomized, multicenter, double-blind, placebo-controlled trials. Safety and efficacy of bezlotoxumab was observed in 2,655 participants assigned to receive actoxumab+bezlotoxumab, bezlotoxumab, actoxumab or placebo.
The primary efficacy objective in both studies was whether or not treatment with one single infusion of one or both of the individual mAbs given with SOC antimicrobials decreased CDI recurrence vs placebo and SOC therapy alone during the 12-week study period. In Study P001, the proportion of patients who experienced CDI recurrence was significantly lower in the actoxumab+bezlotoxumab group (15.9%) vs placebo (27.6%). The adjusted differences in CDI recurrence between actoxumab+bezlotoxumab and placebo were −11.6% (95% CI, −17.3% to −5.9%) and −10.1% (95% CI, −15.9% to −4.3%) between bezlotoxumab and placebo.
In Study P002, the proportion of patients who experienced CDI recurrence was significantly lower in the actoxumab+bezlotoxumab group (14.9%) and the bezlotoxumab group (15.7%) vs placebo (25.7%). The adjusted differences in CDI recurrence between actoxumab+bezlotoxumab and placebo was −10.7% (95% CI, −16.3% to -5.1%), and −9.9% (95%

CI, −15.5% to −4.2%) between bezlotoxumab and placebo. In regards to safety, < 1% of patients discontinued treatment due to the adverse effects. Commonly reported ADRs included nausea, diarrhea, headache and fever.

Conclusion: Bezlotoxumab has the potential of being the first monoclonal antibody indicated to prevent the recurrence of CDI, but approval from the FDA is currently pending. More studies need to be performed in order to prove bezlotoxumab's efficacy since additional data was requested by the FDA, resulting in the delay of bezlotoxumab's approval. An extension of the Prescription Drug User Fee Act (PDUFA) goal was given with an expected response date of three months. The assigned new goal date for review of supporting data will be on October 23, 2016.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 2-080

Poster Title: Analysis of Clostridium difficile infections in a community health-system

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Purpose: Clostridium difficile infections CDI remain a predominant problem in healthcare, despite precautions used to prevent contamination. Several contributing factors may include employee hygiene, visitor hygiene, or medications used that could increase risk of acquiring a CDI. Previous studies have shown an increase of CDI due to certain antibiotics used compared to others, as well as usage of gastric suppressing agents, particularly proton pump inhibitors (PPI). The purpose of this study is to analyze patients with CDI at Martin Health System.

Methods: Following Institutional Review Board (IRB) approval, a retrospective chart review was performed on patients who were tested positive for CDI from July 1, 2015 to July 1, 2016. A positive result for CDI was defined as a positive test for C. difficile toxin tested by in house microbiology lab. The primary outcomes include rates of infection related to antibiotic use, rates of infection related to certain antibiotic use, and rates of infection related to gastric suppression use. Secondary outcomes included antibiotics used to treat CDI infection and infection severity of the patient. Severity was calculated using the CDI severity index (CSI). End points were collected from the electronic medical record. The data collected included: patient age, gender, infection after admission (days), antibiotic usage within hospital for >3 days, which antibiotic was used for non-C. difficile treatment (if applicable) and duration, gastric acid suppression usage, white blood cell count, albumin level, temperature, C. difficile treatment and duration, and mortality. Following completion of data collection, all patient identifiers were removed. Descriptive statistics were utilized to assess results of the study.

Results: Over 22% of patients who were admitted > 3 days prior of C. difficile testing were taking antibiotic. For admitted patients, the percentages of the most common class of antibiotics taking by patients implicated for C. difficile were fluoroquinolones and

cephalosporins which accounted for a combined total of 66% (33% each). Among the fluoroquinolones, levofloxacin was the most prescribed.
Over 36% of patients were taking antibiotics 1 month prior to hospital admission. For individuals who were taking antibiotics 1 month prior of being admitted, fluoroquinolones were the largest antibiotic class implicated for C. difficile accounting for 31%, followed by cephalosporins accounting for 24%. Ciprofloxacin was the most commonly prescribed fluoroquinolone accounting for 70%. Patients who were taking gastric acid suppressing 1 week prior to admission accounted for 59% of patient admitted.

Conclusion: As the C. difficile severity score increased, the amount of patients taking antibiotics prior to admission lowered. Also, the likelihood of patients taking acid reducers prior to admission increased as severity scored increased. In addition, those who had higher severity scores were given more antibiotic combinations in the inpatient setting. In conclusion, fluoroquinolones were associated with more cases of C. difficile infections. Alternative antimicrobial therapy other than fluoroquinolones may reduce the incidence of C. difficile infections, as well as also reduce the acceleration of antibiotic resistance such as fluoroquinolone resistant pathogens.

Submission Category: Critical Care

Submission Type: Descriptive Report

Session-Board Number: 2-081

Poster Title: Topical Atorvastatin to Reduce the Size and Severity of Stage I and II Pressure Ulcers in ICU Patients

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Purpose: In acute care settings, reducing the length of stay and safely discharging or mobilizing the patient will continue to be a primary focus for health-systems management and patient-care teams alike. The innovative use of topical atorvastatin for the treatment of pressure ulcers in the ICU might help reduce the size of the ulcer and increase patient recovery. Pressure to an area of the skin for long or short periods of time can cause ischemia, which leads to damage of the tissue. In general, an estimated 2.5 million patients/yr are affected by pressure ulcers in just the United States.

Methods: Pharmacy researchers in a medical surgical teaching hospital in Tehran, Iran conducted a relatively novel study with compounded topically applied atorvastatin 1% ointment vs placebo, both in addition to standard care, in patients who were admitted to the ICU with a diagnosed stage I or II pressure ulcer. The study took place over 14 days had 104 patients in the final results, which were measured using the 2-Digit Stirling Pressure Score Severity Scale and measurement of surface area.

Results: Topical application of atorvastatin accelerated the healing of stage I and II pressure ulcers with statistical significance, compared to placebo. The change in pressure ulcer score and surface area showed statistically significant results in the study group compared to the control group.

Conclusion: Based on the results in this trial topical atorvastatin 1% ointment was beneficial in healing pressure ulcers and should be allowed for further exploration by practicing physicians in small cases to gather more evidence. More studies need to be done to solidify conclusiveness

and to increase its possible scope of application as an adjunct to stage III or IV pressure ulcers as well where applicable.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 2-082

Poster Title: Evaluation of a procalcitonin guided algorithm on antibiotic utilization for lower respiratory tract infection in adults

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Purpose: Procalcitonin (PCT) is a biomarker of bacterial infection, which rises and falls with the onset and resolution of infection, respectively. There have been multiple studies validating its use in the treatment of lower respiratory tract infections (LRTI), to guide antibiotic therapy and limit unnecessary use.

Methods: The institutional review board approved this retrospective chart review of patients admitted to a 356-bed community hospital between May and June 2016 with a suspected LRTI. Inclusion criteria included having at least one PCT serum level collected, age greater than or equal to 18 years, and a LRTI diagnosis upon admission. Exclusion criteria included patients with a primary diagnosis other than a LRTI, on antimicrobial therapy for a suspected non-respiratory infection, or immunocompromised. This analysis seeks to evaluate the use of a PCT-guided algorithm and subsequent antibiotic utilization in adult patients with suspected LRTI. Patient clinical stability was considered in the assessment of PCT results to direct antibiotic initiation or discontinuation as well. The primary outcome was the rate of PCT treatment algorithm recommendation acceptance. Secondary outcomes included the average hospital length of stay, average antibiotic treatment duration, and avoidance of antibiotic initiation.

Results: 124 patients were included in which 225 PCT serum concentrations were collected. 54.2 percent of the time the algorithm was followed, while 45.8 percent of the time it was not. Average antibiotic treatment days guided by the PCT algorithm included: chronic obstructive pulmonary disease (COPD) 1.8 , bronchitis 3.8, community acquired pneumonia (CAP) 5, hospital acquired pneumonia (HCAP) 9, unspecified pneumonia 6.8. Average antibiotic

treatment days not guided by the PCT algorithm included: COPD 6.2, bronchitis 4.8, CAP 7.75, HCAP 9.25, and unspecified pneumonia 5. The average length of stay was 7.4 days, and the percentage of avoidance of antibiotic initiation was 11.3.

Conclusion: In the setting of a suspected LRTI, antibiotic initiation, continuation, or discontinuation was determined by the PCT guided algorithm 54.2 percent of the time. Antibiotic usage was decreased as a result of testing PCT in LRTIs. Further studies would be beneficial to determine additional benefit in each type of LRTI.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 2-083

Poster Title: Sofosbuvir and velpatasvir for the treatment of hepatitis C in genotypes 1-6: A comprehensive review

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Purpose: Hepatitis C is a viral infection of the liver that if left untreated can lead to inflammation, chronic hepatitis and other serious complications such as cirrhosis. This virus has six major genotypes that play a role in the prognosis of the disease as well as its treatment options. Despite current management for the specific genotypes, sofosbuvir-velpatasvir is the first available pangenotypic NS5A-NS5B inhibitor to treat all six genotypes. The purpose of this review is to evaluate the safety and efficacy of this single pill combination regimen with or without ribavirin for the six major genotypes of the hepatitis C virus.

Methods: Each trial was approved by the institutional review board or independent ethics committee at each participating study site. An open-label, phase II trial was conducted to evaluate three cohorts of eligible patients with or without compensated cirrhosis. Patients were randomized into 4 groups in a 1:1:1:1 ratio and received a 12 week regimen of a single oral daily dose of sofosbuvir 400 mg plus velpatasvir 25 mg, velpatasvir 25 mg with ribavirin, velpatasvir 100 mg, or velpatasvir 100 mg with ribavirin. A phase III (ASTRAL-1), double-blinded, placebo controlled trial was conducted to evaluate a combination fixed dose of sofosbuvir-velpatasvir versus placebo in hepatitis C genotypes 1, 2 and 4-6 over 12 weeks in patients with or without compensated cirrhosis. ASTRAL-2 and ASTRAL-3 are phase III randomized trials that were conducted to evaluate a fixed once daily oral dose of sofosbuvir-velpatasvir combination versus sofosbuvir plus weight based ribavirin for 12 weeks in hepatitis C genotype 2 and 24 weeks in genotype 3 in a 1:1 ratio. The primary end point for all trials was sustained virologic response at 12 weeks after the end of therapy. It was determined that 120 patients in ASTRAL-2 and 250 patients in ASTRAL-3 were needed to provide greater than 90 percent power to establish

noninferiority on the basis of sustained virologic response of 94 percent and 89 percent, respectively.

Results: In cohort one of the phase II trial, two groups reached 100 percent sustained virologic response while the other two groups reached an 85 percent and 96 percent, respectively. For cohort two, sustained virologic response rates were 58, 84, 88 and 96 percent. In cohort three, two groups reached 100 percent while the other two groups reached 97 percent and 96 percent, respectively. The ASTRAL-1 trial evaluating genotypes 1-2 and 4-6 was found to have a sustained virologic response of 99 percent in patients receiving sofosbuvir-velpatasvir (95 percent confidence interval, 98 to greater than 99) while patients who received placebo obtained no sustained virologic response. In the ASTRAL-2 trial evaluating genotype 2 infections, patients had sustained virologic response in the sofosbuvir–velpatasvir group at 99 percent (95 percent confidence interval, 96-100) compared to the 94 percent rate (95 percent confidence interval, 88 to 97) in the sofosbuvir–ribavirin group (P-value equals 0.02). In the ASTRAL 3 trial evaluating genotype 3 infections, patients had sustained virologic response in the sofosbuvir–velpatasvir group at 95 percent (95 percent confidence interval, 92-98) compared to the 80 percent rate (95 percent confidence interval, 75-85) in the sofosbuvir–ribavirin group (P-value less than 0.001).

Conclusion: Sofosbuvir-velpatasvir given as a once daily fixed dose combination for 12 weeks is a safe, well-tolerated and effective option for the treatment of hepatitis C infection in genotypes 1-6 in patients with or without compensated cirrhosis. All phase III trials demonstrated sustained virologic response rates at 12 weeks of therapy ranging from 94-100 percent with sofosbuvir-velpatasvir. Other studies also confirm its safety and efficacy in HIV co-infected patients as well as in decompensated liver disease.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 2-084

Poster Title: Rolapitant for the prevention of delayed nausea and vomiting from emetogenic cancer chemotherapy

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Purpose: Chemotherapy-induced nausea and vomiting is one of the most distressful side effects of anti-neoplastic agents and continues to have a negative impact on the quality of life in cancer patients receiving treatment. Seventy to eighty percent of cancer patients experience a form of chemotherapy-induced nausea and vomiting whether it is acute, delayed, anticipatory, breakthrough, or refractory. Despite current management, rolapitant has been developed to prevent delayed phase emesis. The purpose of this review is to evaluate the safety and efficacy of rolapitant for prevention of chemotherapy-induced nausea and vomiting in cancer patients receiving moderately or highly emetogenic chemotherapy.

Methods: The institutional review boards at every study site approved the protocol for each trial. Global, randomized, double-blind, active-controlled phase III studies were conducted with adult cancer patients who had not received moderately or highly emetogenic chemotherapy before. Patients were randomized in a 1:1 ratio in all trials to either one oral dose of rolapitant 180 milligrams or matching placebo 1 to 2 hours before chemotherapy administration on day 1. All patients received granisetron 2 milligrams plus dexamethasone 20 milligrams 30 minutes before chemotherapy and granisetron 2 milligrams was administered to all patients once daily on days 2 and 3. The primary efficacy endpoint for all trials was the proportion of patients achieving a complete response defined as no emesis or use of rescue medication greater than 24 to 120 hours chemotherapy initiation. It was estimated that 650 patients in each treatment group for moderately emetogenic chemotherapy would provide 90 percent power to detect an absolute difference of 9 percent in complete responses in the delayed phase between rolapitant and active control. It was determined that 257 patients in each treatment group for

highly emetogenic chemotherapy would provide 93 percent power to detect an absolute difference of 15 percent in complete responses in the delayed phase between rolapitant and active control. Each trial used Kaplan-Meier methodology to summarize time-to-first emesis or use of rescue medication.

Results: In regards to the moderately emetogenic chemotherapy regimen, a significantly greater proportion of patients assigned treatment with rolapitant had a complete response in the delayed phase than did those randomized to active control (475 [71 percent] vs 410 [62 percent], odds ratio 1.6, 95 percent confidence interval 1.2 to 2.0; p-value equals 0.0002). With highly emetogenic chemotherapy regimen in the HEC-1, HEC-2 and pooled studies, treatment with rolapitant also resulted in a significantly greater proportion of patients having a complete response in the delayed phase compared with active control (HEC-1: 192 [73 percent] versus 153 [58 percent]; odds ratio 1.9, 95 percent confidence interval 1.3 to 2.7; p-value is equal to 0.0006; HEC-2: 190 [70 percent] versus 169 [62 percent]; odds ratio 1.4, 95 percent confidence interval 1.0 to 2.1; p-value is equal to 0.0426; pooled studies: 382 [71 percent] versus 322 [60 percent], odds ratio 1.6, 95 percent confidence interval 1.3 to 2.1; p-value is equal to 0.0001). Rolapitant was well tolerated, with similar frequencies of treatment-emergent adverse events to those reported in the active control group such as constipation, fatigue, dizziness, and headache.

Conclusion: Both studies utilizing moderately emetogenic and highly emetogenic chemotherapy demonstrated statistically significant superiority of rolapitant over active control. A single oral dose of rolapitant 180 milligrams 1 to 2 hours before chemotherapy administration in combination with oral or intravenous serotonin receptor antagonists and dexamethasone is a safe and effective treatment for the prevention of delayed nausea and vomiting associated with initial and repeat courses of emetogenic cancer chemotherapy.

Submission Category: General Clinical Practice

Submission Type: Case Report

Session-Board Number: 2-085

Poster Title: Empiric treatment of anti N-methyl-D-aspartate (NMDA) receptor encephalitis with intravenous immunoglobulin (IVIG) and corticosteroids

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Purpose: This case study illustrates the empiric use of IVIG and corticosteroids for anti-NMDA receptor encephalitis. A 35 year old white female presented to the emergency department (ED) complaining of difficulty collecting her thoughts. She denied any personal or family psychiatric history. Patient had visited the ED three times within the previous week; once for fever, nausea, vomiting, and subsequently for insomnia and anxiety. She was treated adequately and discharged home. However, this time she was admitted to the psychiatry unit for further evaluation. Initial labs and computed tomography (CT) were unremarkable. However the urine drug screen was positive for cannabis. Patient initially denied using any substances, but later admitted to rarely using marijuana. The mental status exam performed by the psychiatrist indicated the patient had mixed hallucinations, delusions, and disorganized speech. She was diagnosed with acute psychosis; with a differential diagnosis of general medical condition, schizophrenia, and substance induced psychosis and was started on risperidone. Her psychosis, insomnia, and agitation worsened over the next week despite treatment, often requiring restraints and emergency doses of haloperidol, lorazepam and diphenhydramine. Olanzapine and valproic acid were added to her treatment. Ten days after admission, the psychiatrist noted symptoms of catatonia; including palilalia, verbigeration, mannerisms, and stimulus bound behavior. Lorazepam was initiated to break the catatonia and haloperidol was discontinued. However, there was no improvement in her psychotic symptoms. Neurology evaluation indicated no signs of cerebrospinal fluid (CSF) infection or encephalitis (no fever, decreased level of consciousness and/or seizures). Neurology ordered tests to rule out CNS vasculitis, seizure activity, systemic lupus erythematosus or paraneoplastic syndrome causing inflammation, Wilson disease, human immunodeficiency virus (HIV), or CNS lymphoma. A lumbar puncture (LP) was ordered to evaluate for herpes simplex virus (HSV) and blood samples were obtained for NMDA antibodies, glucose, protein, cell count, differential, and gram stain with culture. A LP was not obtained as the patient was extremely agitated. All other tests were negative/normal except for positive NMDA antibodies in the serum. It was suspected that the patient had NMDA receptor encephalitis, however a clear diagnosis could not be confirmed until CSF was evaluated. Twenty days after admission, the patient was transferred to a medical

floor and a LP was performed 5 days later. One week after the LP, the NMDA CSF sample was found to be insufficient. To prevent further delay in treatment, a second LP was performed and the patient was empirically treated with 0.4 g/kg IVIG every 24 hours for 6 days and methylprednisolone 500 mg IV three times a day for three days with tapering dose over next week. She started showing improvement within 24 hours of initiating empiric treatment. She slept better, was less agitated, did not require restraints and was able to hold a reasonable conversation. One week after initiation of empiric therapy, the LP results revealed NMDA semiquantitative 80 times upper normal limit, confirming the diagnosis of anti-NMDA receptor encephalitis. Another LP was performed the next day to evaluate the effect of treatment. Seven days later, NMDA semiquantitative was 20 times upper normal limit, indicating effectiveness of the empiric therapy. The patient was discharged home 18 days after initiating empiric treatment. This case study demonstrates a patient with atypical presentation of anti-NMDA receptor encephalitis, including normal EEG and MRI. The patient's agitation and subsequent delay in obtaining a sufficient LP further delayed firm diagnosis. This study proposes the option of empiric treatment with IVIG and corticosteroids in patients having severe symptoms of anti-NMDA encephalitis, a positive serum sample for NMDA antibodies with all other medical reasons ruled out, however, firm diagnosis is delayed due to lack of LP.

Methods:

Results:

Conclusion:

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-086

Poster Title: Nitroprusside: controlling blood pressure without bottoming out the budget

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Purpose: Lack of competition on the generic drug market has led to substantial price increases for a handful of generic drugs including sodium nitroprusside. The cost of one 50mg/2mL vial has increased from $6 per vial in 2012 to the current price of $830. Sodium nitroprusside, a potent intravenous vasodilator and venodilator, is routinely used in the cardiac operating room and cardiac intensive care unit. Last year, Johns Hopkins All Children's Hospital spent a calculated $633,290 on this medication. The use of nitroprusside was reviewed over one year to catalog current use, establish criteria for restrictions, and determine potential cost-effective alternatives.

Methods: A medication use evaluation identified 171 patients who received sodium nitroprusside from August 1, 2015 through July 31, 2016. The data collected included: patient demographics, indication, total number of orders (including orders from anesthesia), location of the patient at the time nitroprusside was ordered, and whether the dose was administered or wasted. The patients were then categorized into five age groups for further analysis. The age groups were as follows: neonate (< 28 days), infant (28 days – 1 year), toddler (1-3 years), child (3-12 years), and adult (≥ 12 years). A cost savings analysis was performed by comparing the cost of treatment with nitroprusside to the cost of treatment if an equivalent dose of nicardipine had been used.

Results: A total of 462 drip orders for nitroprusside were entered and prepared by pharmacy over the one year time period. An additional 184 drips were prepared by anesthesia. Of the total orders dispensed from the pharmacy, only 322 (69 percent) were administered to the patient and of the total orders entered by anesthesia, only 133 were administered to the patient (72 percent). The calculated waste came to a total of 218 vials of nitroprusside equating to $180,940. Furthermore, if a nicardipine drip had been ordered instead of a nitroprusside drip

in all age groups excluding neonates, the hospital would have saved an estimated $546,865. If the same number of vials were wasted over the year, the waste would equated to $3,270.

Conclusion: The results of this medication use evaluation demonstrate a need for the development of criteria for restrictions due to the large amount of waste. The goal of developing restrictions is to promote cost savings through decreased medication use by recommending lower cost alternatives such as nicardipine.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-087

Poster Title: Repackaging otic ciprofloxacin and dexamethasone for use during myringotomy with tympanostomy tubes procedures in pediatric patients results in cost savings

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Purpose: Ciprofloxacin and dexamethasone is an otic suspension that is used intraoperatively and post-operatively in patients with acute otitis media with otorrhea who undergo myringotomy with tympanostomy, as well as in patients with acute otitis externa. Given the high frequency of its utilization during ear nose and throat (ENT) procedures and the high cost burden, literature to support its use was evaluated, and a medication use evaluation was conducted.

Methods: A retrospective analysis of a sample of 49 patients who received ciprofloxacin and dexamethasone from January 1, 2016 through March 30, 2016 was performed to determine the most common dose, frequency, and the length of therapy. The data collected included the initiating service, the indication, the number of drops and doses administered to each patient, patient specific frequency of administration, the number of bottles purchased, and the cost per a bottle of ciprofloxacin and dexamethasone. The data was then analyzed to determine the number of doses dispensed, the total volume dispensed, the total volume administered, and the percent of the drug wasted. Further, the wastage percentage determined from the sample analysis was applied to the actual annual data to estimate annual wastage volume. Data was also collected on the number of bottles dispensed to the entire patient population between March 1, 2015 and February 29, 2016.

Results: Based on the findings of this MUE about 89 percent of ciprofloxacin and dexamethasone is utilized intraoperatively or postoperatively in patients with acute otitis media with otorrhea undergoing myringotomy with tympanostomy tubes. The conducted literature review supports the use of ciprofloxacin and dexamethasone for the above indication

in pediatric patients age 6 months or older. Further, it was found that the most commonly administered dose during or shortly after the procedure was 4 drops in each affected ear twice a day. The findings show that only about 6 percent of the 7.5 milliliter bottle was administered to inpatients, and the rest of it was wasted. Based on the above, a proposal was developed for alternative packaging of ciprofloxacin and dexamethasone that would result in yearly savings of 43,626 dollars.

Conclusion: This evaluation identified circumstances and procedures that resulted in ciprofloxacin and dexamethasone wastage, and led to an evaluation of an alternative protocol that would decrease drug wastage and result in cost savings. The department of pharmacy at Johns Hopkins All Children's Hospital is currently in the planning phase of a repackaging program to realize these savings.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-088

Poster Title: Retrospective review of aztreonam utilization and cost-analysis at a multi-center health system

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Purpose: Aztreonam is a monobactam antibiotic that offers coverage of gram-negative bacteria, including Pseudomonas spp. It is commonly used for penicillin allergic patients due to its lack of cross-reactivity with penicillins. However, due to its high cost and narrow antibiotic coverage, use is intended to be limited. The primary endpoint of this study was to determine the appropriateness of aztreonam utilization at a multi-center health system; consisting of one level II trauma center and three community hospitals. Additionally, the secondary outcome was to assess potential cost-savings if alternative agents were substituted when the utilization of aztreonam was deemed inappropriate.

Methods: A retrospective patient chart review was conducted for the months of January through March 2016 to determine the appropriateness of aztreonam utilization. Patient-reported medication allergy data was collected, as well as culture and susceptibility results for indications besides empiric treatment. Aztreonam use was deemed appropriate for patients with documented severe penicillin/beta-lactam allergies (including anaphylaxis, urticaria, and angioedema) if the indication was for: (1) empiric coverage of gram-negative organisms, or (2) documented culture with susceptible organisms. Use was deemed inappropriate if aztreonam was used (1) without documentation of a severe penicillin/beta-lactam allergy, (2) when aztreonam was administered in combination with another beta-lactam antibiotic, or (3) for the treatment of suspected gram-positive or anaerobic organisms. Once the initial data was collected, cost analysis of aztreonam use was evaluated. This was performed through evaluating the drug of choice given patient specific characteristics, such as indication for antibiotic use, concurrent antibiotics, culture and susceptibility report data (when available),

and renal function. The acquisition cost of these alternative agents was compared to that of aztreonam when aztreonam utilization was deemed inappropriate. The course of the decided treatment for the alternative agents was adapted to mirror that of the same aztreonam treatment course to determine the total cost for the use of each of these agents. The cost-savings was then analyzed by comparing the costs of aztreonam with the alternative antibiotic.

Results: The results indicate that from January through March 2016, approximately 60% of all aztreonam utilization was deemed inappropriate per the criteria used in this study. The most common reason for inappropriate aztreonam utilization was due to allergy documentation with reactions listed as “unknown” or “other,” which accounted for approximately 42.3% of all inappropriate aztreonam use. Of the patients who received aztreonam inappropriately, about one-third had no documentation of a severe penicillin/beta-lactam allergy, and roughly one-quarter had a reported penicillin/beta-lactam allergic reaction documented as a “mild” (i.e., rash, nausea, vomiting, or diarrhea). The total aztreonam cost across this health system was approximately $23,000 with almost $14,000 spent on inappropriate aztreonam use. When evaluating the patients that received aztreonam inappropriately, a cost-saving alternative could have been utilized with an estimated expense of $1,400. Overall, this would have provided an estimated cost-savings of over $12,000 for the quarter.

Conclusion: Overall the use of aztreonam across this health system was largely deemed inappropriate, and resulted in significant costs. The study results show that there were opportunities for cost savings demonstrated by the use of alternative agents and proper allergy evaluation. Moving forward, strategies to reduce the inappropriate utilization and avoidable costs associated with aztreonam will be implemented and their impact will be evaluated on a larger scale.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-089

Poster Title: Evaluation of the use of a hyperkalemia order set in a community health system

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Purpose: Order sets are a type of clinical decision support tool that encourage evidence-based medical care and work to minimize adverse events and medication errors to support improved patient health outcomes. The purpose of this medication use evaluation (MUE) is to assess the extent of utilization of a recently implemented order set for the treatment of hyperkalemia in a community health system. This information could help to guide revisions to existing order sets and/or the creation of additional order sets to better provide clinicians with tools that encourage the practice of evidence-based, patient-centered care.

Methods: The Pharmacy Research & Scholarly Subcommittee approved this MUE. Patients with a serum potassium level greater than or equal to 6 mmol/L during the time frame of 1/1/2015 to 3/31/2015 were identified and evaluated for inclusion in this MUE. Patients were excluded if they were less than 18 years old, treated for hyperkalemia in the emergency department without subsequent inpatient admission, or had serum potassium levels that were indicated as being from a hemolyzed sample or otherwise invalidated through repeat laboratory testing. A total of 303 patients met these criteria and were included in the evaluation. The individual patients' electronic health records were then reviewed retrospectively to see if their hyperkalemia was or was not treated using the hyperkalemia order set, and if it was utilized, whether a pharmacist was involved in the process. Additional information was collected concerning: which medications from the order set were used to treat the hyperkalemia, whether general labs and monitoring were conducted per the order set protocol, whether medications and/or exogenous sources of potassium that can cause hyperkalemia were discontinued on the patient's profile, and whether other treatments were used to manage hyperkalemia (e.g. sodium polystyrene sulfonate, hemodialysis). Descriptive statistics were used to analyze the results.

Results: The mean serum potassium level was 6.58 plus or minus 0.607 mmol/L. The order set was used in 41.5 percent of cases and not used in 58.5 percent of cases. When the order set was used, pharmacists were involved in the process 40 percent of the time, either clarifying the order with the prescriber or entering the order set into the electronic order management system following a verbal order. Medication options from the order set and their usage were as follows: albuterol used in 26.1 percent of cases, calcium gluconate or calcium chloride used in 37.6 percent of cases, furosemide used in 13.9 percent of cases, insulin used in 50.5 percent of cases, and sodium bicarbonate used in 31.7 percent of cases. Two or more of these medications were used in combination to treat hyperkalemia 71.6 percent of the time. Non-order set options such as hemodialysis and/or sodium polystyrene sulfonate were used as part of the hyperkalemia management strategy 57.4 percent of the time. Hyperkalemia-causing medications and potassium supplements were discontinued from the patient's profile in 96.4 percent of cases. Laboratory monitoring was conducted in accordance with the order set's recommended frequency parameters in 28.4 percent of cases.

Conclusion: The hyperkalemia order set was used in over 41 percent of cases during the three-month study period following its implementation. Pharmacists were involved in the order set process in some way 40 percent of the time. Laboratory tests (e.g. BMP) and monitoring (e.g. finger stick blood glucose measurements) were usually completed more or less frequently than the general parameters from the order set. These results indicate that use of the order set was fairly common, though they highlight the opportunity to increase utilization. Pharmacists may continue to play an important role in the use of this hyperkalemia order set.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 2-090

Poster Title: Bleeding complications due to direct oral anticoagulants at a large academic affiliated care center

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Purpose: Direct oral anticoagulants (DOACs) are common alternative anticoagulant agents to warfarin. These agents do not require routine monitoring and if prescribed properly have the potential to cause less major bleeding events versus warfarin. Jackson Memorial Hospital (JMH) has a pharmacist led prospective review system in place for approval of DOACs to assure appropriate prescribing and minimize adverse events. The purpose of this study was to investigate the rate at which inpatients prescribed either apixaban, rivaroxaban or dabigatran experienced a bleeding event compared to clinical trials.

Methods: This was a retrospective chart review of all admitted patients 18 years of age or older with an order for apixaban, rivaroxaban, or dabigatran. Charts of those who received at least one dose of a DOAC between October 2015 and May 2016 were screened for bleeding events using the 10th revision of the International Statistical Classification of Diseases and Related Health Problems codes. Bleeding events were classified as minor or major. Major bleeding events included fatal bleeding, and or intracranial, intraspinal, intraocular, retroperitoneal, intraarticular or pericardial, or intramuscular with compartment syndrome and or bleeding causing a fall in hemoglobin level of 2 grams per deciliter more, or leading to transfusion of two or more units of whole blood or red cells. Minor bleedings events were defined as any other bleeding such as hematuria, epistaxis and melena. Further investigation as attempted to determine if the DOAC was a probable cause of the bleeding event. Bleeding events were classified as occurring on admission or during the inpatient stay and stratified based on the DOAC used and indication it was used for. The primary outcome was the percentage of patient's who experienced a major or non-major bleeding event. Fisher's exact test was used to compare bleeding frequency at JMH to the bleeding frequency in each respective clinical trial. All institutional review board procedures were followed.

Results: Of the patients prescribed a DOAC 403 were included; 306 of these patients were prescribed apixaban, 82 rivaroxaban and 15 dabigatran. Overall bleeding rates were 3.6 percent in the apixaban group, 3.7 percent in the rivaroxaban group and none in the dabigatran group. In the apixaban group 11 patients experienced a bleed. Five of the patients that bled had an indication of venous thromboembolism (VTE); 3 major bleeds and 2 minor bleeds. The remaining six patients had an indication of atrial fibrillation. The bleeding rate was comparable to that in each respective clinical trial and the difference was not statistically significant. Of the rivaroxaban group 3 patients experienced a minor bleeding event and all had a VTE indication for the use of the DOAC. The difference between the JMH specific bleeding event rate identified in the rivaroxaban atrial fibrillation group was significantly lower from what was reported in the corresponding clinical trial. The statistical significance of this result is limited by small sample size of the cohort.

Conclusion: Results of this retrospective review indicate that with a pharmacist led prospective approval process the frequency of bleeding events can be kept similar if not lower to that of clinical trials. However, further studies are needed to confirm these findings.

Submission Category: Oncology

Submission Type: Case Report

Session-Board Number: 2-091

Poster Title: Dual sequential therapy with intraventricular cytarabine and rituximab in secondary CNS lymphoma

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Purpose: This case report illustrates the potential role of sequential intraventricular rituximab and cytarabine administration for the treatment of refractory CNS lymphoma. A 52-year-old female with refractory diffuse large B-Cell Lymphoma developed recurrent CNS lymphoma following treatment with R-CHOP (6 cycles), high-dose methotrexate (2 doses), and radiation to the brain and mediastinum. She presented to the emergency department with altered mental status following an acute seizure. Computerized tomography (CT) of the brain demonstrated hypoattenuation concerning for advancement of tumor infiltration and edema. Subsequent brain magnetic resonance imaging (MRI) confirmed progression of lymphoma within the right aspect of the brainstem with vasogenic edema and a small subarachnoid hemorrhage. Brain imaging results were consistent with extensive lymphoma recurrence, warranting treatment with intraventricular chemotherapy.

Intraventricular rituximab may demonstrate clinical benefit in the setting of relapsed or refractory CNS lymphoma. Rubenstein et al. conducted a phase 1 dose-escalation study of intraventricular rituximab in patients with recurrent CNS Non-Hodgkin's Lymphoma. Complete response and cytologic response were demonstrated in over 40 percent of patients. A subsequent phase 1 multicenter study evaluated the safety and efficacy of intraventricular rituximab in combination with methotrexate for relapsed or refractory CNS lymphoma. Patients receiving 25 mg of intraventricular rituximab twice weekly for 4 weeks achieved 75 percent complete cytologic response and 43 percent overall complete response. Over 150 doses of intraventricular rituximab were administered without serious toxicity.

Intrathecal methotrexate was not chosen for treatment of this patient due to concern for methotrexate pneumonitis. The patient was given one dose of liposomal cytarabine and then

started on a modified CALGB (Cancer and Leukemia Group B) regimen consisting of intravenous rituximab and temozolamide. Based on the results from the Rubenstein et al. studies, biweekly intraventricular rituximab was started sequentially with intraventricular cytarabine. Throughout ten weeks of therapy, the patient remained confused, unable to follow commands, and combative with little to no change in condition. Analyses of cerebral spinal fluids were negative for malignancy and infection throughout the duration of therapy. After completion of two cycles of intraventricular rituximab and cytarabine, CT findings showed improvement in areas of pathologic enhancement including the supratentorial white matter, brainstem and left cerebellum with persistent hypoattenuation and vasogenic edema. MRI findings showed a decrease in size from 13 mm to 7 x 5.5 x 5 mm of the right brainstem mass lesion and improvement in surrounding edema. This response was maintained for approximately ten weeks at which point there was progression, and the patient was offered hospice care.

Methods:

Results:

Conclusion:

Submission Category: Pain Management

Submission Type: Evaluative Study

Session-Board Number: 2-092

Poster Title: Evaluating pain medication use patterns in patients undergoing total joint replacement surgery following a preoperative pain education seminar compared to the standard-of-care

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Purpose: Postoperative pain following orthopedic surgery is consistently cited as prevalent and problematic. Furthermore, pain after joint replacement is frequently undertreated. These facts lead to significant patient fear regarding postoperative pain. Our institution and staff orthopedic surgeon utilize a guideline-recommended multimodal approach to pain management following total joint replacement procedures. Additionally, we offer a similarly recommended preoperative education session that establishes appropriate pain management expectations, stresses the importance of rehabilitative therapy, and describes the multimodal approach employed at our institution. Existing literature has established the utility of these sessions in reducing lengths-of-stay and composite pain scores.

Methods: A retrospective chart review was conducted to identify patients who underwent total joint arthroplasty of their knee, shoulder, or hip between June 1, 2016 and August 31, 2016 at our suburban, 72 bed acute care hospital. Patients were then separated into groups based on their participation in a voluntary pre-surgical education session. Medication administration records were reviewed to identify the number of doses of targeted pain management medications administered during a patient's stay. These agents included acetaminophen, celecoxib, cyclobenzaprine, diazepam, fentanyl, gabapentin, hydrocodone-acetaminophen, ketorolac, hydromorphone, meperidine, morphine, oxycodone, oxycodone-acetaminophen, pregabalin, tapentadol, and tramadol. Patient length-of-stay was also compared between groups. Due to its design, this study is exempt from institutional review board approval.

Results: The mean number of doses administered to patients who attended the educational session was 13.5 ± 6.24 compared to 12.75 ± 5.33 (P=0.35) among those who did not attend such a session. The mean length-of-stay in the experimental group was 2.33 ± 0.675 and 2.36 ± 0.574 (P=0.453) in the control group.

Conclusion: Attendance of a voluntary pre-surgical educational session did not impact the number of doses of pain management medications a patient utilized while admitted. Further, there was no statistically significant difference in lengths-of-stay between groups. Limitations within this design include poor participation in pre-surgical education and a small sample size.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Evaluative Study

Session-Board Number: 2-093

Poster Title: Serving the underserved population: A review of a community hospital prescription voucher program

Primary Author: Tyler Haney, University of Florida College of Pharmacy, Florida; **Email:** tylerdhaney@ufl.edu

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Purpose: A voucher program from Sarasota Memorial Hospital, a nonprofit hospital, offers free prescriptions for uninsured patients identified through case management. The voucher provides up to a 30-day supply. The hospital began participating in the 340B drug discount program in January 2015. In May 2016, it began participating in the contract pharmacy component of the program. This project was designed identify the disease states and the costs associated with those prescriptions by comparing the previously contracted price to 340B price. In addition, readmission rates of patients that received vouchers were assessed.

Methods: Prescriptions dispensed via the voucher program for patients 18 and older from January 1, 2016 to March 31, 2016 were reviewed after Institutional Review Board approval. Using retrospective chart review based upon the patients' hospital admission, the associated disease states and whether they were acute or chronic were identified. Patients were excluded if there was no disease state associated with the prescription. Readmission rates for these patients were reassessed after 30 days and 60 days. The previously contracted price of the prescriptions was compared to the 340B price during quarter three of 2016 and the prescription costs was ranked based on 340B price. The primary objective was to identify the disease states that present in our underinsured population and the costs associated with those disease states.

Results: Over three months, 204 patients received 529 prescriptions. Five disease states with the highest 340B prescription cost were identified: diabetes, asthma, heart failure, pneumonia, and deep vein thrombosis. There was a significant difference between the price of the previously contracted price and 340B price (p value less than 0.0001). There was no difference between readmission rates of acute and chronic conditions in either 30 day or 60 day

readmission rates (p values equal 0.45 and 0.46 respectively). The most common disease states to be readmitted were asthma and diabetes for 30 days, and asthma and COPD for 60 days. Only 57.2% of prescriptions associated with chronic disease states were written for a 30 days supply.

Conclusion: In the uninsured population that received prescription vouchers, diabetes, asthma, and COPD were the most frequently presenting conditions. Thirty and sixty day readmission occurred most often with asthma, diabetes, and COPD. These also represented the highest spending in the voucher program.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 2-094

Poster Title: Not so poor-phyria: Cost containment strategies for hemin

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Purpose: Medication costs and utilization continue to rise, greatly impacting pharmacy health system budgets. Developing cost management initiatives are integral in maintaining the financial performance of the pharmacy department. Although drug expenditures are important considerations, patient outcomes and quality of care remain the top priority. Acute intermittent porphyria is a rare disorder that affects the production of heme and is treated with an orphan drug called hemin. The usual treatment course includes 4-5 doses of hemin, each dose costing institutions nearly $7,000. This project was designed to assess potential solutions for hospitals caring for patients requiring this high cost medication.

Methods: The institutional ethics committee approved this retrospective medication review. Inclusion criteria consisted of patients who received hemin administration over the course of approximately 2.5 years. Patient data collected included dose of hemin and number of doses received. The total number of doses over this time period had a significant impact on the pharmacy department's drug expenditures. Potential resources were researched and examined to offset this drug cost. The 340B program was identified as a drug discount program that offers hemin at a significantly lower cost than hospital pharmacy department purchase price. Additionally, the manufacturer of hemin (Recordati) offers a patient assistance program for uninsured patients who require hemin administration.

Results: During the 2.5 year time period analyzed, 155 doses were received by 4 patients. The approximate drug cost was $1,000,000. On average, most patients received 4-5 doses during their hospital admission. The cost of receiving the same course of treatment through the 340B drug discount program can be as low as approximately $25. The potential savings for an institution are robust, approximately $30,000 per treatment course for the drug alone.

Recordati provides hemin at no cost for uninsured patients who meet pre-specified requirements.

Conclusion: Hemin administration is a costly treatment that has a significant impact on a pharmacy department's expenditures. Although substantial savings can be obtained through the 340B drug discount program or manufacturer patient assistance programs, the process of obtaining these discounts can be intricate and labor intensive. The information and resources identified may be beneficial for any hospital also facing the repeated use of a high cost drug like hemin.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-095

Poster Title: Evaluation of intravenous unfractionated heparin use at a community health system

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Purpose: A lot goes behind the safe use of heparin; it requires weight-based dosing, frequent monitoring through activated partial thromboplastin times (aPTT), and rate adjustments depending on what the aPTT labs are. The aim of this evaluation is to examine the use of heparin within the health system in order to see if nuanced changes to protocol and best practice alerts (BPAs) have resulted in a reduction in heparin administration errors and an improvement in time to 2 consecutive therapeutic aPTT values.

Methods: The institutional review board approved a retrospective chart review that will evaluate the usage of intravenous heparin infusions in patients within the Lee Memorial Health System. Data will be collected from a maximum of 120 patients that were admitted to Cape Coral Hospital, Gulf Coast Medical Center, HealthPark Medical Center, and Lee Memorial Hospital that received IV heparin during the period of April to May 2016. Patients will be included if they were above the age of 18 years and received heparin for more than 24 hours. 15 patients on low dose heparin drips and 15 patients on standard dose heparin drips will be analyzed per hospital. Potential patients will be analyzed for inclusion via a report generated through EPIC ProDiver. The primary outcome for this MUE will be the elapsed time (in hours) to get 2 consecutive therapeutic aPTT levels. Statistics for each observational data measure collected will be descriptive in nature only.

Results: The last heparin use evaluation was conducted in 2013, as a health system the time to two consecutive therapeutic aPTTs was 38.4 hours. After all the data was collected for the

current heparin use evaluation the time to reach two therapeutic aPTTs was calculated to be 31.7 hours, which is a 6.7 hour reduction.

Conclusion: Best practice alerts and nuanced changes to the heparin protocol did reduce the overall time to two therapeutic aPTTs within the health system. However, there were several areas identified that seemed problematic with heparin administrations, these areas will need to be addressed and solutions will need to be discussed in future evaluations.

Submission Category: I.V. Therapy/ Infusion Devices/ Home Care

Submission Type: Descriptive Report

Session-Board Number: 2-096

Poster Title: Establishing a comprehensive and efficient guideline for intravenous immune globulin preparation, dosage, and administration to be used by clinicians within a hospital setting.

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Purpose: Intravenous immune globulin is used to strengthen the body's natural defense system to decrease the risk of infection in persons with a weakened immune system. When given in the setting of hypogammaglobulinemia, antibody deficiency disorders, or other immunodeficiency states, intravenous immune globulin preparations act by providing antibodies against a broad range of pathogens. Currently, there are no specific guidelines published in the literature that outlines the appropriate administration and usage of immune globulin. This set of guidelines was created to provide clinicians with a quick and comprehensive reference on how to dose, prepare, and administer immune globulin.

Methods: A registered pharmacist with advanced clinical training in oncology devised an administration guideline and quick reference sheet for the appropriate preparation, dosage, and administration of intravenous immune globulin. The administration guideline includes appropriate evidence-based recommendations on rates of infusion, dose adjustments, and precautions with use. The quick reference sheet includes a list of popularly utilized immune globulin products and information outlining how the immune globulin product is supplied, infused, administered, dosed, and any additional notes regarding special populations and precautions to be taken. Additionally, a pharmacy student working with this pharmacist created an evaluation document to objectively determine the comprehensiveness and accuracy of these resources. This evaluation document was divided into multiple categories such as comprehensiveness, organization, and efficiency of use. Each category was graded with a corresponding numeric scale that represented the strengths or weakness of the resources. Clinicians were asked to appropriately identify patients that qualified for immune globulin therapy and properly categorize these patients according to patient specific factors (age,

immune status, pregnancy). The clinicians were then encouraged to use this guideline and reference sheet as their primary tool for decision making. Retrospectively, those who participated in using the guideline were given the evaluation form and asked to evaluate the overall comprehensiveness of these resources in aiding their ability to make clinical decisions regarding intravenous immune globulin usage.

Results: Two pharmacists successfully were evaluated after using the guidelines and reference sheets. Both pharmacists returned their evaluations and classified the documents as being comprehensive, organized, evidence-based, and efficient. All of the categories on the evaluation sheet received scores of five out of a possible five points. The clinicians using the document verbalized that they felt more comfortable using the comprehensive guidelines and planned to continue using the resources to make clinical decisions moving forward.

Conclusion: Comprehensive and efficient guidelines for intravenous immune globulin preparation, dosage, and administration proved to be a helpful tool in assisting specialized clinicians with their decisions making and may be a useful tool that can be expanded and utilized in additional practice settings within a hospital setting.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Descriptive Report

Session-Board Number: 2-097

Poster Title: Pharmacy impact on 30-day readmission rates: Collaboration in a Heart Function Clinic

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Purpose: Heart failure is a serious epidemic, affecting as many as 5.8 million people in the US and 23 million people worldwide. High readmission rates, especially within the first thirty days, for patients with reduced ejection fraction (≤ 40%) calls for special interventions to help combat this problem. Patients with heart failure would benefit from having an interdisciplinary team that specializes on all aspects of the disease. Pharmacist involvement in heart failure clinics aims to target medication management as well as lifestyle modifications.

Methods: A retrospective study conducted at a single institution, which targeted patients that were discharged from the hospital with a primary diagnosis of heart failure from between February 1, 2016 to May 31, 2016. Inclusion criteria included age ≥ 18 years of age, a primary diagnosis of heart failure, and receiving guideline appropriate therapy. Exclusion criteria include ejection fraction > 40%, ECHO results unavailable, patients not admitted to the hospital, and patients admitted for a planned procedure such as pacemaker placement. Data collection included patient information, any previous diagnosis of heart failure, comorbidities, ejection fraction, Heart Function Clinic follow up post discharge, and if patient was readmitted to the same hospital within 30 days.

Results: During the four-month study period, 257 patients were discharged from the hospital with a primary diagnosis of heart failure. 130 patients were excluded for the following reasons: EF > 40%, preplanned procedures, patients not admitted, and duplicate date entry. Of the 127 included in the analysis, 24 patients followed up in the Heart Function Clinic and 4 (16.7%) of these patients were readmitted within 30 days. Additionally, 25 patients (24.3%) were readmitted within 30 days that did not follow up with the Heart Function Clinic. This resulted in a 31.3% relative risk reduction (7.6% ARR) with regards to readmission rates within 30 days for patients with a clinic follow up compared to those without.

Conclusion: In heart failure patients with reduced ejection fraction, upon hospital discharge, follow up in an interdisciplinary Heart Function Clinic resulted in a lower readmission rate within 30 days compared to those who did not. Heart Function Clinics offer bridging between hospital discharge and follow up appointments with cardiologists. This is important because such appointments often do not occur within the first 30 days leading to higher readmissions. Pharmacy partnership in such clinics stands to have a positive impact. Between medication optimization and patient education, pharmacists can become a crucial member of the interdisciplinary team increasing patients' overall quality of life.

Submission Category: I.V. Therapy/ Infusion Devices/ Home Care

Submission Type: Case Report

Session-Board Number: 2-098

Poster Title: Potential risk of accidental and fatal 5-FU (Fluorouracil) toxicity in patients using infusion pumps

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Purpose: This case illustrates a potentially deadly drug overdose in a patient receiving a 5-FU (Fluorouracil) infusion for chemotherapy. The patient was a 69 year old female with a diagnosis of cancer of the appendix with peritoneal metastases and a BSA of 1.65 meters squared. She was initiated on Modified FOLFOX6 chemotherapy for cancer treatment. Modified FOLFOX6 consists of oxaliplatin 85 milligrams per meter squared IV over 2 hours concurrent with folinic acid 400 milligrams per meter squared IV over 2 hours followed by 5-FU (Fluorouracil) 400 milligrams per meter squared IV bolus on day 1, then 1,200 milligrams per meter squared per day times 2 days (total 2,400 milligrams per meter squared over 46 to 48 hours) IV continuous infusion. The cycle is repeated every 2 weeks. On Day 1 of Cycle 12 on 5/23/16, this patient received 5-FU (Fluorouracil) 400 milligrams per meter squared which equaled 660 mg IV bolus over 5 minutes followed by 5-FU (Fluorouracil) 2,400 milligrams per meter squared which equaled 3,960 milligrams at 30 milliliters per hour over 4.6 hours instead of 3 milliliters per hour over 46 hours. The infusion rate per hour was programmed incorrectly by the nurse at 30 milliliters per hour instead of 3 milliliters per hour and the infusion pump did not have safety options to prevent this error from happening. The WalkMed 350 VL infusion pump must be clicked once to erase the old rate and to bring the rate back to zero. If it is quickly clicked twice then it moves the decimal point to the right. The nurse entered the infusion rate per hour and quickly clicked twice to zero the pump, ultimately moving the decimal point to the right by mistake, and therefore entering the rate at 10 times the intended rate (30 milliliters per hour instead of 3 milliliters per hour). The patient was given the pump with the incorrect infusion rate and sent home for the night. The patient made a call to the emergency hotline that night at 2235 when she noticed the infusion stopped and the bag was empty. She was advised to call her physician immediately. The patient arrived at clinic the morning after her pump stopped

stating "the chemo on my pump completed last night." The pump was assessed and chemotherapy infusion had completed. The patient had turned the pump off and clamped the mediport line. The patient denied concerns or complaints, and just stated that she felt more fatigued than usual. The oncologist assessed the patient at chair side, pharmacy was made aware, and the patient was admitted to the hospital for supportive care and lab observation. The patient was started on uridine triacetate that night (05/24/2016) at 2000. The dose ordered was 10 grams given orally every six hours for a total of 20 doses. The last dose was given on 05/29/16 at 1400 and the patient was discharged with no overt problems from 5-FU (Fluorouracil) toxicity. She followed-up with the oncologist on Tuesday, 05/31/16. The pump manufacturing company was contacted and informed about the safety concern and they assured that they are working to develop a new pump that will have improved safety features. 5-FU toxicity is usually fatal as shown in the literature by other case reports. As this case suggests, WalkMed 350 VL infusion pumps, which are used commonly in many hospitals for drug infusion, have faulty safety options which make it simple for a decimal error to occur. It is imperative to double check infusion rate entry while using these types of pumps to prevent adverse or fatal medication related errors.

Methods:

Results:

Conclusion:

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-099

Poster Title: Evaluation of tolerability and side effects of inhaled epoprostenol in patients with high pulmonary arterial pressures

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Purpose: A preferred pharmacologic treatment for management of acute high pulmonary pressures after surgery includes the administration of inhaled nitric oxide (iNO) and inhaled epoprostenol (iEPO). iNO requires frequent monitoring, is associated with toxicity and is expensive compared to iEPO. Two formulations of iEPO are available, Flolan® (iFLO) and Veletri® (iVEL). Studies to date compare iNO to iFLO and show the inhaled prostacyclin is an alternative to iNO, but studies using iVEL are lacking. The purpose of this evaluation is to determine the tolerability and side effects of iVEL as an option for use in patients with high pulmonary pressures.

Methods: The institutional review board approved this single center, retrospective drug-utilization evaluation. The electronic medical record was used to report all patients who were administered iVEL over a total of thirteen months (June 1, 2015 through August 31, 2016). All patients who received the medication were included to determine the primary endpoint of adverse event rate. Adverse events were determined by evaluation of inpatient notes through the duration of medication administration including nursing, medical, physical therapy, surgical, respiratory, pharmacy and inpatient healthcare provider notes. Bronchospasm adverse events were determined by initiation of bronchodilator medication after iVEL initiation. Secondary endpoints were pulmonary arterial pressure, mean pulmonary arterial pressure, and cardiac index. Duration of therapy and length of hospital stay were also reported. The primary endpoint of adverse event rate, as well as patient sex and ethnicity, are reported as a percent. All other secondary endpoints and baseline characteristics are reported as a mean plus or minus standard deviation.

Results: Six patients over the time period received iVEL. Of the six patients, only one (16.67 percent) experienced an adverse event. The adverse event noted was nausea and vomiting and was non-life threatening. No patient experienced life-threatening adverse events from the administration of iVEL, and no patients experienced bronchospasms. The average duration of therapy was 79 hours (median equals 82 hours). The average baseline pulmonary arterial pressure (mPAP) prior to iVEL initiation was 40.0 mmHg plus or minus 11.53 mmHg, while the average mPAP throughout the duration of medication administration was 26.97 mmHg plus or minus 8.72 mmHg.

Conclusion: The tolerability of iVEL is favorable and the side effects observed in this study proved to be non-life threating and amendable. Only one patient had an adverse event, the medication was continued and the reaction was treated with appropriate nausea medication. This evaluation shows that this medication is well tolerated, however larger evaluations over a more diverse population would be beneficial.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 2-100

Poster Title: Review of antimicrobial stewardship in a level III neonatal intensive care unit (NICU)

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Purpose: The University of Florida Health (UF Health) neonatology service began an antibiotic monitoring team in 1988 aiming to decrease antibiotic use and resistance. The neonatology providers believe that antimicrobial use should be formally reexamined and consequently enrolled in the Vermont Oxford Network (VON) for their 2016 continuous quality improvement initiative "Using Antibiotics Wisely." The initiative's long-term goal is to increase knowledge among staff and parents on best antibiotic practices and decrease the use of antibiotics. The objective of this study is to determine the baseline characteristics of antibiotic use in the NICU at UF Health before the VON initiative.

Methods: We compiled a 3-month retrospective review from November 1, 2015 to January 31, 2016 to determine pre-VON initiative characteristics for use of antibiotics in the UF Health Jacksonville NICU. Patient charts were reviewed in the electronic health record, and data was recorded regarding gestational age, gender, antibiotic agents used, indications for antibiotic use, number of antibiotic courses, culture results, and laboratory values including white blood cells (WBC), band neutrophils, platelets, and C-reactive protein (CRP) at the time of antibiotic initiation. The mean gestational age, percentage of males and females, mean number of antibiotic courses per patient, mean duration of antibiotic course, mean WBC, mean percentage of band neutrophils, mean number of platelets, and CRP range, was determined. The percentage of antibiotic courses for each indication out of the total number of courses was also determined. The percentage of courses lasting greater than 48 hours and percentage of courses lasting greater than 48 hours with positive cultures for all indications and for sepsis rule out only were determined. Days of therapy (DOT) were also determined and the antibiotic

utilization rate (AUR) was calculated as DOT divided by census for the same time period multiplied by 100 to equal 100 patient days.

Results: A total of 93 babies were reviewed with 56.99 percent males and an average gestational age of 31 weeks 5.5 days. Subjects received a total of 221 courses of antibiotic treatment with 940 DOT equaling an AUR of 26.8 (DOT/100) patient days. Each patient received an average of 1.16 antibiotic courses with average course duration of 4.52 days. The mean baseline WBC and platelets were 12.35 and 242.58 thousand per cubic millimeter, respectively. Mean percent of bands was 7, and baseline CRP ranged from 0.2 to 223.8 milligrams per deciliter. Of the antibiotic courses, 79 percent were indicated for sepsis rule out. 41.12 percent of courses had duration greater than 48 hours, and 27.27 percent of these had positive cultures. Of the positive cultures lasting greater than 48 hours, 25 percent were indicated for sepsis rule out. A total of 88 percent of antibiotic courses had negative culture results.

Conclusion: These pre-VON initiative baseline characteristics show that antibiotic use in the NICU needs to be reduced. This baseline data indicates that an antimicrobial stewardship initiative is necessary. This will provide a baseline for post-VON initiative data to be compared to in order to assess whether the initiative was successful in reducing antibiotic use in the NICU.

Submission Category: Infectious Diseases

Submission Type: Case Report

Session-Board Number: 2-101

Poster Title: Virologic outcomes of antiretroviral therapy in human immunodeficiency virus (HIV) infected patients following bariatric surgery: A case series

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Purpose: Alterations in the surface area and pH of the gastrointestinal tract following bariatric surgery may impact absorption of antiretroviral therapy (ART) and ultimately, virologic suppression. Data on the efficacy and tolerability of ART in HIV-infected patients who have undergone bariatric surgery are limited or lacking for newer antiretrovirals, such as dolutegravir (DTG). The aim of our analysis was to assess virologic suppression and ART tolerability following bariatric surgery. We report a retrospective case series of 7 morbidly obese HIV-infected patients receiving ART who underwent bariatric surgery. Of the 7 patients identified with a median treatment duration of 9 months, 3 underwent sleeve gastrectomy and 2 each underwent gastric banding or bypass. Virologic suppression was achieved with 8 out of 9 ART regimens (88.9%) administered following bariatric surgery with 1 patient experiencing virologic failure due to ART-intolerance (nausea/vomiting) requiring ART change. Six patients were on DTG-containing regimens and all achieved virologic suppression. In this case series, the majority of ART regimens administered after bariatric surgery were well-tolerated and effective in achieving virologic suppression. This is the first reported data on the efficacy of DTG-containing regimens in patients who have undergone this procedure. Further studies are needed to determine the pharmacokinetic and long-term virologic effects of ART following bariatric surgery.

Methods:

Results:

Conclusion:

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 2-102

Poster Title: Management of hypokalemia in post open heart surgical patients on continuous furosemide infusion

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Purpose: Patients undergoing cardiac surgery are at increased risk of experiencing hemodynamic instability, defined as systolic blood pressure less than 90mmHg or heart rate less than 60 or greater than 80 beats per minute. Furosemide infusions are used to maintain urine output and prevent edema; however, furosemide can lead to hypokalemia which can contribute to hemodynamic instability. The purpose of this study is to determine the incidence of mild (3.6 to 4 millimoles per liter), moderate (3.1 to 3.5 millimoles per liter), and severe (less than or equal to 3 millimoles per liter) hypokalemia and evaluate adherence with potassium replacement protocol.

Methods: The institutional review board at Sarasota Memorial Hospital approved this retrospective chart review study. The inclusion criteria for the study were post-cardiac surgery adult patients on a furosemide infusion who had at least one potassium level drawn during the infusion. There were no exclusion criteria. Data was collected from August 2015 to March 2016. The primary outcome of the study was to determine the incidence of hypokalemia (mild, moderate, and severe) in patients on a furosemide infusion. The secondary outcomes were to assess compliance with the potassium replacement protocol which included the number of potassium replacement doses given and the number of follow-up levels obtained, and to evaluate the incidence of hemodynamic instability while patients were hypokalemic.

Results: Of the 23 patients included in this study, 20 (87 percent) experienced hypokalemia while on a furosemide infusion. Of the 126 potassium levels drawn, 87 (69 percent) were low

and required replacement: mild 56 (64 percent), moderate 29 (33 percent), and severe 2 (2 percent). Adherence with the protocol was determined as follows: 81 of 89 (91 percent) replacement doses were given, repeat levels were obtained 39 percent of the time, and the majority of follow-up levels, 33 of 39 (85 percent), remained low. Fourteen of 20 patients (70 percent) experienced hemodynamic instability while hypokalemic on furosemide infusion.

Conclusion: Based on the results, the recommendations will be to add scheduled oral potassium doses, increase the doses in the replacement protocol, and start furosemide infusions only when potassium levels are greater than 4 millimoles per liter.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 2-103

Poster Title: Evaluation of a pharmacist led QTc interval monitoring program in high-risk patients

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Purpose: Medications that prolong the QTc interval are commonly used in the hospital setting. Patients are often placed on two or more of these medications during a hospitalization. Pharmacists do not routinely monitor the QTc interval in high-risk patients. The purpose of this study was to implement and evaluate the effectiveness of a QTc interval informatics alert and monitoring protocol. Effectiveness will be measured by number of abnormal intervals discovered, interventions made, and outcomes of these interventions.

Methods: Using Sentri-7 Software, a dashboard item was created that would generate a real-time list of patients that are on two or more selected QTc prolonging medications. Due to limitations in code capacity, twenty formulary medications were selected that have proven or probable risk of QTc prolongation. The medications selected were those that have a high degree of severity or incidence of QTc prolongation and that are commonly used in this institution. The QTc interval, as reported by the ECG technician, was recorded daily for a period of 5 weeks. The QTc interval was calculated following Bazett's formula. Interventions were made by the pharmacist based on the QTc interval that was calculated.
If the QTc interval was between 0.43s to 0.45s for males and 0.45s to 0.47s for females, it was considered borderline and these patients received continued daily monitoring. If the QTc interval was greater than or equal to 0.45s for males and greater than or equal to 0.47s for females, it was considered abnormal and these patients received interventions as deemed clinically appropriate and continued daily monitoring. If the QTc was greater than 0.5s, in either males or females, an intervention was made in order to remove a QTc prolonging medication or reduce the dose. Patients with atrial fibrillation were excluded from this program due to the high variability of readings in these patients.

Results: Out of ninety QTc intervals calculated, 49% were in the borderline or abnormal ranges, with the majority (79%) in the abnormal range. Eight readings above 0.5 seconds were discovered which required immediate interventions. No patients suffered arrhythmias related to QTc prolongation while on this monitoring program. The average was 2.7 medications that prolong the QTc interval per patient. The medications that appeared most for all high-risk patients were levofloxacin, citalopram, and amiodarone. Twelve interventions were made as a direct result of this monitoring program and included: discontinuing medications, making therapeutic interchanges, lowering doses of medications, and adding telemetry monitoring. These interventions were 91% successful in lowering the QTc below 0.5 seconds. One patient required two interventions to achieve a QTc below 0.5 seconds.

Conclusion: This program was successful in allowing pharmacists to monitor QTc interval in high-risk patients based on the numerous abnormal readings found and interventions made. The informatics alert and monitoring protocol were integral in identifying patients at risk for arrhythmias and aiding pharmacists to make meaningful interventions. This alert and protocol have proven to be useful to direct pharmacists' attention to the most at-risk patients, decreasing the risk of serious and fatal arrhythmias. This is a new clinical opportunity for pharmacists to provide patient care that may have life-saving results. These results are hypothesis generating for future research into pharmaceutical monitoring.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 2-104

Poster Title: Computer system creatinine clearance calculation assessment

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Purpose: Clinicians, including but not limited to physicians, pharmacists, and nurse practitioners, routinely use healthcare facility computer systems' patient creatinine clearance (CrCl) output to assess patient renal function, and to adjust medication doses to prevent toxic overdosing or suboptimal underdosing of medications. At many facilities, both inpatient and outpatient clinicians trust facility laboratory reported CrCl as the best available estimate of patient renal function.
The purpose of this study was to compare an inpatient institution computer system's patient CrCl output to pharmacy's patient CrCl algorithm output, and to assess the potential impact of these disparities on appropriate medication renal dosing.

Methods: This research was an ethics committee approved, randomized, observational quality improvement study. Data was collected from a randomized sample of 159 patients, including male and female adult patients, and excluding pregnant and trauma patients; patients without an available computer system calculated CrCl were also excluded. Computer system Sunrise Clinical Manager's CrCl output, "SCM-CrCl", was compared to clinical pharmacy's CrCl algorithm output, "Pharmacy-CrCl".
The SCM-CrCl calculation utilized ideal body weight (IBW) within the Cockcroft-Gault CrCl calculation, and did not implement clinical adjustments for overweight or geriatric patients. The Pharmacy-CrCl algorithm also utilized IBW within the Cockcroft-Gault formula, additionally adjusting for both weight and age to aim for a more accurate patient renal function estimate. Actual body weight was used for patients weighing at least 20% below IBW, and adjusted body weight was used for patients weighing at least 20% over IBW. Serum creatinine (SCr) was adjusted via a rounding algorithm in geriatric patients aged at least 65 years.
A sample of medications which may have dangerous adverse effects if overdosed or underdosed (levofloxacin, ciprofloxacin, dabigatran, and rivaroxaban) were hypothetically assigned to each patient. The primary endpoint was cumulative SCM-CrCl renal dosing error rate, measured by total disparities between SCM-CrCl directed and Pharmacy-CrCl directed

medication doses. CrCl differences between SCM-CrCl output and Pharmacy-CrCl output, regardless of whether these differences resulted in medication dosing disparities, represented secondary endpoints.

Results: Patient demographics included 48.4% geriatrics, 58.5% males, and 41.5% females. Regarding the primary endpoint of cumulative SCM-CrCl renal dosing error rate, the individual medication dosing error rates were as follows: levofloxacin 6.92%, ciprofloxacin 8.18%, dabigatran 2.52%, and rivaroxaban 5.03%. The cumulative total SCM-CrCl medication renal dosing error rate was 22.65%, only taking these four medications into account.
Regarding secondary endpoint differences between SCM-CrCl output and Pharmacy-CrCl output, the SCM-CrCl overdose risk (percentage amount of SCM-CrCl values at least 5% above Pharmacy-CrCl) was 18.87%, and the SCM-CrCl underdose risk (percentage amount of SCM-CrCl values at least 5% below Pharmacy-CrCl) was 54.09%. SCM-CrCl output ranged from 73.36% below Pharmacy-CrCl output to 48.76% above Pharmacy-CrCl output. The Pharmacy-CrCl algorithm made adjustments for geriatric patients in 28.30% of the sample, whereas the SCM-CrCl calculation made zero adjustments in this patient subgroup to decrease the risk of geriatric medication overdose. Additionally, the Pharmacy-CrCl algorithm made adjustments for underweight patients in 3.14% of the sample, and also made adjustments for overweight patients in 52.83% the sample, while the SCM-CrCl calculation made zero adjustments in the overweight patient subgroup to decrease the risk of suboptimal renal dosing in overweight patients.

Conclusion: The computer system's SCM-CrCl led to a cumulative medication dosing error rate of 22.65%, as compared to Pharmacy-CrCl medication dosing. This statistic considers only four medications, which is just a small sampling of the multitude of medications that require renal dose adjustments; therefore, SCM-CrCl may actually lead to an even greater cumulative medication dosing error rate, which may endanger patients.
To ensure patient safety by decreasing this dangerous risk of inappropriate medication dosing, which could lead to potentially fatal adverse events, the researcher suggests that pharmacy collaborate with information technology (IT) to refine the computer system's clinical CrCl calculation algorithm.

Submission Category: Infectious Diseases

Submission Type: Case Report

Session-Board Number: 2-105

Poster Title: Reactivation of chronic Chagas disease post heart transplant: Implications of therapeutic management

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Purpose: Chagas disease (American Trypanosomiasis) is a disease that affects 8-11 million people worldwide and approximately 300,000 people in the United States. It is caused by infection with Trypanosoma cruzi, commonly acquired in the Americas by vectorborne transmission via insects called the triatomines that act as vectors for the protozoan parasite. The disease can also result from congenital transmission, transfusion of contaminated blood products, and transplant from an infected donor. Chagas disease has two phases, acute and chronic. Many patients with chronic Chagas disease are unaware of their infection and remain asymptomatic. Reactivation of chronic Chagas disease can occur if infected individuals become immunocompromised. There are currently only two treatment options available for Chagas disease, benznidazole and nifurtimox. Although these medications have been used for more than 30 years in Latin America, they are not FDA approved and are available in the United States only from the Centers for Disease Control and Prevention (CDC) for use under an Investigational New Drug (IND) protocol for compassionate treatment. The patient presented in this case review is a 61 year old female, originally from Brazil. Infection with T. cruzi was hypothesized to have occurred through vectorborne transmission during the time she lived in Brazil or through congenital transmission. The patient moved to the United States and developed severe chagasic cardiac disease during the 40 years she resided here. In November 2015, she received a heart transplant and was treated with anti-rejection medication, including tacrolimus. Serial PCR testing was performed weekly after the procedure to detect presence of T. cruzi genome in the peripheral blood; increasing levels were detected starting two weeks post-transplant, leading to the diagnosis of reactivation of Chagas disease. Staff at CDC's Parasitic Diseases Branch authorized the release of benznidazole by CDC's Drug Service and the patient was started on benznidazole 150 mg twice a day for 60 days. During this time, the patient was monitored closely to determine the safety and efficacy associated with

benznidazole treatment. Testing by T. cruzi PCR reverted to negative by week two of treatment and remained negative two months after completion of therapy. Adverse side effects reported by the patient included fatigue, malaise, and anorexia, which resolved four weeks post-treatment. Nausea, disorientation, and an abnormal taste were also reported and these symptoms did not resolve four weeks post-treatment. Patient also reported severe, painful, bilateral peripheral neuropathy below the knees. This side effect is frequently reported with benznidazole treatment and the severity of the symptoms sometimes leads to discontinuation of the medication or therapeutic management of the symptoms. The patient was started on gabapentin therapy and the symptoms resolved approximately 5 weeks into therapy. The patient also experienced a venous clot while on benznidazole therapy. Consideration of treatment options for this condition proved to be difficult as there is not sufficient relevant published information discussing the use of new oral anticoagulants (NOACs) with benznidazole. In order to avoid possible drug-drug and drug-disease interactions, warfarin therapy was recommended for this patient to properly monitor how it would react with the patient's anti-rejection medication as well as her benznidazole treatment. The patient completed treatment for reactivation of Chagas disease early in 2016 with no further complications, other than the ones listed above. Although most health care providers are not familiar with Chagas, there is growing awareness of the disease. This patient case presented a challenge and an opportunity for pharmacists to use their knowledge and clinical experience to determine appropriate medication management strategies.

Methods:

Results:

Conclusion:

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Descriptive Report

Session-Board Number: 2-106

Poster Title: Using discount drug lists to promote patient access

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Purpose: More than 1-in-6 patients report high drug costs as a barrier to medication access.1 Discount medication lists aim to remedy barriers to therapy by offering affordable prescriptions to uninsured patients at outpatient pharmacies. Furthermore, 90-day supplies of chronic medication have been attributed to high rates of adherence due to increased convenience. The purpose of this poster is to describe updating and expanding, then assessing utilization of the new Medication Access List to include more medications and offer 90-day supplies to patients at 11 outpatient pharmacies operated by the Johns Hopkins Outpatient Pharmacy (JHOP) department.

Methods: The approach we took to expanding access included: considering medications currently available in the market place on discount lists, gathering feedback from stakeholders across the health system to identify patient need, assessing long-term financial sustainability. The first step in updating the discounted list was to assess the current list offered by the Johns Hopkins Outpatient Pharmacy department and compare the market offerings of other retail pharmacies. Based on this comparison, a preliminary list of medications was created as a basis for the new medication list. Purchasing information was used to determine which medications could be offered at a discount to patients while providing financial sustainability to the pharmacy department. Finally, several medications were added despite not meeting our predefined performance measures to ensure the list reflected the needs of the patient population. Promoting the list to patients in need took place by communicating directly to patients, and to other stakeholders in the health system (e.g., physicians, nurses, social workers). Data analysis is in-progress to determine use of the new list and patient savings.

Results: A market comparison of several pharmacy chains led to a preliminary medication list of 222 items. Through an analysis of the market, an assessment of financial viability, and

stakeholder feedback, a new medication list of 207 items was developed, offering most medications in both 30- and 90-day supplies. In total, 44 medications were subtracted from the original list and 84 medications were added. Large increases were seen in the number of medications added in several categories, including a net increase in heart and blood pressure medications by 25 medications, arthritis/pain by 13 medications, and diabetes by 7 medications. Data collection is in-progress to determine use of the new list and patient savings

Conclusion: By performing a market comparison of pharmacy discount medication lists followed by a financial analysis to determine economic feasibility, patient access to commonly used generic medications was increased by updating and increasing the medications offered by the outpatient pharmacies operated by the Johns Hopkins Outpatient Pharmacy department.

Submission Category: Ambulatory Care

Submission Type: Case Report

Session-Board Number: 2-107

Poster Title: Risk of euglycemic diabetic ketoacidosis in a patient treated with sodium-glucose co-transporter 2 inhibitor for diabetes

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Purpose: This case highlights the risk of euglycemic diabetic ketoacidosis (euDKA) in a patient treated with a sodium-glucose co-transporter 2 (SGLT-2) inhibitor. The patient is a 78-year-old African American male with a past medical history of type 2 diabetes x 18 years, hypertension, nephrotic syndrome, and a history of venous thromboembolism. He has previously tried numerous sulfonylureas and insulin therapy during his course of treatment but discontinued when his diabetes was better controlled. His A1C goal was set at < 8% due to multiple coexisting chronic illnesses, and past surgical history of amputation, vascular surgery, thrombectomy, stent placement, eye surgery, and foot surgery. While taking metformin 850mg by mouth twice daily, sitagliptin 100mg by mouth daily, and pioglitazone 30mg by mouth daily, the patient still had not reached his goal A1C. With an A1C of 9.9%, canagliflozin 100 mg PO daily was prescribed by the provider. Two weeks later, pioglitazone was discontinued, sitagliptin and metformin were combined, and canaglifozin was increased to 300 mg PO daily by the clinical ambulatory pharmacist. A basic metabolic panel (BMP) and c-peptide were also ordered during the encounter; all labs came back within normal limits. During his two week follow up, the patient complained of hematuria, diarrhea, fatigue, and weakness. The urine analysis (UA) returned negative for red blood cells, however it did reveal trace ketones. BMP also revealed low bicarbonate (12 mEq/L), anion-gap metabolic acidosis (23 mEq/L), and a normal BG level (133 mg/dL). Canagliflozin was subsequently discontinued as it was the suspected offending agent for the euDKA and a repeat UA, BMP was ordered.
The Food and Drug Administration's (FDA) safety announcement released in May 2015 stated that use of SGLT-2 inhibitors may be associated with diabetic ketoacidosis (DKA). This was based on 20 reports of DKA in patients that were treated with SGLT-2 inhibitors from March 2013 to June 2014. The majority of cases were in type 2 diabetics (T2D) with only a slight

increase in blood glucose, suggesting euDKA, but not clearly defined. DKA is typically characterized by increased blood glucose levels (> 250 mg/dL), high anion gap, ketonemia, and ketonuria. According to the latest European Medicines Agency announcement on June 12, 2015, there was a total of 101 cases of DKA in T2D patients treated with SGLT-2 inhibitors reported worldwide in the EudraVigilance adverse event reporting system as of May 2015. This announcement mentions that all of the cases required hospitalization and a number of them were euglycemic with only a moderate increase in blood glucose. A meta-analysis by Erondu et al. assessed 15 randomized, controlled studies of canagliflozin to determine the incidence of serious adverse events of DKA in patients with T2D. This analysis included 17,596 patients and found that 0.07% (n=12) of the patient population experienced a serious DKA event. Additionally, only 0.017% of the patients (n=3) had a euDKA event with a blood glucose level of < 250 mg/dL. This study suggests that DKA occurs at a low rate in T2D patients treated with canagliflozin, and euDKA has an even lower rate of occurrence. Although the currently available evidence suggests that the rate of euDKA in patients with T2D is very low, patients and healthcare providers need to be educated about this issue since it is serious and life threatening. Since a precipitating factor includes the discontinuation or inadequate use of insulin therapy, ordering c-peptide routinely prior to initiating SGLT-2 inhibitors may be warranted if patient is not currently on insulin therapy. Most importantly, educating the patient to monitor for signs and symptoms of DKA such as nausea, vomiting, abdominal pain, difficulty breathing, confusion, and unusual fatigue is vital.

Methods:

Results:

Conclusion:

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 2-108

Poster Title: Pediatric immunization: Resources used to seek information, and their influence on the decision-making process

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Purpose: The frequency of parents refusing to vaccinate their children is continuing to increase, and misinformation from the media and other sources is perpetuating this choice. An increasing reliance on online sources for health information makes it difficult for pharmacists and other healthcare providers to dispel rumors about immunizations without knowing whether or not the information that is causing concern is accurate. The purpose of this study is to determine which resources are most frequently used by parents/caregivers seeking information about pediatric immunizations, and to evaluate how much influence these resources have on the decision-making process of parents/caregivers.

Methods: This study is a qualitative observational cross-sectional survey, and has obtained Institutional Review Board (IRB) approval. A questionnaire was created and administered to a randomly selected sample of men and women, and an agreement of consent was collected for every participant that submitted a response. In order to be included in the study, participants had to be 18 years of age or older, and incomplete responses were excluded from the data set. The questionnaire included both open-ended and close-ended questions and was administered via Qualtrics Survey Software. The study and survey were advertised through different social media posts including Facebook, Twitter, LinkedIn, and Reddit. Completed questionnaires were received via Qualtrics Survey Software and checked for completeness. Inclusion/exclusion criteria were applied, and all completed surveys were logged into an Excel spreadsheet. Preliminary statistical analyses of the data included mean average of baseline characteristics to quantify the patient population, and percent agreement with survey questions.

Results: A total of 137 responses were received, with 111 (81 percent) of the participants being female and 26 (19 percent) male. The mean age was 53 years old and 97 (70 percent) of the participants were Caucasian. Doctor's offices and medical websites were the most frequently used sources for vaccine information, with 97 (78 percent) and 87 (64 percent) respectively. Approximately 61 (45 percent) of the participants considered pharmacies as their primary source of information. Schools, friends/family, television, and newspapers were not reported to be used as a primary source of information. "Reliability of Social Media" was measured on a scale of 1 to 5, with 1 being "not reliable at all" and 5 being "very reliable". This resulted in an average rating of 1.77. Among various common concerns for participants, the most noted were concerns regarding ingredients found in vaccines and possibility of autism.

Conclusion: Parents/caregivers are turning to multiple sources to obtain immunization information. Understanding which health information resources are used by caregivers, and how much they trust that information, is crucial for health care practitioners in order to determine the most effective and empathic way of providing education. This study revealed that pharmacists are one of the most reliable and frequented sources for immunization information. This further supports how profound an opportunity exists for pharmacists to educate patients and address any potential concerns they may have regarding pediatric immunizations.

Submission Category: Critical Care

Submission Type: Case Report

Session-Board Number: 2-109

Poster Title: Sugammadex for the reversal of residual neuromuscular blockade after neostigmine administration

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Purpose: Neuromuscular blockers are commonly used to facilitate intubation, optimize surgical conditions, and ensure fewer complications. However, studies have demonstrated that neuromuscular blockers are associated with negative and lingering side effects and can result in residual neuromuscular blockade in the recovery room. For decades, neostigmine has been utilized for the reversal of non-depolarizing neuromuscular blockers. However, a newly approved drug, sugammadex, is now also commonly used for the reversal of neuromuscular blockade induced by rocuronium and vecuronium in adults undergoing surgery. This case illustrates the potential use of sugammadex for adequate recovery of residual paralysis after neostigmine administration has resulted in residual neuromuscular blockade. The patient is an 89-year-old female admitted for a computerized tomography guided right lung biopsy due to a lung mass. She is 156.2 centimeters tall and weighs approximately 50 kilograms. She has a past surgical history of tonsillectomy and adenoidectomy, as well as thyroidectomy. She reports no prior reactions to anesthesia but states that her father once became apneic after it's administration. On the day of surgery, the patient received ondansetron 4 mg IV preprocedurally. The patient was intubated by anesthesia and received the following drugs: midazolam 2 mg IV, lidocaine 40 mg IV, propofol 100 mg IV, and rocuronium 30 mg IV. The patient also received continuous oxygen and 75 mcg of IV fentanyl spaced out into 3 doses throughout the procedure. The patient was on a continuous electrocardiogram and remained in sinus rhythm throughout the procedure. After the completion of the procedure, the patient was given neostigmine 2 mg IV, glycopyrrolate 0.4 mg IV, and ondansetron 4 mg IV. The patient was then extubated and received by the post-anesthesia care unit for recovery. Although her oxygen saturation remained at 100%, the patient remained unresponsive. She displayed no movement, was unable to speak, and displayed total sensory loss. Her score was a 35 on the

National Institutes of Health Stroke Scale and therefore a stroke alert was called. The patient was taken to receive a computed tomography scan of her head by the emergency response team. A stroke was ruled out as the scan only showed age related atrophy. The patient was transferred to the emergency department as part of the admission process and although there were hopes that she would awake, she began to deteriorate. She required more oxygen as her oxygen saturation began to trend downward, reaching 91%. The decision was made to intubate the patient and transfer her to the intensive care unit. It is at this time that the pharmacy team in the emergency department decided to intervene. Studies have demonstrated that sugammadex is faster than neostigmine in achieving recovery from rocuronium neuromuscular blockade. Sugammadex has also been shown to reduce the incidence of residual blockade compared to neostigmine in the operating room. The pharmacy team presumed that the patient was experiencing residual neuromuscular blockade and recommended the use of sugammadex for moderate block. The physician agreed to their recommendation and the family was made aware of the situation. The pharmacy team rushed to the pharmacy and retrieved a vial of sugammadex 200 mg/2 mL. The patient was given a dose of 100 mg/1 mL IV by her nurse and monitored for side effects. Within 15 minutes the patient's oxygen saturation had reached 99% and she was talking, alert, and oriented. As this case illustrates, sugammadex may have the potential to reverse persistent neuromuscular blockade, prevent intubation, and aid in patient outcomes. However, further research and clinical trials are needed to demonstrate the safety and efficacy of sugammadex for the reversal of residual neuromuscular blockade after neostigmine administration.

Methods:

Results:

Conclusion:

Submission Category: Automation/ Informatics

Submission Type: Evaluative Study

Session-Board Number: 2-110

Poster Title: Attitudes and perceptions regarding patient centered mobile health applications supporting dynamic, interdisciplinary interventions

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Purpose: Mobile health (mHealth) technologies provide unprecedented opportunities for patients to actively take charge of their health. These applications give healthcare providers the ability to monitor and observe changes and trends of key markers in patients with chronic diseases. Pharmacists and physicians may capitalize on rich, longitudinal data by mining for actionable insights in the context of patient centered, interdisciplinary interventions. The purpose of this study was to assess patients', pharmacists', and physicians' attitudes and perceptions within USF Health towards mHealth applications that support dynamic, interdisciplinary interventions.

Methods: The institutional review board approved this survey assessment. Eligible participants age 18 and older were recruited and enrolled following a waiver of informed consent. Surveys were developed based on the Agency for Healthcare Research and Quality's (AHRQ) Health (Information Technology) IT Survey Compendium, administered via Qualtrics, and distributed electronically to conduct a descriptive assessment. Three different surveys were created and distributed to each study population (i.e. patients, physicians, and pharmacists). A 7-point Likert scale (1 = absolutely disagree, 7 = completely agree) was utilized to address areas of use related to willingness and ability, comfort, frequency, and sharing of information. The primary outcome was to provide an analysis of these survey questions. Statistical analysis was conducted in Microsoft Excel 2016 with Real Statistics Resource Pack add-in.

Results: Among the 26 total participants, 44 percent of physicians are completely willing to recommend a mHealth application (n=16), 100 percent of patients agreed they are willing to use an mHealth application to collect their health information (n = 4), and 83 percent of

pharmacists feel that they have the proper knowledge to interpret and evaluate mHealth data (n=6). The Mann-Whitney U test was used to compare physician and pharmacist willingness to recommend applications, access data, use and input data, and allow patients to have more responsibility for their health. There were no significant differences in median response to each item (U and U critical values were 38 and 21, 46 and 21, 38 and 21, and 39.5 and 21, respectively). When asked about their ability to use mHealth applications, no significant difference was found in any of the questions on the survey related to this measure including: understanding what mHealth is and why it is important, having the proper knowledge to evaluate data from a mobile application, and believing their patients have adequate health literacy to use mHealth (U and U critical values were: 32.5 and 21, 34.5 and 21, and 22.5 and 21).

Conclusion: These results indicate strong positive attitudes and perceptions towards mHealth applications in clinical practice with a strong willingness and ability to partake in such an opportunity by both physicians and pharmacists.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-111

Poster Title: Evaluation of timing of culture collection to determine need for antibiotic stewardship program at a small regional health center.

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Purpose: At least two million people become infected with antibiotic resistant bacteria annually. According to the CDC, some of the best ways to combat such resistance are to order cultures before antibiotics are given, and start drugs promptly. Make sure indication, dose, and expected duration are specified in the patient records. It is also important to reassess antibiotic treatment within 48 hours and adjust the antibiotic if necessary or stop the antibiotic if indicated. This study was done to review procedures at Newman Regional Health in terms of culture collection to determine the need of an antibiotic stewardship program.

Methods: Retrospective review of inpatient charts. The inclusion criteria were patients who received one or more of the following antibiotics over the course of March 1st – August 31st 2016:
Ampicillin, Ampicillin/Sulbactam, Nafcillin, Zosyn, Cefazolin, Ceftriaxone, Cefepime, Aztreonam, Meropenem, Ertapenem, Levofloxacin, Doxycycline, Azithromycin, Gentamycin, Vancomycin, and Daptomycin.
The exclusion criteria were patients under the age of 18; cultures drawn more than 7 days before or after antibiotic therapy; and patients seen as outpatient treatment, same day surgeries and wound care. There were 33 cases of patients whose files could not be accessed in MediTech because their last stay fell out of the previous 6 months range at the time of information retrieval.
The study entailed whether or not cultures were collected and if so, were cultures drawn before or after start of antibiotic regimen. Length of antibiotic use was also recorded. From this information, estimated costs were calculated based on pharmacy contract prices obtained on September 22nd, 2016. Each estimated dose was calculated by cost per vial plus an overall charge of $50 for the IV supplies. Estimated total and average cost per admission were based

on the assumption that current dosing guidelines from Lexicomp were followed. Appropriate changes to antibiotic therapy based on the cultures were assumed in terms of de-escalation and discontinuation. A further study would need to take place to test these assumptions.

Results: There were a total of 684 admissions that fell under the study parameters. The total number of antibiotics used was 1,021 which averaged to 1.49 antibiotics per admission. Out of the sixteen antibiotics monitored, six of them were used more than 10% of the time. These were: Ceftriaxone (34.94%), Levofloxacin (19.88%), Cefazolin (16.52%), Azithromycin (16.37%), Vancomycin (16.08%), and Zosyn (12.57%). All of these antibiotics have broad-spectrum coverage, except for Vancomycin. The estimated total cost was $344,008.53. The estimated average cost per admission ranged from Ampicillin at $64.40 to Daptomycin at $2,343.03 per admission. Out of 684 admissions, 115 (17%) did not receive any cultures. Out of the 684 admissions, 47 (7%) cases did not have a blood culture drawn. Of the cases where blood cultures were drawn, 324 (47%) were taken before start of antibiotics. Out of these cases, 313 (46%) cases had blood cultures drawn after start of antibiotics. Other cultures included CSF, joint fluid, nasal/respiratory panels, sputum, stool, urine, and wound samples. Of the 684 cases, 224 (33%) did not have these cultures collected. Of those collected, 265 (39%) were collected before start of antibiotics while 195 (29%) cases had these cultures drawn after start of antibiotics.

Conclusion: Almost all of the antibiotics used were broad spectrum or powerful antibiotics. Although most antibiotic regimens involved culture samples, less than half were drawn before start of therapy. This conclusion does not account for prophylactic antibiotic use like surgical procedures or labor which could skew the results. However, this conclusion would still indicate a higher risk for antibiotic resistance. An antibiotic stewardship program would monitor culture collection as well as verify that antibiotics are used appropriately by verifying the culture results and either de-escalating or discontinuing inappropriate therapies. These actions would lower the risk of antibiotic resistance and improve care.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-112

Poster Title: Evaluation of sleep agent use for the treatment of insomnia in suicidal patients

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Purpose: Insomnia has been linked to suicidal thoughts and behaviors. As a result, it has been theorized that effectively treating insomnia can potentially lead to a reduction in suicidal risk. This study sought to evaluate the prescribing patterns for sleep medications in the adult psychiatric unit between suicidal and non-suicidal patients.

Methods: A retrospective chart review was conducted for patients admitted to the adult psychiatric unit of a Midwestern academic hospital between July 1st 2014 and June 30th 2015. Patients were identified through the Healthcare Enterprise Repository for Ontological Narration (HERON) database. Patients were included in the study if they were 18 years of age or older, and had a length of stay between 2 and 14 days. Data collected were compared between suicidal and non-suicidal patients, and included: patient demographics, suicidal attempts, behaviors or ideation, primary discharge diagnosis, and the number and class of sleep medications patients received prior to admission, during admission and at discharge. Data analysis was conducted using SPSS v.23. Chi-square was utilized to assess differences in race, diagnosis, gender, and medication class, while independent t-tests were used to assess differences in length of stay, age, and number of medications, between suicidal and non-suicidal patients with an a-priori a=0.05. The institutional review board at the University of Kansas Medical Center approved the study.

Results: Four hundred and fifteen patients met the inclusion criteria for this study, of which 262 (63.1%) had an admission for suicidal ideations or behaviors. Demographics for suicidal and non-suicidal groups varied significantly for race (71.8% vs 60.1% white for suicidal and non-

suicidal, respectively; p=0.02), and length of stay (6.43 days vs 4.87 days; p < 0.01, suicidal and non-suicidal, respectively). Suicidal patients were more likely to have a primary diagnosis for mood or anxiety disorders (p < 0.01, 0.04, respectively), while non-suicidal patients were more likely to have a thought disorder primary diagnosis (p < 0.01). The most commonly prescribed sleep agents amongst all patients during hospitalization were sedating antidepressants (69.1% in suicidal and 64.1% in non-suicidal patients), benzodiazepines (31.3% and 39.9% respectively), and sedating antihistamines (24% and 22.9%, respectively). In both groups, the number of medications received at discharge was larger than the number received prior to admission (0.85 vs 0.43 for suicidal, and 0.66 vs 0.36 for non-suicidal; p < 0.01 for both groups). Upon discharge suicidal patients were prescribed a larger number of sleep agents than non-suicidal patients (0.85 vs 0.66; p < 0.01), and class-wise received a greater number of sedative antipsychotics (7.3% vs 2.6%; p=0.046).

Conclusion: Overall, use of sleep medications was similar between suicidal and non-suicidal patients during hospitalization. However, suicidal patients were more likely to continue on their sleep medication at discharge. This may suggest suicidal patients' insomnia symptoms were more prevalent or severe during hospitalization and required on-going treatment. Regardless of suicidal status, patients on average received more than one sleep agent during admission and were prescribed significantly more sleep medications upon discharge than prior to admission. Further studies are required to evaluate the effectiveness of sleep medications in suicidal patients and their potential in decreasing suicidal risk.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 2-113

Poster Title: Evidence for compounded topical agents used for the treatment of neuropathic pain

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Purpose: Approximately 3.8 million patients in the United States suffer from neuropathic pain. Despite the availability of numerous oral options, adverse events such as drowsiness, dizziness, impaired cognition, and nausea often limit their use. In addition, less than 50% of patients with neuropathic pain experience satisfactory pain relief, and over 45% of these individuals already take two or more medications to manage their pain. This project assessed the clinical evidence for use of compounded topical agents for the treatment of neuropathic pain as an alternative to oral products.

Methods: An initial PubMed search was conducted to identify commonly used topical pain medications for neuropathic pain. From the search, medications used most frequently in studies were determined to be ketamine, amitriptyline, gabapentin, and baclofen. A second literature search was conducted within the databases of the University of Kansas Library, as well as Google Scholar, with search terms "neuropathy" or "neuropathic pain" plus "topical" and/or "compounded" both with and without medication names through the date of July 21, 2016. There were 26 studies identified to be relevant to the topical treatment of neuropathic pain with one or more of the four medications studied. Elements of each study were categorized by number of medications in product, the medication(s) and their concentrations, study design, number of patients studied, indication, dosing and administration, duration of treatment, and safety. The data was then analyzed to determine whether these elements impacted the efficacy of the product studied.

Results: The efficacy was conflicting for three of four drugs with exception of gabapentin which had 60/60 patients report improvement in four non-randomized studies. There were 11 studies that evaluated ketamine with varying concentrations. Ketamine/amitriptyline combinations were assessed in five trials with three times the number of patients studied for the other topical therapies, although efficacy was low (140/700).

Medical conditions varied between and within studies. Post-herpetic neuralgia patients from eight trials responded consistently (146/172). Vulvodynia/vestibulodynia (73/73) and complex regional pain syndrome (27/27) exhibited consistent results, although only two studies included each condition. Chemotherapy-induced neuropathic pain was studied in three trials with the largest patient population, although efficacy was low (209/671).
Formulations differed by medication(s) and number of medications, concentrations of medication(s), compounding vehicle used (lipoderm and pluronic lecithin organogel were the most common), and properties of penetration enhancers used. The definition of efficacy differed between studies based on reduction of a varying number of symptoms including pain, numbness, and tingling. The only study with an oral comparator (gabapentin) determined topical ketamine to be non-inferior. At least some symptom improvement was reported in 43% of patients overall. Patients reported minimal side effects, with mild skin irritation being the most common.

Conclusion: Topical gabapentin generated the most consistent results compared to the other three medications in addition to medication combinations. At this time, the clinical evidence is inconclusive and cannot be used to predict a benefit for any of the four medications used topically; however, adverse events were minimal among all of the evaluated products.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 2-114

Poster Title: Discontinuation rates of oral P2Y12 inhibitors in end-stage renal disease patients on chronic dialysis

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Purpose: The purpose of this study is to describe the characteristics and medication discontinuation rates of patients with end-stage renal disease (ESRD) in an academic medical center who have been prescribed clopidogrel, prasugrel or ticagrelor. Furthermore, it was hypothesized that physicians would have prescribed prasugrel or ticagrelor more frequently than clopidogrel to patients with established cardiovascular disease due to the reported superior antiplatelet effects of the newer agents. Patients with ESRD and on dialysis are commonly excluded from clinical trials for these medications, leaving clinicians with little guidance for the use of oral P2Y12 inhibitors in dialysis patients.

Methods: The electronic medical records (EMR) of 85 ESRD patients on dialysis who were prescribed clopidogrel, prasugrel or ticagrelor between July 20, 2011 and December 31, 2015 were reviewed to collect baseline characteristics and determine medication discontinuation dates. Baseline characteristics included age, sex, race, body mass index, comorbid conditions, current medications and history of cardiovascular disease. A medication was considered prematurely discontinued if the patient was on the medication less than 330 continuous days following percutaneous coronary intervention (PCI) with a drug eluting stent. Patients with a history of myocardial infarction, coronary artery bypass graft (CABG), coronary stent, any amputation or diagnosis of coronary artery disease prior to the inciting event requiring medication with an oral P2Y12 inhibitor were considered to have established cardiovascular disease. Ischemic stroke or transient ischemic attack (TIA) were excluded from the definition of established cardiovascular disease because prasugrel is contraindicated in these patients. Outcomes included all-cause death, gastrointestinal bleeding rates and major adverse cardiac

events (MACE). MACE was defined as occurrence of new coronary artery stent, heart valve replacement, CABG, any amputation and all-cause hospitalization following the inciting event. Data analyses were performed using IBM SPSS Statistics Version 23. An alpha value was set a priori at less than 0.05 to be statistically significant.

Results: Of 848 ESRD patients on dialysis who were prescribed an oral P2Y12 inhibitor between 2011-2015, 785 were prescribed clopidogrel (92.6%), 46 were prescribed prasugrel (5.4%) and 17 were prescribed ticagrelor (2.0%). From the 63 EMR of patients who received either prasugrel or ticagrelor, only 48 EMR contained adequate information to collect all required baseline and outcome data. A convenient sample of 54 EMR of ESRD patients on dialysis was randomly selected from the 785 EMR of patients who received clopidogrel, and yielded 37 complete clopidogrel entries. The charts of 85 patients, or 10% of ESRD patients on dialysis who were identified to have been prescribed an oral P2Y12 inhibitors, were reviewed.
No statistically significant differences were observed in baseline characteristics or outcomes between the clopidogrel and prasugrel/ticagrelor groups. However, there was a difference in medication discontinuation rates between the clopidogrel group (13.5%) versus the prasugrel/ticagrelor group (35.4%) (p=0.022). While more patients prescribed prasugrel or ticagrelor met the definition of established cardiovascular disease (91.7%) compared to the clopidogrel group (81.1%), these findings were not statistically significant (p=0.20).

Conclusion: The large majority of ESRD patients on dialysis who needed antiplatelet therapy were prescribed clopidogrel, indicating that it is the medication that prescribers are most comfortable using in dialysis patients. Reasons for discontinuation of prasugrel or ticagrelor were not captured in this study, but could include high cost, lack of insurance coverage, or higher rates of adverse effects such as bleeding. Larger studies are needed to evaluate contemporary use of P2Y12 inhibitors in dialysis patients and investigate their association with clinical outcomes.

Submission Category: Critical Care

Submission Type: Descriptive Report

Session-Board Number: 2-115

Poster Title: Comparing allogeneic red blood cell transfusion practices before and after provider education

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Purpose: The practice of allogeneic red blood cell transfusion, although common, differs greatly amongst providers. Although potentially lifesaving, transfusions also come with significant health risks. Recent guidelines suggest that restrictive use of transfusion (only patients with hemoglobin values 8 grams per deciliter (g/dL) or less) decreases harm and improves patient outcomes. Education was provided to prescribers at Hays Medical Center regarding these guidelines. In order to identify compliance, and to evaluate the effect of provider education on transfusion practices, a retrospective analysis was begun to identify provider trends in ordering blood transfusions at Hays Medical Center from 2012 to 2016.

Methods: Following the guideline updates for red blood cell transfusions, education was administered to prescribers by physician and pharmacy staff. This education, begun in February 2014, highlighted the appropriate hemoglobin thresholds to initiate transfusion in order to ultimately reduce the total number of transfusions and to ensure a less than five percent monthly and annual incidence of transfusion in patients with a hemoglobin value of 9 g/dL or greater. To analyze the effects of provider education on transfusion practices, patient charts from January 2012 to June 2016 were retrospectively analyzed via retrieval from the hospital's MEDITECH electronic health record system. Records of those patients who received blood transfusions were retrieved and the hemoglobin values at which transfusion occurred were subsequently recorded. Data were analyzed for monthly and yearly trends. The total number of transfusions per month and year were also calculated. Data were analyzed for the two years

prior to the intervention and for two years following the intervention for comparative purposes.

Results: The total number of transfusions decreased yearly, with 788 transfusions in 2012, 772 in 2013, 747 in 2014, and 679 transfusions in 2015. From January to June of 2016, 296 transfusions were completed. Additionally, following prescriber education, the percentage of transfusions at elevated hemoglobin values decreased. In 2012 and 2013, 3.04% and 3.10% of transfusions occurred at hemoglobin values greater than or equal to 9 g/dL, respectively. In 2014, transfusions given at hemoglobin values 9 g/dL or above accounted for 5.20% of the total transfusions. For every month after June 2014, the incidence of transfusion for a hemoglobin 9 g/dL or greater was below the 5% goal. In 2015, 2.50% of transfusions occurred at hemoglobin values at or above 9 g/dL, with only one month above the 5% goal. In 2016, for the data analyzed between January and June, transfusions occurring at a hemoglobin 9g/dL or greater accounted for only 1.40% of the total yearly transfusions, with zero months above the 5% threshold.

Conclusion: Physician- and pharmacist-driven education proved efficacious in altering allogeneic red blood cell transfusion practices in prescribers at Hays Medical Center. Collaboration between multiple disciplines can provide improved patient and hospital outcomes and may be considered for future interventions.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 2-116

Poster Title: Institution wide evaluation of medication overrides from automated medication dispensing cabinets after process improvement changes: One year later

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Purpose: Overrides from medication dispensing cabinets are necessary for emergent and urgent patient care, but should be limited to ensure patient safety and drug security. It was found that there is little consensus across the region for standards of overrides. Lawrence Memorial Hospital is a 176-bed community hospital using automated dispensing cabinets for the bulk of patient medications. Lawrence Memorial Hospital revised its medication override policy by limiting the overridden medications to those only approved by the institution as safe for emergent use. Limiting the number of medications should reduce the total number of overrides and improve patient safety.

Methods: A Plan-Do-Check-Act cycle was used for process improvement. A previous study provided the baseline for the cycle of improvement by providing definitions of appropriate and inappropriate overrides as well as a frequency of occurrence by nursing unit. Improvement plans included establishing a list of approved override medication approved by the Medication Use Team and the Pharmacy and Therapeutics committee and only allowing charge nurses access all of the institution's formulary for emergency override. The available reasons for override include removing refrigerated med, Douglas Fire and Med, kits, medication order reviewed by qualified healthcare professional, urgent situation, and enter free text reason. Medication overrides were approved for emergency use for any product in the cabinet. Retrospective data review was collected from August 1, 2016 to August 15, 2016. The ratio of overrides to total doses removed was compared to the previous improvements and baseline project. The overrides were stratified by reason for override and nursing unit. Nursing unit data

were stratified by “inappropriate” (if there was either no physician order, no pharmacist verification, or if they were assessed by the pharmacist as not meriting override) or “appropriate” (if all criteria were met). Overrides for supplies, kits, and refrigerator access to obtain IVs are also deemed appropriate so excluded from the total count because these are not a concern.

Results: In the two week period examined, there were 275 (1.7 percent) overrides out of 15,940 removals (baseline 1079, 5 percent, overrides out of 21,645 removals). Overall, the number of medication overrides decreased as did the percentage of medication overrides compared to previous years after process improvement changes. Of these overrides, 190 (86 percent) were appropriate compared to a baseline of 858 (81 percent). Thus, only 30 (14 percent) were inappropriate compared to a baseline of 198 (19 percent).
The number of data excluded increased from baseline of 23 to 55. All of the excluded data were due to no medication removal found, versus previous year’s data included both no medication removal found and incomplete patient information and thus inability to assess appropriateness of medication override removal.
A chi squared test was used to evaluate statistical significance. With 1 degree of freedom, the critical value is 2.706 for a probability 0.1. The chi squared value (3.24) exceeds the 2.706 indicating departure from expectation. The chance of this result occurring by change is less than 7 in 100. We can be 93% confident that our changes are due to the process improvements.

Conclusion: The process improvement changes of limiting the number of medications reduced the total number of overrides and improve patient safety. All overrides threaten patient safety by omitting safety parameters in place, such as avoidance of look-alike/sound-alike drugs and multiple drug strengths. Areas with less critically ill patients, such as internal medicine, had fewer overrides, compared to ICU, due to decreased emergent situations with the exception of LDR. The list of inappropriate medication overrides and the current list of appropriate medications for overrides will be presented to the Medication Use Team for assessment and further improvements.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-117

Poster Title: Trazodone utilization for insomnia in the adult psychiatric hospitalization

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Purpose: Trazodone, a sedating antidepressant, is commonly used off-label for the treatment of insomnia. However, there is little clinical evidence to support it use as a sleep agent. This study evaluated prescribing practices related to trazodone utilization for the treatment of insomnia in an adult inpatient psychiatry unit.

Methods: A retrospective chart review was conducted using inpatient medical records from a Midwest academic medical center. Patients were identified through The Healthcare Enterprise Repository for Ontological Narration (HERON) database. Patients included in the study were at least above 18 years of age or older, prescribed trazodone, and admitted to the inpatient psychiatry unit between July, 1 2014 to June, 30 2015. Patients were excluded if their hospital length of stay was less than two days or greater than 14 days or if they were prescribed trazodone for the treatment of depression. Indications for trazodone were evaluated for trazodone's use if the dosage was above 200 mg to determine study inclusion. Records were reviewed for demographics, dosages, regimens (scheduled versus as needed), discharge diagnosis, and other hypnotic medications. Additionally, trazodone use prior to admission, during hospitalization, and at the time of discharge were evaluated. Data analysis was conducted using SPSS v.23. Descriptive statistics were used for continuous values, and chi-squared analysis was done to assess trazodone utilization prior to admission and at discharge. Statistical significance was defined as $p < 0.05$. This study was approved by the University's institutional review board.

Results: Four hundred and fifteen patients were admitted to the psychiatry unit between July, 1 2014 to June, 30 2015. Demographics for both trazodone and non-trazodone groups varied based on age, gender, race, length of stay, and primary discharge diagnosis. Overall, 248 patients (58%) were prescribed trazodone as a hypnotic during hospitalization. Only 44 patients (17.7%) had a trazodone prescription prior to admission. However, trazodone was prescribed to an additional 204 patients (82.2%) during hospitalization. Upon discharge trazodone was prescribed to 128 patients (51.6%), despite only 31% of patients receiving trazodone having a documented insomnia complaint ($p < 0.05$). On average, each patient was prescribed at least two hypnotics, for instance, trazodone, benzodiazepines, melatonin, etc. Trazodone was most commonly started on the first day of hospitalization.

Conclusion: This study found high utilization of trazodone among psychiatric patients. There was a significant increase in trazodone prescribing at discharge as compared to prior to admission. Based on limited clinical evidence regarding trazodone usage for insomnia, the overall utilization of trazodone should be evaluated.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-118

Poster Title: Intravenous iron sucrose order set compliance within a multi-hospital regional health system.

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Purpose: An electronic order set is available to prescribers within Saint Luke's Health System (SLHS) to ensure intravenous (IV) iron sucrose is ordered and administered in a cost-effective and safe manner. When IV iron sucrose is ordered within the SLHS computerized physician order entry (CPOE) system, the verifying pharmacist ensures each of the required elements within the order set have been completed by the prescriber. The purpose of this study was to conduct a medication utilization evaluation to ensure IV iron sucrose is being ordered in compliance with parameters set forth within the SLHS order set.

Methods: This study was granted exemption by the health system's investigational review board. A retrospective patient chart review was performed on IV iron sucrose orders that were placed between July 2015 and December 2015. A random sample of 100 inpatient orders, generated electronically, was selected for evaluation across four hospitals. The selected orders were divided proportionally amongst the four hospitals relative to patient volume. Outpatient orders and orders for hemodialysis patients were excluded given that separate order sets are utilized for these populations. Patient charts were reviewed using the electronic health care record to collect the following: location of patient, dose and frequency ordered, order set utilization, prescriber, verifying pharmacist, estimated glomerular filtration rate (eGFR) and corresponding stage of chronic kidney disease, presence of contraindications, diagnosis/indication for IV iron sucrose, and laboratory values as follows: hemoglobin, serum ferritin, and transferrin saturation (Tsat). The primary outcome measured was overall

compliance rate with adherence to order set criteria. Secondary outcomes measured included reasons for noncompliance and compliance rates categorized by hospital location.

Results: Of the 100 IV iron sucrose orders evaluated, 15 were originally determined to be noncompliant with the order set, which equaled an overall compliance rate of 85 percent. Of those 15 noncompliant orders, six orders were determined to be clinically appropriate upon further independent review by a pharmacy clinical coordinator despite exceeding the 72 hour time parameter set forth on the order set for obtaining labs prior to IV iron sucrose administration. This led to an overall adjusted compliance rate of 91 percent. Of the remaining nine noncompliant orders, four orders did not have any or all of the necessary labs drawn to meet criteria, four orders consisted of a relative contraindication (uncontrolled bacterial infections), and one because it had lab values that did not warrant IV iron sucrose usage. Compliance rates categorized by hospital location were 92 percent for the largest urban hospital, 90 percent for the largest suburban hospital, and 90 percent at each of the two smallest suburban hospitals.

Conclusion: Compliance with the IV iron sucrose order set within SLHS was 85 percent. The exclusion of six additional orders originally deemed noncompliant but later deemed to be clinically appropriate, led to an overall adjusted compliance rate of 91 percent. Recommendations for potential areas of improvement in the future included implementing a hard stop within the CPOE system which would prevent physicians from ordering IV iron sucrose without the appropriate iron studies being available. Also, including the iron study results within the order verification screen so that verifying pharmacists would be able to view those results immediately.

Submission Category: Pharmacy Law/ Regulatory/ Accreditation

Submission Type: Evaluative Study

Session-Board Number: 2-119

Poster Title: Evaluation of Kansas pharmacy students' perspectives on physician-assisted suicide and the demographic factors that influence those perspectives

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Purpose: A controversial issue in pharmacy practice today is physician-assisted suicide, which is defined in this study as self-administration of a lethal drug dosage prescribed by a physician. Currently physician-assisted suicide is legal in five states. Four states have legalized it due to legislation, and one state has legalized it via a court ruling. A survey was conducted to determine general views and demographic factors that may influence the opinions of pharmacy students in Kansas, a state where physician-assisted suicide is not currently legal.

Methods: This survey was sent out to 603 Kansas pharmacy students. Two hundred and eighty one students submitted surveys with 279 surveys having completed responses, leading to a response rate of approximately 46 percent. The survey assessed demographics, including: gender, age, religion and the level of religious belief, political views, enrolled year in pharmacy school, current and/or past pharmacy work experience and the pharmacy setting, and whether students knew of or have witnessed a family member and/or friend suffering from a terminal illness. The other questions asked related to students' opinions on physician-assisted suicide, such as the morality of suicide, under which medical conditions or circumstances physician-assisted suicide should be limited to, willingness to dispense a lethal drug dosage, et cetera. The survey was administered and analyzed using REDCap (research electronic data capture). Means were calculated and responses for each question were compared between the different demographic groups to determine which factors had the greatest influence on a variation from the overall mean response. The institutional review board of the University of Kansas approved this study.

Results: It was found that 50 percent of pharmacy students would support legalizing physician-assisted suicide for terminally ill patients in Kansas. Twenty four percent of students said their support would be conditional, and 26 percent said they would not support the legalization. Several demographic factors were found to be more or less in favor of physician-assisted suicide, with a 10 percent difference or more in their categorical mean from the overall mean response. Students were more likely to support a bill legalizing physician-assisted suicide from the overall mean if atheist (35 percent more likely) and liberal in their political views (24.1 percent more likely). Students were less likely to support the legalization if Christian (10.5 percent less likely) or considered themselves to be religious (23.3 percent less likely) or very religious (24.3 percent less likely). Students were less likely to support the legalization if conservative (15.5 percent less likely) or very conservative in their political views (39.7 percent less likely). First year pharmacy students were 17.8 percent less likely to support the legalization.

Conclusion: This study found that the majority of Kansas pharmacy students would support legalizing physician-assisted suicide. The most influential demographic factors that determined views towards physician-assisted suicide were: being 30 years of age or older, religion and the level of religious belief, political views, enrolled year of pharmacy school, and current and/or past pharmacy work experience and the pharmacy setting. However, due to the small sample size, further research is needed to establish more comprehensive results.

Submission Category: Geriatrics

Submission Type: Evaluative Study

Session-Board Number: 2-120

Poster Title: University of Kansas geriatrics champions program (GCP): Assessment of interprofessional competence

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Purpose: The purpose of this study was to investigate if knowledge gained by learners during the Geriatrics Champions Program (GCP) 1) was applied in advanced pharmacy practice experiences (APPE), 2) equipped students with the ability to communicate with geriatric patients comfortably, and 3) prepared students for interprofessional teams. Additionally, information for potential areas of program improvement was obtained.

Methods: GCP was a 12 month, 6 professional curriculum designed to teach geriatric content in an interprofessional manner using a team-based learning format at the University of Kansas Medical Center.
A retrospective survey study was developed using a likert scale to assess the eight learning domains achieved with the GCP program. The surveys were completed online through Google Forms, and answers were 100% anonymous without any link to the preceptor. Preceptor practice background was collected, which included years of practice, setting, and scope of geriatric practice.
Inclusion criteria included preceptors of GCP students during August-September 2016. The exclusion criteria included students directly involved with the research process as well as students who participated in an additional geriatrics elective.
The intervention group included preceptors of students who had completed the GCP program in 2015-16 and the control group included preceptors of students who were randomly selected in the months of August-September 2016 and had not completed the GCP program. Once both groups were established, separate surveys were emailed to preceptors of the identified students.

The primary outcome measured the demonstration of eight learning domains and the secondary outcome measured specific areas for potential improvement while on APPEs. Descriptive statistics and student T-Test of quantitative data were employed to report trends in responses.
This study has been approved by the institutional review board (IRB).

Results: There were a total of 23 (42.6%) responses in the intervention group and 19 (35.2%) responses in the control group out of 54 surveys sent to both groups. Preceptors came from a variety of backgrounds including critical care, corporate management, ambulatory care, and research. Preceptors indicated medication management as the most prevalent learning domain as well as the strongest area for both groups. However, the exposure and opportunities students had while on rotation were lacking in a few of the learning domains for both groups such as special considerations in geriatric care, cognitive, affective, and behavioral health, end of life care, and ambulatory care of older adults. Preceptors also identified complex/chronic illnesses in older adults and end of life care as the weakest areas for students in both groups. The intervention versus control group showed differences in the ability to participate on an interprofessional team [21 (91.3%) and 16 (84.2), respectively, p=0.9695], comfort in geriatric patient communication [14 (60.9%) and 8 (42.1%), respectively, p=0.6227], and previous possession of clinical knowledge regarding geriatric patients [14 (60.9%) and 12 (63.2%), respectively, p=0.6405].

Conclusion: Our analysis showed similar conclusions with primary and secondary outcomes across groups; however, the intervention group had higher percentages of interprofessionalism and geriatric communication. Due to small sample size, statistical differences did not emerge in this study. These results furthered assessment insight through the preceptor's perspective on students' abilities and the correlation with interprofessional programs, which can inform educational governing bodies such as the Center for the Advancement of Pharmacy Education (CAPE) and the Accreditation Council for Pharmacy Education (ACPE). Further data from additional years of study or input from other professions would strengthen the results of this study.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-121

Poster Title: Evaluation of enoxaparin dose adjustments in renally impaired or obese patients in a medium-sized community hospital

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Purpose: Enoxaparin is a commonly used anticoagulant for venous thromboembolism (VTE) prophylaxis in the inpatient setting with benefits such as reduced laboratory monitoring and a relatively quick onset of action. The Pharmacy & Therapeutics (P&T) Committee created guidelines for dosing at-risk populations with renal impairment (bleeding risk from reduced clearance) or obesity (thrombosis risk from inadequate dosing). Pharmacists have a collaborative practice agreement to adjust for renal dosing, but not for obesity. The purpose of this study was to determine the frequency and accuracy of dosing adjustments in these at-risk populations.

Methods: All inpatients age 18 or older with an order for enoxaparin over a three-month time frame were included in this retrospective, chart review. Patients receiving enoxaparin for an indication other than VTE prophylaxis or patients currently receiving dialysis were excluded. Patient's concurrent weight, height, and estimated creatinine clearance were used to evaluate the initial doses ordered by the practitioner, the doses verified by the pharmacist, and the dose adjustments made later in therapy.
P&T guidelines recommend enoxaparin 30 mg subcutaneously daily for individuals with renal impairment, defined by an estimated creatinine clearance less than 30 mL/min, and a dose of 0.5 mg/kg subcutaneously daily for obese individuals, defined by a body mass index of greater than or equal to 40 kilograms per square meter.
The primary outcome measure was the percentage of patients whose renal function or body mass index warranted dosing alterations per P&T guidelines. The secondary outcome measures

were the percentages of accurate dose modifications made by the pharmacist or prescriber. The study received an expedited approval from the Institutional Review Board and P&T committee.

Results: A total of 450 encounters were screened for this study. Sixty-six patients were excluded. Of the remaining 384 encounters, 111 patients met criteria for dose alterations per P&T guidelines. The patients were further divided into those with renal impairment (48, 12.5 percent), obesity (66, 17.2 percent), or both (3, 0.8 percent). Overall, 56.3 percent of patients with renal impairment and 25.8 percent of obese patients had doses correctly modified according to P&T guidelines.
The prescriber accurately modified the first dose in 5 (10.4 percent) of the renal patients and 10 (15.2 percent) of the obese patients. Pharmacists correctly modified the doses of an additional 22 (45.8 percent) patients with renal impairment, but incorrectly modified the dose for 1 (2.1 percent) patient. Pharmacists correctly modified the doses of an additional 7 (10.6 percent) obese patients, but incorrectly modified 6 (9.1 percent).
Estimated creatinine clearances improved from initial calculations for 16 (33.3 percent) of the 48 renally impaired patients to the point where dose adjustments would no longer be required. Of these 16 patients, only 5 received dose adjustments based on their initial creatinine clearance, and 2 of these 5 patient's doses were readjusted to normal following their improvement in renal function.

Conclusion: A significant number of patients required dose adjustments of enoxaparin for renal impairment (12.5 percent) and obesity (17.2 percent). The collaborative practice agreement increases P&T guideline adherence in adjusting for renal impairment; however, there is room for improvement. Education of pharmacy staff may be of value. The P&T Committee may reconsider the addition of obesity dosing to the collaborative practice agreement.

Submission Category: Geriatrics

Submission Type: Evaluative Study

Session-Board Number: 2-122

Poster Title: Developing and piloting a model to improve geriatric chronic care management outcomes

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Purpose: About 5% of Medicare beneficiaries account for approximately half of Medicare expenditures. These high-cost beneficiaries tend to be older, disabled and more likely to have multiple chronic conditions, which have high symptom burden and functional impairment. The purpose of this study was to explore an alternate model of delivering chronic care management (CCM) to a geriatric population while assessing the impact on patient satisfaction, patient perceived health status, and use of hospital and emergency department services as compared to usual care.

Methods: A prospective cohort study was designed to evaluate a geriatric population enrolled in the care of an interprofessional chronic care management (IP-CCM) service. Three study arms were established to assess the study outcomes. The primary outcome was to reduce preventable hospitalization and emergency department (ED) service utilization. The secondary outcomes were to improve patient perception of care and self-assessed health status and to reduce use of potentially inappropriate medications. Intervention arms included patients who received the IP-CCM service and the clinic's standard CCM service. The control arm included patients who continued to receive usual care. Descriptive statistics were used to assess baseline characteristics of the study population to ensure similar groups were enrolled in each study arm. This study was approved by the IRB.

Results: A total of 448 patients were enrolled which included, 58 IP-CCM patients, 160 CCM patients, and 230 standard care patients at baseline. IP-CCM patients had an average age of 75.5 years, and were 86.2% Caucasian, 12.1% African American, and 1.7% other race. The

average CCI of the IP-CCM group was 5.65, with 29% diagnosed with dementia. The baseline possibly preventable rate for hospitalizations was 11 of 28 total hospitalizations, and for ED use was 15 of 28 total ED visits. CCM patients had an average age of 75.3 years, and were 68.8% Caucasian, 27.5% African American, and 3.8% other race. The average CCI of the IP-CCM group was 6.3, with 23% diagnosed with dementia. The baseline possibly preventable rate for hospitalizations was 26 of 53 total hospitalizations, and for ED use was 34 of 50 total visits. Standard care patients had an average age of 74.3 years, and were 74.4% Caucasian, 12.2% African American, and 10.4% other race. The average CCI of the Standard Care group was 5.5, with 21% diagnosed with dementia. The baseline possibly preventable rate for hospitalizations was 27 of 59 total hospitalizations, and for ED use was 37 of 62 total visits.

Conclusion: There were no significantly different trends noted between the study arms in this study. Lessons gained from this study will inform the best practices of how to administer Chronic Care Models in large academic ambulatory care settings.

Submission Category: Oncology

Submission Type: Descriptive Report

Session-Board Number: 2-123

Poster Title: Value of Sequencing-guided Treatment in Breast Cancer Patients

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Purpose: Breast cancer patients who have under gone molecular profiling and utilized sequence-guided treatment have lead to 55% of advanced breast cancer patients responding to either a complete response or partial response. Using sequence-guided therapy instead of just traditional chemotherapy is often reserved as last line use due to cost. The value of sequence-guided treatment is often overshadowed by the price so this study was designed to show the value in the added cost of the sequence-guided therapies.

Methods: This was a single center retrospective observational study including patients diagnosed with breast cancer between 1991 and 2016 at Avera Cancer Institute in Sioux Falls, South Dakota. All patients were sequenced after consultation with the genomic sequencing team at Avera Cancer Institute. Tissue for sequencing was obtained from the original diagnostic biopsy or re-biopsy of primary tumor. Sequencing treatments were based off designated targets determined from the FoundationOne and Garden360 or Theralink genomic analysis. A review of all patients past documents were used to collect all past and current cancer regimens including traditional therapy and sequence-guided therapy. Therapy costs were determined based on AWP pricing and a standard patient size of 180lbs and BSA 1.8m2

Results: Cancer treatment costs for thirty-six total patients were collected. Twelve patients were neoadjuvant, 12 patients were adjuvant, and 12 patients were metastatic. The primary outcome was cost of sequence-guided cancer treatment and response to cancer treatment. In all three categories, the sequence guided therapy made up the majority of the total cost for the patients' treatment. In metastatic patients the total cost tripled the total cost of neoadjuvant or

adjuvant patients. This is due to the one drug at a time, trial and error standard treatment carried out in metastatic disease. So by giving patients sequence guided treatment up front they can receive greater outcomes while also exposing the patient to a less toxic side effect profile. This can help improve the quality of life while on treatment and to better prevent metastatic disease where the total cost of treatment can triple the total cost seen in neoadjuvant or adjuvant disease.

Conclusion: Sequence guided therapy early in the neoadjuvant of adjuvant setting provided patients with an overall reduced cost of care throughout their therapy while delaying the progression of disease. If patients pay the up front cost of sequence guided treatment in neoadjuvant or adjuvant disease, there is a greater chance of complete or partial response. With an improved outcome compared to traditional therapies, we found there is value for paying for sequence-guided therapy early on in the neoadjuvant or adjuvant setting.

Submission Category: Pediatrics

Submission Type: Case Report

Session-Board Number: 2-124

Poster Title: Complicated Pregnancy Due to Prolonged Fetal Exposure to an Angiotensin-Converting Enzyme Inhibitor

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Purpose: This case report details ACE inhibitor fetopathy. Baby boy T 's mother has a history of chronic hypertension reports using her mother in laws Lisinopril/HCTZ 20 mg/12.5 mg during pregnancy when her blood pressure was high. She reports stopping the medication 12 weeks into her pregnancy. Prenatal ultrasounds noting enlarged, echogenic kidneys. There was a 3-4 week period of anhydraminos, but the fluid level returned to normal prior to delivery. Prenatal ultrasound at 24 weeks noted anhydraminos when fluid has been previously noted on 20 week ultrasound. Infant was born via C-section due to complication of advanced maternal age, severe pre-eclampsia, placental insufficiency, and ductus elevations. Baby Boy T has large anterior and posterior fontanelle with significantly separated sutures. Small sutures with significant portion of the head unprotected with skull bones consistent with hypocalvaria. This warrants concern for ACE inhibitor fetopathy. Along with skull malformations, the infant has congenital anomaly of kidney. Subsequent basic metabolic panel shows a rise in anion gap, serum creatinine, and phosphorus, albumin, and potassium with peaked T wave. This is likely underlying chronic kidney disease. Impaired renal concentrating ability has also polyuria. Daily monitor of I/Os and hemodynamic status as well as replenishing fluids as needed. One dose of Lasix 2mg/kg PO was given and potassium began to trend down. Baby boy T's kidneys and brain will be carefully monitored throughout his first year of life. This case study suggests the harmful toxicity of taking medication prescribed for another individual without provider consent.

Methods:

Results:

Conclusion:

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 2-125

Poster Title: Pharmacy discharge medication counseling: An analysis of the impact on chronic obstructive pulmonary disease and asthma readmission rates in an academic, tertiary-level institution

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Purpose: Both chronic obstructive pulmonary disease (COPD) and asthma can cause frequent readmission to hospitals nationwide. Readmission can be directly linked to failure to properly adhere to a medication regimen and incorrect use of prescribed maintenance inhalers. Through a "Meds 2 Beds" program at an academic, tertiary-level institution, pharmacy-led discharge medication counseling integrated with medication delivery was implemented to provide patient education and follow-up in order to improve adherence and outcomes and decrease same-cause readmission. This study seeks to evaluate the impact of the Meds 2 Beds program on readmission rates for patients readmitted with either COPD or asthma exacerbations.

Methods: This study is a retrospective, observational chart review to evaluate if patients who were admitted for a COPD or asthma exacerbation between April 1, 2016 and August 1, 2016 and then participated in the Meds 2 Beds program had a decrease in same cause readmission. Patients who participated in the Meds 2 Beds program during this time period were compared to those patients who did not participate in the program. The primary outcome for this study was 30-day readmission for COPD or asthma exacerbations, as defined by ICD-10 codes. Secondary outcomes included 7-day readmission rate.

Results: For this time period, a total of 120 qualifying patients were admitted to the hospital with COPD or asthma exacerbations and, of these, 8 participated in the Meds 2 Beds program. Thirty-day readmission occurred in 15 of the patients who did not participate in the program

(13.3%) and only one (12.5%) occurred in the Meds 2 Beds participant group (p=01.0). Rates of 7-day readmission rates were non-significantly reduced (5 [4%] in non-participant group, 0 [0%] in participant group, p=1.0).

Conclusion: As this study shows, innovative pharmacy services such as a medication delivery and education service like the Meds 2 Beds program have the potential to decrease 30-day and 7-day readmission rates for chronic conditions like COPD and asthma, which would lead to increased positive patient outcomes while decreasing hospital costs. Further study is warranted with a larger study population to determine the exact effect of this type of program.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 2-126

Poster Title: Innovative activities used to educate high school students on preventing the spread of sexually transmitted infections

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Purpose: Healthy People 2020 describes the need for further education on prevention of sexually transmitted infections (STIs), as well as promotion of STI screening in the adolescent population. Given this, Sullivan University College of Pharmacy started a new project titled Operation Protect Yourself, allowing student pharmacists to use innovative strategies to educate high school students about STI transmission and prevention. The purpose of this study was to assess the effectiveness of teaching methods used to deliver STI education to high school students. This project involved the use of an anonymous pre- and post-program quiz for high school students.

Methods: This multicenter observational study was approved by the Sullivan University Institutional Review Board. Subjects were high school students, ages 14 to 19, who were in attendance of the Operation Protect Yourself program. Operation Protect Yourself is a student pharmacist run program that goes to various high schools in the Louisville Metro area and teaches a 50-minute STI presentation to 6- 8 classes in one day. Along with a PowerPoint presentation, multiple active learning strategies (two games and a classroom discussion) are employed to help the students conceptualize the prevalence and transmission of STIs, the signs and symptoms of STIs, and preventative strategies. Students complete a pre-program quiz, which includes five knowledge-based questions. After the program, students complete a post-program quiz containing the same five knowledge-based questions, plus five additional questions assessing the students' perceptions of the program. The primary outcome of this study was students' confidence in their ability to protect themselves against STIs after the

presentation. To assess knowledge gained, a secondary outcome was change in score from pre-quiz to post-quiz for knowledge-based questions. Pre- and post-program quiz scores were analyzed and compared using a paired t-test, with students serving as their own control group. Other secondary outcomes included student perceptions of knowledge gained, likelihood of discussing STIs with their parents after the program, and students' preferred learning styles.

Results: A total of 1,663 students were educated on STIs and completed a survey; 137 of the surveys were excluded due to insufficient completion. Results from the primary outcome showed 91.9 percent of high school students felt confident in their ability to protect themselves from STIs after attending the programming. Students scored 25 percent higher on knowledge-based questions on the post-program quiz compared to the pre-program quiz (3.78 versus 3.02 out of 5.0 total; mean increase of 0.76, 95 percent CI 0.67-0.85, p less than 0.0001). Additionally, 88.6 percent of high school students felt the presentation improved their knowledge of STIs. Despite encouragement to discuss STIs with their parents from the presenters, only 31.7 percent of high school students said they were likely to discuss STIs with their parents after completing the program. When asked about their favorite part of the STI education program, 83.9 percent of students identified an active learning strategy.

Conclusion: This study found that the Operation Protect Yourself STI education program was effective at increasing confidence and knowledge regarding STI prevention among high school students. The program did not effectively motivate high school students to discuss STIs with their parents; therefore, other methods should be utilized in the future if aiming to increase STI discussion among students and parents. This cohort of high school students preferred to use active learning strategies to learn about STIs; therefore, other groups aiming to provide STI education to youth should consider incorporating active learning into their teaching.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 2-127

Poster Title: Evaluation of crosstalk between clinical and pharmaceutical sciences departments

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Purpose: Currently, clinical and basic sciences are not integrated at Sullivan University College of Pharmacy. A method, referred to as "crosstalk" was implemented, with the goal of improving the consistency of information taught, as well as to improve application skills. Prior studies have evaluated integration of courses in a traditional four-year pharmacy curriculum; however, to our knowledge, no studies exist evaluating crosstalk in a three-year accelerated program. The purpose of this study was to evaluate student perceptions of lectures taught via the crosstalk method, as well as student performance on material taught via this method.

Methods: Lecturers for the therapeutics, pharmacology, and medicinal chemistry portions of Parkinson's Disease met prior to class and discussed the delivery and focus of the disease. During the "crosstalk" session, lecturers focused on four main points: 1) eliminating or reducing contradictions in material taught; 2) reducing redundancy; 3) applying active learning strategies to improve application of basic sciences to clinical sciences; and 4) standardizing the slides (i.e., cover the drug classes in the same order, choosing the same drugs to highlight from each class). The primary endpoint was change in student performance on assessments, before and after crosstalk implementation. Exam scores for the Class of 2016 (with crosstalk) were compared retrospectively to the Class of 2015 (without crosstalk), using a two-sample independent t-test with an online software program, OpenEpi. After the lectures, second-year students at Sullivan College of Pharmacy participated in a survey evaluating the effectiveness and clarity of Parkinson's disease lectures taught via the crosstalk method. Secondary objectives included student perceptions of consistency of information delivered, student understanding of the rationale for the information delivered, and student perceptions of active learning on their

ability to apply information learned. An anonymous survey was delivered through Survey Monkey and included nine questions, with the options based on a four-point Linkert-type scale. Descriptive statistics were used for the secondary endpoints.

Results: A total of 73 students in the Class of 2016 (with crosstalk) and 91 students in the Class of 2015 (without crosstalk) were compared for the primary endpoint. Students scored significantly higher when taught via the crosstalk method in medicinal chemistry (88.3% vs. 76%; $p < 0.001$) and pharmacology (86.8% vs. 78.6%; $p < 0.001$). There was not a significant difference in the therapeutics scores (82% vs. 85.3%; $p=0.116$). Of the 73 students taught via the crosstalk method, 43 completed the anonymous survey. The secondary outcomes, survey data, reported that 97.73% (n=43) thought that compared to other lectures, the Parkinson's Disease lecture had more consistency and fewer contradictions between therapeutics, medicinal chemistry, and pharmacology. Compared to other lectures, 97.73% also reported that they were better able to understand the rationale taught in each subject: pharmacology, medicinal chemistry, and therapeutics. All survey participants claimed that it was evident that the lecturers coordinated and intentionally sequenced their lecture materials for this lecture. In addition, 100% students reported that the active learning and patient case were helpful and effective.

Conclusion: The significant improvement in exam scores for medicinal chemistry and pharmacology suggest crosstalk method had a positive impact on student learning. The survey results indicated students perceived benefit from this teaching style, including improvement in their ability to apply the basic sciences into clinical practice. Future studies will focus on evaluating a larger cohort, as well as the impact of crosstalk on multiple disease states. The 2016 Accreditation Council for Pharmacy Education standards emphasize the need to integrate content and incorporate active learning into didactic courses; crosstalk is one potential method to assist in achieving this standard.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 2-128

Poster Title: Perceived benefits and motivations of students who may enroll in a landmark trials elective course

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Purpose: Landmark Trials is a course designed to reinforce current clinical evidence-based medicine and allow students to practice evaluating literature and creating and presenting clinical trial data and analyses. Preliminary data revealed that students who took the class may have performed better on a standardized exam; however, student motivation for electing this learning opportunity as well as perceived benefits remain unclear. This project was designed to determine student motivations and perceived benefits from taking the course, and if it or its components should potentially be incorporated into the core curriculum at a college of pharmacy.

Methods: A 10-item survey was designed to capture the reasoning behind why students did or did not take landmark trials and any reported benefits from taking the course. The survey included questions regarding why or why not the student chose to take the course, the extent he/she did or did not benefit from taking the course, and if he/she feels this course should be a requirement in the core curriculum. Sections were also available for further comment. The survey link was sent via email to students in the immediate past graduating class, the current graduating class, and the class currently enrolling in elective courses. This study was submitted to and approved by the University's Investigational Review Board.

Results: The survey received 75 responses. Of the 40 students that had already taken the class or were signed up to take it, 39 (97.5%) believed it helped them feel more confident while on rotations, and 40 (100%) believed they felt more prepared for journal clubs and literature evaluation. Of note, 10 of these 40 students (25%) took the course to improve necessary skills

for residency training. Out of all of the survey respondents, 47 (62.7%) either agreed or strongly agreed that the landmark trials elective should be a required course in the curriculum.

Conclusion: The landmark trials course was perceived to be of value to the students that took the elective. Based on previous data and positive student response, it may be beneficial for the college of pharmacy to incorporate this course or its most meaningful components into the required part of the curriculum and further disseminate its design and outcomes.

Student Poster Abstracts

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 2-129

Poster Title: Advancing pedagogy in pharmacy for learning excellence.

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Purpose: Sullivan University College of Pharmacy (SUCOP) is an intensive 3-year program, as such professors' time with students must be focused and effective. Literature currently suggests that there is a variance in the learning style preferences of pharmacy students. Furthermore, we may infer that students may not experience success with the more traditional teaching style of lectures. This study was designed to identify the variance, and implement new tools to improve student test scores.

Methods: Over a period of several years, the Health Professionals' Inventory of Learning Styles survey was administered to students during the pharmacy year 1 at the college. It became evident that every year the majority of students are "Assimilators," meaning they prefer to study alone, ask few questions in class, and learn best through observing others. Previous exams were evaluated for core concepts that students failed to master. Enhanced learning styles such as screencasts, videos, and self-paced learning tools were prepared and evaluated by two focus groups of 7-10 students who had completed courses from which these core concepts had come. With the guidance of the focus groups and with the understanding that the majority of students are Assimilators, new education methods were implemented, notably 3-5 minute instructional videos that can be accessed outside of the classroom. The Class of 2016 was then evaluated based on the same core concepts in which previous classes had struggled. In the following years, SUCOP has continued to administer the H-PILS survey.

Results: H-PILS survey classifies students as Accommodators (prefers group work), Assimilators (studies alone and asks few questions), Convergers (leadership qualities), or Divergers (resourceful and tries to impress others). In the Class of 2015: 57.7 percent of students were Assimilators, 20.2 percent Convergers, 5.8 percent Accommodators, and 3.8 percent Divergers. Class of 2016: 65 percent Assimilators, 15 percent Convergers, 5 percent Accommodators, and 4 percent Divergers. Class of 2017: 61.5 percent Assimilators, 17.9 percent Convergers, 5.1 percent Divergers. Class of 2018: 51 percent Assimilators, 21 percent Convergers, 5 percent Accommodators, and 3 percent Divergers.
Core concepts evaluated in the class of 2014 and class of 2015 included the dilution of sterile powder calculation, drip rate calculations, basal energy expenditure calculation, and body surface area calculation. The average percentage of students to answer questions in each of these categories correctly was 84.8. The class of 2015 had a fifth category added for calculation of osmolarity with only 57.8 percent of students correctly answering that question. After the addition of the enhanced learning tools, the Class of 2016 answered the first four core concepts with an average of 98.5 percent correct, and the fifth category with 84.0 percent.

Conclusion: Pharmacy students have a predictable learning style profile that does not fit the traditional lecture format. The University of Louisiana Monroe has also begun administering the H-PILS survey and have found strikingly similar results. They have agreed to a joint continuation of this study. With rapid changes happening to the world of pharmacy, including those to the North American Licensure Examination, it is no longer feasible to expect students to be able to learn solely through standard lecturing, and hope to see improvements. We suggest learning tools and lectures be formatted or altered to better cater to students' needs.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 2-130

Poster Title: Integrase inhibitor verus Protease inhibitor-based Therapy for treatment of HIV-1 infection in patients presenting with Acquired Immunodeficiency Syndrome

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Purpose: Acquired Immunodeficiency Syndrome is a complication resulting from the human immunodeficiency virus (HIV) that attacks the body CD4 cells. The preferred antiretroviral regimens (ART) are 2 non-nucleotide reverse transcriptase inhibitors (NNRTI) in combination with a third active drug such as a protease inhibitor (PI) or an integrase inhibitor (INSTI). Most studies comparing INSTI and PIs have either excluded patients with low CD4 counts (< 200) or have limited patients included. The purpose of this study is to investigate the efficacy between PI-based and INSTI-based regimens in patients presenting to clinic with CD4 ≤ 200 cells/mm3, with or without an opportunistic infection.

Methods: In this retrospective, non-inferiority, matched-cohort study, patients with HIV were selected via the Careware® database from a Ryan-White funded HIV clinic. The inclusion criteria included males and females≥18 years old who were treatment naïve with CD4 counts ≤ 200 cells/mm3 or ≤ 14%. The exclusion criteria included pregnant women, age < 18 years, CD4 count ≤ 200 cells/mm3 with or without opportunistic infections. The selected patients were then screened and divided in a 1:1 ratio into 2 groups: PI-based regimen and INSTI- based regimen. Groups were matched based on sex and age. Within these two groups, the patients were then stratified based on presence of opportunistic infection and baseline viral load (< 100,000 copies/mL vs. >100,000 copies/mL). Data points were collected to determine effectiveness among this patient population of PI-based regimens vs. INSTI-based regimens on ability to reach viral suppression.

Results: The primary outcome of the study was the proportion of patients that reached viral load suppression (defined as RNA viral load of < 50 copies/mL). We screened a total of 134 patients and 88 patients met the inclusion criteria. The results showed that there is no significant difference between the PI-based regimen vs INST-based regimen in viral load suppression; the p value was greater than 0.05, 95% CI (0.73 – 2.55).

Conclusion: There is no significant difference between the PI-based regimen vs. INST-based regimen in viral load suppression. Additional outcomes will be presented at the Midyear.

Submission Category: Pharmacy Law/ Regulatory/ Accreditation

Submission Type: Descriptive Report

Session-Board Number: 2-131

Poster Title: Analyze Drug Enforcement Administration 106 Report of Theft or Loss of Controlled Substance

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Purpose: In order to decrease the amount of thefts and loss of controlled substances in Kentucky, we need to identify risk factors for pharmacies. Information in the Drug Enforcement Administration (DEA) 106 forms can be used to identify trends and patterns in the theft and loss of controlled substances. This information will help pharmacists in Kentucky take precaution to prevent theft and loss of controlled substance. Phase I of the study will focus on identifying the amount of DEA 106 forms submitted to Kentucky Board of Pharmacy based upon pharmacy setting and identifying the number of thefts involved in Hospital/Clinical Setting.

Methods: The study design is a retrospective study and will be analyzing data from the DEA 106 reports between the years of 2014-2016. The DEA 106 report is sent directly to the Kentucky Board of Pharmacy. The study population will include pharmacies.

Results: According to 304 DEA 106 forms submitted to the Kentucky Board of Pharmacy between the years 2014-2016, we found pharmacies identified as “Retail” settings submitted 267 DEA 106 forms, pharmacies identified as “Hospital/Clinic” submitted 27 DEA 106 forms and pharmacies identified as “Distributors” or “Mail Order Pharmacy” submitted 10 DEA 106 forms. Hospitals/Clinics DEA 106 forms were further analyzed and found “Employee Pilferage” was mentioned in 17 out of 27 forms.

Conclusion: In conclusion, the DEA 106 reports contain a lot of beneficial information that can be used to identify trends and patterns on the theft and loss of controlled substances, which can help pharmacies take precaution and prevention as needed. This study is an ongoing study and will be further investigating and identifying trends and patterns of theft and loss of controlled substances utilizing the DEA 106 reports.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Evaluative Study

Session-Board Number: 2-132

Poster Title: Impact of Home SSRI/SNRI Continuation on Sedation Outcomes in Medical Intensive Care Unit Patients

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Purpose: Limited clinical data exists regarding the impact of restarting home neuropsychiatric medications and sedation-related outcomes in the ICU. The purpose of this study was to compare sedation-related outcomes between patients restarted on their home SSRI/SNRI in the first 5 days of their ICU stay versus those who were not.

Methods: The institutional review board approved this single center retrospective chart review. Adult patients admitted to the medical ICU (MICU) at University of Kentucky Chandler Hospital between January 2011 and January 2015 taking an SSRI or SNRI prior to admission were included. Patients had to be intubated prior to or on admission to the MICU and must have received benzodiazepine based sedation from admission to >/= 5 days. Those admitted to the MICU for overdose, who were extubated in < 72 hours within admission, or were receiving high-dose benzodiazepines for deep sedation were excluded . Patient The primary objective was to compare the median daily RASS scores observed in each cohort. Secondary objectives included the average total daily dose of benzodiazepine sedation during the first 5 days of the ICU stay between the cohorts, rates of new-start anti-psychotics as a surrogate outcome for delirium, and lengths of stay and ventilator days between cohorts.

Results: A total of 67 patients were included in the study on a home medication regimen consisting of one or more antidepressant medications associated with serotonin reuptake such as the SSRIs or SNRIs. The baseline age, Charlson Comorbidity score, UHC predictor of mortality, and midazolam requirements during the first 2 days were comparable in both sets of patients. More patients who had their home SSRI/SNRI restarted within 5 days (early restart group) had median RASS scores within goal range , compared with those who had their home SSRI/SNRI started back after 5 days or not at all (late restart group) (73% vs. 46% respectively; p=0.04). Median RASS scores were lower in the early restart group (1.5 (-2.0 to -1.0)) compared to those in the late restart group (-2 (-3 to -1.5), p = 0.01). There were no differences between early and late restart cohorts in cumulative benzodiazepine dose received (median 297.5 mg vs. 213.5

mg, p = 0.27), ventilator days (median 7 days vs. 8 days, p = 0.65), or rates of new- start antipsychotics (30% vs. 11%, p = 0.49).

Conclusion: Re-starting home SSRI/SNRIs within 5 days of ICU admission was associated with patient's maintenance of lighter levels of sedation within the goal RASS range while intubated in the MICU. While restarting these medicines may facilitate light sedation, they were not associated with a reduction in cumulative BZD dosing, mechanical ventilator days, or surrogate markers for delirium.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Evaluative Study

Session-Board Number: 2-133

Poster Title: Characterization of opioid overdose at an academic medical center

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Purpose: Prescription opioid abuse has been a pervasive problem in the United States. In Kentucky, laws have been passed to decrease access to prescription opioids. As a by-product, rates of heroin abuse have increased. As heroin and prescription opioids very in their pharmacokinetics and routes of administration, they may require different treatment modalities. Most information related to overdose comes from monitoring systems, not medical centers, where treatment occurs. The goals of this study are to describe heroin and non-heroin overdoses at an academic medical center and the dosing schemes of naloxone used to treat overdose events.

Methods: 926 patients presenting to the emergency department with a diagnosis of opioid overdose were retrospectively reviewed between January 1, 2005 and September 15, 2015. Patients were excluded if the overdose was due to non-opioids or an unknown substance, if pregnant, or if transferred from an outside hospital. The primary objective was to characterize patients who present with heroin and non-heroin overdoses and identify differences in demographics and past medical history between the groups. Secondary objectives were to determine whether there was any significant difference in the management of these patients, especially with respect to naloxone use. Data collected included patient demographic information, chief complaint upon admission, pertinent past medical history and social history, pertinent home medications, date and time of presentation to the institution, mode of arrival, length of stay in the ED, intensive care unit, and overall hospital length of stay, days of mechanical ventilation, and in-house and 28-day mortality. Data collected related to the use of naloxone included: whether the patient required naloxone administration en route or upon

arrival, whether continuous infusion or bolus naloxone administration was used, and cumulative dose of naloxone required.

Results: 482 patients were included in the non-heroin group, and 444 patients were included in the heroin group. Over the study period, the number of heroin overdoses seen per year steadily increased as non-heroin overdoses steadily decreased over the study period. The heroin group contained more patients who were younger by comparison to the non-heroin overdose group. In addition more patients had a diagnoses of hepatitis C. Patients in the heroin group were also more likely to have had a previous overdose event (p=0.007), history of injection drug use (p= < 0.0001), and prescription opioid abuse (p= < 0.0001). The non-heroin group contained more patients with a history of benzodiazepine abuse (p= < 0.0001). Treatment also varied between heroin and non-heroin groups, with the heroin group being more likely to receive naloxone en-route to the hospital (p= < 0.0001), but less likely to receive it upon admission (p=0.0017). The non-heroin group was more likely to receive significantly more total naloxone (p=0.05), as well as need a continuous infusion and were more likely to be admitted (p=0.04). While the cost of admission was also significantly higher in the non-heroin group (p= 0.0001), in-house and 28 day mortality was not significantly different between groups (p=0.98, p=0.44 respectively).

Conclusion: This data supports prior findings which indicate there are an increasing number of overdose patients presenting to emergency departments. A notable difference between groups was that non-heroin overdoses required more naloxone compared to heroin overdoses. The longer half-life of prescriptions opioids likely results in longer hospital stays and higher naloxone requirements. This may also be the cause of higher costs of admission shown with the non-heroin group. More studies are needed to determine if different protocols need to be used in heroin and non-heroin opioid overdoses, and more resources are needed in order to curb addiction and overdose events.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 2-134

Poster Title: Characteristics of asthma patients using high volumes of inhaled short-acting beta-agonists (SABA) in Scotland

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Purpose: Asthma is a disease that results from inflammation and constriction of the airways leading to symptoms such as wheezing, cough, shortness of breath, and chest tightness. Short acting beta agonists (SABA) are used to relieve symptoms associated with an acute asthma attack. It has been previously identified that patients who use large amounts of SABA inhalers are more likely to be poorly managed. The objective of this study was to determine if there are specific patient characteristics that could predict if a patient was more likely to excessively use SABA inhalers and therefore, have poorly managed asthma.

Methods: All people aged 0-44 years in Scotland (population 5.3 million) who received at least one SABA inhaler between January through December 2015 were identified from the national prescribing information system (PIS). PIS does not hold diagnosis information so an upper bound of 44 years was used to restrict subjects to those with asthma and not chronic obstructive pulmonary disease (COPD). The number of inhalers received was recorded as was gender, five-year age band and Scottish index of multiple deprivation (SIMD) decile. SIMD incorporates several aspects of deprivation into a single measure that is applied to neighborhoods that can then be ranked. Patients who received greater than 12 inhalers were identified and between group comparisons were evaluated using the z-test. Relationships with age and SIMD were investigated using linear regression.

Results: Of 250,304 people treated with a SABA during 2015, 19,584 (7.6%) received greater than 12 inhalers. Of these patients, 10,634 (54.3%) were male and males were the majority in each age group. This difference became most apparent and widened from adolescence. There was a strong correlation between using >12 SABA inhalers and increasing age ($R^2=0.93$, p-value < 0.0001). In addition, there was a strong association with increasing levels of deprivation and

the proportion of patients to using >12 SABA inhalers. (R2=0.99, p-value < 0.0001). Of the population that used >12 SABA inhalers, 11% of patients were in the most deprived group versus 5% of patients were in the least deprived group (p-value < 0.05).

Conclusion: In patients aged 0-44 years, using >12 SABA inhalers in 12 months was associated with increasing age, being male and living in a socio-economically deprived area. It is hard to say why these patients are more likely to use SABAs excessively. A variety of factors may be involved including: accessibility to healthcare lack of engagement with such services, or an education gap on proper inhaler use. By being aware of the populations most at risk, pharmacists will be able to begin to intervene in the asthma management of these patients– decreasing exacerbations, increasing quality of life, and decreasing healthcare costs.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 2-135

Poster Title: Influence of age, gender, and deprivation on the prescribing of gabapentinoids in Scotland

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Purpose: Chronic pain management presents a major therapeutic, emotional, and financial challenge to both patients and clinicians. Nearly one in every five patients in Scotland is affected by chronic pain. With the increase in opioid prescribing during the last 20 years, numerous epidemiological studies have reported that higher deprivation has been correlated with higher use of opioid agents.
The prescribing of pregabalin and gabapentin has also increased due to their utility in addressing chronic pain. Our aim was to utilize national prescribing data in order to investigate if deprivation, age, or gender influences the prescribing of pregabalin and gabapentin.

Methods: The national prescribing information system (PIS) holds information on all National Health Service (NHS) prescriptions dispensed within community pharmacies in Scotland (population 5.3 million). Each patient is assigned a unique patient identifier (CHI number), which grants access to demographic information and allows for the events relating to an individual to be linked together. Using PIS, all patients that had received a prescription for an analgesic in 2014 or 2015 were identified. Patients were then stratified by age, gender, Scottish Index of Multiple Deprivation (SIMD) decile, and type of analgesic received: non-opioid, weak opioid (tramadol, codeine), strong opioids, or gabapentinoids (pregabalin and gabapentin). Using this data the number of patients treated with each type of analgesic was trended and compared between each of the 14 regional health boards throughout Scotland. Use of each type of analgesic was also compared between age bands, gender, and SIMD decile for the whole of Scotland.

Results: In 2014 1,459,440 patients were identified as receiving any type of analgesic prescription of whom 764,233 (52.3%) received non-opioids, 894,559 (61.3%) received weak opioids, 79,903 received strong opioids (5.4%), and 144,607 (9.9%) received gabapentinoids. In

2015 there was an overall increase of 19,236 patients receiving any analgesic (total of 1,478,376). There was also an increase in non-opioids (776,464-52.5%), strong opioids (86,516/-5.8%), and gabapentioids (160,801-10.8%). However, in 2015 there was a decrease in the amount of patients receiving weak opioid prescriptions with 890,413 (60.2%).
There was a strong correlation for increased use of all analgesic agents with increasing levels of deprivation ($R2=0.985$; $p < 0.001$). There was also a strong correlation for gabapentinoid usage with increasing levels of deprivation ($R2=0.992$; $p< 0.001$).
Overall there was greater analgesic use in females compared to males and greater use of gabapentioids in females with 134,293 patients compared to males with 84,097 patients (61.5% and 38.5% respectively). There was greater use of gabapentinoids in females compared to males in every age band, with the mean age of use being 53 years old for all patients. A difference in use between genders was greatest with the older age bands of 75-84 and 85 and up.

Conclusion: A significant proportion of the Scottish population received an analgesic agent in 2014 and 2015. The prescribing of these agents continues to increase, although the proportion of analgesic type is shifting toward gabapentinoid usage. There is a very strong correlation between deprivation and analgesic use, including gabapentinoids. In general analgesic use increased with aging and females had higher use compared to males in all age bands. The higher prescribing of gabapentinoids in elderly females may be due to greater longevity in females, differences in pain tolerance or due to indications other than chronic pain management.

Submission Category: Pharmacy Law/ Regulatory/ Accreditation

Submission Type: Evaluative Study

Session-Board Number: 2-136

Poster Title: Assessment of the current reporting requirements of the Kentucky immunization registry

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Purpose: Immunization registries were created to allow for data collection of patient-specific administered vaccines. This confidential reporting system was developed to improve population health by providing insight into vaccine compliance, disease prevention, and missed opportunities. While some regulations surround individual state registries, most states have optional reporting for the majority of healthcare providers. The purpose of the survey is to assess pharmacists' views of the Kentucky immunization registry. Survey focus is based around the satisfaction with current reporting requirements and the potential need to make reporting mandatory for all vaccines administered in the state of Kentucky.

Methods: In order to assess the need of expanding the current reporting requirements of the Kentucky immunization registry (KIR), a needs assessment survey was conducted. An Institutional Review Board (IRB) certified survey was administered to 1,000 randomly selected pharmacists registered within the state of Kentucky. The survey consisted of ten topic related questions and three demographic questions. The survey was available for a period of two months through the Research Electronic Data Capture (REDCap). REDCap is a secure, web-based application designed exclusively to support data capture for research studies. Once the link to the survey in REDCap was opened, the respondent would see a cover letter containing the applicable elements of informed consent. This cover letter explained the purpose of the survey. After reading the cover letter, the survey recipient would receive a unique pin-number that would allow them to log into the REDCap system to enter their survey responses. All data received from respondents completing the survey online was anonymous. Upon survey closure, results were analyzed through Microsoft Office Excel and Statistical Package for the Social Science (SPSS) to examine awareness of the KIR and current satisfaction with reporting requirements and to examine the importance pharmacists placed on missed opportunities and preventable disease prevention within the state of Kentucky.

Results: Out of the 1,000 pharmacists randomly selected to take the survey, 142 pharmacists completed the survey. In order to aggregate the collected data, all responses were averaged over a five point Likert scale. If the mean was less than the neutral value, three, then on average the surveyed group “agreed” with the statement. Comparatively, if the mean was greater than three, then on average the surveyed group “disagreed” with the statement. The further the mean is from the neutral value, the stronger the group felt about a particular question. P-values were calculated for each question to assess whether the responses to the questions were relevant and not based on chance. All questions were determined to have significance based on all p-values being reported as less than 0.05. Nine out of the ten questions reflected a mean of equal to or less than three. One question reflected a mean value greater than three, demonstrating unfamiliarity with the immunization registry. A Levene’s test for equality of variances was conducted to compare how community pharmacists responded to questions in comparison to all other categories of pharmacy referenced within the survey. In two instances community pharmacists responses varied significantly from all others.

Conclusion: Immunization registries are becoming more prevalent in today’s healthcare community. The ideology behind the purpose of the immunization registry seems clear among pharmacists in Kentucky, but the need for expanded reporting requirements is not as evident. While pharmacists view missed opportunities and preventable diseases as issues that Kentucky faces, they do not seem to be entirely convinced mandatory reporting to the immunization registry is the most efficient way to handle these issues.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 2-137

Poster Title: Elucidating the pathway of mycobacterial cholesterol catabolism, a potential novel target for the discovery of tuberculosis therapeutics

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Purpose: Tuberculosis (TB), caused primarily by Mycobacterium tuberculosis (Mtb), remains one of the deadliest communicable diseases and is notorious for its cumbersome treatment regimen. A third of the world's population is estimated to be infected by the pathogen in the latent form, and efficient treatment against TB in the latent state has not yet been developed. The long-term goal is to develop novel therapeutics effective against latent TB including both drug-sensitive and drug-resistant TB. We hypothesize that cholesterol metabolism (specifically the oxidative degradation of the aliphatic side chain of cholesterol) is an ideal target for eradicating latent TB.

Methods: The majority of the genes essential for Mtb cholesterol metabolism have yet to be identified or functionally assigned. However, two proteins (FadD17 and FadD19) are well characterized in the literature to be involved in the cholesterol catabolism pathway of Mtb H37Rv. The genes encoding FadD17 and FadD19 are located in two separate genomic islands within the chromosomal DNA of Mtb H37Rv, and we and others have hypothesized that genes adjacent to fadD17 and fadD19 are also required for the cholesterol catabolism pathway. These two genetic loci were bioinformatically analyzed using the Department of Energy Joint Genome Institute Integrated Microbial Genomes and Microbiome Samples to identify 12 additional gene products that are potentially involved in this pathway. Each of these twelve genes as well as fadD17 and fadD19 was cloned and expressed in Escherichia coli BL21(DE3). The function of the soluble, recombinant proteins was tested in vitro using the expected substrate generated in situ using FadD17 or FadD19, which are both carboxylate-CoA ligases that 'activate' the aliphatic side chain of cholesterol to initiate the degradative pathway. Reactions were monitored by HPLC using diode array and charged aerosol detectors.

Results: After analysis of the two gene clusters that are putatively involved in cholesterol catabolism, we hypothesized that at least fourteen total genes were involved in the oxidation pathway. Only four of these genes (fadD17, fadD19, rvbd3504, and rvbd3505) have been characterized and are known to be involved in the cholesterol pathway. Eleven out of fourteen genes, which includes the four genes previously identified, were successfully cloned and expressed in Escherichia coli BL21(DE3) to yield soluble protein. The activity of FadD17 was confirmed as an ATP-dependent cholate:CoA ligases, which was aided by the use of synthetically prepared product as a standard.

Conclusion: Mtb is able to survive within harsh environments of our body by utilizing cholesterol from the cell membranes of our immune cells. Cholesterol is oxidized to provide a source of both carbon and energy to maintain metabolic functions of Mtb while residing in macrophages. Proposed genes involved in the oxidation pathway have been successfully identified and cloned. The results afford the opportunity to functionally assign and characterize the function of each gene product and ultimately developing high throughput activity-based assays to screen for potential inhibitors. These inhibitors could then be used as new medications to treat patients with TB.

Submission Category: Geriatrics

Submission Type: Evaluative Study

Session-Board Number: 2-138

Poster Title: Pharmacovigilance of statin therapy in adults over 75 years old in a geriatric and family medicine primary care clinic

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Purpose: Statins have been proven effective in decreasing the risk of atherosclerotic cardiovascular disease. However, the use of statin therapy in those over the age of 75 years old is controversial due to changes in the aging process, an underrepresentation in clinical trials, and unclear recommendations in the American College of Cardiology and American Heart Association guidelines. The purpose of this study was to evaluate appropriate monitoring and documentation of statin therapy in adults over the age of 75 years old, as the safety and effectiveness of statin therapy is unclear in this population.

Methods: The institutional review board approved this observational, retrospective study. Data was obtained from Allscripts TouchWorks, an electronic health record system used by the University of Louisville Physicians group.
Men and women age greater than 75 years were included in this study if they were enrolled as patients in the University of Louisville Geriatric or Family Medicine clinics and were currently taking a statin at the time of initiation of the study. Statin therapy included atorvastatin, fluvastatin, lovastatin, pitavastatin, pravastatin, rosuvastatin, simvastatin, and simvastatin/ezetimibe. Patients who had not been seen in either clinic in the last 12 months were excluded from the study.
The data collected included the patient's medical record number, sex, age, race, body mass index, ideal body weight, serum creatinine, creatinine clearance, liver enzymes, total number of current medications, diagnosis of diabetes, diagnosis of hypertension, and presence or absence of liver or chronic kidney disease. All data was de-identified of patient specific information. The indication for statin therapy, statin dose and intensity, lipid panel results, reported adverse effects of statin therapy, and any notes from the provider regarding statin therapy were also

recorded. The data was analyzed using descriptive statistics to determine rates of appropriate statin therapy monitoring documentation in the study population.

Results: There were 222 patients found to be on statin therapy, with 60 percent on a statin for primary prevention. Regarding the statins prescribed, 15.8 percent of the patients were on a high-intensity statin and 50 percent were on a lipophilic statin. During clinic visits, 6.3 percent of patients discussed switching to a less lipophilic statin with their provider and 4.5 percent of patients discussed discontinuation of their statin completely. Providers documented the presence of absence of muscle pain, weakness, spasm, or cramps in 15.3 percent of the patients with 9 percent of the total patients specifically complaining of muscle symptoms. A creatine kinase test was performed in 6.3 percent of patients, but was only done in 1 of the 20 patients who complained of muscle symptoms. A lipid panel was absent in 27.6 percent of patients and 16.7 percent of patients did not have a new lipid panel completed in the past 12 months. There were 23.4 percent of patients who had a documented diagnosis of chronic kidney disease or renal insufficiency and 13.8 percent of these patients were on potentially inappropriate statin doses due to their declining renal function.

Conclusion: In this study of adults over the age of 75, it was found that the safety and appropriateness of statin therapy was not properly monitored and documented. The guidelines acknowledge that there are study gaps and future research needs regarding statin use for primary prevention of cardiovascular disease in older adults, thus highlighting the importance of pharmacovigilance in this population. Over half of the patients were prescribed a statin for primary prevention, with many lacking assessment of current lipid levels and adverse effects. This study exemplifies the need for providers to become more diligent in medication management in older adults.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Descriptive Report

Session-Board Number: 2-139

Poster Title: Assessment of pharmacy professional year four advanced pharmacy practice experience (APPE) mock interview exercise

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Purpose: During the Advanced Pharmacy Practice Experience (APPE) pharmacy students are given the opportunity to practice in various practice sites. In recent years, University of Kentucky College of Pharmacy faculty and administrators received anecdotal reports that students could benefit from practice interviews. Two mock job/residency/fellowship interviews have been incorporated into the APPE year to help the students hone their interview skills and increase comfort and confidence in the interview process. This study aims to examine student self-reported interview performance to determine if students improve between the first and second interviews.

Methods: To improve the students' performance during interviews, pharmacy faculty developed questions that evolved into a mock interview to be performed twice during the fourth professional year. Depending on the practice site, the interview is hosted by pharmacists, pharmacy residents, and other pharmacy staff to offer the student valuable feedback on their interview skills. Before each interview, the student completes the Pre-practice Interview Self-Assessment which gives a baseline assessment of the student's confidence in various interview areas. After each interview, the student completes the Post-Interview Self-Assessment and Reflection. This form offers the student the ability to comment on their interview performance as well as assess their confidence in how they performed in certain areas. The Post-Interview Self-Assessment and Reflection form consists of Likert-type response options as well as open-ended questions to assess students' perceptions of their performance on the interview, the most challenging interview questions, what made the interview successful, and ways to improve for future interviews. In order to interpret the open-ended response questions, thematic analysis was performed. Themes were extracted from the students' responses to the open-ended questions, which allowed the researchers to obtain an

overall sense for areas of weakness and places for development based on the extrapolated themes.

Results: Two-hundred thirty-four students completed the interviews – one hundred twenty- six in the Class of 2015 and one hundred eight in the Class of 2016. Five themes were extracted from the student responses in areas of improvement – Preparation, Recall, Nervous Habits, Confidence, and Other. Overall, the top three categories in which the majority of students in both class years self-reported needing to improve were preparation, confidence, and nervous habits. These themes were apparent both after Interview One and Interview Two. In terms of Likert-based response options, students improved overall from Interview One to Interview Two.

Conclusion: Mock interviews during the APPE year were beneficial in addressing student self-reported areas of weakness and places for improvement. The information gleaned from these interviews may be useful to college of pharmacy administrators, professors, and curriculum developers. The mock interviews can better prepare fourth-year pharmacy students for interview experiences they may encounter in their fourth year, as well as exposing other pharmacy students to real-life job interview experiences.

Submission Category: Leadership

Submission Type: Evaluative Study

Session-Board Number: 2-140

Poster Title: Effect of peer instruction on student retention in a pharmacotherapy course

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Purpose: Active learning has been studied in a variety of disciplines, including pharmacy coursework. It has been shown to improve learning and increase student understanding, as well as improve retention when compared to traditional lecturing.
Peer instruction, a specific method of active learning, consists of preparatory student reading assignments, followed by short in-class lectures and small-group student discussion. This process encourages students to think through the concepts of the subject and encourages collaboration and debate with classmates.
We hypothesized that peer instruction would improve student understanding and retention of two therapeutics topics taught to third year Doctor of Pharmacy students.

Methods: Peer instruction was implemented for two topics, Pharyngitis and Febrile Neutropenia, in a third year pharmacy therapeutics course. Students were assigned pre-class readings to complete, and a pre-lecture quiz was given at the beginning of class to assess student preparation and understanding. Class was conducted either traditionally or using peer instruction methods. In 2010 (N=124), Pharyngitis was taught using peer instruction, and Febrile Neutropenia was taught using traditional lectures. In 2012 (N=126), teaching methods were reversed. Post-lecture quizzes, given 60-90 days after class, were used to measure students' retention of the material, and differences between pre- and post-lecture quiz scores were analyzed between teaching methods for both topics. An exam was given to the students at the end of the block, and exam data pertinent to Pharyngitis and Febrile Neutropenia was gathered and analyzed as well.

Results: Mean pre- and post-lecture scores were collected for both Pharyngitis and Febrile Neutropenia. When peer instruction was implemented, post-lecture quiz scores averaged 14.5% higher than pre-lecture scores, although scores increased by varying degrees in the two topics. Conversely, post-lecture scores were 2.8% lower than pre-lecture scores with a traditional teaching method. Neither of these values reached statistical significance.
In addition to quiz scores, Pharyngitis and Febrile Neutropenia exam data was also evaluated. Exam scores were reported by topic as well as teaching method, and peer instruction vs. traditional lecture exam scores were averaged for each topic. On average, 77.61% of students answered the Febrile Neutropenia questions correctly. Comparatively, 68.76% of students answered Pharyngitis exam questions correctly. Similar to quiz score data, these values were not statistically significant.

Conclusion: Even though this study did not find a significant difference in student retention in peer instruction versus traditional teaching groups, further study should be done in larger settings to determine if a difference actually exists.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 2-141

Poster Title: Developing a unique advanced pharmacy practice experience: Research in clinical practice

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Purpose: The American Society of Health-System Pharmacists (ASHP) requires accredited residency programs to incorporate research projects into training. Postgraduate year 1 (PGY1) pharmacy residents often lack expertise in clinical research and often are inexperienced with designing studies, implementing study protocols, and publishing relevant findings. The objective of this rotational experience was to develop an early introduction to the clinical research process to better prepare students for residency training and future research endeavors.

Methods: This Advanced Pharmacy Practice Experience (APPE) was student-initiated and designed to provide early exposure to the clinical research process that would be beneficial for a future clinical pharmacy practitioner. The six-week rotation allowed the student to undergo a self-directed learning process through clinical project management and shadowing experiences. The student's goals were drawn upon to tailor the experience toward the student's future career interests. Twice to thrice weekly topic discussions were planned surrounding core research topics, including developing research questions, ethics, statistics, and various advantages and disadvantages of study designs and analyses. The student was also required to attend lecture series on research topics offered by the Center for Clinical and Translational Science. Shadowing experiences were created with the university's investigational drug service, nurse research project coordinators, and multiple institutional review board meetings. Opportunities were arranged for the student to participate in a variety of study designs, including randomized clinical trials, prospective observational studies, and retrospective cohort

studies. The student participated in various projects across the continuum, from idea generation and protocol development to execution and analysis.

Results: This clinical research rotation enabled the student to gain first-hand exposure to a broad array of clinical research areas beneficial to future clinical pharmacy practice. Shadowing a variety of practitioners allowed the student to learn the practitioner's particular role and involvement in the research process. Reflections of these experiences were documented and discussed with the preceptor. The student and preceptor met daily to discuss status of projects on which the student was working. This experience also introduced the student to the challenges of project and time management with regard to the planning, execution, and manuscript writing for multiple projects occurring simultaneously. The student assisted in screening and enrolling efforts for a prospective double-blinded randomized control trial, screening and collecting data for a prospective observational study, as well as working on a retrospective cohort study and protocol writing to gain exposure to the early processes of designing clinical research. At the conclusion of this APPE, the student gained exposure to all aspects of research, from investigator-initiated projects to industry-sponsored studies and the role that the clinical pharmacist can play in each of these.

Conclusion: A clinical research APPE rotation is a novel way to prepare future graduates with a baseline level of research knowledge that prepares them to engage in clinical research as a resident and beyond.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-142

Poster Title: Patterns of pharmacologic diabetic treatment in Scotland in the fiscal year 2015/2016

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Purpose: The prevalence of type 2 diabetes is strongly correlated with socioeconomic deprivation, and the most deprived patients in Scotland have been shown to develop the disease up to 20 years earlier than the least deprived patients. Increasing prevalence places a financial strain on resources. Scotland spent £67 million ($87 million) in the fiscal year 2015/2016 on diabetic drug therapies, averaging £288 ($374) per treated patient for the year. With the cost of treatment differing widely between drug classes, there may be significant opportunity for efficiencies if prescribing is optimized. This study analyzed prescribing tendencies across deprivation levels, age, and gender.

Methods: The National Prescribing Information System (PIS) holds a record of all National Health Service prescriptions dispensed in the community in Scotland. This study used PIS to extract anonymized data on all patients who received a pharmacologic diabetic treatment during the fiscal year 2015/2016. Treatments were categorized by drug class, and data was stratified by age, gender, and Scottish Index of Multiple Deprivation (SIMD) decile. The SIMD uses a range of socioeconomic measures to rank small geographic regions by deprivation. The higher the SIMD decile, the less deprived the area is. First the proportion of all treated patients by gender who received each drug class was calculated and compared using z-scores. If $p < 0.05$ and there was a difference of 1% or greater in prescribing between genders, this difference was reported as significant in this study. This method was then repeated to find the proportion of all treated patients in each age band treated with each drug class. Patterns in prescribing between age bands were identified using graphing techniques. Finally the data was analyzed to find the proportion of all treated patients in each SIMD decile treated with each drug class and analyzed using linear regression. If $p < 0.05$ and $r2 > 0.85$, then the difference in prescribing between SIMD deciles was reported as significant in this study.

Results: We identified 232,382 patients who were treated with a pharmacologic diabetic treatment in the fiscal year 2015/2016 . Of these patients 44% were female and 56% were male, and 97.9% of these patients were 25 years of age or older. The proportions of females treated was significantly lower than for males for each of the following drug classes: biguanides (71.4% vs. 74.9%), dipeptidyl peptidase-IV (DPP-IV) inhibitors (12.3% vs. 14.1%), sulfonylureas (31.4% vs. 36.0%), and thiazolidinedione (5.1% vs. 6.6%). Analysis by age band showed that biguanides, sulfolyureas, and DPP-IV inhibitors were the most frequently used in all age bands above 25 years. Rapid and long acting insulins were the most frequently used classes of medication in younger age bands. Drug classes with significant correlation between SIMD and proportions of patients treated included: biguanides (r2=0.94), DPP-IV inhibitors (r2=0.85), glucagon-like peptide-1 receptor (GLP-1) agonsits (r2=0.95), sodium-glucose cotransporter-2 (SGLT-2) inhibitors (r2=0.93), rapid acting insulin (r2=0.97), long acting insulin (r2=0.94), and biphasic insulin (r2=0.88). The oral therapies mentioned above and biphasic insulin were slightly more common in lower SIMD deciles, and rapid and long acting insulins were slightly more common in higher SIMD declines.

Conclusion: Our findings broadly indicate that the usage of oral diabetic therapy follows published guidelines. We identified some differences in the use of different drug classes in relation to age, gender, and deprivation. However, without diagnostic data we cannot determine whether these are clinically significant or the result of differences in the proportions of type 1 and type 2 diabetes among the study groups. Further work to investigate this is warranted.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 2-143

Poster Title: Effect of a total care specialty pharmacy model on adult cystic fibrosis clinical outcomes

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Purpose: Access remains a barrier for adult cystic fibrosis patients with respect to obtaining the necessary therapies to manage their chronic disease state. Currently, little data is available assessing the impact of a total care pharmacy model on clinical outcomes in the adult cystic fibrosis population. The University of Kentucky has a specialty pharmacy that has implemented a total care pharmacy model for adult cystic fibrosis patients. The primary objective of this study is to identify what effects a total care specialty pharmacy has on clinical outcomes in the adult cystic fibrosis population.

Methods: This study was submitted to the Investigational Review Board for approval. This is a retrospective chart review of cystic fibrosis patients, ages 18 years and older, seen in the Adult Cystic Fibrosis Clinic at the University of Kentucky and enrolled in the University of Kentucky Specialty Pharmacy Total Care services. To be included, patients had to have had all medications filled during calendar years 2013 and 2015 at the University of Kentucky Specialty Pharmacy. . Demographic information, including, genetic mutations and comorbid conditions were collected. Clinical endpoints including, weight, body mass index (BMI), forced expiratory volume in the first second (FEV1), and number of inpatient and outpatient exacerbations were collected pre- and post-enrollment into specialty pharmacy services. Data elements from calendar year 2013 were collected to encompass the pre-enrollment period. The same data was collected for calendar year 2015 to reflect the post-enrollment period. The data was then reviewed to determine how the use of a total care specialty pharmacy model impacts the clinical outcomes of the study population.

Results: During retrospective chart review, 31 patients met inclusion criteria into the study. The average age of patients included in the study was 28 years [range: 19 to 48 years]. Nineteen (61.3%) patients were male with 64.5% of patients being homozygous Phe508del. The most common concomitant disease state was Cystic Fibrosis Related Diabetes. . The 2013 pre-

enrollment period yielded an average FEV1 of 58%. The post-enrollment period yielded an average FEV1 of 54%.. The pre-enrollment period yielded an average weight of 57.5kg and the post-enrollment period yielded an average weight of 60kg. Likewise, the pre-enrollment period yielded an average BMI of 20.9 kg/m2 and post-enrollment average BMI of 21.6 kg/m2. The average number of outpatient and inpatient exacerbations was 0.96 and 1.44 for the pre-enrollment period and post-enrollment period, respectively. The post-enrollment period showed an average number of outpatient exacerbations of 1.52 and inpatient exacerbations of 1.72.

Conclusion: This study highlighted the impact of a total care specialty pharmacy model on clinical outcomes for an adult cystic fibrosis patient population. There was an identified positive impact on weight and BMI, with an average 2.5 kg weight gain and 0.7 kg/m2 increase in BMI for patients enrolled in the specialty pharmacy total care services. Enrollment in services did not show a positive impact on pulmonary function as measured by FEV1 or number of exacerbations. Other factors should be considered that may impact pulmonary function or exacerbation rate, like control of Cystic Fibrosis Related Diabetes.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Descriptive Report

Session-Board Number: 2-144

Poster Title: Hyper-response to clopidogrel in patients undergoing neuroendovascular procedures

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Purpose: Clopidogrel decreases the risk of stent thrombosis, myocardial infarction, stroke, and death. Numerous factors contribute to variable clopidogrel responses. Patients with poor activation of clopidogrel often have high on-treatment platelet reactivity and are usually switched to an alternative P2Y12 inhibitor. A small percentage of the population is characterized as patients with a hyper-response and may be at increased risk of bleeding. The use of VerifyNow in hyper-responders as a therapeutic drug monitoring tool has not been well described in the literature. The purpose of this study was to describe various methods of dose adjustments in patients with hyper-response to clopidogrel.

Methods: This was a retrospective, cohort study of patients taking clopidogrel prior to an intracranial stent or other neuroendovascular procedures from January 2013 thru June 2016. Platelet reactivity after clopidogrel therapy was evaluated with the VerifyNow PRUTest. Any value less than 100 PRU (P2Y12 reactivity units) was classified as a hyper-response. Data collected included concomitant medications, dosage of clopidogrel, PRU values, and incidence of thrombosis or bleeding. Descriptive statistics were applied to the data as applicable.

Results: Forty-three patients received clopidogrel for neuroendovascular procedures during the study period. Fourteen patients (32.5 percent) were classified as having a hyper-response. Each of the dosing strategies was evaluated in these patients.

Conclusion: The incidence of hyper-response to clopidogrel is frequent enough to warrant testing in patients. Numerous individualized dosing strategies may be reasonable for hyper-responders to clopidogrel.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-145

Poster Title: Medication use evaluation of calcitonin at a large, academic medical center

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Purpose: Calcitonin is a peptide sequence similar to human calcitonin that antagonizes the effect of parathyroid hormone. Calcitonin quickly reduces the amount of calcium present in the body but only to a small extent. The cost of calcitonin has increased 3,300 percent since 2014. Calcitonin utilization was initially curbed after process improvements were initiated last year. However, recent trends show utilization is still variable. The process improvement guidelines that are used include an automatic 48 hour stop date, rounding protocol, and restriction to symptomatic patients. The purpose of this study is to ensure safe, cost-effective, and appropriate use of calcitonin.

Methods: This is an Institutional Review Board approved retrospective cohort study. Patients greater than 18 years of age who received calcitonin from March 1, 2016 to August 31, 2016 were included. Patients were excluded if intranasal was the route of administration for calcitonin. A predefined data collection form was used and included the following information: patient specific information (indication for treatment, current clinical service, calcium levels, and albumin) and information specific for calcitonin (dose, route of administration, and time of administration). In addition, a chart review was performed to determine duration of therapy and if the patient had symptomatic hypercalcemia. Patients were considered to be symptomatic if they were experiencing one of the following cardiovascular, neuromuscular, renal, gastrointestinal, or skeletal symptoms. Based on the current indications for calcitonin, the utilization was assessed. Appropriate therapeutic use was assessed by reviewing indication for calcitonin use and the patients' corrected calcium levels. Data collection was summarized using descriptive statistics and analyzed for identification of suggested focus areas for quality improvement for calcitonin usage. Cost of therapy was also evaluated.

Results: 21 patients were identified who received calcitonin during the 6-month period. Of those 21 patients, 48 percent of patients (n equals 10) were on the internal medicine service. There were 14 percent of the patients (n equals 3) for surgery and 10 percent of patients (n equals 2) for the pulmonary ICU service. Remaining orders were placed by providers in various other areas. 95 percent of patients (n equals 20) had a documented indication for calcitonin use. 24 percent of patients (n equals 5) received calcitonin longer than 48 hours. In addition, 21 percent of doses (n equals 16) were given that did not follow the rounding procedure, thus there was an additional expense of 17,600 dollars. Lastly, 14 percent of patients (n equals 3) received therapy for an inappropriate indication. These patients were not experiencing symptoms due to their hypercalcemia but still received calcitonin. Overall, 52 percent of patients (n equals 11) received inappropriate therapy based on current institutional guidelines.

Conclusion: The analysis revealed that there was low compliance in regards to guidelines established from prior process improvement initiatives. At this time there are still several areas where pharmacists can improve services to facilitate appropriate use of calcitonin. The suggested services include pharmacovigilance for safety and efficacy, duration of therapy, and verification of appropriate dosing. The recommendations from this analysis include requesting the Information Technology department to design a hypercalcemia oncology specific order set that has a drop down window to facilitate dosing's based on 200 unit increments and review the formulary status of calcitonin.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 2-146

Poster Title: Gabapentin discrepancy rate compared to controlled and non-controlled substances in an institutional setting following security protocol intervention

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Purpose: Gabapentin (Neurontin®) is an antiepileptic drug that is commonly used off-label for indications such as chronic neuropathic pain and diabetic neuropathy. Concerns of abuse and diversion stemming from outpatients pharmacies have raised concerns that these issues are also taking place in the inpatient setting. As Kentucky considers reclassifying the medication as a controlled substance it is pertinent to understand how the discrepancy rate of gabapentin compares to other medications before and after treating gabapentin as a controlled substance in the automated dispensing cabinet system (ADC).

Methods: In March of 2016 University of Kentucky Healthcare implemented a new protocol treating gabapentin as a controlled substance, even though it is not scheduled at the state or federal level, due to a high level of observed discrepancies in the ADC. The security protocol included stocking gabapentin in secure pockets allowing access to only users with controlled substance authorization and requiring a blind count when accessed. The discrepancy rate, defined as the difference between the amount expected and the actual amount in the ADC over the amount of medication dispensed, 4 months before the implementation of the security protocol was compared to the 4 months following. Data was collected by running a discrepancy report of all drugs stored in the ADC system throughout the health-system and analyzing the data using Excel. Only discrepancies of tablets, capsules, suppositories and films were included for dosage form consistency. The primary outcome of the research is to compare the gabapentin discrepancy rate 4 months before the security protocol was implemented and 4 months after to see if the intervention was effective. The secondary outcome is to compare the discrepancy rates of gabapentin to other controlled and non-controlled substances before and after the security protocol was implemented. The study was deemed exempt by the University of Kentucky Institutional Review Board.

Results: As a non-controlled substance, gabapentin was responsible for the 3rd most frequent discrepancies in the ADC system, following acetaminophen and ibuprofen. The discrepancy rate for gabapentin (2.6%) was over twice as high as for the average of the controlled substances while it was being treated as a non-controlled substance. Once the security protocol was implemented, the number of discrepancies decreased by 568. This represents a 62.2% decrease in discrepancies from the pre-intervention period of the security protocol. Also, the discrepancy rate after the policy was implemented decreased to 0.86% for gabapentin. This was a 66.9% decrease in the discrepancy rate, whereas the decrease in discrepancy rate for non-controlled substances was relatively unchanged.

Conclusion: These results suggest that gabapentin diversion may be an issue effecting inpatient hospital settings. Therefore, more strict policies are recommended in order to minimize the amount of discrepancies when an ADC is used to obtain the medication. This information can be used to inform the pharmacy community on the growing concern for diversion surrounding gabapentin. This data supports the lobbying effort to the Kentucky legislature to reclassify gabapentin.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Descriptive Report

Session-Board Number: 2-147

Poster Title: Pharmacist interventions to improve medication safety for patients discharged from the emergency department

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Purpose: Pharmacists play a significant role in preventing medication errors and enhancing the transitions of care. The fast-paced nature of the emergency department (ED) can prevent pharmacists from reviewing discharge prescriptions. This study aimed to examine interventions made from call-backs from community pharmacies and evaluate the errors most commonly associated with prescriptions written for patients discharged from the ED.

Methods: All pharmacist interventions are collected into a RedCap database. Entries from July 2015 to July 2016 were retrospectively reviewed. Only calls from pharmacies requesting clarifications or corrections for prescriptions written by ED providers were included for analysis. Data collected included: date of call, patient age, date of ED visit, medication in question, callback reason, correction made to prescription, and level of training of the prescriber. Pharmacy call back data was aggregated and analyzed to determine trends in prescription errors based on time of year, type of medication, and type of prescriber. Entries were excluded from analysis if the call was related to a prescription from a non-ED provider or if details surrounding the intervention were incomplete or unable to be ascertained.

Results: A total of 552 entries were collected in the one year period from July 2015 to July 2016. More than 85% of call backs occurred within 48 h of discharge from the ED with around half of all pharmacy calls made the same day the prescription was written. The most common types of medications that required pharmacist intervention were antibiotics, analgesics, and antiemetics. Reason for the prescription call back included the prescriber or ordered product

not being covered by the patient's insurance, incorrect quantity, and incorrect instructions. In nearly 10% of entries there were two or more unique problems identified that needed to be addressed. Physician residents averaged 6.5 calls per prescriber while attending physicians and mid-level providers had similar rates of prescription call backs (5.6 and 5.0 calls per prescriber, respectively).

Conclusion: ED pharmacists are in a unique position to help optimize transitions of care and identify opportunities that exist to improve the prescription writing process to prevent future errors. Some interventions include more robust education for prescribers. Other adjustments could be made to computerized order entry systems to suggest common doses and instructions associated with the most commonly prescribed medications. The potential importance of a 24/7 outpatient pharmacy location within the hospital may serve as a stopping point for patients being discharged with prescriptions and aid in error mitigation.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Evaluative Study

Session-Board Number: 2-148

Poster Title: Evaluation of patients requiring crotalidae polyvalent immune fab treatment at an academic medical center

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Purpose: The Viperidae family of snakes including copperhead, cottonmouth, pigmy rattlesnake, and timber rattlesnake are indigenous to many parts of Kentucky including the regions served by our institution. Morbidity can be significant as a result of envenomation and can lead to mortality if treatment is inadequate. Crotalidae polyvalent immune Fab (ovine) is approved for use in patients presenting with envenomation caused by the aforementioned snakes. However, little data exists on patients requiring extended durations of treatment. The purpose of this study is to examine Crotalidae polyvalent immune Fab use and characterize those patients requiring extended durations of treatment.

Methods: The institutional review board approved this retrospective case series. Data were obtained from existing patient records, so no informed consent was necessary. Patients receiving Crotalidae polyvalent immune Fab were identified through pharmacy dispensing records from January 1, 2010 – August 31, 2016. Demographic data were obtained with regards to age, species of snake involved, and location of bite. Treatment data were collected with regards to Snakebite Severity Score, number of vials received, surgical interventions, coagulopathy, and adverse events. Those patients receiving greater than or equal to 10 vials of medication were considered to have received an extended duration of treatment. Data obtained from the general population and the extended duration population were compared.

Results: Pharmacy dispensing records indicated 111 patients receiving Crotalidae polyvalent immune Fab between January 1, 2010 and August 31, 2016. Of the 111 identified patients, 21 were found to receive an extended duration of medication. The average age was 26 years in

those patients not requiring an extended duration of treatment and 33 years in those requiring an extended duration. The age distribution was varied between the two groups with a higher percentage of pediatric patients in the normal duration than extended duration population. Copperheads constituted the majority of bites in both populations but 50% of rattlesnake bites lead to an extended duration of medication. The extended duration population had higher Snakebite Severity Scores (3.5 versus 4.5), received more antivenin prior to arrival (1.3 vials versus 2.5 vials), and received more antivenin in hospital (4.5 vials versus 12.5 vials). Coagulopathy rates were 12% in the general population and 24% in the extended duration population. Surgical intervention was rare in both groups (2 patients versus 1 patient) as well as adverse drug events (2 patients in each group).

Conclusion: Risk factors associated with requiring an extended duration of antivenin therapy were rattlesnake envenomation, higher Snakebite Severity Score at presentation, and coagulopathy. Only a small number of patients treated with antivenin require surgical intervention for management. Adverse drug reactions are uncommon, but may be attributed to receiving larger amounts of antivenin.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 2-149

Poster Title: Assessing the effect of stroke on medication regimen complexity

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Purpose: The medication regimen complexity index (MRCI) tool quantifies a patient's medication regimen based on dosing forms, frequency and instructions. This tool may identify those who would benefit from medication therapy management. Hospital visits for adverse drug events were associated with MRCI of greater than 8 while all-cause readmission rates were associated with MRCI ranges of 20 to greater than 33. MRCI has not been examined following acute neurologic injury. The purpose of this pilot study was to analyze whether MRCI was increased following the occurrence of acute stroke in patients qualifying for acute rehabilitation prior to returning home.

Methods: This project was approved by the University of Kentucky institutional review board (IRB). Patient level MRCI values were calculated for 40 patients with acute stroke admitted to an inpatient tertiary care hospital and transferred to a single acute rehabilitation facility. All patients included in this study were discharged home from the acute rehabilitation facility. Admission medication reconciliation forms were used for baseline MRCI and medication discharge teaching forms were used for MRCI calculations upon rehabilitation transfer to home. Demographics included gender, age, National Institute of Health Stroke Scale (NIHSS), Functional Independence Measure (FIM) scores, dysphagia, and, number of medications at each time point. Severe stroke was defined as NIHSS less than 9 at acute care admission. Functional Independence Measures were defined as Independent (FIM greater than or equal to 90); Modified Dependence (37-89) and Complete Dependence (FIM less than 37). MRCI calculations were matched for each subject at the two time points. Student's t-test for paired data and one-way ANOVA were used for statistical analysis.

Results: There were 18 males and 22 females. Mean age was 67 plus or minus 14.5 years. Three subjects had dysphagia. Twenty-one subjects (52.5 percent) were admitted with severe stroke. Upon discharge from acute rehabilitation to home, 16 subjects were completely independent, 23 were moderately dependent and three were completely dependent. Baseline Admission Mean MRCI was 14.5 plus or minus 13.5 and mean number of medications was 7 plus or minus 5.7. At discharge from acute rehabilitation to home, the mean number of medications was 11 plus or minus 3.9 and MRCI was 28 plus or minus 13.8. MRCI means were 27 plus or minus 3.1 with NIHSS less than 9 and 29 plus or minus 3.2 with NIHSS greater than 9. MRCI means were 24 plus or minus 3.4 for Independent FIM scores, 31 plus or minus 2.9 for Modified Dependent FIM scores and 28 plus or minus 7.9 for Complete Dependence FIM scores. There was no association between admission NIHSS or acute rehabilitation discharge FIM scores and MRCI in this small sample. The overall mean change in the MRCI between admission and discharge was 13.5 plus or minus 2.3 (95 percent CI 8.98-18.1, p less than 0.0001).

Conclusion: This pilot study shows a significant and rapid increase in medication complexity regimens following acute stroke. The MRCI at discharge from acute rehabilitation to home was within range of prior reports showing increased risk of medication related hospital readmissions. Medication therapy management should be routinely employed for patients following acute stroke.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 2-150

Poster Title: Assessment of pharmacist knowledge change by practice site following completion of an online continuing pharmacy educational diabetes management activity

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Purpose: Continuing pharmacy education (CPE) programs are crucial in educating pharmacists and maintaining current, evidence-based practices. There is little data available that details whether pharmacist practice setting (health-system, retail, or other) is associated with different levels of pre- and post-test knowledge following online monograph CPE and whether there are similar barriers to implementing changes in practice in these different settings. This study assesses pharmacist change in knowledge after completing an online CPE monograph regarding glucagon-like peptide-1 receptor agonists (GLP-1 RAs) in the management of type 2 diabetes mellitus (T2DM), and determines whether practice setting is a factor in knowledge change.

Methods: An online educational content delivery platform was used to host CPE for pharmacists to convey knowledge regarding management of T2DM using GLP-1 RAs. Participants were given a pre- and post- assessment within the online setting (n equals 3,871) containing five knowledge-based questions based on the activity learning objectives and designed to measure the change in knowledge before and after the activity. Participants (n equals 3,740) also completed an optional evaluation at the end of the activity. The evaluation portion included questions about whether the participant intended to make a change in practice resulting from information learned and to identify barriers to making practice changes. All identifying information from the assessments and evaluations was removed following the educational activity and submitted to the institutional review board for exempt status for this analysis using de-identified data.
Percentage of correct responses was calculated for each question for all participants and again by pharmacist practice setting, where setting was categorized as health-system, retail, or other

practice setting. Change in performance on knowledge assessment from pre- to post- activity was calculated via chi square analysis for each question by practice setting, with a priori significance set at 0.05. Frequency of responses for intentions to make a change in practice and barriers to making a change was calculated by pharmacist practice setting. Analysis was conducted with Stata v12.0 and Microsoft Excel.

Results: Of 3,871 participants, 27 percent were health-system pharmacists, 39 percent were retail pharmacists, and 34 percent were pharmacists practicing in other settings. Statistically significant improvement was demonstrated on all knowledge assessment questions, with pharmacists from each practice setting improving performance at post-assessment on every question (p less than 0.01, all questions). Health-system pharmacists had the highest percent improvement when performance was aggregated for all questions, followed by retail pharmacists. Notably, retail pharmacists showed the highest overall percent improvement in knowledge regarding the mechanism for which GLP 1-RAs improve glycemic control (plus 47.58 percent), followed by health-system pharmacist percent improvement in knowledge regarding differences in GLP-1 RA product formulation (plus 47.04 percent).
The most frequently reported intended change in practice from health-system pharmacists was to educate colleagues about the role of GLP-1 RAs in T2DM management (32 percent) while retail pharmacists (46 percent) and pharmacists in other practice settings (28 percent) most frequently intended to educate patients. The most frequently reported barrier to making a practice change related to GLP-1 RAs was formulary restrictions, according to health-system pharmacists (55 percent) and pharmacists in other practice settings (42 percent). Retail pharmacists report patient ability to pay as the greatest barrier (42 percent).

Conclusion: Pharmacist pre-test knowledge improved after completion of an online CPE monograph regarding GLP-1 RAs as shown through increased post-test knowledge for health-system pharmacists, retail pharmacists, and pharmacists who practice in other settings. By gaining a stronger understanding of GLP-1 RAs, pharmacists may be influenced to implement changes in practice in order to maximize patient care. However, certain barriers to practice change, including cost and formulary restrictions, can impede these practice changes from occurring.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 2-151

Poster Title: Resumption of direct oral anticoagulant therapy following a gastrointestinal bleed at a single institution

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Purpose: Acute gastrointestinal bleeding (GIB) is recognized as the most common adverse effect in patients receiving long-term anticoagulation therapy. While recent studies have demonstrated that the benefits of restarting warfarin therapy after a GIB outweighs the risks when considering thrombosis, recurrent GIB, and mortality, there are limited studies regarding resumption of direct oral anticoagulants (DOACs) following a GIB. Due to differences in onset, duration and the availability of a reversal agent, it is unclear whether practitioners should resume DOACs and warfarin in a similar manner. Therefore, the risks, benefits, and timing for resumption of DOACs after a GIB require further evaluation.

Methods: Following Institutional Review Board approval, a retrospective cohort study was conducted. All patients admitted to the Lexington VA Medical Center with a GIB while receiving anticoagulation therapy between December 2013 and May 2016 were reviewed. Patients were then divided into 2 groups by type of anticoagulant, either DOAC or warfarin. All patients receiving a DOAC were included while patients on warfarin therapy were randomly selected to obtain a ratio of approximately 1:3 for comparison purposes. The primary outcome for this study was to characterize the practice for resuming DOAC therapy at our facility by comparing the timing for resumption of anticoagulation in patients on DOACs and warfarin following a GIB. Specifically, the percentage of patients resuming anticoagulation within 7 days and 60 days following GIB resolution were compared. The secondary outcome was a comparison of the composite incidence of re-bleeding, thrombosis, or mortality in the 90 days following GIB resolution.

Results: Fifty patients experiencing a GIB while on anticoagulation therapy during this time period were included in this study. There were 12 patients admitted with a GIB while taking a DOAC (n= 10 rivaroxaban, 1 dabigatran, 1 apixaban). There was no significant difference between the percentage of patients resuming DOACs and warfarin within 60 days following GIB resolution (67 vs 79% respectively, p =0.39). Of the patients who resumed anticoagulation, there was no difference in the percentage of patients who resumed within 7 days (75 vs 80%, p= 0.76). The median time for resuming therapy was similar at 3.5 vs 2 days (p = 0.57). Additionally, there was no difference in the composite outcome of re-bleeding, thrombosis, or death within the 90 days following GIB resolution (25 vs 34%, p= 0.73).

Conclusion: This retrospective cohort study found that following an acute GIB, practitioners are resuming DOACs in a simliar manner and time frame as warfarin. Despite pharmacologic differences between DOACs and warfarin, there was no difference in adverse outcomes. Due to our limited sample size, future studies are required to confirm these findings and define the most appropriate timing for resuming DOAC therapy following a GIB.

Submission Category: Pharmacokinetics

Submission Type: Evaluative Study

Session-Board Number: 2-152

Poster Title: Evaluation of once daily tobramycin dosing in adult cystic fibrosis patients admitted for a pulmonary exacerbation

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Purpose: Tobramycin is part of the antimicrobial regimen used to manage a pulmonary exacerbation caused by Pseudomonas aeruginosa in cystic fibrosis (CF) patients. Staubes and colleagues found that 41% of encounters achieved target peak concentrations, with a 10% incidence of nephrotoxicity. Subjects were on an initial tobramycin dose of 10 mg/kg/day. The University of Kentucky Medical Center utilizes a higher initial tobramycin regimen of 12-13mg/kg/dose every 24 hours. The primary objective of this study is to assess the initial dosing regimen by evaluating peak and trough concentrations. A secondary objective investigates the incidence of nephrotoxicity of the tobramycin therapy.

Methods: This study was submitted to the Investigational Review Board for approval. This is a retrospective chart review of CF patients 18 years and older who received tobramycin therapy for a Pseudomonas aeruginosa pulmonary exacerbation while admitted to the University of Kentucky Medical Center between January 1, 2014 and July 31, 2016. Patients were identified via pharmacy charges for tobramycin intravenous solution and admitted to the Internal Medicine service during the study period. Patients with multiple visits within the study period only had their five most recent visits included for analysis. Other data collected included: patient age, gender, weight, height, dose of tobramycin, dosing adjustments, tobramycin levels, minimum inhibitory concentrations, serum creatinine, forced expiratory volume and concomitant nephrotoxic medications. Patients were excluded if their tobramycin therapy deviated from the dosing regimen of 11.5-13.5mg/kg/day, they had less than two tobramycin concentrations recorded, they had a baseline history of end stage renal disease requiring

dialysis, they had a lung transplant or they were pregnant. The peak concentration was considered therapeutically appropriate if the peak serum concentration was >15mg/L or the peak to MIC ratio was >8. The incidence of nephrotoxicity was assessed by looking for an increase in serum creatinine by 0.3mg/dl, an increase in serum creatinine by 1.5 times baseline or as noted by the RIFLE criteria.

Results: Baseline patient demographics, clinical characteristics, tobramycin data and pharmacokinetic parameters were collected. The primary outcome investigated was the success of the initial tobramycin dosing regimen in achieving the target peak concentration (>15mg/L) and trough concentration (< 0.5mg/L). The secondary outcome investigated was the incidence of nephrotoxicity. Of the 35 patient encounters, 88.6% achieved the target peak concentration and 100% achieved the target trough concentration. Using the RIFLE criteria to evaluate glomerular filtration rate (GFR), 14.3% of patients were at risk of renal injury and zero patients were injured. One patient experienced an increase in serum creatinine by 1.5 times baseline. A total of 4 patients (11.4%) had their baseline serum creatinine increase by 0.3mg/dL or greater.

Conclusion: The current initial tobramycin dosing regimen of 12-13mg/kg/dose every 24 hours at the University of Kentucky Medical Center met target serum tobramycin concentrations.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Evaluative Study

Session-Board Number: 2-153

Poster Title: Characterization of acetylcysteine dosing regimen in obese patients weighing greater than 100 kilograms receiving treatment for acetaminophen overdose

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Purpose: Acetaminophen is one of the most widely used medications. Ingestion of large amounts is associated with acute liver failure, acute kidney failure, and death due to the production of the toxic metabolite, NAPQI. N-acetylcysteine (NAC) is an antidote that serves to increase detoxification and limit formation of NAPQI. The Food and Drug Administration approved package insert for intravenous (IV) NAC provides dosing up to 100 kilograms (kg). There are no specific dosing guidelines for patients who are obese. This study serves to characterize a NAC dosing strategy in obese patients—to cap or not to cap doses at 100kg?

Methods: This is a single-center, retrospective analysis of patients who presented to the emergency department at University of Kentucky (UK) HealthCare with acetaminophen overdose requiring treatment with NAC that has been approved by the Institutional Review Board. UK HealthCare does not cap NAC doses at 100kg. Data collection was conducted through REDCap by the Institute for Pharmaceutical Outcomes and Policy. Patient identification for inclusion were identified by pharmacy charges or ICD 9/ICD 10 codes. Inclusion criteria were met if a patient received IV NAC treatment for acetaminophen overdose, weight greater than 100kg, age greater than or equal to 18 years old, and NAC was received from January 1, 2009 to January 1, 2016. Patients were excluded if NAC was used for non-acetaminophen overdose indications, no labs drawn within 24 hours of admission for acetaminophen level or liver function tests, or if the patient was transferred from an outside hospital where NAC treatment had already been initiated. The primary endpoint was to describe the incidence of hepatic injury (AST or ALT greater than 100 IU/L or doubling of AST or ALT during admission) or hepatotoxicity (peak serum AST or ALT greater than 1000 IU/L). Secondary endpoints included characterizing the incidence of adverse events during NAC administration; average total NAC

dose and cost per patient; length of hospital stay; length of Intensive Care Unit (ICU) stay; and mortality.

Results: Nine patients were evaluated (n = 9). The primary endpoint of hepatic injury was present in 5 (56 percent) patients and hepatotoxicity occurred in 4 (44 percent) patients. Secondary endpoints revealed a total incidence of adverse events during NAC administration of 22.2 percent; average total NAC dose and cost per patient was 38,238mg and 5,531 dollars, respectively; the average length of hospital stay was approximately 5 days; the average length of ICU stay was approximately 53 hours; and 100 percent of patients survived to discharge. Further characterization of patients showed 6 (67 percent) males; 2 (25 percent) chronic ingestions, 5 (62.5 percent) acute ingestions, 2 (25 percent) mixed ingestions, 3 (37.5 percent) intentional ingestions; 5 (55.6 percent) required additional bags of NAC.

Conclusion: There are no current guidelines for NAC dosing in obese patients greater than 100kg. Potential advantages to not capping NAC doses include affecting rates of survival to discharge and hospital stay. Potential disadvantages to not capping doses are increased drug costs and greater likelihood of adverse events from increased NAC exposure. It is unclear if using actual body weight for NAC dosing could impact the incidence of hepatic injury and hepatotoxicity by providing larger doses of NAC. Further studies are needed to establish the clinical significance of NAC dosing strategies in patients weighing greater than 100kg with acetaminophen overdose.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Evaluative Study

Session-Board Number: 2-154

Poster Title: Multicenter retrospective review of characteristics associated with bleeding with the new oral anticoagulants

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Purpose: As with all anticoagulation therapies, the new oral anticoagulants pose a risk for adverse bleeding events that may range from minor to major, or even fatal in severity. Previous studies have developed and evaluated the bleeding risk assessment scores for anticoagulation therapy. However, these scores were mainly evaluated and developed with regards to warfarin. This study will examine the characteristics associated with the occurrence of bleeding events from use of the new oral anticoagulants.

Methods: The study retrospectively looked at patients who presented to the Emergency Departments of Charleston Area Medical Center General or Memorial Hospitals and the University of Kentucky Chandler Medical Center from November 1, 2010 to November 1, 2015. Patients included were diagnosed with a bleed and currently taking one of the new oral anticoagulants including rivaroxaban, apixaban, or dabigatran. A subgroup analysis was also preformed for patients taking antiplatelet medications in combination with new oral anticoagulants. The primary objective for this study is to determine the presence of common characteristics associated with the occurrence of major bleeding events in patients taking one of the new oral anticoagulants in the outpatient setting. The secondary objectives included characterizing the occurrence of gastrointestinal bleeding or intracranial bleeding, use of agents to reverse anticoagulation, intensive care unit length of stay, hospital length of stay, hospital mortality rate, and concurrent use of antiplatelet medications and a new oral anticoagulant at home.

Results: Of the 145 patients included in the primary analysis, major bleeding occurred in 32 patients (22.1 percent), intracranial bleeding in 19 patients (12.6 percent), and gastrointestinal bleeding in 44 patients (29.1 percent). 76 patients (50.3 percent) concurrently received anticoagulant and antiplatelet therapy. In-hospital mortality occurred in 18 patients (11.9 percent), with 60 patients (39.7 percent) requiring admission to an intensive care unit.

Conclusion: The most common type of bleed associated with the use of a new oral anticoagulant was non-major, with a higher rate of gastrointestinal bleeding than intracranial bleeding. This retrospective study may provide the basis for further investigations regarding the bleeding risk associated with the use of new oral anticoagulants as there is no validated scoring tool available at this time.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 2-155

Poster Title: Student success may depend more on nurture than nature

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Purpose: To determine whether admissions data can adequately predict student success in the first-year Pharm.D. curriculum and whether monitoring and intervention improve success.

Methods: A systematic evaluation of the literature assessing student success was carried out. We analyzed internal admissions data and first-year outcomes for our pharmacy classes of 2016-19 and conducted an interim evaluation of monitoring and mentoring.

Results: Pre-pharmacy GPA, science GPA, PCAT score, and prior degree status each retain some predictive value regarding success, and combinations of these factors may improve predictive power. There remains a significant, and perhaps insurmountable, gap in identification of metrics that forecast student success. We find that early monitoring and intervention provide an actionable means for enhancing student success.

Conclusion: While quantitative academic measures are important in selecting qualified students from the applicant pool, it appears that more subjective measures applied within an institution may better position students for long term success

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 2-156

Poster Title: Effectiveness of pharmacist managed erythropoietin and iron therapy

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Purpose: Patients with chronic kidney disease often need supplemental erythropoietin and iron given during dialysis sessions to prevent anemia. Recommended treatment goals have been refined to be more conservative to target hemoglobin levels just high enough to prevent transfusions and avoiding hemoglobin greater than 12 g/dL. For iron, the target ferritin goal is between 100 ng/mL and 1000 ng/mL and transferrin saturation goal is 20 percent to 50 percent. The purpose of this study is to evaluate how effective the current pharmacist managed dosing is at maintaining patients within the target hemoglobin and iron levels in comparison to physician dosing management.

Methods: The institutional review board approved this retrospective review of patients with chronic kidney disease undergoing dialysis at the Lexington Veterans Association Medical Center. Patients were identified from the computerized patient record system. Inclusion criteria included all patients chronically receiving dialysis from March 1 to June 30, 2015 (physician managed) and March 1 to June 30, 2016 (pharmacist managed). Exclusion criteria for this study were veterans not erythropoietin dependent and without end stage renal disease. Data collection included demographics (age, sex, dialysis schedule), laboratory and medication data. The primary outcome was percentage of time patients spent in targeted hemoglobin, ferritin, and transferrin range. Secondary outcomes included time to intervention after level obtained, if dosing was held when hemoglobin was greater than 12 g/dL, and frequency of dose changes. We used descriptive statistics for continuous variables and categorical variables to analyze the outcomes of this study.

Results: From March 1 to June 30, 2015, 28 dialysis patients met inclusion criteria and from March 1 to June 30, 2016, 24 dialysis patients met inclusion criteria. All patients were male. The percentage of patients with targeted hemoglobin range occurred 23.7 percent of the time

under physician management and 27.1 percent of the time under pharmacist management. The percentage of patients with targeted ferritin level was achieved 96 percent of the time under physician management and 94.7 percent of the time under pharmacist management. The percentage of patients with targeted transferrin level was achieved 86.3 percent of the time under physician management and 87.2 percent of the time under pharmacist management. Erythropoietin doses were appropriately held 92.1 percent of the time in physician managed therapy and 95.1 percent of the time in pharmacist managed therapy. It took an average of 108.3 hours to make a dose adjustment under physician management and an average of 12.7 hours under pharmacist management. Physician management recommended erythropoietin dose changes 20.2 percent of the time and iron dose changes 11.3 percent of the time. Pharmacist management recommended erythropoietin dose changes 49.5 percent of the time and 46.8 percent of the time for iron dose changes.

Conclusion: In this study, both physician and pharmacist dosing management showed similar percentage time patients were within targeted levels. Both groups were successful at appropriately holding erythropoietin doses when targeted hemoglobin levels were greater than 12 g/dL. Pharmacist managed dosing was more timely in conducting recommendations after the laboratory level was drawn, but physician managed dosing made far fewer dose changes. However, the documentation for medication changes was not standardized for physicians and was difficult to locate in the electronic medical record.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-158

Poster Title: Outcomes from an inpatient proton pump inhibitor stewardship program

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Purpose: Proton pump inhibitors (PPIs) are useful for the treatment of acid-related disorders. Unfortunately, they are a greatly overused therapy with several long-term adverse effects. To decrease the incidence of PPI overprescribing in an inpatient setting, a PPI stewardship program was created at a single institution.

Methods: This was a retrospective cohort study. Any patient admitted to an internal medicine team at the Lexington VAMC from 3/14/16 to 8/9/16 with a prescription for a home PPI was evaluated by the PPI stewardship team for an appropriate indication for continuation of therapy while hospitalized and after discharge. All patients without an indication for inpatient PPI therapy discontinued treatment and started as needed acid suppressive therapy (AST), with stipulations that providers may resume home PPIs if patients had refractory symptoms. The primary objective of the study was to determine the percentage of patients requiring resumption of their home PPI during hospitalization. Secondary objectives included determining risk factors for the resumption of the PPI and the percentages of patients requiring the use of inpatient AST therapy.

Results: Between 3/14/16 until 8/9/16, 1179 patients were admitted to an internal medicine service. Out of those, 526 (44.6%) were on PPI therapy and PPIs were subsequently discontinued in 216 (18.3%) patients not meeting criteria for inpatient continuation of therapy. Only 8 patients (3.7%) required inpatient resumption of their PPI and 33 patients (15.3%) requested an AST dose. When comparing the patients who required restart versus those who did not, home daily dose was significantly higher for the resumed group (47.5mg vs. 32.0mg, p=

0.03). There were no significant differences in duration of PPI use, age, or BMI; although, there was a trend towards a higher BMI in the resumed group (33.5 vs. 29.5, p=0.10).

Conclusion: Many patients admitted to a hospital without a clear indication for a home PPI can discontinue therapy with minimal tolerability issues and AST use while hospitalized. However, care should be taken when discontinuing higher doses of PPIs. Future studies will be needed to evaluate an optimal discontinuation plan for this population and to evaluate the continued success of this program post-discharge.

Submission Category: Pain Management

Submission Type: Evaluative Study

Session-Board Number: 2-159

Poster Title: Reduction in opioid prescribing for pain management upon discharge in trauma surgery patients due to pharmacist-led educational programs de-emphasizing narcotics

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Purpose: Patients admitted to an inpatient trauma surgery service often receive significant pharmacological analgesia upon discharge. Effective management of pain in these patients can result in improved recovery and quality of life; however in light of the trend of increasing opioid consumption, abuse and misuse, an opportunity is presented to pharmacists to curb this problem while maintaining effective pain management. The purpose of this study was to determine whether a pharmacist-led educational program de-emphasizing opioid analgesics and including non-narcotic analgesics in the management of pain could result in significant decreases in opioid prescribing to patients upon discharge.

Methods: The institutional review board approved this retrospective pre-post intervention study. Patients greater than 18 years of age admitted to a level one trauma center with orthopedic injuries in 2013 and 2015 who received at least 1 dose of any opioid analgesic were included. Patients with abdominal operation during admission, severe traumatic brain injury, or a history of illicit drug use were excluded. Pregnant patients were also excluded. The pharmacist-led education program commenced in 2014 and consisted of multiple sessions with attending physicians, monthly to bi-monthly sessions with resident physicians, and two optional web-based training sessions for nurses. The primary outcome of this study was discharge morphine milligram equivalents (MME) per day for all patients. Secondary subgroups included MME/day upon discharge of patients who were receiving at least 30 MME/day on admission and patients who were opioid naïve on admission (admission MME/day of 0).

Results: A total of 913 patients were admitted (489 in the 2013 cohort and 424 in the 2015 cohort). The mean morphine milligram equivalent per day upon discharge of the 2013 group patients prior to the pharmacist led educational program being initiated was 99.34 mg/day. The

mean MME/day upon discharge of the 2015 group patients after the program had been in place for 4 months was 68.25 mg/day, representing a 31.2% decrease in MME/day prescribed upon discharge. Within the 2013 group, patients who were admitted with a MME/day of 0 had a mean of 90.5 MME/day upon discharge while the 2015 group opioid naïve patients were discharged with a mean of 52.3 MME/day, representing a 42.2% decrease after the program had been in place. Patients who were on at least 30 MME/day had an average increase of 42.3 MME/day on discharge as compared to admission in the 2013 group and an average increase of 46.0 MME/day in the 2015 group on discharge as compared to admission, representing a mean increase of 3.7 MME/day.

Conclusion: The implementation of a pharmacist-led program de-emphasizing use of opioids and inclusion of non-opioid analgesics in trauma surgery patients resulted in a significant decrease in the prescribing of opioids upon discharge, which was even more pronounced in opioid naïve patients. In patients who were admitted with at least 30 MME/day, no decrease in 2015 compared to 2013 suggests a decrease in discharge opioids may not be as feasible in this population using only patient and provider education.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 2-160

Poster Title: Effect of Hospital Stay Duration in Patients Treated with Aztreonam vs. Cefepime for Gram Negative Empiric Therapy: Interim Analysis

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Purpose: Penicillin allergies are the most common drug allergies with a prevalence between 8 and 12%. Furthermore, 90% of patients with documented allergies to penicillins are able to tolerate these drugs after a formal evaluation. Many guidelines recommend the use of beta-lactams for gram-negative coverage and avoiding these drugs has been associated with worse clinical outcomes. Patients with these allergies are frequently given aztreonam for gram-negative coverage. The purpose of this study was to compare the effect of hospital stay duration in patients treated with aztreonam vs. cefepime.

Methods: This was a retrospective cohort of patients at Eastern Maine Medical Center in Bangor, Maine between January 2012 and July 2016. Patients ages 18 and older were enrolled if they were treated with aztreonam or cefepime as initial gram negative coverage for a minimum of 72 hours. Patients were matched based on type of infection. Other patient characteristics collected include age, body mass index (BMI), severity of illness at initiation of therapy, comorbid conditions, presence of a beta-lactam allergy, anti-methicillin-resistant Staphylococcus aureus (MRSA) coverage if given, cultured pathogens if available, and site of infection. The primary outcome was duration of hospital stay. Secondary outcomes included clinical failure at 96 hours (defined as changing to a different agent with similar coverage or clinical worsening of illness), 30 day all-cause mortality, appropriateness of therapy based on type of infection, and appropriateness of therapy based on allergy status. A sample size of 160 in each group was calculated to achieve a power of 80% and a 2-tailed alpha of 0.05. For this interim analysis of 80 patients in each arm, a P-value of 0.025 was considered to be statistically significant. Sensitivity analysis was performed based on beta-lactam allergic status.

Results: A total of 160 patients were screened and evaluated for inclusion. The mean age of the population was 67.85 (±13.6) with 75 (46.9%) being male and 85 (53.1) being female. The severity of illness at initiation of therapy was similar between the aztreonam and cefepime with median APACHE II scores of 11 (2-42) and 11.5 (2-41). Pneumonia was the most common type of infection with 53 (66.3%) patients in each group. Majority of patients (81.25%) received anti-MRSA coverage with the vancomycin (76.9%) being the most commonly used agent. The median length of stay for all patients was 9 days (3-42 days). There was no difference in duration of stay between aztreonam and cefepime (9 days versus 9.5 days; P=0.4839) in the primary analysis nor was there in the Kaplan-Meier analysis (P = 0.0769). There was no difference in clinical failure at 96 hours between aztreonam and cefepime (31.3% versus 25%; P=0.3793), 30 day all-cause mortality (17.5% versus 30%; P=0.0632), or appropriate empiric therapy (85% versus 95%; P=0.0623). There was a difference in appropriateness of therapy based on allergy status (45% versus 98.8%; P < 0.0001).

Conclusion: Based on this interim data, there was no statistically significant difference in the duration of hospital stay in treatment with aztreonam compared to cefepime. Though it wasn't statistically significant, there was a higher rate of 30 day all-cause mortality with cefepime compare to aztreonam. Based on the sensitivity analysis, majority of patients receiving aztreonam (55%) could have used a beta-lactam for gram negative coverage. A limitation of this study is the lack of matching patients based on culture pathogen. Future studies controlling for this would be beneficial to determine if there is really no difference in outcomes between treatment groups.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-161

Poster Title: Use of drug information mobile applications by Maine pharmacists

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Purpose: The purpose of this survey was to determine the use of drug information (DI) mobile applications by pharmacists licensed in the State of Maine and to determine possible barriers to their use.

Methods: A Google Forms survey was developed in conjunction with the Director of Assessment at the Husson University School of Pharmacy. Comprised of five sections, the survey gathered data on respondent demographics, mobile application use, access to DI mobile applications, usefulness of DI mobile applications, and barriers to the use of DI mobile applications. Branching techniques directed respondents to the appropriate questions. The Maine Board of Pharmacy provided the list of all registrants. The list was manually scrubbed to create a list of individual pharmacists. This anonymous, confidential survey was sent to pharmacists licensed in Maine starting on September 8, 2016. A tickler notice sent on September 20, 2016. The survey closed at 11:59 PM on September 29, 2016. Respondents could enter a drawing for a $25 gift card as an incentive to participate in the survey.

Results: The survey was sent via email to 2,372 licensed pharmacists in Maine; 63 addresses failed. The response rate among those with current email addresses was 5.8% (n=135). Respondents were evenly matched by gender; 59% were over 45 years-of-age; 48% were in community practice; and 42% were preceptors for a college/school of pharmacy. Overall, 73% of respondents reported using mobile applications (e.g., Facebook or Weather.com) on a regular basis while 9% reported never or almost never using them. Forty percent of respondents use DI mobile applications on a regular basis at their practice site; 36% never or almost never do so. Fifty-two percent of respondents reported DI mobile applications as a preferred method of gathering drug information. Sixty-eight percent agreed or strongly agreed that their work site provides adequate access to DI mobile applications, most commonly

Lexicomp, Clinical Pharmacology, and/or UptoDate. Lexicomp was noted to be the most useful. Nearly two-thirds of respondents reported that they do not use mobile applications or that they only download free DI mobile applications. The biggest barriers to using DI mobile applications were the availability of Wi-Fi (36%) and cost (34%).

Conclusion: Maine pharmacists appear to be using mobile applications, though fewer are using DI mobile applications. The majority of respondents use DI applications at their worksite and report that the worksite provides adequate access to them. More Maine pharmacists report the Lexicomp application as useful than any other DI mobile application. A majority of Maine pharmacists report only downloading free mobile applications. The biggest barrier to using DI applications is the availability of Wi-Fi and cost. This study was limited by the low response rate and a resulting sample that may not be representative of the population of pharmacists in Maine.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 2-162

Poster Title: Pharmacists, student pharmacists and pharmacy technicians prevent adverse drug events by making clinically significant changes to home medication lists on hospital admission

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Purpose: Medication errors occurring during hospital admission result from incomplete or inaccurate medication histories. These errors can lead to reduced quality of care and increased costs. Medication history and reconciliation is required during the hospital admission process and can be completed by any health care team member. Pharmacists, student pharmacists and pharmacy technicians are skilled in conducting patient interviews and completing the best possible medication histories at hospital admission. The goal of this quality improvement project was to identify clinically significant changes made to patients' home medication lists upon completion of the medication history process by the pharmacy team.

Methods: Student pharmacists conducted a retrospective review of patients who were admitted into the hospital and interviewed by the Pharmacy Medication Transitions team between September and November 2015. Pharmacists, student pharmacists, and pharmacy technicians followed a standardized format of prioritizing patients, conducting an interview, and confirming medications sources to construct an electronic medication list. The final step in the medication history process was the documentation in a note template that included pertinent information from the interview including who was present, sources used to confirm the medications, all medication changes made to the electronic list, medication access or adherence issues and the final medication list. The completed medication history, home medication list and documentation was reviewed and verified by a licensed pharmacist. Medication changes to home lists were tracked and categorized as additions, removals or changes to medication entries on the original list related to formulation, strength, dose or frequency. These changes were further evaluated for their potential to result in an adverse

drug event or impact the clinical management or outcome during hospital admission. The criteria used to determine clinically significant changes included incorrect formulation, strength, dose, frequency and those medications that were discontinued or added. Lastly, clinically significant changes were further categorized into pharmacological classes.

Results: During this time period, the Medication Transitions Pharmacy team interviewed 854 admitted patients. Of these patients, 42% were categorized as high-risk patients based on age, comorbidities, polypharmacy and anticoagulant use. Eighty percent of admitted patients reviewed had clinically significant changes made to their medication list. For the 5971 medications changes made to home medication lists, 2657 (44.5%) changes were determined to be clinically significant. The most common medication class errors involved psychoactive medications (16.79%), anti-hypertensive medications (15.88%), and pain medications (13.29%). Medication errors due to inaccurate medication lists can lead to increased length of hospitalization and potential readmission; it was noted that 38% of the 854 patients reviewed were readmissions.

Conclusion: Pharmacy teams can improve quality of patient care and decrease medical costs by preventing adverse drug events. Pharmacists', student pharmacists', and pharmacy technicians' involvement in the medication history process improves accuracy of medication lists resulting in reduced medication errors on admission and at discharge. Pharmacy students and staff dedicated to the transitions of care process are better equipped with medication knowledge and experience in building the best possible medication history. Student pharmacists and pharmacy technicians are valuable resources in helping to make clinically significant changes to patients' medication lists.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-163

Poster Title: Evaluation of calcitonin utilization in a tertiary healthcare setting

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Purpose: Calcitonin is an efficacious method for acutely treating patients experiencing hypercalcemia. However, the cost has dramatically increased in recent years resulting in a significant financial burden to medical facilities and patients if used improperly. This drug-use evaluation was completed with the objective of eliminating unnecessary calcitonin use and creating a hospital-wide order set to encourage responsible prescribing of calcitonin for hypercalcemia.

Methods: A retrospective analysis was conducted for all patients who had a calcitonin order entered during the 2.5 year period from 01/01/2014 to 06/01/2016. All patients who received at least one dose were subdivided per the following indications; hypercalcemia, osteoporosis vertebral compression fractures (OVCF), and osteoporosis. Literature research and guidelines were analyzed to determine the appropriateness of each indication. Using clinically accepted indications and duration of use (tachyphylaxis occurs after 48 to 72 hours of use), an analysis was conducted to discern savings, had prescribing restrictions existed during the study period. Finally, an order set was developed to implement prescribing restrictions and encourage responsible use of calcitonin in hypercalcemia of malignancy. Physicians, nursing, clinical pharmacist specialists, and laboratory personnel were consulted regarding the order set, which was based upon current literature and prescribing restrictions from other surveyed hospitals.

Results: There were 68 calcitonin orders placed over the 2.5 year period, which resulted in 32 patients with at least 1 documented dose. Of those 32 patients, 24 were being treated for hypercalcemia, 7 for OVCF, and 1 for osteoporosis. Eight of the hypercalcemia patients and 3 of the OVCF were treated for a duration greater than 2 days. Osteoporosis was ruled out as an appropriate indication due to the lack of documented efficacy, as well as the correlation

between long-term use and malignancies. Calcitonin was determined to be a last line option for OVCF in light of cheaper alternatives. Overall, it was estimated that if calcitonin use was restricted to treatment of hypercalcemia and limited to a duration of 48 or 72 hours, the hospital could have saved $98,700 or $81,900, respectively. The resulting order set for hypercalcemia of malignancy reflected these restrictions, placing a 72 hours maximum duration on injectable calcitonin. The order set also recommends the laboratory evaluation of ionized calcium rather than total serum calcium. Ionized calcium is not affected by multiple myeloma, which can present with falsely-elevated calcium levels and could lead to the over diagnosis of hypercalcemia of malignancy.

Conclusion: An order set was developed to encourage prudent prescribing of calcitonin for hypercalcemia of malignancy in a tertiary healthcare center. The order set was based on a medication-use evaluation estimating that $81,900 could have been saved over a 2.5 year period by restricting the duration of calcitonin use to 72 hours and utilizing it only in appropriate patient populations.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 2-164

Poster Title: Feasibility study of a kindergarten through grade 12 (K-12) educational intervention on cannabinoids and the brain: Refinement among college students.

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Purpose: K-12 addiction educational outreach has grown in New England in recent years. Members of the College of Pharmacy from the University of New England (UNE) have contributed to these efforts. Despite these efforts, there is a paucity of evidence examining the efficacy of these interventions. Our objectives were to conduct our cannabinoid intervention among college students to examine the feasibility of our approach and refine our methodology prior to entering K-12 schools. We hoped to gain a better understanding of the complexity of our intervention in relation to grade-level ability before administering it to our target population of adolescent students.

Methods: This study was approved by the UNE Institutional Review Board (IRB). Our participants were UNE college students ages 18 years and older, who voluntarily participated in our cannabinoid intervention. The intervention consisted of three phases: Phase 1 (pre-assessment), Phase 2 (cannabinoid mini-lecture with activities), and Phase 3 (post-assessment). Our cannabinoid intervention was designed from publicly available and vetted materials from the National Institute on Drug Abuse (NIDA; https://teens.drugabuse.gov/). Sixteen pre and post assessment questions were compared to assess change in outcomes. Students were given the option to skip any question during either assessment. The primary outcome measure was derived from multiple “risk of harm” items taken from the Monitoring the Future Study (Johnston et al, 2016). For example, students were asked: “How much do you think people risk harming themselves physically and in other ways when they smoke marijuana once or twice a week?” Responses included “no risk,” “slight risk,” “moderate risk,” and “great risk.” These responses were collapsed into “no risk” versus “any risk.” Secondary outcomes included cannabinoid content knowledge and feedback regarding the complexity and age-

appropriateness of the material. Since college students were not our final target population to test intervention efficacy, we prospectively chose not to link pre and post assessment data at the expense of lacking statistical analyses. This allowed our team to maintain privacy, confidentiality, and reduced influence of coercion.

Results: We identified various differences between pre and post assessments following our cannabinoid intervention. For example, the percentage of participants that endorsed perceived harm of "any risk" from weekly marijuana use increased from 23 percent (n=9) to 91.6 percent (n=33). There were also increases in the percentage of correct responses within the knowledge of cannabinoid content domain. For instance, an increase from 53.8 percent (n=21) to 97.2 percent (n=35) of respondents correctly identified marijuana as potentially addictive, which was an area specifically targeted in our educational intervention. Participants subjectively reported that our material would be appropriate for grades 9 to 12, but would be particularly beneficial for younger students and early intervention efforts. We identified specific assessment items that provided no useful information and these have been removed from future assessments.

Conclusion: We distilled nationally available information on the effects of cannabinoids to the developing brain and vetted methods of educating K-12 students. As a result of our pharmacy-initiated intervention, participants demonstrated an increased perception of harm associated with the use of marijuana as well as increased competency of cannabinoid knowledge. Based on student feedback, we have revised our intervention and assessments to ultimately use in the target population of adolescent students. We plan to provide the refined intervention to larger, multiple samples of adolescents and to link the pre and post assessment data to conduct appropriate statistical efficacy analyses.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 2-165

Poster Title: Primary care visit duration on quality of medication use

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Purpose: The goal of this research is to evaluate the impact face-to-face time on medication use and how further evaluating this relationship could uncover areas for pharmacists and other healthcare providers to improve patient care in an ambulatory setting. There is growing concern that duration of visits with primary care physicians are decreasing for each individual patient in combination with increased medication usage. Utilizing data provided by the Center for Disease Control and Prevention (CDC), we will determine what correlation may exist between the total number of medications that patients take and how long they spend with their provider.

Methods: Data from 2013 National Ambulatory Medical Care Survey (NAMCS) file was used to perform the analysis. The survey sampled ambulatory care visits to office-based physicians in 22 states and 7 groups formed by their Census divisions. The data includes patients 18 or older who were seen in an outpatient setting by a physician. 2,705 physicians participated in the study and data was collected by Census Field Representative abstraction. They recorded the total number of medications, up to 10, along with how long the provider spent face to face with the patient.

Results: Patient weighting provided in the sample was utilized and a Pearson's Correlation was evaluated using the two variables. The average number of medication patients were on was 4.50 and the average time spent with physicians was 22.36 minutes. Analysis revealed a significant, negative correlation of -0.005 ($p < 0.01$) with a covariance of -0.195.

Conclusion: Longer visits correlated with patients taking fewer medications. Perhaps providers are more selective in starting therapy or they are under prescribing if they feel rushed with complex patients. This significant correlation shows that visit duration has a subtle impact on

medication use and prescriber habits in ambulatory visits. Further research should be done to evaluate additional factors that impact not only the number of prescriptions provided, but also their appropriateness.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-166

Poster Title: Prescription monitoring program trends among individuals arrested in Maine for diversion or illegal possession of prescription and illicit drugs in 2015.

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Purpose: The Maine Prescription Monitoring Program (PMP) was developed in 2004 as a way to hinder as well as identify drug abuse, misuse, and diversion. The objective of this study is to evaluate controlled substance prescribing trends available in the Maine PMP among individuals arrested for diversion or illegal possession of substances in 2015.

Methods: This retrospective, cohort study utilized data from the Maine Diversion Alert Program (DAP) and Maine PMP. The study population consisted of arrests reported to the Maine DAP by local police departments and DEA agencies in Maine in 2015. The arrest records and PMP database were made available by the Maine DAP and the Maine Office of Substance Abuse, respectively; both were subject to a data use agreement. PMP records within 90 days prior to the date of arrest (index date) were linked into a single database with the arrest records by first name, last name, date of birth, and gender. A 90 day interval before and after the arrest was chosen because it aligns with the current time-frame for distribution of unsolicited threshold reports generated by the Maine PMP. We investigated whether the individual had at least 1 matching prescription record in the PMP for the substance involved in the arrest within the pre-specified time interval. The secondary data points consisted of the total number of prescriptions, the number of unique pharmacies and prescribers, in addition to the payment method as classified based on the codes in the PMP. The research project was approved by the Institution Review Board (IRB#090915-011).

Results: In 2015, there were a total of 1,999 individuals involved in 2,368 arrest offenses for either prescription or illicit drugs reported by the Maine DAP. The average age of these individuals was 33.9 years, and 1,355 (67.8%) were male. The 3 most common arrest categories

included possession (n=1,409, 59.5%), trafficking (n=483, 20.4%), and aggravated trafficking (n=136, 5.7%). The 5 most common substances involved in these arrests included heroin (655), cocaine (499), buprenorphine (265), oxycodone (214), and benzodiazepines (197). The majority (65.3%) of persons arrested had no record in the Maine PMP within 90 days of the index date. Of those who had PMP records, 124 individuals had a matching prescription for the substance in the arrest record reported by the Maine DAP; the most common being buprenorphine (52), benzodiazepines (34), oxycodone (27), hydrocodone (9), and methylphenidate (9). The majority (54%) of the 124 individuals used 2 or more pharmacies, 46.8% used 2 or more prescribers, and the most common payment method (51.6%) was commercial insurance.

Conclusion: Most individuals arrested for illegal possession or diversion of prescription or illicit drugs had no PMP records within 90 days of the arrest. Traditional red flags for diversion, such as utilizing multiple pharmacies and prescribers were present in the cohort of patients with matching PMP records, while cash payment was less common than other payment methods.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 2-167

Poster Title: Evaluation of in vitro fluoroquinolone resistance selection in Neisseria gonorrhoeae

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Purpose: Neisseria gonorrhoeae is an urgent threat because of emerging multidrug antimicrobial resistance. Fluoroquinolones are no longer recommended for the treatment of gonococcal infections due to resistance concerns, but in vitro and/or clinical data suggests that newer fluoroquinolones such as gemifloxacin and moxifloxacin have activity against resistant N. gonorrhoeae. Resistance is promoted when antimicrobial concentrations are in the mutant selection window (MSW), the concentration interval between the minimum inhibitory concentration (MIC) and the mutant prevention concentration (MPC), which is a novel susceptibility parameter. We compared the activity of fluoroquinolones against N. gonorrhoeae through determinations of the MPC and MSW.

Methods: A gyrA mutant of ATTC 49226 (m-49226) was studied. MIC testing was performed with an inoculum of 10^5 colony-forming units (CFU). MPCs were derived by culturing 10^10 CFU of m-49226 on supplemented gonococcal agar with known concentrations above the MIC of each antimicrobial and then measuring the lowest concentration that inhibited mutant growth. The MSW was determined by calculating the difference between the MIC and the MPC. Pharmacokinetic parameters obtained by therapeutic doses of ciprofloxacin (500 mg PO twice daily; fCmax 2.08 mg/L, t1/2 4 hours, AUC(0-24) 19.18 mg-hours/L), gemifloxacin (320 mg PO once daily, fCmax 0.56 mg/L, t1/2 7 hours, AUC(0-24) 3.48 mg-hours/L), levofloxacin (500 mg PO once daily; fCmax 3.93 mg/L, t1/2 7 hours, AUC(0-24) 32.78 mg-hours/L), and moxifloxacin (400 mg PO once daily; fCmax 2.70 mg/L, t1/2 12 hours, AUC(0-24) 28.80 mg-hours/L) were used to calculate the time within the MSW (% of the dosage interval that antimicrobial concentrations fall within the MSW) and the AUC/MPC ratio for each fluoroquinolone.

Results: For m-49226, the MIC/MPC (mg/L) of ciprofloxacin, gemifloxacin, levofloxacin, and moxifloxacin were 0.0625/0.25, 0.0625/1, 0.0625/0.25, and 0.125/0.5, respectively. Concentrations of all of the studied fluoroquinolones except gemifloxacin are predicted to exceed the MPC, and remain above the MPC for the entire dosage interval. Concentrations of gemifloxacin are not predicted to exceed the MPC, and are predicted to fall within the MSW for 92.5% of the dosage interval. Calculated AUC/MPC values for ciprofloxacin, gemifloxacin, levofloxacin, and moxifloxacin are 76.72, 3.48, 131.12, and 57.6, respectively. Thus, resistance to gemifloxacin (but not ciprofloxacin, levofloxacin, or moxifloxacin) is predicted to occur if this antimicrobial is used to treat infections caused by N. gonorrhoeae.

Conclusion: In mutant N. gonorrhoeae, all of the tested fluoroquinolones except gemifloxacin are predicted to prevent mutant selection. As resistance in N. gonorrhoeae continues to be an emergent problem, new antimicrobial therapies are needed. Although fluoroquinolones are no longer recommended for the treatment of gonococcal infections, few alternative antimicrobials with activity against N. gonorrhoeae are available. Further studies of fluoroquinolones, particularly newer agents such as moxifloxacin that have not been adequately studied, are thus warranted.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 2-168

Poster Title: Isavuconazonium sulfate: new drug review and cost-minimization analysis

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Purpose: Isavuconazonium sulfate is a broad-spectrum azole antifungal approved by the Food and Drug Administration (FDA) for the treatment of invasive aspergillosis and mucormycosis. The purpose of this new drug review was to describe the drug's place in therapy, pharmacokinetics, efficacy, and safety profile compared to similar agents in the antifungal class. The review was focused on the indication for invasive aspergillosis. Additionally, a cost-minimization analysis was performed.

Methods: A literature search was conducted including articles published between 2000 and 2016. Randomized controlled trials, systematic reviews, and meta-analyses were the primary sources used. Database searches included: Medline and Cochrane. Additional sources used to search for unpublished studies and ongoing clinical trials included the websites, www.fda.gov and www.clinicaltrials.gov. Also, manufacturer product labeling and Academy of Managed Care Pharmacy (AMCP) dossiers were evaluated. A cost-minimization analysis of isavuconazonium sulfate was performed to assist in making a formulary recommendation. Publically available data sources were assessed for drug costs.

Results: Isavuconazonium sulfate is a prodrug of isavuconazole and works by inhibiting the synthesis of ergosterol, which results in a weakened and dysfunctional fungal cell membrane. Currently, there are no head-to-head studies with isavuconazonium sulfate and other antifungal drugs. Common adverse effects include nausea, vomiting, diarrhea, and headache. Isavuconazonium sulfate demonstrated a better side effect profile resulting in lower rates of discontinuation than comparators due to better tolerability. Isavuconazonium sulfate offers no clinically compelling advantages over existing antifungal agents. Results of the cost-

minimization analysis from least to most cost effective were: isavuconazonium sulfate, posaconazole, and caspofungin. Additionally, isavuconazonium sulfate was more costly than voriconazole and itraconazole.

Conclusion: Based on the cost-minimization analysis, isavuconazonium sulfate was the least cost-effective antifungal. Isavuconazonium sulfate was recommended as non-formulary and non-preferred with additional prior authorization requirements to ensure patients have had an adequate response to more cost-effective alternatives, such as voriconazole, prior to use of isavuconazonium sulfate.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 2-169

Poster Title: Medication Use in Stroke Patients with Falls in an Acute Rehabilitation Hospital

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Purpose: Falls in stroke patients can cause many health related complications such as internal bleeding or hemorrhage, which can lead to high mortality rates. There have been studies that report certain medication classes are major risk factors for potential fall risk. According to a retrospective study of 41 stroke patients in a rehabilitation center, in 89% of falls, the patients were on antihypertensive, hypoglycemic, tranquilizing or neuroleptic drugs. The purpose of this study was to describe the types of medications and frequencies prescribed for stroke patients with recent falls in an acute rehabilitation hospital.

Methods: This study was a retrospective chart review of patients with stroke and documented fall from January to July 2016. Data collected from the electronic medical records included patients' gender, age, diagnosis, date of incident, time of fall, blood pressure and pulse at the time of fall, fall witness, fall assist, fall location, activity at time of fall, fall condition, medications, and time when medications were administered. These data were analyzed and identified for the different types of medication classes prescribed and the most frequently used medication class in the patient population. The medication class with most frequent use was further evaluated for subtypes within the class.

Results: There were a total of 41 patients included in the study: 21 were females (51.2%) and average age was 63.7 years old (range 24-96 years). There were 48 fall events as some patients sustained multiple falls. A total of 489 medications were used in these patients. Of 489 medications, these were the top three drug classes most frequently used: 67 were antihypertensive (14%), 43 were anticoagulants (9%) and 32 were antidepressant (7%). The most frequently used drug class, antihypertensives, was further investigated and then categorized into the top three frequently used subtypes: 25 were beta blockers (37.31%), 15 were angiotensin-converting-enzyme (ACE) inhibitors (22.39%) and 12 were calcium channel

blockers (17.91%). In addition, other types of drug classes prescribed included: 25 hypoglycemic agents (5%), 9 antipsychotics (2%), and 3 benzodiazepines (1%).

Conclusion: From this study, antihypertensive drugs were most frequently used in stroke patients that had fallen at least once followed by anticoagulants and antidepressant agents. Antipsychotics, benzodiazepines and hypoglycemic agents were also prescribed. These drug classes are similar to the study referenced, which stated that their stroke patients were on medications within these classes, in 89% of the falls. Therefore, stroke patients that are on these medications should be monitored carefully and frequently for blood pressure, glycemic control, and cognition status. For future research, medication used in stroke patients without fall events will be compared to the findings from this study.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-170

Poster Title: Efficacy and safety of adjunctive dexmedetomidine in the management of severe alcohol withdrawal syndrome in patients admitted to the intensive care unit

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Purpose: Use of dexmedetomidine, as an adjunct to benzodiazepines, in patients with alcohol withdrawal syndrome (AWS) in the intensive care unit (ICU) is becoming increasingly more common, but conflicting data exists supporting its efficacy and safety in this patient population. Due to inconsistent efficacy data reported in previous studies, adverse event concerns, and elevated costs, this study aimed to evaluate the effects and safety of dexmedetomidine in adult patients with severe AWS in the ICU of a community hospital.

Methods: A retrospective chart review of all patients with a diagnosis of AWS according to ICD-9 or ICD-10 codes admitted to the adult medical intensive care unit between January 1, 2014 and August 31, 2016 was performed. Patients must have been receiving benzodiazepines according to the hospital's symptom-triggered Clinical Institute Withdrawal Assessment for Alcohol Scale, Revised (CIWA-Ar) protocol. The primary outcomes were the difference in mean lorazepam equivalent dose requirements, mean haloperidol dose requirements, and mean CIWA-Ar scores 24 hours before and after dexmedetomidine initiation. Secondary outcomes included mean lorazepam equivalent dose requirements per day on CIWA-Ar protocol, median ICU length of stay (LOS), and median hospital LOS. Secondary outcomes were compared between patients who had received dexmedetomidine as adjunctive therapy to benzodiazepines versus patients who had only received bolus doses of benzodiazepines for AWS management(control group). Safety outcomes assessed in patients who had received dexmedetomidine included the incidence of hypotension (systolic blood pressure less than 90 mm Hg) and bradycardia (heart rate less than 50 beats per minute). The Wilcoxon Sign Rank test was used to detect differences 24 hours before and 24 hours after initiation in the dexmedetomidine group. The Wilcoxon Rank Sum test was used to compare differences between the dexmedetomidine group and the group that did not receive dexmedetomidine.

Results: Thirty-three admissions met criteria for enrollment. Thirteen patients received dexmedetomidine along with benzodiazepines and 20 patients received boluses doses of benzodiazepines only. There were no significant differences in mean lorazepam equivalent dose requirements (14.6 mg vs. 10.9 mg, p = 0.22), mean haloperidol dose requirements (7.7 mg vs. 3.8 mg, p = 0.26), and mean CIWA-Ar scores 24 (9.0 vs. 6.2, p = 0.08) 24 hours after dexmedetomidine was initiated. Benzodiazepine dose per day on CIWA-Ar protocol was similar between groups (Dexmedetomidine: 11.8 mg vs. Control: 10.0 mg, p = 0.14). Hospital LOS was longer in the dexmedetomidine group (Dexmedetomidine: 136 hours vs. Control: 68 hours, p = 0.08) and ICU LOS was significantly longer for patients who had received dexmedetomidine (Dexmedetomidine: 120 hours vs. Control: 64 hours, p = 0.005). Three patients (23 percent) who received dexmedetomidine experienced bradycardia and four patients (31 percent) experienced hypotension. One patient had to discontinue dexmedetomidine due to bradycardia.

Conclusion: Adjunctive dexmedetomidine for the management of severe AWS in ICU patients does not significantly improve CIWA-Ar scores or significantly decrease the need for benzodiazepines or haloperidol. Patients who received dexmedetomidine had a significantly longer median ICU length of stay. Bradycardia and hypotension were also common in patients who received dexmedetomidine Due to the small population, more research is needed to assess the negative impact of using dexmedetomidine in patients with severe AWS.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 2-171

Poster Title: Cariprazine: new drug review and cost-minimization analysis

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Purpose: Cariprazine is a new second generation atypical antipsychotic (AAP) approved for the treatment of schizophrenia and the acute treatment of manic or mixed episodes associated with bipolar I disorder. The purpose of this review was to define the role of cariprazine in current therapy for the treatment of schizophrenia, considering efficacy, safety, tolerability, and cost.

Methods: The primary sources used for the review included two phase III multinational, randomized, double blind, placebo and active controlled trials and product labeling. Also, systematic reviews and current practice guidelines were evaluated. Other databases searched included: Cochrane Database of Systematic Reviews, Micromedex, Lexicomp, Clinical Pharmacology. Current practice guidelines were obtained from the British National Institute for Clinical Excellence (NICE) and Diagnostic and Statistical Manual of Mental Disorders (DSM) library. Additionally, ongoing clinical trials were evaluated using www.clinicaltrials.gov. A cost-minimization analysis was conducted comparing cariprazine to other similar AAPs within the class. Data was compiled and analyzed to generate a clinical conclusion and formulary recommendation.

Results: Cariprazine is a second generation AAP indicated for schizophrenia and acute treatment of bipolar I disorder. To date, there have been no head to head studies comparing cariprazine to other AAPs. Two pivotal trials showed the efficacy of cariprazine compared to placebo, with clinically significant changes in the Positive and Negative Syndrome Scale (PANSS) for schizophrenia. Clinical considerations for cariprazine include adverse effects such as akathisia, extrapyramidal symptoms (EPS), nausea and vomiting, as well as the contraindication

for use in patients with a CrCl less than 30 mL/min. A cost-minimization analysis was performed comparing cariprazine to other AAPs with the indication of schizophrenia. Cariprazine was the most costly and least cost-effective compared to lurasidone, quetiapine, aripiprazole, olanzapine, asenapine and risperidone, from most to least costly, respectively.

Conclusion: Based on the cost-minimization analysis, cariprazine was the least cost-effective atypical antipsychotic. Cariprazine was recommended as Tier III non-formulary requiring a prior authorization in patients with a diagnosis of schizophrenia who are at least 18 years of age and have failed therapy with both aripiprazole and risperidone.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-172

Poster Title: Antimicrobial stewardship at an acute psychiatric facility: compliance with clinical guidelines for urinary tract infection, upper respiratory infection, and skin and soft tissue infections

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Purpose: While useful in certain bacterial infections, antibiotics are often inappropriately prescribed in the hospital setting. Unnecessary or improper use of antibiotics leads not only to increased health care costs, but also increased bacterial resistance. The purpose of this study was to review compliance with current practice guidelines for urinary tract infection (UTI), upper respiratory infection (URI), and non-purulent skin and soft tissue infection (SSTI) to the antibiotic regimens that were prescribed to patients in an inpatient psychiatric hospital.

Methods: The ethics committee at Spring Harbor Hospital has approved this study along with University of New England exempt IRB status. The time of period assessed for chart review was from September 1, 2015 to August 31, 2016. To be included in the study, patients of all ages must have received an oral or intramuscular antibiotic during their stay at Spring Harbor Hospital.
Those prescribed antibiotics for diagnoses other than UTI, URI or non-purulent SSTI (cellulitis) were excluded. Additionally, patients were excluded if antibiotics were prescribed before admission to the hospital. Guidelines were obtained from the Infectious Diseases Society of America as well as the American College of Clinical Pharmacy. Antibiotics prescribed were then compared to treatments recommended by the guidelines.

Results: There were 234 patients who received antibiotics during assessment. After accounting for exclusion criteria, 99 patients were evaluated. Out of 34 patients with uncomplicated UTI, 33 were treated with first line antibiotics (97 percent guideline adherence). A total of 14 patients were diagnosed with complicated UTI: 10 patients treated with first line therapy (71.4 percent adherence to guidelines). This meant a combined 89.6 percent adherence to guidelines

for all UTI. A total of 18 patients were diagnosed with URI, with 10 patients given first line treatment, 1 patient receiving second line treatment (61.1 percent of patients received either first or second line treatments). Out of 33 patients diagnosed with non-purulent SSTI, 17 were given first line treatment and 10 were given second line treatment (81.8 percent adherence to guidelines).

Conclusion: Failure to follow current practice guidelines when prescribing antibiotics often results in increased healthcare costs and bacterial resistance. This retrospective study found a high compliance rate with current practice guidelines for UTI, URI, and non-purulent SSTI (cellulitis). However, additional intervention should be made to ensure 100 percent compliance with guidelines.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 2-173

Poster Title: Brexpiprazole: new drug review and cost-minimization analysis

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Purpose: Brexpiprazole is a new atypical antipsychotic (AAP) approved by the Food and Drug Administration (FDA) for schizophrenia and as adjunctive therapy to antidepressants for Major Depressive Disorder (MDD). The purpose of this new drug review was to describe the drug and compare the efficacy, safety, dosing, and pharmacokinetics of brexpiprazole with similar agents in the AAP class. The review focused on the indication for MDD. In addition, we performed a cost-minimization analysis.

Methods: Randomized, controlled trials, and systematic reviews were the primary literature sources used in this review. Specific databases searched included: MEDLINE, Database of Abstracts of Effects (DARE) and the Cochrane Database for Systematic Reviews. Additionally, clinical trials and systematic reviews from the National Institute for Health and Care Excellence (NICE), Oregon Evidence-based Practice Center Drug Effectiveness Review Project (OHSU), and the Agency for Healthcare Research and Quality (AHRQ) were evaluated. Unpublished studies and ongoing clinical trials from www.fda.gov and www.clinicaltrials.gov were considered in addition to data from manufacturers including product labeling and Academy of Managed Care Pharmacy (AMCP) dossiers. A cost-minimization analysis of brexpiprazole was performed comparing similar agents with the indication for MDD as adjunctive therapy. Drug costs were assessed using publicly available data sources.

Results: Brexpiprazole is an AAP that exhibits partial agonist activity for serotonin 5-HT1A, dopamine D2 and D3 receptors, antagonist activity for serotonin 5-HT2A, 5-HT2B, 5-HT7, and multiple noradrenergic receptors. Brexpiprazole has a high affinity for serotonin, dopamine,

and noradrenergic receptors, and moderate affinity for histamine receptors. This new AAP is indicated for both schizophrenia and as adjunctive therapy to antidepressants in MDD. Compared to placebo, brexpiprazole 2 mg and 3 mg demonstrated statistical and clinically significant differences in lowering Montgomery-Asberg Depression Rating Scale (MADRS) score. Common adverse effects include akathisia, weight gain, and increased serum triglycerides with lower discontinuation rates than comparators due to better tolerability. Brexpiprazole has limited use among elderly patients, pediatric patients, and pregnant women. Results of the cost-minimization analysis from least to most cost-effective were: brexpiprazole, aripiprazole and quetiapine.

Conclusion: Although clinically efficacious, brexpiprazole was the least cost-effective atypical antipsychotic agent based on a cost-minimization analysis. Brexpiprazole was recommended as Tier 3 non-preferred medication with additional prior authorization requirements and quantity limits to ensure patients have had an adequate trial of more cost-effective alternatives first before use of brexpiprazole.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-174

Poster Title: Evaluation of accurate dietary supplement product labeling

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Purpose: Dietary supplements and over-the-counter medications (OTC's) do not have to be proven safe or effective before being sold to consumers like prescription medications. Under the Dietary Supplement Health and Education Act of 1994, manufacturers only have to prove their product causes no harm to consumers. Some dietary supplements are known to contain saw dusts, lead, pesticides, arsenic, glass particles, and insect parts. The specific aim of this study is to verify whether dietary supplements and OTC's contain the amount of ingredients claimed on the label of a product.

Methods: The institutional review board approved this evaluation study. University of New England College of Pharmacy faculty, staff, and consumers who consumed dietary supplements were included in this study. Sixteen participants voluntarily shared the names of the dietary products that they use, including product name, manufacturer, and strength. Participants provided their name and email address for follow-up. Sixteen participants shared a total of 54 dietary supplements that were then evaluated. ConsumerLab.com® and the United States Pharmacopeia® (USP) verification system were then used to evaluate if their dietary supplements were approved. ConsumerLab.com® and the USP® are the leading providers of independent test results, which approve whether products are accurately labeled with the correct amount of active ingredients and whether they contain harmful ingredients. Once information was evaluated, participants were contacted and informed whether ConsumerLab.com® or USP® tested and approved their product. The primary outcome measure was percent of dietary supplements used by participants that were approved by ConsumerLab.com® and/or USP®. Secondary outcomes included percentage of dietary

supplements not approved by ConsumerLab.com® and/or USP®, and percentage of dietary supplements not tested by ConsumerLab.com® and/or USP®.

Results: The percent of dietary supplements used by participants that were approved by ConsumerLab.com® was 24.07 percent (13/54 dietary supplements). The percent of dietary supplements used that were approved by USP® was 7.40 (4/52 dietary supplements), and the percent of dietary supplements used that were approved by both ConsumerLab.com® and USP® was 2.04 (1/49 dietary supplements). Percentage of dietary supplements that were not approved by ConsumerLab.com® was 3.70 (2/54 dietary supplements), and there were not any dietary supplements that were tested by USP® and not approved. 72.2 percent (39/54) of the dietary supplements were not tested by ConsumerLab.com® and 92.6 percent (50/54) of dietary supplements were not tested by USP®.

Conclusion: ConsumerLab.com® approved more dietary products used by participants than USP®. ConsumerLab.com® disapproved more dietary products than USP®, since there were not any dietary supplements that were tested by USP® and not approved. Overall, both verification databases failed to provide information on a majority of supplements inspected. Verification systems need to expand their number of supplements tested to give consumers correct information.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 2-175

Poster Title: Insulin degludec: New drug review and cost minimization analysis

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Purpose: Insulin degludec is a novel long-acting basal insulin analog recently approved by the United States Food and Drug Administration (US FDA) to improve glycemic control in adults with type 2 diabetes mellitus (T2DM). The purpose of this new drug review is to describe the place in therapy of insulin degludec as well as to compare the efficacy, safety, dosing, and pharmacokinetics of insulin degludec with similar agents in this class. A cost minimization analysis was performed comparing similar agents.

Methods: The primary sources used for the review included two phase III, multinational, inferiority trials and manufacturer product labeling. In addition, systematic reviews and current practice guidelines were evaluated. Other databases searched included Cochrane and Lexicomp. Additional clinical information was gathered from the Academy of Managed Care Pharmacy (AMCP) dossier, and ongoing clinical trials were evaluated using www.clinicaltrials.gov. To help determine formulary placement, a cost minimization analysis was performed using publicly available data sources to determine drug costs.

Results: Insulin degludec is a long-acting insulin similar in administration and dosing to insulin detemir and insulin glargine. However, insulin degludec has a faster onset, longer duration, and longer stability upon initial use of insulin pen. In two head-to-head trials and a systematic review, participants with T2DM and inadequate blood sugar control at baseline, treatment with insulin degludec provided reductions in HbA1c similar to those achieved with insulin glargine. There were no differences in adverse effects between insulin degludec and insulin glargine,

although insulin degludec may cause less nocturnal hypoglycemia. This drug is well tolerated with common adverse effects including: nasopharyngitis, headache, upper respiratory tract infection, and diarrhea. Cost minimization rankings of medications from the least to the most cost-effective were as follows: insulin glargine, insulin detemir, and insulin degludec.

Conclusion: Despite unique pharmacokinetic parameters and the potential for less nocturnal hypoglycemia, insulin degludec offers no clinical advantages over similar agents used to treat T2DM. Due to high cost, we recommend insulin degludec as non-formulary with additional prior authorization criteria to ensure patients have had an adequate response to more cost-effective alternatives.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 2-176

Poster Title: Ombitasvir/paritaprevir/ritonavir: new drug review and cost-minimization analysis of a fixed dose-combination antiviral

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Purpose: The US Food and Drug Administration (FDA) approved a fixed dose-combination antiviral containing ombitasvir/paritaprevir/ritonavir to be used in combination with ribavirin for the treatment of hepatitis C virus (HCV) genotype 4 infections in patients without cirrhosis. The purpose of this new drug review was to describe the drug and compare dosing, pharmacokinetics, safety, and tolerability of this fixed dose-combination with current therapies. Additionally, a cost minimization analysis was performed.

Methods: A clinical effectiveness review of antiviral agents indicated for HCV genotype 4 was conducted. Efficacy, clinical practice guidelines, safety, and tolerability were evaluated. Unpublished studies and ongoing clinical trials were considered in addition to data from manufacturers including product labeling and the Academy of Managed Care Pharmacy (AMCP) dossiers. A cost-minimization analysis of the fixed dose-combination was performed comparing similar agents to aid in formulary decision-making. Drug costs were assessed using publicly available data sources.

Results: This fixed dose-combination is the first drug to demonstrate safety and efficacy in the treatment of HCV genotype 4 infections without the need for co-administration of interferon. The tablet includes a NS5A inhibitor (ombitasvir), a NS3/4A protease inhibitor (paritaprevir), and a CYP3A inhibitor (ritonavir) and is given in combination with ribavirin for 12 weeks. This drug combination is a Grade IA recommendation from the American Association for the Study of Liver Diseases (AASLD) for both treatment-naïve and treatment-experienced patients. In

combination with ribavirin, the fixed dose-combination agent achieved a higher sustained virologic response (100 percent) compared to treatment without ribavirin (91 percent). The most common adverse effects were nausea, insomnia, asthenia, fatigue, pruritus and other skin reactions. This drug is contraindicated in patients with moderate to severe hepatic impairment, moderate and strong inducers of CYP3A, and concomitant use with ethinyl estradiol-containing products. Results of the cost-minimization analysis from least to most cost-effective were: sofosbuvir, ledipasvir/sofosbuvir, ombitasvir/paritaprevir/ritonavir, and elbasvir/grazoprevir.

Conclusion: Although clinically efficacious, ombitasvir/paritaprevir/ritonavir was not the most cost-effective agent. The fixed dose combination was recommended as a Tier 2 non-preferred medication with additional prior authorization requirements including patients who have failed treatment with elbasvir/grazoprevir or have contraindications to other first line agents used in the treatment of HCV genotype 4 infections.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 2-177

Poster Title: Improved Quality of Medication Histories Performed by a Student Pharmacist with Prior Training in a Transitions of Care Elective Course

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Purpose: Medication histories are generally performed by hospital staff with limited knowledge of pharmacy practices. The purpose of this added service is to demonstrate the effectiveness of an Advanced Pharmacy Practice Experience (APPE) pharmacy student obtaining best possible medication histories (BPMH) in a large teaching hospital. With improved medication histories, potential adverse drug events can be prevented during admission.

Methods: A group of eight third year pharmacy students completed an elective course titled, "Transitions of Care in Pharmacy" during the fall semester of 2015. The elective course focused on obtaining the best possible medication history for patients admitted to the emergency department. Patients were selected by using scoring tools which categorized them based on low, medium, or high risk. During the course, students were trained to use proven interview techniques, and contact available resources to confirm medication fill history with pharmacies, healthcare providers, and electronic health records to build the BPMH. Having completed the didactic course work and practical training, the student pharmacist applied these skills during a subsequent APPE rotation with an Adult Medicine Team. The student pharmacist conducted medication histories for patients admitted to the medicine team who had not received a prior BPMH by a pharmacist or intern in the emergency department. Medication errors or discrepancies found on the patient's medication list were shared with the medicine team during clinical teaching rounds and documented in the electronic medical record system. The medicine team service population included all patients admitted to the Adult Medicine team at Maine Medical Center in Portland, Maine from May 16 to June 24, 2016.

Results: Thirty-five medication histories were completed during the six-week APPE rotation. Of these medication histories, a total of 408 medications were reviewed and resulted in 117 clinically significant changes. The clinical changes were tracked and categorized as medications removed from, added to or changed on the prior to admission (PTA) medication list in the electronic medical record. The third category, number of medications changed, contained medications on the patient's PTA list, that had either the incorrect dosage, directions, or formulation. Of the thirty-five medication histories completed, 94 medications were removed, 65 medications were added and 84 medications were changed from the patients' PTA lists.

Conclusion: Prior training in a transitions of care elective during the third professional year of pharmacy school improved the quality of medication histories performed during an acute care APPE rotation. Based on these results, the training during the third professional year of pharmacy school serves as both a valuable learning experience and an important contribution to the quality and safety of a patient's hospital admission. This practice model should be considered a standard in the future of pharmacy education.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 2-178

Poster Title: National survey of pharmacokinetic and therapeutic drug monitoring activities of practicing pharmacists throughout the United States

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Purpose: Performance-based measures are key for guiding clinical pharmacokinetics' course design in pharmacy graduate programs. This survey was used to determine which medications undergo pharmacokinetic (PK) monitoring with the use of calculations, which undergo therapeutic drug monitoring (TDM) without the use of calculations, and also to describe the specific methods used for each by practicing pharmacists, so that curricula may be tailored to best prepare students for real-world practice.

Methods: A thirteen-question electronic survey was developed, then approved by the institutional review board (IRB). It was created through SurveyMonkey and distributed via the American Society of Health-System Pharmacists' (ASHP) discussion boards. Follow-up posts were made at week 3 to maximize response and the survey closed at 6 weeks. Total responses were tallied and analyzed on a national, as well as regional basis.

Results: Final analysis was conducted on 340 completed responses from 47 states. Data showed that vancomycin (88% of all respondents), aminoglycosides (84%), phenytoin (58%), and digoxin (44%) most commonly require PK calculations in clinical practice. Interestingly, medications with the highest frequency of calculations (>10 times/week) included vancomycin (35%), aminoglycosides (3%), and cyclosporine (2%). The most common method of PK monitoring is 'calculating by hand'. Most TDM is performed on warfarin (86%), enoxaparin (78%) and other anticoagulants (79%), vancomycin (65%), and aminoglycosides (59%), with the two most common methodologies being 'use of clinical judgment' and 'institutional protocols'.

Conclusion: The actual practices of working pharmacists should drive curricula of clinical pharmacokinetics courses, and in order to assure relevant performance measures for students,

PK and TDM activities of pharmacists must be thoroughly evaluated. Results of our survey indicate that frequency of PK calculation does not reflect the overall likelihood of a calculation being performed in any setting. Instead, medications requiring most frequent calculation are perhaps only found in specialty sites (ex. Cyclosporine). An “ever-exposed” metric would be a more accurate assessment of whether competence in managing a medication must be specifically addressed prior to student integration into general practice.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 2-179

Poster Title: Susceptibility of Pseudomonas aeruginosa bloodstream isolates in Maine and the implications for selection of empiric antibiotic regimens

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Purpose: Pseudomonas aeruginosa (P. aeruginosa) bacteremia is associated with prolonged hospitalizations, intensive care unit stays, high morbidity and high mortality. This highlights the need for proper empiric antimicrobial selection and antimicrobial stewardship. Resistance patterns can be elucidated through detailed analysis of susceptibility data, culminating in the construction of an antibiogram. This allows healthcare providers to quickly optimize therapy, thereby improving patient outcomes. The aim of this study was to analyze susceptibility of P. aeruginosa bloodstream isolates collected at institutions in Maine, in an effort to define optimum empiric monotherapy agents.

Methods: Patients with positive blood cultures for P. aeruginosa between 2008 and 2016 at multiple institutions in Maine were identified. All patients with P. aeruginosa positive blood culture results were included in this analysis. Following a screening process to identify patients with positive blood cultures for P. aeruginosa, the following data were collected: gender, age at time of positive blood culture, height, weight, hospital location, Pitt bacteremia score, source of infection, selected antimicrobial therapy, susceptibility data and information describing patient outcomes. All data was de-identified and archived in a secure database for analysis. Descriptive statistics were performed on baseline characteristics and susceptibility data.

Results: A total of one hundred and thirty five patients with positive blood cultures for P. aeruginosa were identified from patients at multiple hospitals in Maine. Susceptibility data for ten agents with known activity against P. aeruginosa were included in this study. Observed susceptibility data is as follows (presented as susceptible isolates over total number of isolates,

followed by percent susceptibility): Amikacin 131/131 (100), tobramycin 130/131 (99.2), gentamicin 128/131 (97.7), ceftazidime 112/115 (97.4), cefepime 127/131 (97), meropenem 123/131 (94), levofloxacin 77/85 (90.6), piperacillin-tazobactam 117/131 (89.3) ciprofloxacin 106/125 (84.8) and aztreonam 103/131 (78.6).

Conclusion: Amikacin, tobramycin, gentamicin, ceftazidime, cefepime, meropenem and levofloxacin exhibited greater than 90 percent susceptibility against P. aeruginosa isolates. Piperacillin-tazobactam empiric monotherapy may no longer be sufficient. The 2016 Infectious Diseases Society of America hospital acquired pneumonia/ventilator acquired pneumonia guidelines recommend adding a second agent when using agents with less than 90 percent susceptibility. Ceftazidime, cefepime and meropenem are likely the best empiric monotherapy candidates for the treatment of P. aeruginosa bacteremia in Maine. Further evaluation of outcomes in patients receiving monotherapy when susceptibility is greater than or equal to 90 percent should be conducted to better define optimum empiric monotherapy.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 2-180

Poster Title: Exploration of the clinical impact associated with the contributing factors that influenced clinical inertia at the Maine medical partners-endocrinology and diabetes center (MMP-EDC)

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Purpose: When managing patients with diabetes mellitus (DM), the failure to intensify therapy when the target hemoglobin A1c (HbA1c) is not achieved after approximately 3 months is referred to as clinical inertia, per current American Diabetes Association (ADA) guidelines. While clinical inertia is known to lead to long-term health problems, the clinical impact associated with contributing factors that influenced clinical inertia remains unclear. The purpose of this quality assurance review is to explore the clinical impact associated with the contributing factors for clinical inertia to elucidate the implications of therapeutic decisions that deviate from the ADA guidelines.

Methods: We performed a detailed retrospective review of electronic medical records to identify the contributing factors for clinical inertia and to determine if the decision to waive treatment intensification led to a negative clinical impact. Data was collected from a previous study at the MMP-EDC which found the incidence of clinical inertia to occur 34 percent of the time. 116 study cases with Type 2 DM presenting to the MMP-EDC from January 1, 2015 through August 1, 2015 were considered. Inclusion criteria: diagnosis of Type 2 DM, greater than or equal to 18 years of age, therapy managed medically, HbA1c greater than or equal to 7 percent. Exclusion criteria: greater than 75 years of age, pregnancy, less than 2 HbA1c readings within study window. Contributing factors defined as 1) concordance: therapy intensification when HbA1c greater than or equal to 7 percent, 2) true non-concordance: lack of concordance when HbA1c greater than or equal to 7 percent with no provider documentation for clinical inertia, 3) false non-concordance: lack of concordance when HbA1c greater than or equal to 7

percent with documentation for clinical inertia, 4) refused therapy: therapy intensification recommended, but patient refused. Clinical impacts of false non-concordance defined as 1) positive: HbA1c last recorded less than HbA1c during initial visit, 2) negative: HbA1c last recorded greater than or equal to HbA1c during initial visit.

Results: Of the 116 study cases who visited the MMP-EDC during the study window, clinical inertia was found to occur approximately 34 percent of the time (n equals 40). The baseline characteristics of our study cases were: mean age 62 years, 45 percent male, 93 percent white or Caucasian, mean HbA1c 8.4 percent, mean BMI 39, mean SCr in mg/dL 1.3. After exploring the contributing factors for clinical inertia, 21 patients (53 percent) were associated with concordance, 4 patients (10 percent) were associated with true non-concordance, 12 patients (30 percent) were associated with false non-concordance, and 3 patients (8 percent) refused therapy. Negative clinical impacts of false non-concordance occurred in 4 patients (33 percent) and positive clinical impacts of false non-concordance occurred in 8 patients (67 percent).

Conclusion: 67 percent of MMP-EDC patients with providers documenting contributing factors for clinical inertia were associated with positive clinical impacts. After further exploration of the contributing factors that influenced nonadherence to ADA guidelines was the documented downward trend of the HbA1c. This suggests that the provider's therapeutic decision to not apply specific guideline recommendations is influenced by factors other than the HbA1c value alone, such as the provider-patient relationship, clinical judgment and experience. Future studies in multiple practice settings which include a larger population size may help clarify the clinical implications of false non-adherence.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 2-181

Poster Title: Alirocumab: new drug review and cost-minimization analysis

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Purpose: Alirocumab is the first cholesterol-lowering agent approved in a new class of drugs known as proprotein convertase subtilisin kexin type 9 (PCSK9) inhibitors. This new drug is indicated as add-on therapy for adults with primary heterozygous familial hypercholesterolemia (HeFH) or clinical atherosclerotic cardiovascular disease (ASCVD), and in patients who require additional LDL-cholesterol lowering, with diet control and maximally tolerated statin therapy. The objective of this new drug review was to define the role of alirocumab in current therapy and its drug-specific characteristics, including efficacy, safety, and tolerability. A cost-minimization analysis was also performed.

Methods: Phase III, randomized, double-blinded, placebo-controlled, and active comparator clinical trials and product labeling were the primary literature sources used for this review. Databases searched included: MEDLINE-PubMed, Cochrane Database of Systematic Reviews, and Embase. Current clinical guidelines from the American Diabetes Association (ADA) and American Heart Association (AHA) were considered. Additionally, clinical information was gathered from the US Food and Drug Administration (FDA), Lexicomp, and the Academy of Managed Care Pharmacy (AMCP) dossier was evaluated. A cost-minimization analysis was performed comparing similar agents to aid in a formulary recommendation. Publicly available data sources were used for drug costs.

Results: Alirocumab, a PCSK9 inhibitor, is a humanized monoclonal antibody, given every two weeks by subcutaneous injection. This new drug is indicated as adjunctive therapy to diet and maximally tolerated statin therapy for patients with primary HeFH or ASCVD. Currently, there

are no head-to-head clinical studies with alirocumab and evolocumab, another PCSK9 inhibitor. In a meta-analysis of 25 randomized control trials, alirocumab showed an additional 36-59 percent LDL reduction when combined with maximally tolerated statins and was associated with an overall reduction in LDL by 52.6 percent versus placebo and 29.9 percent versus ezetimibe when combined with a statin. This drug is well tolerated with common adverse effects, including nasopharyngitis, diarrhea, injection site reactions, and influenza. Cost-minimization analysis rankings of medications used to lower LDL from the least to most cost-effective include: atorvastatin, rosuvastatin, Lipitor, evolocumab, and alirocumab.

Conclusion: Alirocumab, as an adjunct therapy to statins, effectively lowers LDL levels in patients with primary HeFH and ASCVD. Due to its high cost and limited long-term safety and efficacy, alirocumab was recommended as non-formulary with additional prior authorization criteria to ensure patients had an adequate response to more cost-effective alternatives prior to using alirocumab.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Descriptive Report

Session-Board Number: 2-182

Poster Title: Warfarin Effectiveness in Patients Receiving Enteral Feeding

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Purpose: When a patient needs to take warfarin and to be concurrently supported with enteral feeding, the responsible clinician needs to carefully manage the patient. A few case reports and in vitro studies have shown that warfarin use while on enteral feeding can result in 'warfarin resistance' which is better labeled 'warfarin malabsorption'. We conducted a literature review to document the influence of enteral feeding upon warfarin effectiveness (achieving target INR and time in therapeutic range). The results may be used to develop guidelines for management of patients needing anticoagulation and enteral feeding simultaneously while in the hospital.

Methods: The literature was reviewed for case reports, in vivo and in vitro studies, guidelines or protocols related to warfarin and tube feeding. Thirty-six references and 4 sets of guidelines were found and reviewed. These sources were reviewed to answer the following questions: (1) "When a patient is stabilized on warfarin, what is the change (i.e., amount and timing) in INR experienced when enteral feeding is started or stopped?"; and (2) "When a hospitalized patient is on warfarin, what adjustments to the enteral feeding process can keep the INR in the therapeutic range? Each case of a patient, or in vitro study, was recorded along with the circumstances related to warfarin and enteral feeding use. This literature search looked for specific 'warfarin change events' to determine if they made a meaningful difference in the patient's response to warfarin such as a change in INR level or time in therapeutic range (TTR). Among the 'Warfarin Change Events' identified were: (1) A change in the dosage regimen of warfarin; (2) Initiation of the use of warfarin in a patient receiving enteral feeding; (3) Initiation or discontinuation of the use of enteral feeding in a patient receiving warfarin; or (4) A change in the procedure for administering enteral feeding (e.g., holding feeding before and after the warfarin; change in enteral feeding formula; change in feeding tube, etc.).

Results: Daily monitoring of INR should be done to manage warfarin dosing and to maximize time in therapeutic range (TTR) with a typical target INR range of 2.0 to 3.0. Impaired bioavailability of warfarin has been attributed to various factors related to enteral feeding including: (1) presence of vitamin K in enteral products; (2) binding of warfarin to proteins in nutritional products; (3) binding of warfarin to feeding tubes; and (4) albuminuria which can reduce warfarin effect due to more binding to serum albumin. When possible a warfarin patient's dietary vitamin K intake should be known and held constant. Several sources recommended that enteral feeding should be stopped 1 hour before and after administration of warfarin. Since warfarin binding to feeding tubes may reduce warfarin concentration 23% to 38%, several sources recommended flushing of feeding tubes with water before and after warfarin administration. Increases in serum albumin concentration due to enteral feeding, or for any reason, may lead to reduced therapeutic effect from warfarin. Although warfarin is rapidly absorbed (peak about 4 hours) and widely distributed throughout the body in 6 to 12 hours, the therapeutic effect of changes in warfarin level may take three or more days to develop.

Conclusion: The literature documented several circumstances in which a patient on warfarin and enteral feeding may have impaired warfarin bioavailability. Studies in the literature have demonstrated the effects of various factors that influence warfarin bioavailability. Literature reports provide practical details for optimal warfarin administration through enteral feeding tubes including tube type and size, enteral access sites, drug administration techniques, and timing of enteral feeding and drug administration. The information and results from this review provide a means to help clinicians identify and carefully manage factors that may influence warfarin effectiveness, such as INR and TTR, in patients concurrently using tube feeding.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 2-183

Poster Title: Comparing first and third-year family medicine residents' perceptions of collaboration with pharmacists at the Duluth Family Medicine Clinic

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Purpose: The purpose of this project is to understand the state of family medicine resident and pharmacist collaboration from the perspective of the family medicine residents at the Duluth Family Medicine Clinic located in Duluth, MN. The goal of this research is to optimize medicine and pharmacy collaboration in the ambulatory setting. This will be used to expand collaborative opportunities in the future.

Methods: Sixty-minute focus groups were separately conducted by the primary investigator, with groups of first-year and third-year family medicine residents. The audio for the focus groups were recorded, with the participants remaining anonymous to allow them to give feedback freely. The residents were asked questions related to the role of a pharmacist and their interprofessional interactions at the clinic. Audio from the focus groups was recorded and transcribed verbatim. Content analysis of the transcripts was conducted using the classic analysis strategy by two investigators. The transcripts were coded for common themes using a constant comparison-like approach to analyze what focus group participants said. The themes were then compared between the first-year and third-year resident focus groups.

Results: The focus group conducted on January 8th 2015 consisted of six of nine third-year family medicine residents in the program. The focus group on January 15th 2015 included seven of the eight first-year family medicine residents. The themes of accessibility, limited time, using pharmacists to answer questions, and education from pharmacists were common to both focus groups. There were also multiple themes from the first year and third year groups that were unique to each group. The themes unique to the first-year group were patient-centered care, using pharmacists for double check in the hospital, pharmacists helping with complicated patients and polypharmacy, pharmacists helping with insurance, and pharmacists being

knowledgable on immunizations. Themes unique to the third-year group were patients being honest with the pharmacist, pharmacists being helpful for medication reconciliation, having pharmacists make recommendations, relying on pharmacists to adjust doses, having more contact with hospital pharmacists than community, appreciating pharmacist input, and increased collaboration with familiar people.

Conclusion: It appeared that first-year residents used pharmacists more for a safety net and an information resource, while third-year residents collaborated with pharmacists for more clinical duties. Some examples of this mentioned by third-year residents were medication reconciliation and dose adjustments. Third-year residents had a common theme of appreciation for pharmacists, showing the positive relationship they developed at the clinic.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 2-184

Poster Title: Drug therapy problem identification and resolution at Duluth Family Medicine Clinic

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Purpose: The purpose of this study was to determine the number of drug therapy problems (DTP) identified and resolved on the same day as the Medication Therapy Management (MTM) appointments conducted at a family medicine residency program clinic.

Methods: This was a retrospective chart review conducted at the Duluth Family Medicine Clinic (DFMC) analyzing documentation of 631 MTM visits retrieved from the electronic health record system between August 1st, 2012 and February 28th, 2015. This study included all patients who were referred by medical residents at DFMC to receive MTM services. The study only excluded patients who weren't under the care of medical residents. Clinical pharmacists and pharmacy residents performed the MTM visits.

Results: Of the 631 MTM visits, the mean (SD) age was 53.76 (15.68) years old with a mean number of conditions of 5.7 (2.49). Patients were taking a mean of 11.9 (5.78) medications. The mean number of drug therapy problems identified was 4.24 (2.10). The mean drug therapy problems resolved the same day of the visit was 2.08 (1.66). The mean MTM visit time was 31.14 (9.44) minutes.

Conclusion: Patients who received MTM services at DFMC had 50% of their DTPs resolved on the same day of their visit. One area of potential future research is to categorize the DTPs and identify the most frequent categories of DTPs. This information is needed to design global interventions such as continuing education to providers to prevent DTPs from occurring.

Submission Category: Pharmacokinetics

Submission Type: Evaluative Study

Session-Board Number: 2-185

Poster Title: Does weight matter in the dosing of therapeutic biologics?

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Purpose: The general perception is that biologics more often adopt body-size-dependent dosing regimen in comparison to the weight-independent (fixed)-dose regimen which is common for small molecule drugs. The body-size-dependent dosing approach stems from the hypothesis that it can minimize the pharmacokinetic (PK) variability in patients. This study aims to verify the hypothesis/perception by answering the following questions:
1) What is the proportion of FDA approved biologics using fixed versus body-size-based dosing approach?
2) Does the selected dosing regimen follow the allometric principle for PK model?
3) Is the PK variability smaller when the dosing approach follows the allometric principle?

Methods: Therapeutic biologics is a booming area with 118 products approved by U.S. Food & Drug Administration (FDA) as of August 2016. We reviewed FDA approved labels and clinical pharmacology review documents for 66 biologics approved during 2005-2016 to identify the dosing approaches, PK models, and the inter–individual variability (IIV) for area under the curve (AUC) and concentration data. An additional 16 products approved before 2005 were included in this study based on literature review. The effect of body weight on clearance (CL) is routinely evaluated in population PK model using the allometric function with an exponent of theta_BW_CL. Current literature suggests that when theta_BW_CL is < 0.32, fixed dosing results in less IIV; whereas when theta_BW_CL is > 0.68, body-size-dependent approach is better in reducing IIV. The lower IIV in PK parameters is associated with a smaller deviation from the population average for subjects with extreme body weight values, i.e., extremely high or extremely low. If theta_BW_CL lies between 0.32 and 0.68, both dosing approaches perform similarly. We examined how many products have dosing regimens that follow such principle. For assessing IIV, the variability in AUC, measured as % coefficient of variation (%CV), was used

in the study and the difference in PK variability between products that follow the above principle and those products that do not was calculated by Mann-Whitney U Test.

Results: Of 82 therapeutic biologics, 37 (45.1%) are dosed using fixed-dose approach. The proportion of products using fixed-dose approach is similar between monoclonal antibodies (46.0%) and proteins (43.8%). Among body-size-dependent dosing approaches, a commonly used method is body weight (BW)-based dosing, i.e., mg/kg, followed by body surface area (BSA)-based dosing, i.e., mg/m2. In 58 biologics with available theta_BW_CL value, body weight is a significant covariate for clearance in 46 products. Among which, 3 (5.2%) products have theta_BW_CL < 0.32, 20 (34.5%) products have theta_BW_CL between 0.32 and 0.68, and 23 (39.6%) products have theta_BW_CL > 0.68. For the remaining 12 products, body weight has no effect on clearance and theta_BW_CL = 0. As expected, 93.3% of 15 biologics with theta_BW_CL less than 0.32 use fixed-dose approach. In contrast, only 60% of products with theta_BW_CL > 0.68 adopt body-size-dependent approach. In biologics with theta_BW_CL between 0.32 and 0.68, as anticipated, the difference in %CV for AUC between two dosing approaches was not statistically significant with smaller deviation in body-size-dependent dosing of 33.8% versus fixed-dose of 37.0% (p-value: 0.55). Unexpectedly, there was also no significantly difference in %CV for AUC between the two groups in biologics with theta_BW_CL greater than 0.68. (p-value: 0.83).

Conclusion: This analysis demonstrated that both fixed dose and body-size-dependent approach are commonly used in therapeutic biologics. While theta_BW_CL can serve as a tool for selecting the dosing strategy in first-in-human studies, the final recommended dose regimen is often influenced by other factors. Further research is needed to identify other important factors affecting the pharmacokinetics/pharmacodynamics and clinical response for therapeutic biologics.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 2-186

Poster Title: Nuclear localization of G protein-coupled receptor kinase 5 in primary human cardiomyocytes and its interactions with nuclear proteins

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Purpose: In this early report, we queried nuclear GRK5 expression in primary human cardiomyocytes and explored its ability to interact with and phosphorylate a number of nuclear proteins- nucleophosmin, nucleolin and nucleostemin.

Methods: The nuclear GRK5 localization was queried by immunofluorescence in primary human cardiomyocytes. Co-immunoprecipitations were performed to determine if GRK5 interacts with nucleophosmin in these cells. In vitro phosphorylation reactions were carried out to determine if GRK5 can phosphorylate nucleolin and nucleostemin

Results: We observed nuclear GRK5 localization in primary human cardiomyocytes. Co-immunoprecipitations between GRK5 and NPM1 was observed in nuclear extracts from human cardiomyocytes. In vitro phosphorylation reactions showed that GRK5 phosphorylates nucleolin and nucleostemin, demonstrating that they are new GRK5 substrates.

Conclusion: In this report, we showed that GRK5 is observed in the nucleus of primary human cardiomyocytes, recapitulating what was observed in other cardiomyocytes and cancer cell lines. In addition, we see also GRK5-NPM1 complexes in these cells, observed previously in cancer cells, as well as new GRK5-nuclear protein complexes. Collectively, this suggests that nuclear GRK5 could be functional in the nucleus to control a plethora of nuclear processes through protein-protein interactions.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 2-187

Poster Title: Dexmedetomidine use in initially non-intubated children

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Purpose: Dexmedetomidine is approved in adults for sedation of initially intubated and mechanically ventilated patients during treatment in an intensive care setting and non-intubated patients prior to and/or during surgical and other procedures. Manufacturer labeling recommends to not exceed use beyond 24 hours. Safety of prolonged use has been reported in initially intubated pediatric and adult patients, but support is lacking for initially non-intubated patients during treatment in an intensive care setting. The purpose of this study is to evaluate the safety and effectiveness of dexmedetomidine use in initially non-intubated pediatric patients for non-procedural sedation.

Methods: The Atlantic Health System and Rutgers institutional review boards approved this retrospective chart review. Patients that were initially non-intubated, 21 years of age and younger, admitted at Goryeb Children's Hospital, and who received dexmedetomidine for non-procedural sedation between January 1, 2014 and December 31, 2015 were included in the study. The data that was collected included patient demographics such as admitting diagnosis, length of stay, type of respiratory support, and concomitant sedation and/or analgesia used. Dexmedetomidine indication, dose, and duration as well as occurrence and management of adverse effects (bradycardia and hypotension) was also recorded. Horizon Meds Manager was used as the source of study participants by creating a Clinical Drug Utilization Report. Information from Medical Records was used to identify potential participants which were verified through a chart review. The primary outcome was to evaluate the safety and effectiveness of dexmedetomidine use for prolonged non-procedural sedation in initially non-intubated pediatric patients. Secondary outcomes included the description of

dexmedetomidine use such as indication for sedation, dose, duration, adverse effects, and concomitant sedation and analgesic medications.

Results: A total of 47 initially non-intubated pediatric patients were included. The median length of stay was 5 days. The median age of patients was 2 years with the majority of the primary admitting diagnoses being pulmonary related (83 percent). The median starting dose was 0.3 mcg/kg/hour, with a median maximum dose of 0.7 mcg/kg/hour, and median infusion duration of 53 hours. No patients were given a loading dose. All were treated in the pediatric intensive care unit. The most frequent types of respiratory support used when dexmedetomidine was initiated were bilevel positive airway pressure (45 percent) and high-flow nasal cannula (28 percent). The indications for sedation were agitation (80 percent), irritability (13 percent), anxiety (4 percent), pain (4 percent), aggressiveness/combativeness (2 percent), and to minimize respiratory effects (2 percent). Bradycardia was noted in 4 percent, hypotension in 2 percent, and bradycardia and hypotension in 2 percent of patients. The adverse effects lasted 3-6 hours and were managed by holding the infusion or decreasing the rate. Majority of patients (62 percent) received zero concomitant sedatives/analgesics, while 28 percent received one, 4 percent received two, and 6 percent received three. Only 2 percent of patients required post-dexmedetomidine intubation.

Conclusion: Use of dexmedetomidine in initially non-intubated pediatric patients for non-procedural sedation was safe and effective. Adverse effects of bradycardia and/or hypotension occurred in only 8 percent of the patients and they were responsive when the dose of dexmedetomidine was held or rate of infusion was reduced. Additionally, a majority of patients did not require concomitant sedatives and/or analgesics. Dexmedetomidine may be considered for sedation in pediatric patients treated in an intensive care setting who are initially non-intubated.

Submission Category: Ambulatory Care

Submission Type: Case Report

Session-Board Number: 2-188

Poster Title: Outpatient management of diabetic gastroparesis with orally-administered erythromycin in a patient with comorbid psychiatric disorders: A case report

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Purpose: Diabetic gastroparesis (DGP) is a frequent and clinically important complication of diabetes mellitus (DM). It is characterized by delayed gastric emptying without mechanical obstruction which can lead to associated cardinal symptoms, such as nausea, vomiting, early satiety, bloating, and abdominal pain. The first-line management of DGP includes restoration of fluids and electrolytes, nutritional support, and optimization of glycemic control. Prokinetic agents, alone or in combination with antiemetics, may be used for symptomatic management. Of available prokinetic agents, metoclopramide is the only agent that has been approved by the U.S. Food and Drug Administration for the treatment of DGP. However, metoclopramide use may not be appropriate for all patient populations, such as those predisposed to psychiatric conditions. Drowsiness, fatigue, lassitude, and restlessness occur in approximately 10% of patients on the mostly commonly prescribed dose. More serious psychiatric complications have also been reported, including agitation, anxiety, insomnia, mental depression, suicidal ideation, and hallucinations. In cases when metoclopramide is not appropriate, alternative prokinetic agents may be considered, including domperidone, cisapride, and erythromycin; however, data to support use of alternative agents is limited. Domperidone is currently unavailable in the United States, and cisapride use is associated with cardiac arrhythmias and death. As domperidone is not available for use and the risk of using cisapride appears to outweigh the benefit, erythromycin is likely the most appropriate option for use in patients who cannot tolerate metoclopramide. Yet, evidence supporting the effectiveness of erythromycin is limited to small-scale clinical trials and case reports. This case report aims to illustrate the clinical dilemma of using prokinetic agents to manage a patient with comorbid DGP and psychiatric illnesses. A 40-year-old female with a 15-year history of DM and comorbid bipolar and anxiety disorders presented to her primary care provider (PCP) with complaints of stomach cramps, lack of appetite, and progressively worsening nausea and vomiting. The patient was referred to

a gastroenterologist who diagnosed the patient with DGP. Treatment was not initiated. As symptoms persisted, the patient returned for a follow up visit with her PCP. At the time, her glycosylated hemoglobin was 6.1%, indicating adequate glycemic control. Results from her metabolic panel were within normal limits. Her gastroparesis cardinal symptom index (GCSI) was calculated to be 28 out of a possible 45, indicating the presence of severe, symptomatic DGP. Due to the risk of exacerbating psychiatric symptoms, metoclopramide was not recommended. Alternative therapy with oral erythromycin was initiated at a dose of 250 milligrams three times daily with an intended duration of therapy of 4 weeks, which is consistent with the dosing found in the literature. An over-the-counter nutritional supplement was also prescribed. The patient completed the full 4-week trial of erythromycin therapy and claimed to be adherent to the regimen. After the trial was completed, the GCSI was recalculated to be 38 out of 45, indicating worsening of the symptoms of DGP. As this case report suggests, pharmacotherapy options for the treatment of DGP are limited. While results from small clinical trials and case reports indicate that erythromycin may be a safe and effective alternative to metoclopramide, results from our case report did not support such a claim. Additional, well-controlled studies are warranted to confirm that erythromycin is a safe and efficacious medication to be used for the treatment of DGP in patient who cannot tolerate metoclopramide.

Methods:

Results:

Conclusion:

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-189

Poster Title: Loss of Weight with Phentermine and Topiramate (LOW PhAT): A Retrospective Analysis

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See Gin Lee
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Purpose: One third of the adult population is affected by obesity in the United States. If weight loss is not achieved after lifestyle modification, pharmacotherapy can be initiated. Phentermine has been approved for short term management of weight loss but can be used off label for chronic management. Topiramate monotherapy has also been effectively used off label for weight reduction. However, there is limited information regarding the efficacy of long term use of these medications. The purpose of this study is to determine the average percent weight loss on short term versus long-term therapy with phentermine or topiramate.

Methods: The institutional review board approved this retrospective study that was conducted at two family medicine practice sites. Patients included in the study were men and women greater than 18 years of age who were taking phentermine or topiramate between January 2010 and August 2016. Individuals who failed to have their weight recorded in the beginning of therapy, at 12 weeks, and end of therapy were excluded as well as patients who failed to fill their phentermine prescriptions according to the New Jersey Prescription Monitoring Program. Patients on combination phentermine and topiramate were also excluded. A data collection sheet was created to record patient demographics, weight, treatment, and change in weight. The primary outcome was to evaluate the average percent body weight loss of phentermine or topiramate on short term (less than 12 weeks) versus long term (more than 12 weeks) therapy. The secondary outcome was to evaluate the percent of patients who achieved 5% weight loss from baseline at 12 weeks for phentermine or topiramate. Descriptive statistics was used to analyze the data.

Results: After patients were screened, 23 patients were included in the phentermine group and 53 patients were included in the topiramate group. The patient demographics were mostly female, and white with an average age of 46.4 years for phentermine and 45.3 years for topiramate. The average treatment duration was 48.5 weeks and 38.8 weeks. For the primary endpoints, the phentermine group experienced more weight loss on short term treatment at 4% than topiramate group at 1.23%. For long term therapy, the phentermine group lost 3.45% and topiramate group lost 1.79%. Twelve (50%) patients on phentermine and ten (18.9%) patients on topiramate were able to meet a 5% weight loss goal at 12 weeks of treatment.

Conclusion: The findings from this study indicate that both phentermine and topiramate can induce weight loss but few patients continued to lose weight after 12 weeks of treatment. These results support current recommendations of short term utilization. Therefore, patients may experience the most benefit with short term weight loss treatment. Cessation of these medications after 12 weeks may be encouraged to limit the adverse effects especially if there is not a continued significant weight loss.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-190

Poster Title: Evaluation of prescriber adherence to methadone use policies in a community hospital

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Purpose: Most hospitals do not possess a methadone detoxification license and thus cannot initiate methadone detoxification or maintenance therapy. Methadone can be prescribed for the purposes of pain control, continuation of a patient enrolled in an opiate maintenance program admitted for non-addiction related medical treatment, or to manage acute withdrawal symptoms if they interfere with medical treatment. Use of methadone in this manner must follow a specific protocol to be in compliance with hospital policy. The purpose of this study was to evaluate prescriber adherence to our institution's methadone maintenance policy.

Methods: The health-system's institutional review board approved this retrospective chart review. The health system's clinical information system was utilized to identify male and female inpatients 18 years of age or older who received oral methadone admitted between March 1, 2015 to February 29, 2016. Information collected included (1) demographic information (patient age, gender, actual body weight); (2) patient medical information (urine drug screen performed/result, patient enrollment in methadone maintenance program/program contact, therapeutic use of methadone); (3) opioid withdrawal management (initial withdrawal symptoms, initial dose of methadone, appropriateness of initial dose, subsequent doses administered, mean methadone dose in 24 hour period, prescribing physician specialty, hospital unit/floor of methadone administration, clonidine use, and length of stay). Descriptive statistics were computed for the total sample. Variables examined include demographic characteristics and available clinical outcomes. For continuous variables, means, medians, and standard deviations were computed. For categorical variables, percentages will be reported.

Results: Eighty five patients were identified and 84 patients who received oral methadone were included in our analysis. Seventy five percent of patients (n = 63) were enrolled in a methadone

maintenance program and contact was successfully made with 95.2 percent of methadone clinics. Approximately 11 percent of initial methadone doses were inappropriate for management of withdrawal symptoms and 50 percent of doses were lacking withdrawal symptom documentation. Only 39.3 percent of initial methadone doses were in compliance with the hospital's methadone maintenance policy. Methadone use exceeded 40 mg a day in 10.7 percent of patients receiving methadone for management of withdrawal symptoms.

Conclusion: Prescriber adherence to our institution's methadone maintenance policy is low. Specific areas of deficiency to our policy are a lack of documentation of opiate withdrawal symptoms and appropriateness of initial and subsequent methadone doses. An alarming percentage of doses were inappropriate for withdrawal symptoms documented or exceeded hospital policy for maximum daily methadone dose. Implementation of a standardized and validated opiate withdrawal scale may be helpful in improving adherence to the institution's methadone maintenance policy.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Descriptive Report

Session-Board Number: 2-191

Poster Title: Call to action on opioid addiction: gap analysis of New Jersey naloxone pricing and access

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Purpose: On February 2, 2016, President Obama proposed a 1 billion dollar budget to increase funding for drug abuse, especially those related to heroin and prescription opioids. This would allow increased access to treatment, particularly the emergency life-saving drug naloxone. With the significant rise in drug overdoses in the past few years, naloxone prices have risen exponentially. The purpose of this study was to analyze the prices of the different administration forms of naloxone and to determine its availability in the top 5 counties in New Jersey (NJ) associated with the highest opioid and heroin use.

Methods: The NJ Division of Mental Health and Addiction Services was contacted to find the top 5 NJ counties with the highest heroin and opioid admission rates. Towns with the highest admission rates within their respective counties were chosen to be studied. Pharmacies (independent and chain pharmacies) in each of these towns were identified and asked about the availability and cash pricing of 3 products of naloxone, including the Narcan nasal spray (4 mg), injectable naloxone (0.4 mg/mL), as well as the Evzio naloxone auto-injector (0.4 mg). The pharmacist was queried through a standardized method of data collection which captured each naloxone product and enabled the interviewer to inquire about the cash price of the specific strength and if the specific product was currently in stock.

Results: In Toms River Township (Ocean County), 2 of 10 pharmacies had naloxone products available. Prices ranged from 19 to 5625 dollars, depending on administration form. In Middletown Township (Monmouth County), 0 of 8 pharmacies had naloxone products

available. Prices ranged from 35 to 4000 dollars depending on administration form. In Newark City (Essex County), 1 of 11 pharmacies had naloxone products available. Prices ranged from 19 to 5600 dollars depending on administration form. In Atlantic City (Atlantic County), 0 of 5 pharmacies had naloxone products available. Prices ranged from 28 to 5000 dollars depending on administration form. In Camden City (Camden County), 1 of 10 pharmacies had naloxone products available. Prices ranged from 26 to 4700 dollars depending on administration form. The most expensive administration form was found to be Evzio naloxone auto-injector. The least expensive administration form was found to be injectable naloxone. There was only 1 independent pharmacy and 3 chain pharmacies that had naloxone available.

Conclusion: Despite the increase in drug overdoses in the past few years, naloxone access remains scarce. Brand products of naloxone (Narcan and Evzio) were more expensive than the generic naloxone injection. Only 4 of 45 pharmacies had naloxone readily available. Laws were passed to increase naloxone access, but changes have not yet reached communities with high substance abuse admission rates. Increasing availability of naloxone in local pharmacies is an important public health option that could permit patients and caregivers to take timely and necessary actions to reduce opioid-related adverse events including most tragically, a patient's death.

Submission Category: Critical Care

Submission Type: Case Report

Session-Board Number: 2-192

Poster Title: Drug-induced thrombocytopenia after consumption of tonic water

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Purpose: Drug-induced thrombocytopenia (DITP) is a diagnosis of exclusion since other causes of thrombocytopenia must first be ruled out. DITP can lead to severe consequences, including spontaneous bleeding or defects in clotting. We describe a 49-year-old female who woke up with what was described as a “blood blister” on her lip. In the emergency department (ED), the patient stated she experienced bleeding from her tongue, inner cheek, and nose, reported heavier than usual menstrual flow, and noted red spots on her lower extremities which prompted her to seek medical care. The patient reported drinking two glasses of gin and tonic at dinner the previous night. Physical exam findings include hemorrhagic bullae on the inner right cheek, a hemorrhagic lesion on her lip, dried blood in the nares, mildly dry mucous membranes, and petechiae on her lower and upper extremities, abdominal wall, and chest. She was found to have a platelet count of 3000 cells per microliter. The patient had a documented quinine allergy in which she experienced bleeding and thrombocytopenia in the past. Past medical history includes type 1 diabetes mellitus managed with an insulin pump. Based on the patient’s history of quinine-induced thrombocytopenia and the inadvertent consumption of tonic water, the diagnosis of drug-induced thrombocytopenia was made. The patient received methylprednisolone 60 mg IV for one dose, intravenous immunoglobulin 48 g (0.5 mg/kg) for one dose, and a transfusion of platelets in the emergency department. Methylprednisolone 60 mg every 6 hours was given until the patient was discharged. Additionally, the patient received aminocaproic acid 50 mg every 8 hours for menorrhagia. Her platelet count improved to 40,000 cells per microliter on hospital day 3 and 56,000 cells per microliter on hospital day 5. Signs and symptoms of bleeding resolved by discharge on hospital day 5. Recommendations for the treatment of DITP include discontinuation of the drug and, if severe, a transfusion of platelets. Since other causes of thrombocytopenia are being ruled out on presentation, treatment for primary immune thrombocytopenia which includes corticosteroids (dexamethasone 40mg by mouth or prednisone 1mg/kg by mouth) and intravenous immune globulin 1g/kg or plasma

exchange, may also be considered initially. There is no evidence to support the continued use of these treatments in patients with confirmed DITP. In this case, the platelet transfusion, methylprednisolone, and immune globulin were appropriate upon presentation, but the immune globulin dose was lower than recommended (0.5 mg/kg vs. 1mg/kg). The continued use of methylprednisolone was also inappropriate and resulted in elevated blood glucose levels in a diabetic patient. Applying the Naranjo adverse drug reaction probability scale, a score of 8 was obtained, which indicates a probable association between the patient's consumption of tonic water and thrombocytopenia. This case highlights the importance for healthcare providers to not only document an allergy to quinine in the medical record, but to also counsel the patient on medications and foods that contain quinine in order to prevent future episodes of DITP.

Methods:

Results:

Conclusion:

Submission Category: Pain Management

Submission Type: Evaluative Study

Session-Board Number: 2-193

Poster Title: Evaluation of opioid analgesia for pain management in hospitalized hemodialysis−dependent patients

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Additional Author (s):
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Purpose: Patients with end-stage renal disease (ESRD) who are hemodialysis-dependent have a high symptom burden. Over 50 percent of ESRD patients report suffering from moderate to severe pain. Studies confirm the accumulation of potentially harmful metabolites of opioids such as morphine, hydromorphone, and oxycodone in patients with renal failure. The World Health Organization (WHO)-analgesic ladder has been modified for patients with renal failure; however, there are no well-established guidelines for treatment of pain in ESRD patients. Our objective was to assess the appropriateness of opioids analgesia in hospitalized hemodialysis-dependent patients and to evaluate the prescribing patterns of non-opioid analgesics.

Methods: After receiving institutional review board approval, a query of the institution's Renal Dialysis Services clinical information system identified ESRD patients age 18 years or older who were hemodialysis-dependent and received at least one dose of analgesic medication during their admission to one of the two health-system's hospitals between January 1, 2014 and December 31, 2014. A retrospective chart review was performed and the following data was extracted: age, gender, ethnicity, comorbid conditions, opioid regimen(s) ordered, opioid dose(s) administered, concomitant non-opioid or adjuvant medication(s) regimens ordered and administered, pain levels (numeric scale), pain quality and description, vital signs, comprehensive metabolic panel lab results, and any reported adverse events. Numeric pain scores reported by the patient prior to analgesic regimen administration were compared to numeric pain scores reported by the patient following analgesic administration.

Results: Fifty-three patients encompassing 110 total admissions met inclusion criteria. Patient comorbidities included diabetes mellitus (48.1percent), depression or anxiety (15.4 percent),

and peripheral neuropathy (3.8 percent). Almost half of patient admissions (N=47; 44 percent) included only one analgesic medication order. The most commonly ordered analgesic medication was acetaminophen (48.2 percent) followed closely by morphine (44.5 percent), hydromorphone (43.6 percent), and the combination of oxycodone-acetaminophen (40.9 percent). Mean pain scores before administration were 7.8 and 7 for opioid and non-opioid medications, respectively. Patients receiving opioid analgesics had a mean pain score reduction of 5.75 while those receiving non-opioid analgesics had a mean pain score reduction of 5.25. Of 996 total medication orders, 55 orders (5.5 percent) specified a pain scale for administration, and 119 doses (11.9 percent) were given to patients whose reported pain scale was outside the specified range of the order. The total milligram morphine equivalent (MME) administered per day was 39.8 mg, which is considered a low daily dose as per the Centers for Disease Control and Prevention.

Conclusion: Our investigation revealed that potentially unsafe analgesics are ordered in approximately half of our patient population. Due to the retrospective nature of the study, adverse effects were rarely recorded and could not be compared between analgesic medications. Based upon our data, further use of non-opioid analgesia should be considered in this population. Patient-reported pain scores remains the most readily available measure for evaluating medication effectiveness and must be routinely documented. Because of the previously published research and our own observation, reduction in the use of opioids for pain management in the inpatient hemodialysis-dependent population is recommended.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 2-194

Poster Title: Navigating the barriers: Expanding access to paliperidone palmitate

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Purpose: Schizophrenia is a mental disorder characterized by relapse episodes of altered perception, socialization and volition. Of the patients relapsing for the first time, a significant number admit to medication non-adherence and relapse shortly thereafter suggesting continued non-adherence. Such schizophrenic episodes lead to high healthcare and socioeconomic costs. Long acting injectables, such as Invega Sustenna and Invega Trinza, thus provide patients with one-month and three-month dosing alternatives to reduce non-compliance, relapse and costs, though coverage barriers hinder access to these medications. This poster explores barriers to insurance coverage of Invega, and delineates paths through which to navigate these barriers.

Methods: Research of the commercial plans of Medicare, Medicaid and the top pharmacy benefit managers was conducted to compare market access to long acting injectable formulations of Invega Sustenna (paliperidone palmitate), Invega Trinza (paliperidone palmitate) and Risperdal Consta (risperidone). Specific emphasis was placed on the following factors which affect market access: 1) formulary placement, 2) prior authorization requirement and 3) co-pay or co-insurance requirement, if such information was available. Following investigation of these barriers to access, research was conducted to explore various programs that offer assistance with access to Invega Sustenna and Invega Trinza. Each program was evaluated on: 1) source of funding, 2) eligibility requirements and 3) program description. These insurance plans and assistance programs were described qualitatively and quantitatively based on evaluation criteria. The average wholesale price of Invega was used to quantify co-insurance amounts.

Results: The data suggests that insurance plans classify Risperdal Consta, Invega Sustenna and Invega Trinza as non-preferred, specialty tier, or not covered. Out of 4,400 commercial health plans, Invega Sustenna was classified by 24 percent, 68 percent and 8 percent of plans as preferred, non-preferred and not covered, respectively. Also, Invega Trinza was classified by 14 percent, 83 percent and 3 percent of plans as preferred, non-preferred and not covered, respectively. Specifically looking at non-preferred plans, co-insurance costs can reach as high as 25 to 30 percent for both commercial and Medicare Part D plans, translating to out-of-pocket costs between 110 to 788 dollars for Invega Sustenna and 657 to 2365 dollars for Invega Trinza. Multiple programs exist to assist patients with these payments, nearly half of which are provided by Johnson & Johnson. These programs include: Janssen Connect, Instant Savings Program, Inpatient Free Trial Program, Outpatient Sample Program, Johnson & Johnson Patience Assistance Foundation, Medicaid Coverage Assistance, Medicare Savings Programs, Medicare Part D Extra Help, Third Party Coupons, and Prior Authorization Appeals Assistance. Co-pays when using 8 out of 10 of the above pathways are between 0 to 50 dollars, and are more often than not free-of-charge.

Conclusion: While many insurance barriers hinder market access to long-acting injectable formulations of Invega Sustenna and Invega Trinza, there are many ways to navigate these barriers. Having a comprehensive understanding of both the access barriers as well as the programs that offer assistance in addressing these barriers puts to rest much concern over therapeutic costs. Thus, in selecting medication therapy for patients with schizophrenia moving forward, prescribers ought to place more emphasis on the value of therapeutic compliance.

Submission Category: General Clinical Practice

Submission Type: Case Report

Session-Board Number: 2-195

Poster Title: Potential risk of 1,3 dimethylamylamine in patients with bipolar disorder

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Purpose: This patient case illustrates the probable risk of taking pre-workout supplements containing 1,3 dimethylamylamine (DMAA) in patients with psychotic disorders. DMAA is an amphetamine derivative that is commonly found in sport supplements and often used for its weight loss, performance enhancing and body building effects. DMAA was once approved as an inhaled nasal decongestant but there is no currently approved medical use since it was taken off the market in 1983. Common health risks associated with DMAA include elevated blood pressure and tightening of the chest. DMAA has also been suspected to have a risk of exacerbating psychosis. Despite the adverse event profile, DMAA is still a main ingredient found in dietary supplements, against FDA recommendations, including the product marketed as Executioner®. The described patient reported taking this pre-workout supplement before his workouts. The patient had a history of bipolar disorder and was previously treated with quetiapine. He was brought in by the police for bizarre behavior and put in restraints after punching a nurse. He reports compliance to his medications and no current illicit drug use. His toxicology screen was negative. He was admitted to the psychiatry department presenting with diminished need for sleep, excessive and pressured speech, and clear evidence of distractibility. During his first day, he was easily irritated and delusional, requiring haloperidol injections as needed. Initially, the patient did not attend group sessions, such as art therapy, and was disruptive. The patient was noted to respond to auditory hallucinations, suggesting psychotic features associated with his current manic episode. He was continued on quetiapine, but the titration process was restarted with a dose of 100 mg initially. The dose of quetiapine was increased daily until a maximum of 800 mg at bedtime. During treatment team meetings, it was suspected that his pre-workout supplement may have exacerbated his recent manic episode with psychotic features. He reported recently taking Executioner® because it helps him through his workouts. DMAA was the main ingredient suspected in the pre-workout to exacerbate his current psychotic symptoms. The patient's psychotic features improved

throughout his twelve days at the hospital, requiring less haloperidol each day. He was more cooperative, less intrusive, and no longer delusional. Upon discharge, the plan was to continue his antipsychotic medication and to stop taking his pre-workout supplement. As this patient case suggests, certain ingredients in pre-workout supplements, like DMAA, have the potential to exacerbate psychotic symptoms in patients with psychotic disorders. Although more research is needed to solidify this association, patients with psychotic disorders should be advised against certain pre-workout products that may contain DMAA.

Methods:

Results:

Conclusion:

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 2-196

Poster Title: Retrospective analysis of cefepime and meropenem associated seizures in the neurologic intensive care unit

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Purpose: Neurologic critical care patients are at high risk of infection due to their increased risk of central nervous system infection and frequent reliance on life-supporting measures, such as ventilators. Antibiotic selection is driven by the drug's ability to penetrate the blood brain barrier, favoring the use of cefepime and meropenem. However, cefepime and meropenem have been associated with a rare, but serious risk of seizure. The purpose of this study is to evaluate if cefepime or meropenem is associated with a higher risk of seizure in a neuro-critical care population.

Methods: The institutional review board approved this retrospective chart review. Subjects over the age of 18 were enrolled if they were admitted to the intensive care unit for a neurologic diagnosis and received at least one dose of cefepime or meropenem. Patients who were actively being treated for seizure or experienced a seizure prior to receiving the first dose of the antibiotic were excluded from the study. Baseline patient characteristics collected include age, gender, creatinine clearance, admission diagnosis, and use of seizure prophylaxis. Baseline treatment factors include the choice of antibiotic, dose, indication, and duration of use. The primary outcome measure was the incidence of seizure while treated with cefepime or meropenem. Seizures were identified either by clinical documentation or by electroencephalogram. Secondary outcome measures include length of stay in the intensive care unit and change in mental status, as defined by change in Glasgow Coma Score, confusion, memory impairment, and speech difficulty. Seizure incidence was analyzed using the Fischer Exact test. The Students t-test was used to analyze length of stay in the intensive care unit. Mental status changes (Glasgow Coma Score, confusion, memory, and speech) were analyzed using the Mann-Whitney test.

Results: Sixty-four patients met inclusion criteria and were enrolled in this study. The average age of the population was 59.6 years, and the mean creatinine clearance was 76.2 ml/min. Female patients accounted for 36 (56.3 percent) of the enrollees. Thirty-five patients received cefepime, and twenty-nine received meropenem. Three patients who received cefepime and no patients who received meropenem had a seizure, resulting in a non-significant difference (P=0.245). The average length of stay in the intensive care unit for cefepime and meropenem was 12.2 and 13.2 days respectively, which did not demonstrate statistical significance (P = 0.551). The change in Glasgow Coma Score did not demonstrate statistical significance (P=0.322). Change in confusion, memory, and speech also did not show statistical significance (P= 0.757; P=0.234; P=0.223 respectively).

Conclusion: Use of cefepime did not demonstrate a statistically significantly increased risk of seizure over meropenem in neuro-critical care patients. However, all of the identified seizures occurred in patients who received cefepime. Thus, a larger prospective study powered to detect a difference would be warranted to identify if there is a difference in seizure rates between cefepime and meropenem in a neuro-critical care population.

Submission Category: Geriatrics

Submission Type: Descriptive Report

Session-Board Number: 2-197

Poster Title: Identifying Inappropriate Medication Usage in Geriatric Fall Risk Patients via an Interdisciplinary Communication Tool

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Purpose: Accidental falls occur frequently in older adults and are associated with considerable morbidity and mortality. Some of the most prominent risk factors for falling include postural instability, a history of falls, a Morse fall score of > 45, and the use of ≥ 3 medications implicated in causing falls. These medications have side effects which predispose patients to falls, such as orthostatic hypotension from certain antihypertensives and sedation from opioids and psychotropic drugs. The purpose of this study was to evaluate the inappropriate use of these medications in geriatric inpatients via an interdisciplinary communication form.

Methods: A brief survey was first disseminated amongst nurses, pharmacists, and physicians to gauge the extent to which each profession believed that interdisciplinary communication would help mitigate fall risk. Based on the survey results, a paper-based form was produced which identified patients at most risk of falling. The form was intended to be filled out by a multidisciplinary team of nurses, physicians, and pharmacists involved in each patient's care. The form was divided into sections allowing for nurses to document the patient's age, number of high fall risk medications, and Morse score; physicians to evaluate the patient's gait status; and pharmacists to flag potential therapeutic interventions. The form was trialed at two nursing units at 2 Meridian Health hospitals from July to August 2015. A medication utilization analysis was also performed on patients meeting inclusion criteria for potential fall risk. This was defined as patients older than 65 years of age and on ≥ 3 high fall risk criteria medications. High risk medications included medications from the Beers' Criteria and from other classes known to be associated with falls, including certain CNS agents (benzodiazepines, nonbenzodiazepine hypnotics, antipsychotics, anticonvulsants, antidepressants, opioids) and diuretics.

Results: In total, 16 out of 29 (55%) patients analyzed met inclusion criteria (older than 65 and on ≥ 3 high fall risk medications) for potential fall risk. Eleven out of 16 patients (69%) had Morse scores of ≥ 45, putting them at greatest risk of falling. A total of 50 high risk medications were identified from the 29 patients. The most frequent offenders were antidepressants and benzodiazepines, with each class individually making up 11 out of 50 (22%) of all medications and with both totaling 44% of all medications. The next most prevalent classes were opioids and diuretics, which were each separately observed in 7 out of 50 medications (14%). Anticonvulsants and nonbenzodiazepine hypnotics accounted for 10% of medications. Antipsychotics were recorded the least frequently, at a rate of 8%. From these medications, there was a total of 16 therapeutic interventions identified by pharmacists. Additionally, results from an interdisciplinary communication survey found that out of 58 healthcare providers interviewed, 76% of nurses, 100% of pharmacists, and 69% of physicians agreed that increased interdisciplinary communication would be beneficial in preventing falls.

Conclusion: As demonstrated by the survey results, a large majority of healthcare professionals believe that greater interdisciplinary communication is an important consideration to help mitigate geriatric inpatient fall risk. The results from the medication analysis demonstrated that many high risk patients may be inappropriately taking medications which further predispose them to falling. Future measures to curb the use of multiple high risk agents may be facilitated by communication forms such as the one trialed, which can help identify these patients prior to a fall incident.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-198

Poster Title: Evaluation of an oral vitamin D supplementation protocol in a hospital-based hemodialysis unit

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Purpose: Recent evidence surrounding extra-renal 1-alpha hydroxylase and the pleiotropic effects of vitamin D has led to a discussion on the role of nutritional vitamin D supplementation in patients undergoing maintenance hemodialysis (MHD). While the 2009 Kidney Disease Improving Global Outcomes (KDIGO) clinical guidelines recommend correcting 25(OH)D levels less than 30 ng/mL for patients on MHD, it not does provide a specific treatment protocol. The primary objective of this study is to evaluate the proportion of outpatients achieving optimal 25(OH)D levels of greater than or equal to 30 ng/mL according to the vitamin D supplementation protocol in a hospital-based hemodialysis unit.

Methods: A retrospective analysis was conducted using the dialysis service electronic clinical information system to identify patients undergoing MHD with a 25(OH)D level less than 30 ng/mL from March 1, 2015 to June 1, 2016. Patients were excluded from the study if the corrected calcium level was greater than 10.2 mg/dL and PTH greater than 600 pg/mL. De-identified data was collected from the institution's clinical information system and electronic health information management platform. Data collected included: demographic information (age, gender, weight), baseline laboratory values (corrected calcium, phosphorus, PTH, albumin), active vitamin D analog administration, MHD treatment schedule, ergocalciferol administration, and follow-up 25(OH)D levels. The primary outcome measure was first 25(OH)D follow-up level greater than or equal to 30 ng/mL. Secondary outcomes included adherence to protocol, 25(OH)D level greater than or equal to 30 ng/mL within 6 months of first level taken (second follow-up), initiation of subsequent regimens for 25(OH)D levels less than 30 ng/mL, and third follow-up 25(OH)D level greater than or equal to 30 ng/mL.

Results: A total of 74 patients were included in this study. The overall average first follow up 25(OH)D level was 32.27 ng/mL, where only 32 patients (43.24 percent) were able to reach goal. Approximately 46 percent of patients received the appropriate ergocalciferol regimen according to baseline 25(OH)D level. Among these patients, 15 patients (44.12 percent) achieved a 25(OH)D level greater than or equal to 30 ng/mL. Within six months of treatment, 62 patients had a second 25(OH)D level drawn. Among these patients, 7 patients (11.29 percent) achieved a 25(OH)D level greater than or equal to 30 ng/mL, at an average of 21.44 ng/mL. A second vitamin D supplementation regimen was initiated in 48 patients and 11 of these patients had a third 25(OH)D level drawn. Among these patients, 2 patients (18.18 percent) achieved a 25(OH)D level greater than or equal to 30 ng/mL, at an average of 22.18 ng/mL.

Conclusion: Findings of this study indicate that a large proportion of patients within our hospital-based hemodialysis unit are unable to achieve a 25(OH)D level greater than or equal to 30 ng/mL. Improvements to our current vitamin D supplementation protocol may be beneficial in attaining target 25(OH)D levels. These may include improved adherence, more strict follow-up monitoring, and an extended duration of supplementation. Further studies may be beneficial in assessing the clinical outcomes of long-term vitamin D supplementation in MHD patients.

Submission Category: Pain Management

Submission Type: Evaluative Study

Session-Board Number: 2-199

Poster Title: Evaluation of pain management practices in patients with an opioid use disorder in a community teaching hospital

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Purpose: Patients with an opioid use disorder (OUD) present a unique challenge in providing appropriate pain management within the acute care setting. Practitioners may be apprehensive that providing opioid analgesics propagates addiction and drug-seeking behavior of OUD patients. Clinical management is also complicated as OUD patients may be tolerant to standard doses of opioids. Prescribers seek an optimal, individualized regimen to provide adequate pain management while remaining vigilant that overreaches in therapy could negatively impact the patient. The purpose of this study was to help characterize pain management practice in OUD patients and identify areas of improvement within our institution.

Methods: A retrospective query by the hospital's Health Information Management (HIM) department was performed to identify patients with a primary or secondary discharge diagnosis of an opioid use disorder based upon the ICD-9 or 10 code between March 1, 2015 and February 29, 2016. Patients 18 years or older discharged from the institution with a primary or secondary ICD 9 and 10 discharge codes indicating an opioid use disorder (OUD) were included. De-identified data collected from the institution's clinical information system and electronic health information management platform included: (1) demographic information (patient age, gender, actual body weight, race/ethnicity, marital status, attending physician specialty, hospital unit/floor at discharge); (2) patient medical history (diagnosis of depression/anxiety, history of tobacco/alcohol/other substance use disorder, no. emergency department (ED) visits for pain, no. ED visits for overdose/withdrawal, history of pain syndrome); (3) current visit (pain diagnosis, numeric pain score at admission/discharge, average score, max score, and LOS); (4) pain management received (non-CII analgesic, short-acting CII analgesic, long-acting CII, average prescribed dose, average daily dose, total days of analgesic prescribed at discharge). Descriptive statistics were computed for the total sample. Variables examined included

demographic characteristics and available clinical outcomes. For continuous variables, means, medians, and standard deviations were computed. For categorical variables, percentages were reported.

Results: Data for 101 patient admissions were collected during the study period. Mean age was 48 years old, 67.33 percent of patients were male, and mean length of stay was 5.64 days. Using numeric pain score out of 10, mean pain score at admission was 4.875, mean pain score at discharge was 2.758, mean of the mean pain over duration of stay was 1.914, and mean maximum pain score over duration of stay was 5.373. Approximately half (49.5 percent) of patients received non-CII analgesics, 45.55 percent of patients received short-acting CII analgesics, and 27.72 percent of patients received long-acting CII analgesics. Mean morphine equivalents (MME) per day ranged from 0 to 750 MME per day, with a mean of 78.42 MME per day. A new analgesic was prescribed to 19.8 percent of patients at discharge for a mean duration of 6.5 days. Forty-five patients (44.55 percent) were on an analgesic agent prior to arrival, and 32 (71.11 percent) of those patients continued their prior analgesic agent upon discharge. Of the remaining 13 patients (28.89 percent), 10 patients had agents discontinued upon discharge, one patient changed agents entirely, one patient had agent dosage increased, and one patient had agent dosage decreased.

Conclusion: There appears to be a lack of standardization in approach to characterizing and managing pain in patients with history of OUD within our institution. There also appears to be a lack of patient information collected and available to physicians about OUD patient's nature of pain and previous management. Our institution may benefit from a protocol-based approach to pain management in patients with OUD. This protocol would potentially help physicians collect relevant patient information, guide initial regimen selection, and adjust regimens to individualized patient requirements. Further research is required to implement improvements in pain management practices in patients with OUD.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 2-200

Poster Title: Impact of antibiotic timing on length of stay of septic patients in a community-based hospital

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Purpose: Treatment of sepsis involves prompt administration of fluids and antibiotics to initially manage symptoms. The 2012 Surviving Sepsis Guidelines recommend that empiric antibiotics should be given within one hour of recognition of septic shock and severe sepsis. Every hour delay of antibiotic administration is associated with increased mortality. The purpose of this study is to assess the effect of antibiotic administration on length of stay and other outcomes in septic patients. This study will also evaluate adherence to sepsis guidelines at Capital Health Regional Medical Center.

Methods: The health-system's electronic medical record was utilized to identify patients over the age of 18 years with a diagnosis of sepsis from March 1, 2016 through May 31, 2016. Patients were excluded if they developed sepsis as an inpatient or if timing of antibiotic administration was unable to be determined. Data collected included: patient demographics, labs (including white blood cell count, percent bands, and lactate level) discharge diagnosis, initial vital signs at admission, date and time of admission and discharge, days of intensive-care unit (ICU) stay, days of hospital stay, time of antibiotic ordering, time of antibiotic administration, types of cultures taken, and results of those cultures. The primary outcome of the study was to compare time to first antibiotic administration with length of hospital stay. Secondary outcomes included length of ICU stay, mortality, and adherence to the health-system's sepsis protocol.

Results: Sixty-nine patients were included. Forty-eight patients (69.5 percent) were diagnosed with sepsis, 7 patients (10.1 percent) with septic shock, 4 patients (5.8 percent) with severe sepsis, and the remaining patients had a combination of diagnoses. Antibiotics were given

empirically according to the health-system's protocol and suspected site of infection. Thirty patients (43.5 percent) received empiric antibiotic coverage with vancomycin and cefepime. The average length of hospital stay for all of the patients was 16 days plus or minus 15 days. Fifty-seven patients (82.6 percent) received an antibiotic within one hour. Patients that received an antibiotic within one hour had an average length of stay of 14.5 days plus or minus 14.9 days, whereas patients that did not receive an antibiotic within one hour had an average length of stay of 20 days plus or minus 18.4 days. The average length of ICU stay was 3.8 days plus or minus 4.5 days in the within one hour group, compared to 7.8 days plus or minus 19.5 days in the over one hour group. Eight patients (11 percent) expired during their hospital stay. Seven patients were in the within one hour group, and one patient was in the over one hour group.

Conclusion: It is critical to get septic patients urgent care as quickly as possible. Overall, there was adherence to guidelines of antibiotic administration within one hour of sepsis identification, resulting in decreased length of hospital stay. For patients who received antibiotics after one hour, several barriers were identified, such as a lack of IV line access. The health-system will continuously strive to improve barriers to administration in order to optimize patient outcomes.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 2-201

Poster Title: Companion diagnostics: Current trends from a clinical development and regulatory perspective

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Purpose: The advent of personalized medicine has ushered a shift in both the development and approval of drug therapies. In recent years, the rise of immunotherapies and targeted therapies has also led to a crucial need to better predict patients' clinical response from these medications. The objective of this research is to evaluate current companion diagnostics on the US and European markets and compare the regulatory framework between the US and Europe. Furthermore, another goal is to illustrate the co-development process of companion diagnostics with their corresponding therapeutic products.

Methods: We performed a literature review of existing companion diagnostics, their therapeutic areas, and the regulatory processes required for the approval of companion diagnostics in both the US and Europe. Search engines included Medline, National Center for Biotechnology Information, and PubMed. We also utilized the Food & Drug Administration (FDA) and the European Medicines Agency (EMA) guidelines and guidances for regulatory information. Additionally, we examined trends in the development of companion diagnostics over the past several years, as well as the therapeutic areas represented.

Results: Currently, there are 37 FDA-approved drug-companion diagnostics combinations. The majority of companion diagnostics are geared towards oncology, but other therapeutic areas represented include HIV, cystic fibrosis, and severe growth failure. The development process of companion diagnostics generally involves preclinical trials that focus on biomarker selection. As for subsequent clinical trials, they involve prototype construction, analytical validation, and clinical validation. The FDA recommends that companion diagnostics be developed in parallel with their corresponding therapeutic product and validated in the Phase 3 clinical trial. In

Europe, there is often no cross-talk between companies, and most companion diagnostics are regulated by self declaration under the lowest risk category, “general IVD”, which include all devices except Annex II and self-testing devices. Companion diagnostic tests are expected to fall into the new risk-based classifications (Class C or D) of IVD medical devices by the EMA, whereas the FDA classifies medical devices as exempt, 510(k), or PMA. Overall, both agencies understand that co-development strategies and regulatory issues for drugs present challenges within companion diagnostic projects, so it is important to establish a dialogue with regulatory authorities as early as possible in the development process.

Conclusion: Companion diagnostics offer value by individualizing therapy to improve clinical outcomes. Personalized medicine is the future of many therapies, and the increasing trend in the sales of companion diagnostics over the past several years reflects this phenomenon. In 2010, companion diagnostics generated $1.3 billion. This is predicted to increase to $11.4 billion by 2021. Health authorities are also adapting their regulatory frameworks in order to accommodate the progression of companion diagnostics. Further research may be conducted to distinguish the regulatory process for products with a companion diagnostic from that of agents without one.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 2-202

Poster Title: Assessment of pharmacist interventions in hospitalized patients' medication therapy to prevent development of delirium

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Purpose: The risk of developing delirium is faced by many hospitalized patients, especially those with advanced age, organ dysfunction, and use of medications that can cause delirium. Delirium can present as hallucinations or altered consciousness, and may become permanent or have fatal consequences. The Hospital Life Elder Program (HELP) at Morristown Medical Center helps prevent delirium through various measures, including therapeutic activity programs and early mobilization. Currently, there are minimal interventions related to high risk medications. The purpose of this project is to investigate the potential for pharmacist involvement in the HELP program and to standardize pharmacists' approach to these patients.

Methods: The Beers criteria, hospital formulary, and physician prescribing practices were used to develop a list with rationale and recommendations of medications to be avoided or minimized in patients at risk for delirium. Pharmacy students reviewed the medication profiles of all patients identified by HELP as a delirium risk from May 1, 2016 through May 31, 2016. They identified at-risk patients' age, sex, renal function, and high-risk medications prescribed. Patient medication profiles were further evaluated to identify potential and actual interventions related to medications that pose a delirium risk.

Results: 226 patients were identified to be at risk for delirium by HELP, with 305 potential medication interventions identified among them. 247 medication issues (81%) were identified in patients at least 75 years of age; 155 (51%) were identified in female patients, and 124 (41%) had a creatinine clearance of at least 50mL/min while 69 (23%) incidences occurred in patients with a creatinine clearance below 30mL/min. 174 patients (77%) had been prescribed at least 1 high-risk medication, with 30 (18%) of these patients receiving greater than 1 high-risk medication. High-risk medications most commonly prescribed were benzodiazepines, followed

by diphenhydramine, then sedative-hypnotics. In total, interventions were made on 96 (31%) of the possible medication issues, and of these, the majority consisted of monitoring without recommending changes to the patients' medications. 37 patients developed delirium in the hospital during this time, out of which 13 were enrolled in the HELP program. All 37 patients were prescribed at least 1 high-risk medication.

Conclusion: Many hospitalized patients are at risk of developing delirium, and pharmacists have the opportunity to help prevent delirium caused by medications. Results show that while pharmacists may be aware of the risks of certain medications in developing delirium, little is being done to reduce the medications' exposure to at-risk patients. Development and education of a tool to assist pharmacists in easily identifying high-risk medications, the rationale behind the risk and clear, specific interventions may assist pharmacists in taking a bigger role in the reduction of delirium secondary to medication interventions.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 2-203

Poster Title: Characterization of hypoglycemia management in accordance with a protocol in hospitalized patients with medication-induced hypoglycemia: a retrospective analysis

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Purpose: In hospitalized patients, hypoglycemia and lack of glycemic control are associated with increased morbidity and mortality. The statuses of hospitalized patients change on a daily basis making it more difficult to maintain glycemic control which allows episodes of medication-induced hypoglycemia to occur. Thus, the hospital has instituted a hypoglycemia protocol to ensure episodes of hypoglycemia are corrected appropriately and timely. The purpose of this study is to evaluate the utilization of the protocol developed for managing episodes of hypoglycemia experienced by patients admitted to the hospital.

Methods: This study was a retrospective chart review approved by the hospital's institutional review board. A list was generated from the data-mining program, Theradoc, to identify patients greater than or equal to 21 years old with a blood glucose level less than 80 mg/dL in the intensive care unit or less than 70 mg/dL for the non-intensive care unit, from July 18, 2016 to August 18, 2016. Patients were included if they had an active order for a hypoglycemic-causing medication such as insulin, sulfonylureas, or meglitinides. Patients were excluded if they had an active order for immune globulin intravenous, total parenteral nutrition or experienced an episode of diabetic ketoacidosis, calcium channel blocker overdose, or beta-blocker overdose. Demographic data, such as age, gender, weight, and length of stay was collected. In addition, the choice of intervention and blood glucose levels up to 24 hours post-hypoglycemic event were recorded. The primary endpoint was the percent of patients in which a documented intervention to correct hypoglycemia had occurred. Secondary endpoints were incidence of hypoglycemia with an active hypoglycemic medication, time to reach corrected blood glucose and if the patient had multiple hypoglycemic episodes within 24 hours.

Results: Of the 85 patients with an episode of hypoglycemia, 60 patients met the inclusion criteria. Of these patients, 27 (45 percent) were critical care patients, 56 (93.3 percent) had diabetes, and 25 (41.7 percent) were on concurrent corticosteroids. Initial episodes of hypoglycemia had an average blood glucose level of 60.95 mg/dL and included 58 patients with a concomitant order for insulin, 6 for sulfonylureas, and 2 for meglitinides. For the primary outcome, 17 (28 percent) patients had a documented intervention. The median time from hypoglycemic episode to intervention was 1.24 hours. Of the 60 patients, it took, on average, 3.57 hours from the initial episode of hypoglycemia to reach normoglycemia. In addition, 20 patients (33 percent) had multiple episodes of hypoglycemia within 24 hours.

Conclusion: The results of this study highlight poor compliance with our institution's hypoglycemia protocol. This is evident by infrequent and inconsistent documentation of interventions to reverse hypoglycemia. In addition, this study confirms that most episodes of hypoglycemia occur in patients who are receiving anti-diabetic medications. Of these episodes, older, diabetic patients managed on insulin were at increased risk. Additional education should be considered to ensure each patient receives timely hypoglycemic reversal that is documented in the electronic medical record.

Submission Category: Pediatrics

Submission Type: Case Report

Session-Board Number: 2-204

Poster Title: Termination of eculizumab therapy in a pediatric patient with atypical hemolytic uremic syndrome: a case report

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Purpose: Atypical hemolytic-uremic syndrome (aHUS) is a disease that involves dysregulation of the alternative complement pathway, which leads to complement overactivation. It is associated with thrombotic microangiopathy (TMA), characterized by a triad of microangiopathic hemolytic anemia, thrombocytopenia, and acute kidney failure. Previously, the only treatment was plasma exchange, which led to poor outcomes with almost 50% patient mortality or end-stage renal disease despite treatment. Eculizumab (Soliris®), a monoclonal antibody that targets C5 and prevents complement activation, was approved for the treatment for aHUS in 2011. However, time to response is unclear and it is unknown when to discontinue therapy when a patient seems refractory. This case report presents a 17 year old male patient with a 3 month history of right eye vision loss. Medical evaluations prior to admission revealed anemia and thrombocytopenia. Prior to admission, a bone marrow biopsy was negative for multiple myeloma but revealed abnormal lymphocytes and a PET scan revealed only abnormal adenoid tissue, which was subsequently biopsied and negative. He was admitted for fevers of 102 oF, vomiting, headache, petechial rash and nosebleeds for 2 days. On admission, his white blood cell count was 18.5, hemoglobin 11.9, platelets 63, serum creatinine (SCr) 3.0, C3 complement 23, and C4 complement 16.9. Given his renal insufficiency, thrombocytopenia, anemia, and low C3, this patient was diagnosed with aHUS and given eculizumab 900 mg IV on Day 2 of his admission. ADAMTS13 levels were checked to rule out possible deficiency, which was excluded. His SCr continued to increase, and he was put on dialysis on day 4. He continued weekly eculizumab therapy, as indicated, for 3 additional weeks, and then transitioned to every two week maintenance therapy thereafter. On day 20, he was intubated for acute respiratory failure and hypotension. Echocardiogram showed acute systolic dysfunction with ejection fraction ~40% and pulmonary hypertension. As aHUS and renal function did not resolve with

eculizumab use, the patient began plasmapheresis starting on day 20, at first on consecutive days and transitioning to three times weekly. Due to this procedure, supplemental eculizumab was given up to four times per week, as per the package insert. Plasmapheresis was effective to maintain platelet counts as this patient's admission continued, and continues to the point of this report. Eculizumab was continued on a biweekly schedule with frequent supplemental doses for plasmapheresis up to day 70, when the therapy was discontinued due to lack of clinical improvement. Subsequently, additional therapies have been added, although eculizumab remains on the list of failed therapies for this patient. Signs of refractory use of eculizumab include signs and symptoms of TMA complications, elevated serum creatinine and lactate dehydrogenase, and thrombocytopenia. These should be assessed during therapy in order to monitor drug efficacy. Based on this patient's clinical presentation throughout therapy, we recommend continued vigilant monitoring for efficacy throughout a patient's course of therapy. In addition, review of literature has described few other case reports in which time to response was demonstrated to be within two doses to one month. Due to costs and lack of added benefits, we recommend eculizumab be discontinued after one month of induction therapy without evaluable clinical improvement. This case report demonstrates a continued lack of efficacy of eculizumab therapy after an extended duration of treatment and serves to add to literature supporting a shortened course of therapy in such refractory cases.

Methods:

Results:

Conclusion:

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 2-205

Poster Title: Evaluation of intravenous alteplase in elderly patients with acute ischemic stroke: a retrospective safety analysis

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Purpose: Intravenous alteplase, or recombinant tissue plasminogen activator (rtPA), is frequently used in the emergency setting to provide an increased chance of improved functional outcomes for patients diagnosed with acute ischemic stroke. Although alteplase has been shown to improve neurologic functioning, its outcome measures are generally restricted to younger patients (less than 80 years old) with a better chance of survival and a better ability to recover. The purpose of this study was to determine if there exists an increase risk of mortality in ischemic stroke patients aged 80 years or older with hemorrhagic conversion post alteplase administration.

Methods: This retrospective cohort study was conducted by chart review utilizing the electronic medical record and hospital discharge database from a 365-bed academic community medical center certified as Joint Commission comprehensive stroke center and was approved by the institutional review board. Patients aged 18 years and older were enrolled in the study if the patient had a primary diagnosis of ischemic stroke and received intravenous alteplase, 0.09 mg per kg bolus in addition to 0.81 mg per kg infusion of rtPA between the dates of January 1, 2012 and January 1, 2016. Patients were excluded from the study if the patient did not receive a CT scan or MRI immediately prior to rtPA administration and a minimum of 24 hours post rtPA administration. Patients were also excluded if they were transferred to a different medical institution prior to 24 hours post rtPA administration. The primary outcome measure was in-hospital mortality within 7 days of admission to the emergency department for the treatment of acute ischemic stroke. Secondary outcome measures included the composite of hemorrhagic conversion or major bleeding as defined by the International Society on

Thrombosis and Haemostasis within 7 days of admission to the emergency department for the management of acute ischemic stroke.

Results: A total of 86 patients were eligible for inclusion in the study; 35 patients were aged 80 years or older and 51 patients were under the age of 80. Of the patients aged 80 years or older, 4 patients expired compared to 0 patients in the less than 80 years of age population (11.4 percent versus 0.0 percent, p equals 0.0493). When comparing the incidence of hemorrhagic conversion or major bleeding, 8 patients aged 80 years or older bled compared to 1 patient in the less than 80 years of age population (22.8 percent versus 1.9 percent, p equals 0.0055). There were no patients in either group that experienced hemorrhagic conversion that resulted in death.

Conclusion: The use of intravenous alteplase in acute ischemic stroke patients 80 years or older was associated with a statistically significant increase in the incidence of in-hospital mortality. The composite of hemorrhagic conversion and major bleeding at 7 days post administration also showed a statistically significant increase in the elder patient population. Because older age is a unique risk factor for mortality, more research is required to strengthen the determination of causality between intravenous alteplase administration and ultimate safety endpoints.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 2-206

Poster Title: Examination of the effects of multidisciplinary home visits on 30-day readmission rates in chronic obstructive pulmonary disease and pneumonia patients

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Purpose: Hospital readmissions significantly contribute to overall healthcare costs. Programs such as the Hospital Readmissions Reduction Program now penalize hospitals with excessive 30-day readmission rates for conditions including pneumonia and chronic obstructive pulmonary disease (COPD). While Transitions of Care (TOC) programs involving interventions such as home visits have been implemented, there are few studies assessing their impact on readmission rates. The focus of this study is to evaluate the effects of home visits on 30-day readmission rates of TOC Medicare patients diagnosed with COPD or pneumonia in a community teaching hospital.

Methods: This study was approved by the appropriate institutional review boards. A retrospective chart review was performed for patients 18 years and older with a primary diagnosis of COPD or pneumonia enrolled in a TOC service from January 1, 2014 to December 31, 2015. Patients with dementia, cognitive impairment, or a language barrier, and/or patients discharged with hospice care or to anywhere other than home were excluded. Patient demographic data including age, primary diagnosis, LACE (length of stay, acuity, co-morbidities, emergency department use) index score and insurance provider were collected. Baseline home visit intervention data including home visit occurrence, associated provider(s), and readmission within 30 days were also captured. Primary endpoints included 30-day readmission rates for Medicare patients with COPD who received a home visit versus no home visit and 30-day readmission rates for Medicare patients with pneumonia who received a home visit versus no home visit. Secondary endpoints included 30-day readmission rates for all patients enrolled in

the TOC program who received a home visit versus no home visit and 30-day readmission rates for patients who received a home visit from an Advanced Practice Nurse (APN) alone versus an APN with a pharmacist. Primary and secondary endpoints were evaluated using Fisher's exact test, with an alpha of 0.05 set for significance.

Results: Of the 240 total patient charts reviewed, 189 met inclusion criteria. Medicare patients with pneumonia who received a home visit had a lower readmission rate than patients who did not receive a home visit (0 percent versus 15.38 percent, one-sided P value of 1). Medicare patients with COPD who received a home visit had a higher readmission rate than those who did not receive a home visit (25 percent versus 20.83 percent, two-sided P value of 1). The overall readmission rate for all patients enrolled in the TOC program who received a home visit was lower than in similar patients who did not receive a home visit (11.11 percent versus 14.2 percent, two-sided P value of 1). Lastly, readmission rates for patients who received a home visit from an APN alone were lower than for patients who received a home visit from both an APN and a pharmacist (0 percent versus 13.63 percent, two-sided P value of 1).

Conclusion: Overall, no significant differences in readmission rates for Medicare patients with COPD or pneumonia who received a home visit versus no home visit were observed. There were also no significant differences in readmission rates for all patients in the TOC service who received a home visit versus no home visit and for patients who received a home visit from an APN alone versus an APN with a pharmacist. Although study size was a major limitation, slight trends of decreased readmission rates in some groups were observed. Larger studies evaluating the impact of multidisciplinary home visits should be considered.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 2-207

Poster Title: Perioperative administration of tranexamic acid in total hip and total knee arthroplasty: A retrospective analysis

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Purpose: Tranexamic acid (TXA) is the only pharmacologic agent recommended by the American Academy of Orthopaedic Surgeons for the reduction of postoperative blood loss and transfusions following total knee arthroplasties (TKA). No guidelines are currently published for total hip arthroplasties (THA). The purpose of this study was to evaluate the introduction of TXA to one hospital's protocol and to assess whether it resulted in a reduction of blood loss and consequently a decline in transfusion requirements in patients who underwent THA or TKA.

Methods: This retrospective cohort study was conducted by chart review utilizing the electronic medical record and discharge database from a 365 bed academic community medical center and was approved by the institutional review board. Our study consisted of patients at least 18 years of age who underwent THA or TKA. The control group included patients who underwent surgery between January 1, 2012 and December 31, 2012, before implementation of the hospital TXA protocol in 2013, and the study group included patients who underwent surgery between January 1, 2014 and December 31, 2014 and received two perioperative doses of intravenous TXA. The first dose was administered before tourniquet inflation and the second after tourniquet release. Doses were chosen at the discretion of the anesthesiologist, up to 1 gram. The primary outcome measure was a drop in hemoglobin of greater than 3 mg/dL within 48 hours of surgery. Secondary outcomes included postoperative decline in hematocrit within 48 hours of surgery and the incidence of blood transfusion during hospital admission. Including 162 patients in each group would provide a power of 80 percent with a two sided alpha of 0.05 to detect an absolute difference of 7.5 percent with regard to the primary outcome.

Results: Of the 221 patients who received TXA during their THA or TKA procedure, 32.1 percent experienced drops in hemoglobin greater than 3 mg/dL from baseline versus 72.4 percent of the 279 patients who did not receive TXA (P less than 0.01). There was a 9.5 percent absolute reduction in the incidence of transfusions in patients who received TXA compared to those who did not (4.1 percent and 13.6 percent, respectively; P less than 0.01). The mean decrease in hematocrit was less in patients that received TXA (8.0 percent; 95 percent CI, 7.6 percent to 8.4 percent) than in patients who did not receive TXA (10.6 percent; 95 percent CI, 10.2 percent to 11.0 percent; P less than 0.01). There was no significant difference in the incidence of deep vein thrombosis or pulmonary embolism between the two groups.

Conclusion: Use of TXA during THA and TKA was associated with significantly fewer patients experiencing decreases in hemoglobin greater than 3 mg/dL from baseline as well as fewer blood transfusions without negatively impacting safety.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 2-208

Poster Title: Evaluation of pharmacist interventions in underserved minority patients with diabetes

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Purpose: Diabetes affects approximately 22 million Americans, with Hispanics at a 51 percent higher death rate from diabetes than non-Hispanic whites. Achieving diabetes control through HbA1c reduction has been shown to prevent or delay long-term complications such as retinopathy, nephropathy, and neuropathy and may decrease cardiovascular mortality. There is mounting evidence that pharmacist interventions improve outcomes in diabetes patients, however, there is limited data on the effect of pharmacist interventions in minority populations with diabetes. This study evaluates the effect of the clinical pharmacist's interventions in medically underserved and financially distressed minority patients with diabetes.

Methods: This study was approved by the local Institutional Review Board and was conducted at a Federally Qualified Health Center in New Jersey. All patients 21 years or older that were referred to the clinical pharmacist for diabetes education and therapy management from July 1, 2014 to June 30, 2016 were enrolled in the study. Baseline data, including patients' demographics, medication-related problems, interventions provided, and labs, were collected concurrently. Follow-up outcome data was collected retrospectively at 3 months, 6 months, and 1 year and included HbA1c, blood pressure, LDL, and BMI values. Interventions consisted of comprehensive diabetes and self-management education, therapy recommendations and adjustments in collaboration with the referring physician, and follow-up visits between primary care appointments. Outcomes included mean decrease in HbA1c from baseline, percentage of patients achieving HbA1c goal of 7 percent, and the percentage of patients that improved HbA1c from baseline. Additional outcomes included reduction in blood pressure, LDL, and BMI. Continuous data were analyzed using a two-tailed paired t-test and categorical data were analyzed using a chi-squared analysis.

Results: A total of 262 patients were referred for diabetes management during the study period. The mean age was 51 years, 59.2 percent were females, 69.1 percent were Hispanics, 17.6 percent African Americans, and 55.3 percent were uninsured. Interventions were provided in Spanish for 62.2 percent of the patients. There were 147 patients with HbA1c measurements at 3 months, 128 at 6 months, and 80 at 12 months. The mean baseline HbA1c for all patients was 9.82 percent. The mean decreases in HbA1c from baseline in the 3, 6, and 12 month groups were 1.81 (p less than 0.0001), 1.40 (p less than 0.0001), and 1.30 (p less than 0.0001), respectively. At baseline, 13.8 percent of patients had a HbA1c of 7 percent or less compared to 38.1 percent at 3 months (p less than 0.0001), 36.7 percent at 6 months (p less than 0.0001), and 28.8 percent at 12 months (p less than 0.01). Mean LDL decrease from baseline was 36.4 mg/dL (p less than 0.001), 22.3 mg/dL (p equal to 0.022), and 2.0 mg/dL (p equal to 0.863) at 3, 6, and 12 months, respectively.

Conclusion: Pharmacist interventions in diabetes management in underserved minority patients showed an association with improved glycemic control by significantly reducing HbA1c levels and increasing the number of patients achieving the American Diabetes Association goals for HbA1c. Although the improvement was still evident at 1 year, the magnitude decreased over time, suggesting the need for continued pharmacist interventions. Other factors may have contributed to these outcomes and a randomized controlled trial would be needed to establish a causal relationship.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-209

Poster Title: Adherence to vitamin K usage guidelines for reversal of excessive INR in a community teaching medical center.

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Purpose: The use of vitamin K to reverse supratherapeutic INRs in patients taking vitamin K antagonists, such as warfarin, has clinical efficacy and utility. However, vitamin K usage is not without its own drawbacks: anaphylaxis in approximately 3 of 100,000 patients, long infusion times of 30 minutes, development of thromboembolism, and possible development of resistance to later warfarin therapy. This retrospective study was designed to examine a single institution's vitamin K usage in relation to The American College of Chest Physicians' 2012 guidelines for INR reversal as well as to educate pharmacists on appropriate orders for vitamin K.

Methods: The institutional review board approved this retrospective study. One hundred patients who were 18 years or older and received vitamin K from January 1, 2016 to May 31, 2016 were included in our analysis. Chart review selection was based off of a report generated from Cerner Power Chart and pharmacy dispensing records for the time period of interest. All patients who received vitamin K while also on warfarin were included for the primary analysis of adherence to the INR reversal guidelines. Secondary analysis included all other patients that were receiving a different anticoagulant or no anticoagulation at all.

Results: A total of 48 patients received warfarin and were included for primary analysis. The rate of guideline compliance of our institution was 62.5 percent with 30 patients receiving the correct dose and route of administration of vitamin K. Twenty of these patients necessitated rapid reversal for surgery and 10 had bleeds requiring reversal of anticoagulation. Of the 18 patients who were not given vitamin K appropriately while on warfarin, 13 patients were given vitamin K despite having no bleed, 1 was given vitamin K for a retroperitoneal hematoma that

did not require medical action at the time, 3 had no bleeds with an INR greater than 8.2 (the guideline cutoff is 10 however our system is limited to a maximum value of 8.2) that received more than the recommended 3mg vitamin K by mouth, and 1 had no bleed with an INR greater than 8.2 but was given 10mg intravenously. Of the 52 patients who received vitamin K despite not receiving warfarin as an anticoagulant, 34 patients were not receiving any anticoagulation or antiplatelet therapy at all and the other 18 received direct Xa inhibitors, heparins, aspirin, and clopidogrel.

Conclusion: Our institution was moderately compliant to the guidelines for INR reversal with vitamin K. This study has shown useful, actionable information in how to educate pharmacists with regard to vitamin K administration to improve guideline adherence.

Submission Category: Leadership

Submission Type: Evaluative Study

Session-Board Number: 2-210

Poster Title: Evaluation of student leadership roles and development in a United States pharmacy school

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Purpose: The Accreditation Council for Pharmacy Education (ACPE) has identified leadership as a key element of personal and professional development in the 2016 Standards. Student pharmacists need to develop the necessary leadership skills to provide patient care and advance the profession of pharmacy. The purpose of this study was to evaluate whether the student leadership development opportunities offered at a U.S. pharmacy school meet the elements of leadership defined by the ACPE standards and to identify barriers currently preventing students' involvement in leadership activities.

Methods: A 21 question paper and electronic survey was developed to identify current student leadership activities and the types of organizations that provided those opportunities. Students were asked to self-identify if they had been developed as any of the following significant elements of leadership identified by the 2016 ACPE Standards throughout their professional coursework: Learner, Caregiver, Manager in the Medication Use System, Promoter for Health and Wellness, Provider, Problem Solver, Educator, Advocate, Collaborator, Includer, Communicator, Self-Aware, Leader and Innovator, and Professional. Finally, students were asked to select the primary barriers that prevented their participation in leadership activities. The survey was administered to all four professional year classes and institutional review board approval was obtained prior to data collection. The data was analyzed using descriptive statistics to determine the variability in student development among class years and identify areas for improvement.

Results: A total of 224 responses were collected from the survey with 83 responses from the class of 2020, 52 from the class of 2019, 59 from the class of 2018 and 30 from the class of 2017. A majority of participants from each professional class were female, completing the 0-6 program and had a grade point average from 3.5-4.0. Among the 14 different elements of leadership presented, Communicator, Learner and Professional were the three elements identified most frequently by the class of 2017, 2018 and 2019, while the class of 2020 identified Communicator, Self-Aware and Collaborator. Manager in the Medication Use System was least commonly identified and listed by less than 40 percent of all four classes. The class of 2017, 2018 and 2019 identified subspecialty pharmacy organizations (like ASHP, APhA, DIA) as the most common type of organization that developed them as one of the listed elements, while the class of 2020 chose nonpharmacy organizations. All four professional classes responded that the top three barriers to participating in leadership development were “Not enough time due to school work” followed by “Not enough time due to work/family/other responsibilities” and “Inconvenient logistical considerations.”

Conclusion: Communicator was the most frequently identified leadership element regardless of class year. Elements of leadership that will need to be further emphasized include Manager in the Medication Use System and Provider, for which a majority of participants from all four classes evaluated the effectiveness of their skills in those areas as “neutral”. The most common barriers to participation in leadership development also indicate that leadership development skills and opportunities should be integrated into professional course work as many participants face barriers to attaining them through only extracurricular organizations.

Submission Category: Automation/ Informatics

Submission Type: Descriptive Report

Session-Board Number: 2-211

Poster Title: Implementation of a linked hypoglycemia order set with pre-packaged glucose tablets for mild hypoglycemia

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Purpose: Diabetes guidelines recommend orally administered glucose as the treatment of choice to manage hypoglycemia (blood glucose 70 mg/dL or below) in patients who are able to swallow. In an effort to improve patient care and ensure best practices at our institution, a multidisciplinary group drafted a hypoglycemia protocol that streamlined ordering, dispensing, administration, and documentation practices by leveraging our computerized physician order entry (CPOE) system and automated dispensing cabinets (ADCs). This descriptive report outlines the implementation of a hypoglycemia order set linked to glucose point of care tests and the financial impact of stocking unit-dosed, barcoded, glucose tablets in ADCs.

Methods: After implementation of the new hypoglycemia protocol and accompanying staff education at our institution, every patient who had a glucose point of care test (POCT) ordered automatically had linked orders for oral glucose tablets, injectable 50 percent dextrose (D50W), and glucagon added to their medication profiles for as needed (PRN) use in the event of predefined hypoglycemia. The order set was based on the protocol developed by the Diabetes Program Manager using the current diabetes guidelines and other reviewed literature. Omnicell® ADCs were stocked with barcoded and unit-dosed vials of four glucose tablets, for a total dose of 16 grams of glucose per vial. If patients experienced hypoglycemic events that warranted the use of glucose tablets, the nurse could then scan the attached barcodes on the label of the vial accounting for the full sixteen-gram dose in order to facilitate documentation in the electronic medical record (EMR). Data was collected during the three-month period pre- and post-implementation of this protocol using Omnicell® Pandora Analytics software to track the number of times nurses withdrew D50W and oral glucose tablets from the ADCs. An

analysis of cost was also performed to quantify the potential costs avoided by properly managing “mild” hypoglycemic events.

Results: The hypoglycemia protocol was implemented successfully. The linked order set and stock supply of glucose tablets in the ADCs has simplified ordering, dispensing, administration, and documentation of medications used to manage hypoglycemia at our institution. In the three months prior to the implementation of this program, nurses withdrew 64 doses of D50W from the ADCs on the general medical/surgical floors of our hospital. In the three months after implementation nurses withdrew a larger number of D50W doses (91), but 38 doses of oral glucose tablets were withdrawn on those same floors, indicating that patients had been given oral glucose tablets preferentially in some cases. The acquisition cost of one D50W dose at our institution is $7.21, whereas each vial of glucose tablets had a direct acquisition cost of just $0.08. A cost avoidance of $270.94 was captured in the post-implementation period based on the implementation of the new hypoglycemia protocol.

Conclusion: The linking of the hypoglycemia order set to the glucose POCTs sought to make it easier for nurses to access treatment options during hypoglycemic events and improve documentation of medications administered. Barcoded 16 gram doses of oral glucose tablets were stocked in ADCs in attempt to reduce unnecessary intravenous medication use and improve EMR documentation. These interventions were carried out in an effort to improve best practices and evidence-based care. Further study is needed to identify if hypoglycemia treatment options were used appropriately and if any clinical outcomes have been affected by this new practice at our institution.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 2-212

Poster Title: Evaluation of hazardous drug administration in non-oncology settings

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Purpose: Historically, hazardous drugs were typically classified as anti-neoplastic agents and used in traditional oncology practice settings where safe handling practices were well established. Increasing trends in the administration of hazardous drugs in non-oncology settings may present unforeseen exposure risks to various health care workers, ancillary staff, family and extended family members. To heighten an awareness of these risks, such as inhalation and dermal exposure, and identify hazardous medications administered in non-oncology settings, this evaluation was performed. Evolving trends in the delivery of non-hazardous personalized targeted therapy medications was also included in the research.

Methods: During an elective APPE rotation, an FDU School of Pharmacy Student performed extensive and comprehensive research and review of information obtained from the NIOSH list of Hazardous Medications, NCCN guidelines and several other reputable web sites. In addition, miscellaneous trade journals were reviewed to obtain data encompassing trends in the administration of hazardous drugs in non-oncology settings as well as the evolving trends in personalized targeted therapy medications. Documentation of the use of the drugs present in the NIOSH Hazardous Drug list in non-oncology settings and the various routes of administration of these drugs was performed. Throughout the research process, periodic review of findings were discussed with APPE Preceptors to ensure the capture of appropriate data which was compiled and reflected in various tables and charts for presentation and reference.

Results: Research findings revealed significant risk of exposure to hazardous drugs during medication preparation, transport, administration, disposal and other activities performed in non-oncology settings. Research indicated the use of hazardous drugs in 22 nontraditional settings constituting a potential occupational exposure risk to the staff of these settings. In

addition, potential exposure risk exists in 14 less traditional routes of administration. Research also revealed 9 major trends in personalized medicine, encompassing chronic and rare disease states, RNAi therapies, biologics, targeted monoclonal antibodies, vaccine therapies, unique medical devices and oral formulations. The impact of many of these drug formulations on occupational safety health is largely unknown.

Conclusion: The administration of hazardous drugs in non-oncology settings has revealed unforeseen exposure risks of these medications among various health care workers, ancillary staff, family and extended family members. The need to heighten an awareness of the various administration settings, medications delivered within such practice arenas and the route of administration of these drugs, is of paramount importance to healthcare workers, ancillary staff, family and other caregivers' safety. As facilities evaluate methods to achieve compliance with the recently published USP < 800> standards, these nontraditional settings and treatment protocols must be included in assessment of risk.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 2-213

Poster Title: Evaluation of clopidogrel non-responders (ECNR) at a comprehensive stroke center

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Purpose: Clopidogrel non-response or resistance occurs when there is platelet aggregation despite adequate clopidogrel therapy. Approximately 40 percent of patients do not achieve adequate antiplatelet effects despite dual antiplatelet therapy. Although there has been no consensus on the prevalence of resistance to clopidogrel, the literature suggests a range from 5 to 44 percent. Our study aims to determine the prevalence of clopidogrel resistance at a comprehensive stroke center. The secondary objective is to evaluate stroke risk factors such as age, hypertension, dyslipidemia, and concomitant use of interacting medications in patients who are clopidogrel non-responders as well as loading dose response.

Methods: This study is a retrospective chart review examining prevalence of clopidogrel non-responders using VerifyNow test results from December 24, 2013 through December 29, 2014. The information collected was based on patient demographics, diagnosis/indication for hospitalization, dose of clopidogrel, loading dose (if applicable), patient labs, co-morbid conditions, and concurrent medications. The data was reviewed to determine the prevalence of clopidogrel resistance and to analyze the possible risk factors or conditions associated to clopidogrel resistance.

Results: The cumulative prevalence of initial non-response (P2Y12 Reaction Units above 194) to clopidogrel therapy in stroke patients was 64 percent. One hundred and fifty-three patients met inclusion criteria for the study and out of these patients, 68 patients received loading doses of clopidogrel. Seventeen patients (25 percent) subsequently became responders after receiving a loading dose. Stroke risk factors were seen at the following rates in non-responders: 77.5 percent having hypertension, 60.2 percent having dyslipidemia, and 47.9 percent having

coronary artery disease. Sixty one percent of non-responders were greater than 65 years, 59 percent were on aspirin, 61 percent were on HMG-CoA inhibitors, and 24 percent were on proton pump inhibitors.

Conclusion: Determining the occurrence of clopidogrel non-response is important for the monitoring of antiplatelet therapy. When non-responders receive loading doses of clopidogrel, the ADP-induced platelet inhibition is shortened to less than 6 hours and may decrease the number of non-responders. Of the 68 percent of patients who were non-responders, only 25 percent of them were able to achieve a response after initial loading dose. Further studies are needed to determine the risk factors that predispose patients to clopidogrel non-response, effects of clopidogrel non-response on patient outcomes after stroke hospitalization and any bleeding or adverse effects related to clopidogrel non-response.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 2-214

Poster Title: Evaluation of education on use of the clinical institute withdrawal assessment for alcohol scale, revised protocol

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Purpose: The clinical institute withdrawal assessment for alcohol scale, revised (CIWA-Ar) is a protocol that provides guidance for the medical staff on administration of benzodiazepines to patients experiencing alcohol withdrawal syndrome (AWS). Physicians prescribe the protocol and nurses administer medications per protocol and advocate for adjustments as needed. Proper understanding and ordering of the CIWA-Ar protocol is essential to reducing patient risk of severe withdrawal, which is associated with increased morbidity, increased mortality and prolonged length of stay. This project was designed to evaluate the impact of education on physician prescribing habits for patients with AWS at a community medical center.

Methods: This was an institutional review board-approved retrospective chart review on patients admitted for AWS from April to August 2016. Education was presented to the physicians during a scheduled noon conference and to the nurses during their monthly unit meetings. This presentation was intended to both refresh the knowledge of current residents and educate the incoming residents on the CIWA-Ar protocol per hospital guidelines. Pre and post CIWA-Ar protocol education was compared to assess three target outcomes: proper use of front-loading per hospital guidelines to reduce seizure risk in patients with a history of seizures or delirium tremens, proper use of the complete CIWA-Ar protocol to prevent onset of severe alcohol withdrawal, and selection of diazepam over lorazepam as the preferred benzodiazepine.

Results: A total of 37 treatment regimens prescribed to patients on the CIWA-Ar protocol were evaluated, 14 of which were evaluated prior to education and 23 of which were evaluated

following education. Of these regimens, 85.7 percent (6/7) were properly front-loaded before education and 87.5 percent (7/8) were properly front-loaded after education, indicating a 1.8 percent absolute improvement in the use of front-loading. Additionally, 7.1 percent (1/14) were properly assigned to the CIWA-Ar protocol before education and 34.8 percent (8/23) were properly assigned to the CIWA-Ar protocol after education, indicating a 27.7 percent absolute improvement in use of the complete CIWA-Ar protocol. Lastly, 7.1 percent (1/14) were given diazepam rather than lorazepam before education and 21.7 percent (5/23) were given diazepam rather than lorazepam after education, indicating a 14.6 percent absolute improvement in selection of benzodiazepine.

Conclusion: Education on the proper use of the CIWA-Ar protocol improved adherence. These results are helpful in identifying additional gaps in protocol adherence and in creating routine formal educational programs.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-215

Poster Title: Experience with idarucizumab for dabigatran reversal at a tertiary academic medical center

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Purpose: Idarucizumab is a humanized monoclonal antibody fragment (Fab) FDA approved in 2015 for the reversal of the direct thrombin inhibitor dabigatran. Currently, there is limited clinical outcome and safety data with the use of idarucizumab. Our institution restricts the use of idarucizumab to reverse dabigatran in the presence of life-threatening bleeds or urgent surgery needed to sustain life. The purpose of this review is to describe the experience with idarucizumab for reversal of dabigatran at a 600-bed, level-2 trauma, academic tertiary center.

Methods: All patients ordered with idarucizumab between December 2015 and June 2016 were reviewed for appropriate use per the institution's restrictions. Parameters collected include indications for anticoagulation, dabigatran dose, concomitant antiplatelet medications used, patient weight, age, sex, creatinine clearance, baseline INR and aPTT, types of bleed, types of surgical interventions, and idarucizumab dose given. Outcomes collected include any reported adverse events, ICU length of stay, total hospital length of stay, and survival.

Results: A total of 16 patients were ordered idarucizumab but only 12 received the medication. The mean age of the collected population was 83.5 years old. All patients were taking dabigatran for atrial fibrillation except one patient who received dabigatran for deep vein thrombosis in addition to atrial fibrillation. Nearly half of the patients had life-threatening bleeds and needed idarucizumab for reversal. Six patients were taking aspirin in addition to dabigatran and one was taking ticagrelor. Average INR and aPTT at baseline were 1.43 and 52.9, respectively. Among those 12 patients who received idarucizumab, 2 patients received only one vial of 2.5 grams instead of two vials for the total 5-gram dose as recommended by the package insert. An average length of hospital stay was 8.9 days and ICU stay was 3.3 days. No patients

were reported to have thrombogenic adverse effects. Only 1 patient expired while the other 15 patients survived.

Conclusion: Clinical outcomes data on the use of idarucizumab for dabigatran reversal remains limited. Our institution only administered a total of 12 doses over six months. No adverse events occurred during administration and all but one patient survived to discharge. Idarucizumab is reserved for life-threatening bleeds associated with dabigatran or the need of life sustaining surgery at this academic tertiary center. Idarucizumab appears to be safe when used according to the institution's protocol along with supportive care to treat life-threatening bleeds.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 2-216

Poster Title: Safety and effectiveness of diuretic use in preterm infants

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Purpose: Since pulmonary edema may result in lung injury, diuretic therapy has been used in the management of chronic lung disease to improve lung function. Risks and benefits of various diuretics for infants developing or with chronic lung disease have been analyzed in several small studies. Based on limited literature and lack of evidence for important clinical outcomes and associated adverse effects, diuretic use is generally not recommended in this patient population. The purpose of this study was to evaluate the safety and effectiveness of diuretic use for chronic lung disease in preterm infants at Morristown Medical Center.

Methods: The institutional review board approved this retrospective chart review of 25 preterm infants admitted to the neonatal intensive care unit at Morristown Medical Center who were prescribed at least one dose of diuretics for confirmed or developing chronic lung disease between June 13, 2012 and August 13, 2015. Eligible patients were identified by creating a report by resource utilization by individual resource and encounter number. Patients prescribed diuretics for other indications were excluded. Data collected included information regarding diuretic agent, indication, starting, minimum, and maximum dose and duration; adverse effects (serum electrolytes, nephrocalcinosis, nephrolithiasis, bone demineralization, and ototoxicity), duration of adverse effects, and intervention(s) for resolution; frequency of laboratory monitoring; and patient demographics including gestational age, birthweight, postmenstrual age and active diagnoses at time of diuretic initiation, daily weights, percent nipple feeding, respiratory support including the need for oxygen supplementation and extubation attempts, urine output, mortality, and length of hospitalization. The data was analyzed using descriptive statistics. The primary objective was to assess potential complications of diuretic administration. Secondary objectives were assessment of short-term improvement (within one week): changes in mean airway pressure, need for artificial ventilation, need for continuous positive airway pressure, failure to tolerate extubation, and

oxygen supplementation and long-term improvement: mortality, duration of need for oxygen supplementation and respiratory support, chronic lung disease at 36 weeks postmenstrual age, and length of hospitalization.

Results: Twenty-five preterm infants with a median gestational age of 25 4/7 weeks and median birthweight of 725 grams were included in this study. Spironolactone and thiazide diuretic combination therapy was the most frequently prescribed diuretic regimen (68 percent), followed by furosemide alone (24 percent), and spironolactone, chlorothiazide, and furosemide (8 percent). The average starting dose of spironolactone, chlorothiazide, and furosemide was 1.2 mg/kg/day, 17 mg/kg/day, and 1 mg/kg/day, respectively. The median duration of diuretic use was 36 days beginning at a median postmenstrual age of 32 6/7 weeks. Electrolyte abnormalities occurred in 84 percent of patients and included hyponatremia (29 percent), followed by hypokalemia (21 percent), and hypochloremia (17 percent). Osteopenia of prematurity (7 percent) and nephrocalcinosis (5 percent) were seen as well. Management included electrolyte supplementation (10 percent), discontinuation of diuretic therapy (19 percent), decrease in diuretic dose (33 percent), and supplementation with dose decrease or discontinuation (38 percent). Upon completion of diuretic therapy, 48 percent of infants were weaned to room air, while 52 percent continued to require respiratory support throughout their hospitalization; 24 percent low grade respiratory support and 28 percent high grade respiratory support. The median length of hospitalization was 114 days and four patients died.

Conclusion: This study shows that potential complications of diuretic use in preterm infants with or developing chronic lung disease may outweigh benefits. A majority of patients developed laboratory abnormalities and required management. Short term improvement in the level of required respiratory support was seen in less than half of patients and clinically important improvement in long term outcomes was not appreciated based on more than half of patients requiring continued oxygen supplementation and respiratory support upon diuretic discontinuation or at discharge. Risks and benefits of diuretic use in this patient population should be weighed carefully prior to initiating treatment.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 2-217

Poster Title: Impact of a mentorship program on students' interests in the pharmaceutical industry

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Purpose: Over several years, student interest in the pharmaceutical industry (pharma) as a potential career path has grown due to the versatility provided by PharmD training and increase in post-doctoral programs. A growing need exists for resources that student pharmacists can use to prepare for potential careers in pharma. Mentorship with industry professionals provides an impactful connection for students to receive guidance relating to industry interests. The objective of this study is to evaluate the impact of a mentorship program, hosted by the Industry Pharmacists Organization (IPhO) School Chapter, on pharmacy students' career development and professional interests relating to pharma.

Methods: A 22-question, electronic retrospective survey was distributed via Qualtrics, a web-based survey tool, to all students (N=37) enrolled in the IPhO Fellow Mentorship Program. Data was collected over a 4-week period. Survey completion notifications were sent to students at weeks 2 and 3. Question topics included student demographics, familiarity and knowledge of pharma, interest in pharma and specific functional areas, value of the program, and impact of the program on students' professional development. This study was approved by the University's Institutional Review Board.

Results: Out of the 37 program participants, 67.6% (n=25) completed the survey. At least 80% of students reported an intension to keep in touch with their mentors in the future and identified increased interest in applying for pharma-related opportunities. The majority of the students (61%) reported a change in area of pharma interest upon completing the program. The majority of participants (greater than 53%) had positive perceptions regarding the value

and impact of the mentoring program. Most participants (76%) felt that the mentorship program taught them skills not found in a classroom environment. At least 80% of respondents learned something new regarding pharma or industry fellowships, expressed more interest in pharma-related opportunities, and would recommend a pharma-related mentoring program to other students.

Conclusion: Overall, the mentorship program proved valuable in providing education, fostering professional development, and generating further interest in post-PharmD careers in pharma. Future pharmacy programs and organizations should consider facilitating a program to expose students to pharma through a mentorship program. Future studies may focus on the effects of long-term mentorship as well as the number of post-program students who achieve their desired careers in pharma.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 2-218

Poster Title: Evaluation of compliance to institutional antimicrobial stewardship guidelines for acute bacterial skin and skin structure infections

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Purpose: Acute bacterial skin and skin structure infections (ABSSSI) are associated with increased hospital admissions. Frequent use of unnecessary broad-spectrum antibiotics and prolonged therapy duration is common. This may lead to antibiotic-related adverse events, such as Clostridium difficile infection, and increased length of stay (LOS). An antibiotic stewardship program (ASP) may help improve antibiotic use and outcomes for patients with ABSSSI. Compliance with ASP guidelines has shown to decrease therapy duration and LOS, which can potentially result in decreased antibiotic resistance and adverse events. The objective of this study was to evaluate compliance to institutional antibiotic stewardship guidelines for ABSSSI.

Methods: This study was approved by the Institutional Research Review Board. Adult patients, admitted with a diagnosis of ABSSSI, from April to August 2016, were randomly selected for evaluation. A retrospective review of electronic medical records was performed and data collection included patient demographics, emergency department (ED) and inpatient antibiotic utilization, blood and wound culture results, duration of antibiotic therapy, discharge antibiotics, and patient outcomes. Compliance to institutional antibiotic stewardship guidelines for ABSSSI was evaluated.

Results: A total of 30 patients were evaluated. 18 (60 percent) were females, mean age 58 years (range 24-94). The most common co-morbidities were diabetes, seen in 5 (16.7 percent) and malignancy, in 2 (6.7 percent) patients. 16 (53.3 percent) patients were obese. 11 (36.7

percent) had allergies to antibiotics, which commonly included beta-lactams and fluoroquinolones.
26 (86.7 percent) patients received antibiotics for ABSSSI in the ED. Majority of the antibiotic regimens included vancomycin, ampicillin/sulbactam, levofloxacin, and piperacillin/tazobactam. Blood cultures were collected in 25 (83.3 percent) patients and wound cultures in 12(40 percent). 11(91.7 percent) of the 12 wound cultures were positive. Only 1 (4 percent) blood culture was positive. The most common pathogens isolated included methicillin-resistant Staphylococcus aureus (MRSA), Staphylococcus epidermidis, and Pseudomonas aeruginosa. Among inpatients, 5 (16.7 percent) received ceftaroline and 25 (83.3 percent) received other antimicrobials, which most commonly included vancomycin, first-generation cephalosporins and extended-spectrum beta-lactams.
Of the 30 total patients, all received appropriate antibiotics in the ED, and 29 (96.7%) inpatients received appropriate antibiotics.
All of the patients were discharged, 5 completed antibiotic therapy during hospitalization and 25 received oral antibiotics upon discharge. The average inpatient duration of antibiotic therapy and hospital LOS was 4.33 days.

Conclusion: Overall, the use of antibiotics for ABSSSI in the ED and inpatients was appropriate and consistent with institutional guidelines. Continuous education and monitoring of institutional antimicrobial stewardship guidelines helped improve adherence.

Submission Category: Leadership

Submission Type: Evaluative Study

Session-Board Number: 2-219

Poster Title: Assessment of student leadership development in United States pharmacy schools

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Purpose: The Center for the Advancement of Pharmacy Education (CAPE) emphasizes that pharmacist responsibilities have expanded beyond traditional roles to include interprofessional collaboration, patient advocacy, diverse patient population care, education among various areas, and workplace management. Thus, the 2013 CAPE educational outcomes included leadership development as a desired result of pharmacy curricula. The purpose of this study is to identify current leadership development opportunities offered as curricular, co-curricular, or extracurricular activities in United States pharmacy schools and identify what future leadership initiatives are being planned to achieve updated national education standards set forth by the Accreditation Council for Pharmacy Education (ACPE).

Methods: An anonymous survey of student chapter advisors of Phi Lambda Sigma (PLS) Pharmacy Leadership Society was conducted. A 32-item electronic survey was created in Qualtrics regarding current leadership development opportunities, extracurricular activities, effectiveness of curriculum on leadership development, and future initiatives for leadership development. The survey was open for one week. Institutional Review Board approval was obtained prior to survey distribution and all participants provided informed consent prior to participation.

Results: Out of 121 participants surveyed, 54 participants completed the survey, yielding a 44 percent response rate which included schools from all 8 regions. Of the participants who completed the survey, 78 percent indicated that their school's curriculum included courses related to leadership development. Faculty were involved in teaching 98 percent of leadership development courses. Leadership experience was considered for admission in more than 70

percent of the pharmacy schools completing this survey. Over 90 percent of participants reported their schools offered extracurricular activities, including professional Greek organizations, student government specific to pharmacy, pharmacy academic recognition organizations, and professional pharmacy organizations. A majority of participants agreed that their pharmacy school curricula developed students to be self-aware, to be leaders with the ability to create and achieve shared goals, and to be professionals. However, 45 percent of participants evaluated the development of students as innovators and entrepreneurs to be neutral in effectiveness. Of the 47 percent of participants who stated that future initiatives surrounding student leadership development are being planned in their respective schools, more than half of the participants specified curricular, extracurricular, and co-curricular activities in development.

Conclusion: Surveyed PLS student chapter advisors reported that various leadership development opportunities are currently being offered or planned in pharmacy schools throughout the United States to achieve CAPE and ACPE outcomes. Many pharmacy schools are developing additional curricular, extracurricular, and co-curricular activities to supplement the leadership growth in student pharmacists. Overall, the emphasis on student leadership development in numerous pharmacy organizations and courses demonstrates the increasing relevance of leadership across curricula of United States pharmacy schools.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 2-220

Poster Title: Evaluation and assessment of pharmacy students' knowledge of cultural competency, patient health literacy, and social determinants of health

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Purpose: Throughout the didactic and experiential learning of a pharmacy student, there is limited exposure to the underserved population. Factors such as low health literacy and patient activation levels have been found to be significantly associated with emergency room and hospital reutilization. It is unknown whether students are prepared to work with patients who have limited resources and socioeconomic challenges along with enough cultural sensitivity to adapt to patients' needs. The purpose of this project is to investigate the current knowledge and ability of pharmacy students at a pharmacy school in the northeast to effectively communicate with an underserved population.

Methods: The institutional review board (IRB) approved this prospective, cross-sectional study survey. Descriptive statistics was used to analyze the results. All students who completed an informed consent form and were enrolled in the 1st, 2nd, 3rd, or 4th professional years (P1, P2, P3, or P4) at the pharmacy school during the 2016-2017 academic year were eligible to participate. The survey was developed and adapted from two previously existing and validated surveys, the Underserved Knowledge Assessment and the Clinical Cultural Competency Questionnaire. Permission for use was obtained from both authors of each survey. The survey was hosted through the Qualtrics website. Students were recruited through an IRB-approved recruitment email that was distributed to eligible participants' emails during a one month time frame. The primary outcome was to assess the need for implementation of cultural competency, patient health literacy and social determinants of health education into the pharmacy school curriculum by evaluating pharmacy students' knowledge and skillset of these concepts.

Results: Over 800 students were invited to participate in the survey. 186 students enrolled with 37 being excluded due to incompletion or failing to meet inclusion criteria. 149 students completed the survey (28% P1s, 16% P2s, 19% P3s, 40% P4s). The baseline characteristics of the majority of participants were Asian, female, age between 20-25 years old, coming from a suburban, upper middle class background with their parents achieving some professional or graduate school education. Including rotations, P4s significantly received more exposure hours than P1s (p=.001729). However, through required or elective courses, majority of students received less than 10 hours of cultural competency education. Around 95% of students believed that sociocultural issues affect pharmacists' relationships with patients and healthcare professionals and that it was at least somewhat important for healthcare professionals to receive training in cultural diversity. 89% of students either strongly agreed or agreed that they would like to be involved in serving the medically needy and 95% felt that it was important for pharmacists to receive education about issues related to medically underserved populations. One third of students felt that they did not have any skills to deal with cross cultural conflicts relating to diagnosis, treatment, adherence, or ethical concerns.

Conclusion: The results of the study support the importance and emphasize the need for formalized teaching of cultural competency, patient health literacy, and social determinants of health in the pharmacy curriculum. This supports current recommendations made by the American College of Clinical Pharmacy and the accreditation standards by the Accreditation Council of Pharmacy Education for pharmacists and pharmacy students to receive this type of education.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-221

Poster Title: Evaluation of metronidazole and oral vancomycin use for Clostridium difficile infection

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Purpose: In suspected C. difficile infection, empiric antibiotic coverage with metronidazole and/or oral vancomycin may be initiated based on risk factors, with the Infectious Diseases Society of America and American College of Gastroenterology guidelines recommending possible antibiotic initiation prior to diagnostic testing in high risk patients. Continuation of antibiotics without confirmed diagnosis potentiates resistance and adverse effects. This study will be held at a community teaching hospital, where PCR stool assay is used for diagnosis. The purpose of this study is to determine the percentage of patients who continued to receive antibiotics for C. difficile infection after negative PCR stool results.

Methods: This is an institutional review board approved retrospective medication use evaluation study. A list of patients were generated from the electronic medical record system who received metronidazole and/or oral vancomycin therapy from April to June 2016. A retrospective review was performed on patient charts to determine use of antibiotics for empiric C. difficile coverage prior to PCR stool assay results. Patients were included in the study if they were at least 18 years of age and started on empiric antibiotic therapy for suspected C. difficile infection prior to PCR stool assay results. They were excluded if they had an additional indication for initiating metronidazole and oral vancomycin. A data collection sheet was used to record the results of PCR stool assays and to determine whether antibiotic therapy was continued or discontinued in patients with a negative result. The following data was collected: age, gender, C. difficile risk factors, metronidazole and/or oral vancomycin dose and duration of therapy, time of initiation of PCR stool assay, results and time when reported, and reasons why

antibiotics were continued. The primary endpoint is the percentage of patients who continued to receive antibiotics after negative PCR stool assay results. Secondary outcomes include cost analysis of additional doses of antibiotics given, and the incidence of patients started on empiric antibiotic therapy where a confirmatory PCR stool assay test was not performed.

Results: There were a total of 32 patients included of which 22 patients were started on therapy prior to PCR results, and 11 of those patients tested negative for C. difficile infection. Of the 11 patients, 7 (63.6 percent) patients were continued on therapy for the major concern of non C. difficile infectious diarrhea. For the secondary outcome, there were 7 out of 32 patients (21.8 percent) who did not receive confirmatory PCR stool assay test. Additionally, 3 out of 32 patients were started on therapy after a negative PCR report. In terms of the cost analysis, there were 8 patients who received a range of 1 to 10 additional doses of antibiotics. The price of metronidazole ranged from 1 to 5 dollars. However the costs in additional doses of oral vancomycin ranged from 35 to 175 dollars per person. It should be noted for 2 patients that incurred a cost of 175 dollars each, one did not receive a PCR test and the other tested negative for C. difficile infection. Neither patient appeared on a C. difficile infection report during their hospital stay. Only one of those patients had an active C. difficile infection in the previous 8 weeks.

Conclusion: While patients may have been continued on therapy regardless of a negative result, the indication was appropriate for a majority of those patients. However, there were a number of patients who did not receive a confirmatory PCR test to determine appropriate therapy, which subsequently led to additional doses that were given. This study highlights the importance of the initiation of PCR stool assay tests when C. difficile infection is suspected. Antibiotic use can be further improved by checking whether PCR test results are reported prior to dosage administration.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 2-222

Poster Title: Evaluation of a remote, non-emergency department pharmacy process for tissue plasminogen activator (tPA) for ischemic stroke at a community hospital

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Purpose: Despite clear benefit of an emergency department (ED) based pharmacist, not all hospitals have resources to support this model. This poses concerns for critical populations such as ischemic stroke, in which time sensitive pharmacist involvement is required. Current guidelines recommend that eligible patients receive tPA within 3 hours of symptoms (or up to 4.5 hours with additional exclusions), with hospitals administering tPA within an hour from the time patients present to the hospital. The purpose of this study is to evaluate whether this process can meet these standards when the pharmacist is based in a facility outside the ED.

Methods: Our hospital has an established process in which the ED notifies a pharmacist operating outside of the ED of a potential stroke patient and relays orders to allow for adequate lead time for evaluation, preparation and delivery of tPA. A retrospective review of all patients presenting to the emergency department and having tPA ordered between June 2015 and July 2016 was conducted. Data was collected from the medical record of patients and from the pharmacy's tPA worksheets for 42 patients. Six patients were excluded due to insufficient data or for a tPA indication other than stroke. Process data such as when the emergency room nurse called the pharmacy to inform about the presence of the patient, when the tPA order was faxed to pharmacy, when the tPA order was received by the pharmacy and the time it took for the pharmacist to prepare the tPA was collected from the internal work sheets. To evaluate whether our hospital is within the 3-hour goal from symptom onset to tPA administration, the mean time from last seen normal to the time of tPA administration was calculated. In addition, the mean time from the moment the patient presented to the emergency room and was worked up to the time the patient received TPA was calculated to see whether we reached our 1-hour goal of tPA administration.

Results: For the 36 patients receiving tPA for ischemic stroke in our community-based emergency department over a 13 month period, the mean time from which the patients were last seen normal to the actual time the patient received tPA was 2.20 hours. The mean time from the moment the patient presented to the ED to tPA administration was 54.26 minutes and the mean time it took the pharmacists to prepare tPA was 7.2 minutes.

Conclusion: This quality assessment supports that collaboration between emergency department nurses and physicians with a pharmacist outside of the emergency department in our community hospital allows for tPA to be administered within the required timeframe for patients presenting with ischemic stroke.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 2-223

Poster Title: Assessing cost-effectiveness trials that evaluate integration of a clinical pharmacist into primary care settings for disease-state management of psychiatric conditions

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Purpose: Uncontrolled psychiatric conditions are known causes of heath care burden and reduced quality of life. Efforts should be made to improve care delivery and consider unique strategies for comprehensive management. As medication experts, clinical pharmacists are well positioned to collaborate with primary care providers (PCPs) to optimize outpatient management of psychiatric illnesses in a cost-effective manner. However, few randomized-controlled trials (RCTs) exist to illustrate this point. This systematic review was designed to assess available literature to determine cost-effectiveness of incorporating pharmacists into a collaborative care model for the treatment of psychiatric conditions and to spread awareness of an unmet need.

Methods: A literature review was performed using evidence-based databases that included MEDLINE, Pubmed, Cochrane Library, ScienceDirect, Google Scholar and reference lists of retrieved articles. The following search terms were utilized: pharmacist, outpatient care, primary care, collaborative care, disease state management, depression, psychiatric conditions, mental health, cost-effectiveness, and cost-benefit analysis. Articles were included in the analysis if they met the following inclusion criteria: 1) patients in the trial received disease-state management from a pharmacist in a primary or collaborative care setting, 2) the primary diagnosis of interest included one or more psychiatric condition(s) and, 3) trials used a validated cost-effective measurement. Only randomized-controlled trial (RCTs) published through August 2016 were considered. Articles meeting inclusion criteria were compared and contrasted. Each study was assessed based on trial design, primary outcome measures, cost-effectiveness measures, cost calculations, results, and conclusions.

Results: Seventy-three articles were screened for inclusion, of which thirty-four assessed cost-effectiveness. Studies were excluded if the primary disease state of focus was not a psychiatric condition (n=19) or if the patients were not managed by a pharmacist in a collaborative practice or primary care setting (n=12). Three studies met full criteria for inclusion (Studies A, B, and C). Studies A and B evaluated the impact of community pharmacist-led coaching on antidepressant adherence. Study C evaluated the difference in cost-effectiveness between onsite practice-based collaborative care (PBCC) and telemedicine-based collaborative care (TBCC). PBCC included onsite PCPs and nurse depression care managers (DCMs). TBCC included onsite PCPs and an off-site psychiatric team comprised of a DCM, psychologist, psychiatrist, and clinical pharmacist. Primary cost-effectiveness measures differed among studies. Measures included quality-adjusted life years (QALYs), direct and indirect health care costs, indirect non-health care costs, and societal perspectives. Studies A and B did not find statistically significant differences between groups regarding cost or clinical outcomes. While Study C did not directly measure pharmacist interventions, differences in health care costs between the groups were not statistically significant, whereas clinical outcomes were slightly better in the TBCC group.

Conclusion: Given the complex nature of psychiatric conditions, management can be challenging. Incorporation of clinical pharmacy services into standard practice may offer a cost-effective option to improve care delivery and patient outcomes. However, too few studies exist to show the cost-benefit of pharmacist-delivered disease-state management of psychiatric conditions. Of available studies, significant limitations exist, including small sample sizes, high withdrawal rates, and short follow-up periods. Additional cost-effectiveness studies are warranted to establish the impact pharmacists may have on outcomes associated with psychiatric disorders.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 2-224

Poster Title: Assessment of the use of venous thromboembolism prophylaxis in post-traumatic brain injury patients

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Purpose: Trauma patients are at higher risk for venous thromboembolism (VTE), and traumatic brain injury (TBI) in particular is considered an independent risk factor for VTE. When prophylaxis is delayed beyond 48 hours, TBI patients are three to four times more likely to develop a VTE. Despite the high risk for thromboembolism, controversy often surrounds the decision to initiate pharmacologic VTE prophylaxis because of the potential for bleeding risk complications. The purpose of this study is to evaluate thromboembolic prophylactic therapy in TBI patients for variation in practice, appropriateness of regimen, and efficacy to identify areas of potential improvement in therapy.

Methods: This study was a retrospective chart review approved by the institutional review board. The trauma registry identified patients diagnosed with moderate to severe TBI with a Glasgow Coma Scale (GCS) score of 3-12 from June 1, 2015 to May 31, 2016. Patients 21 years or older who were admitted into the surgical intensive care unit were included if they had a stable CT scan, defined by a radiologist's impression indicating a stable or improving bleed. Patients were excluded if they had a contraindication to pharmacologic VTE prophylaxis, or if they died or were discharged within the first 24 hours. Information collected included admission location, age, gender, weight, height, body mass index, creatinine clearance, admission GCS score, Injury Severity Score, any fatalities, and data associated with thromboembolic prophylactic therapy including time to stable CT scan, time to initiation of prophylaxis, the regimen administered, and incidence of side effects. The primary endpoint assessed was the time to initiation of VTE prophylaxis after a stable CT scan. Secondary efficacy endpoints assessed were the incidence of VTE, stratified into categories reflecting time to

initiation of prophylactic therapy and into categories based on the VTE prophylaxis regimen administered. Secondary safety endpoints assessed were the incidence of adverse effects, including major bleeding leading to a hemoglobin drop of 2g/dL or greater, or bleeding in a critical area, and in-hospital mortality.

Results: Of the 60 patients identified by the trauma registry, 32 patients met inclusion criteria. After a stable CT scan, 4 patients (12.5%) did not receive VTE prophylaxis, 5 patients (15.63%) received VTE prophylaxis within 0 to less than 24 hours, 5 patients (15.63%) within 24 to 48 hours, and 18 (56.25%) patients after 48 hours. The mean time to prophylaxis initiation was 65.26 hours. While there was no statistically significant difference in baseline demographics, patients with a lower GCS tended to have delayed prophylaxis. VTE was diagnosed in 4 patients, 1 of which received prophylaxis within 24 to 48 hours, and 3 of which received prophylaxis after 48 hours post-stable CT scan. All 4 patients received regimens indicated for medical patients: 2 patients were on enoxaparin 40 mg every 24 hours, and 2 patients were on heparin 5000 U every 8 hours. A major bleed occurred definitively in 1 patient in the less than 24 hours group, and a hemoglobin drop of 2 or greater was seen in 5 additional patients with no associated bleed. No patients developed heparin induced thrombocytopenia. All 7 fatalities were associated with the initial injury and not due to a complication of VTE prophylaxis therapy.

Conclusion: The majority of patients in this study received prophylaxis after 48 hours. While the results are not conclusive with regards to optimal timing for initiation of prophylaxis, they do confirm the increased risk for VTE with delayed prophylaxis. Administration of prophylaxis earlier than 24 hours post-stable CT scan was associated with increased risk of major bleeding. Of note, all incidences of thromboembolism occurred in patients receiving medical dosing of prophylaxis, presenting an opportunity to improve our dosing strategy. Additional studies looking at a larger scope of patients are recommended to determine the optimal timing for initiation of VTE prophylaxis.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-225

Poster Title: Retrospective study on time to antibiotic administration in septic patients

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Purpose: The Surviving Sepsis Campaign recommends administering empiric antibiotics within one hour of diagnosis of sepsis. Currently, it is estimated that sepsis begins outside of the hospital for approximately 80 percent of patients, making early antibiotic administration vital. According to Kumar et al, each hourly delay from administering antibiotics after diagnosis results in an increase in mortality of 7.6 percent. At our institution, there is a sepsis committee that evaluates time to initiation of antibiotics. The purpose of this study is to determine if patients received antibiotics within one hour after diagnosis of sepsis.

Methods: This is an institutional review board approved retrospective medication use evaluation study. A list of patients who met the inclusion criteria was generated from the electronic medical record system. Patients who are included in this study are septic patients greater than or equal to 18 years old who received at least one dose of antibiotics from December 2015 to March 2016 and all other patients were excluded. A data collection sheet was utilized to record if patients received antibiotics within one hour of sepsis diagnosis. The data that was collected includes: patient age, gender, race, height, weight, body mass index, antibiotic allergies, condition that led to delay to treatment of sepsis, previous hospital admissions for sepsis, microbiological cultures, antibiotics administered, antibiotics available in Pyxis, time to initial infusion of the first antibiotic, and various time points in the steps taken to prepare and deliver an antibiotic. The primary endpoint of this study was the percent of patients who receive antibiotics within one hour of sepsis diagnosis. The secondary endpoint was the average time to administration of antibiotics after sepsis diagnosis. This study was utilized to evaluate if septic patients are receiving antibiotics within one hour of diagnosis. The

results of this study were used to improve the performance of the process of antibiotic preparation and administration in septic patients.

Results: There were a total of 102 patients evaluated in this study; however, 9 patients were excluded from this study due to no diagnosis of sepsis. Of these 9 patients, 7 did not receive antibiotics. The percent of patients who received antibiotics within one hour of sepsis diagnosis was 69.8 percent. There were 65 patients who received antibiotics within one hour of sepsis diagnosis and 28 patients who did not. Additionally, the percent of patients who received a combination of antibiotics within one hour of sepsis diagnosis was 56 percent. The average time to antibiotic administration in septic patients was 68 minutes. The time to antibiotic administration after sepsis diagnosis ranged from 4 minutes to 6 hours.

Conclusion: Treatment of sepsis requires a multifaceted approach in order to optimize patient outcomes. Early antibiotic administration as well as intravenous fluid resuscitation are essential to decrease mortality. Most patients at this institution received antibiotics within one hour of diagnosis of sepsis, subsequently; the patients who did not were hypotensive and received fluid resuscitation. This study demonstrates the importance of applying a multifactorial approach when treating septic patients. The clinical significance of these findings may be determined through further studies.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-226

Poster Title: Gap analysis for an initiative to optimize inpatient proton pump inhibitor usage

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Purpose: To determine what gaps exist between the optimal use of proton pump inhibitors (PPI) and the current standard of care.

Methods: A list of patients who received intravenous (IV) pantoprazole was generated over 14 days. All patients who were receiving intravenous pantoprazole were included in the analysis; patients were excluded if they had already been converted to oral (PO) pantoprazole or if pantoprazole had been discontinued. All patients were evaluated for conversion to oral therapy based on hospital protocol. The indication for pantoprazole and the outcome of the attempted oral conversion was noted. Prior-to-admission treatment and discharge with proton pump inhibitor therapy was also documented.

Results: 97 patients were evaluated. Of those patients, 47 (48.4%) were receiving PPI therapy at home, while 45 (46.4%) were newly initiated; 5 patients (5.2%) did not have medication reconciliation performed. Five indications for PPI use were identified as inappropriate in 22 of the 97 patients (abdominal pain, diverticulitis, nausea, obstruction, and corticosteroid use). Of these 22 patients, 8 qualified for IV-to-PO conversion, based on the successful administration of other oral medications. 2 of these 8 patients (25%) were successfully converted to PO pantoprazole. Seven indications for PPI use were identified as appropriate in 75 of the 97 patients (epigastric pain, gastrectomy, gastroesophageal reflux disease, gastrointestinal bleed, continuation of home medication, esophagitis, and stress ulcer prophylaxis in select patients). Of these 75 patients, 15 qualified for IV-to-PO conversion, while 10 of these 15 patients (66.7%) were successfully converted. Barriers to IV-to-PO switch included patient discharge immediately upon tolerance of other oral medications and denial by the medical team due to clinically significant nausea. Additionally, out of 45 patients who were newly initiated on PPI therapy, 13

(28.9%) did not have appropriate clinical indications for the use of acid-suppression therapy. 4 of these 13 patients (30.7%) were discharged home with a PPI.

Conclusion: Optimization of proton pump inhibitor therapy is an important intervention that allows the pharmacist to close various gaps in care. Through the conversion of IV to PO pantoprazole, the prevalence of parenteral medication administration was decreased. Provider education, an approved hospital protocol, and more consistent monitoring of indications for PPI therapy may further improve appropriateness of PPI therapy, thus leading to decreased incidence of unnecessary PPI therapy at discharge.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 2-227

Poster Title: Effects of Dioxin Based Exposure in Western Kanawha County, WV

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Purpose: We hypothesize when patient's cancers such as: Colon and Bladder cancer, are paid by public based insurances, the patients will have a higher survival rate than those with other forms of insurance including private and cash pay.

Methods: The primary outcome of median overall survival was assessed for each insurance category within each cancer type. After data was collected, a multivariate analysis was completed for each cancer. Kaplan-Meier Curves as well as a Cox Proportional Hazards Model were created using Stata 11.2 for each cancer. Kaplan–Meier Curves are one of the best methods to estimate the survival of subjects after their treatment has been received. When constructing the survival analysis time event within this study, it involved the enrollment of patients that have been diagnosed with Bladder and Colon Cancer. For Colon Cancer, 2 data sources were considered because of the larger data set of N = 2,267 which allowed for a wider variety of insurance to be studied. For Bladder Cancer the variety examined was less because of the smaller data set of N=596 which only included 6 insurance types. For any insurance type 5 or lower, patients were dropped because of the extremely small sample size. The Kaplan Meir Survival Curve is defined as the probability of surviving after a certain event which is usually treatment.

Results: Both Medicare and PEIA appeared to have the longest survival rate of any curve observed. Managed Care lasted almost as long as Medicare and PEIA but trailed off. The Chi Squared test was used to assess the significance of the Cox Proportional Hazards Model. A total of 2,854 patients were included in the analysis, including 596 patients with Bladder Cancer and 2,267 patients with Colon Cancer (Tables 1-2). The ages of patients at diagnosis were primarily 65 – 90. The Kaplan Meier results illustrate that for Bladder Cancer, Medicaid with (22 cases) had the longest survival rate and this was most likely due to the low sample size. Medicare (145 cases) had the second longest survival time. PEIA (West Virginia State Pension Insurance with

(311 cases) allowed a Kaplan Meier curve all the way to 0 survival because of the continued pension fund of the program and continued data set. Medicare (145 cases) had approximately 40 percent of the patients still living at the end of the patient data. Colon Cancer had a large sample size (N =2,267) with PEIA (1,275 cases) having the longest survival rate while Medicare (431 cases) and Managed care have the next longest survival rates.

Conclusion: Of all the insurance groups, Federal and State plans seemed to indicate there is supportive evidence that well supported Federal and State funds are necessary to insure a higher survival rate in either type of cancer.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Evaluative Study

Session-Board Number: 2-228

Poster Title: Ethical and economic perspectives regarding coverage policies related to expanded naloxone access efforts: a systematic review of the evidence

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Purpose: Drug related overdose deaths have reached epidemic levels in the US. In response to this public health crisis, there have been statewide initiatives to increase access to naloxone, a lifesaving overdose reversal agent. However, little is known regarding the ethics and economics of expanded access to naloxone and subsequent coverage policies. This systematic review explores these areas and identifies gaps in the existing literature. The review will form the basis of a content analysis of pharmacies' distribution policies, as well as assist in generating interview questions for stakeholders such as payers and clinicians involved with naloxone dispensing, coverage, and access.

Methods: The systematic literature review was conducted as per the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines. Articles were searched in relevant healthcare databases (PubMed, CINAHL, PsycInfo) and articles that met the inclusion criteria were abstracted and summarized. Key search terms utilized in combination with naloxone to identify articles included economics, reimbursement, out-of-pocket cost, ethics, distributive justice, stigma, attitudes, beliefs, coverage policies, access, distribution, and dispensing. The student investigator examined each of the healthcare databases to identify relevant articles and completed a detailed data extraction log that included all the desired information relevant to this review. The extracted data was matched against original articles and if there was a disagreement, it was adjudicated by other investigators. Articles were selected based on predefined inclusion and exclusion criteria and the search was conducted from January 2012 to September 2016. Articles were excluded if they were in a language other than English, randomized control trials, other review articles, or articles regarding opioid substitution therapy or treatment modalities for addiction and overdose treatment other than naloxone. Articles involving administration, training, education, or pharmacology of naloxone

were excluded from this analysis as well. The article selection process involved identification of articles based on study titles and bibliographies of identified articles. Articles that met the inclusion criteria were then included in the final review.

Results: A total of 2,072 articles were screened using PRISMA guidelines and 24 relevant citations were included in the final review. 10 studies were conducted in the US and five were international studies from countries including Australia, Finland, Russia, and Scotland. Very few of the studies and articles included in this review discussed economic and ethical issues in tandem. The majority (n=19) discussed each of these content areas in isolation, or alternatively, only included a cursory exploration or acknowledgment of the other area of interest. A total of 10 studies (41.6%) evaluated economic issues, nine (37.5%) focused on ethical issues and five (20.8%) on a combination of the two issues. Several ethical concerns were identified in regards to naloxone distribution practices, including stigma associated with addiction-related health issues, pharmacists' attitudes and practices in relation to dispensing and counseling, and concern with enabling addiction. In reference to the exploration of the naloxone cost and coverage objectives of this review, identified issues included pharmacy reimbursements for naloxone dispensing, access to and costs of naloxone rescue preparations, approved product indications, and the potential for availability of OTC naloxone preparations.

Conclusion: While the majority of the studies examined showed that pharmacists are willing to participate in expanded naloxone distribution efforts to increase access to this lifesaving antidote, stigma and access, attitudes, practices and equitable distribution remain important practice and policy issues. While broad ethical, pricing, and coverage determination concerns were identified, further investigation into the specifics of these considerations in relation to naloxone dispensing and coverage is warranted. The results of this review can be used to inform future investigation aimed at further dissecting the concerns and identifying the gaps and addressing the potential barriers that may hinder naloxone access.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 2-229

Poster Title: Formulation specific hormonal contraceptives and breast cancer subtyping: a retrospective study

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Purpose: Given that many forms of breast cancer are hormonally dependent, hormonal contraceptives (HCs) have gained much attention as a potential risk factor in breast cancer incidence. While HCs carry warnings for increased risk of breast cancer, the literature remains split on this topic; however, it has been suggested that the progestin component and certain patient demographics may be responsible for the increased risk. This study evaluates the differences in breast cancer pathology among patients that ever used one of three HC agents.

Methods: This study received appropriate IRB approval through the Clinical Breast Care Project (CBCP) and Duquesne University. All subjects were duly consented patients attending clinics of the CBCP at Walter Reed National Military Medical Center (Bethesda, MD), the Joyce Murtha Breast Center (Windber, PA), and Anne Arundel Medical Center (Anne Arundel, MD). Data was queried from December 2000 to September 2015 from CBCP Core Questionnaires and Pathology Checklists, identifying 4299 patients who had ever used HC agents. This number was further narrowed to 656 patients based on complete contraceptive and breast pathological history. In order to evaluate the risk of specific progestins on breast cancer subtyping, three HC agents were studied: Lo Ovral, Ortho Tri-Cyclen, and Ortho Novum. Pathological subtypes were categorized as benign, ductal carcinoma in situ (DCIS), luminal A, luminal B, Her2 positive, or triple negative (TN). In order to evaluate patient demographics, seven common risk/protective factors were selected based on current literature. StatPac statistical calculator was utilized for calculating t-tests. All calculations were set at a 95% confidence interval where $p < 0.05$ was considered statistically significant.

Results: Of the initial 4299 patients who had ever used HCs, 39.5% had a benign diagnosis while 59.1% had a malignant diagnosis ($p < 0.0001$). After narrowing to 656 patients, the average age at diagnosis was 41.35 years; mean BMI of 26.12; began utilizing HC agents at a mean age of 20.4 years; and utilized HCs for an average of 10.92 years. Of the 656 patients, 62.7% had a benign diagnosis and 37.3% had a malignant diagnosis ($p < 0.0001$). When stratified by HC, patients who used Ortho Tri-Cyclen were more likely to have a diagnosis under the age of 40 ($p < 0.0001$) and demonstrated a trend favoring a negative family history ($p=0.0848$) while patients who used Ortho Novum were more likely to be Caucasian ($p=0.0041$) and have an increased risk of malignant pathologies ($p=0.0052$). Overall, the ever use of HCs was associated with more luminal A pathologies. When stratified by HC, Lo Ovral showed no statistical differences in breast cancer subtyping, Ortho Tri-Cyclen decreased luminal A ($p=0.0474$) and demonstrated a trend towards an increase in DCIS ($p=0.0758$), and Ortho Novum showed an increase in DCIS ($p=0.0205$) and demonstrated a trend towards an increase in Her2 ($p=0.0833$) and TN ($p=0.0647$) breast cancer pathologies.

Conclusion: For the first time, this study evaluates three HC agents, confirming all progestins do not contribute equally to the overall risk of breast cancer while proving that differences in pathological subtyping exists between progestins. Clinically, norgestimate was least likely and norethindrone was most likely to precipitate a difficult to treat malignant pathology. Given the mean age at diagnosis, the ever use of HC agents is an acceptable risk factor for beginning annual mammograms at age 40.

The views expressed herein are those of the authors and do not reflect the official policy of the Department of Defense, or U.S. Government.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 2-230

Poster Title: Evaluation of the impact of pharmacist-run tobacco cessation classes on abstinence rates in patients of a patient-centered medical home (PCMH) practice

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Purpose: Even with the resulting decline in cigarette smoking from 42 percent in 1965 to 18 percent in 2012 following the initial US Surgeon General's Advisory Committee report on smoking and health, over 42 million Americans still smoke. Guidelines explicitly advocate for the combined use of counseling and medication(s) as the most effective means to improve cessation rates. This study evaluated abstinence rates of patients that attended pharmacist-led group tobacco cessation classes in conjunction with tobacco cessation medications compared to those who utilized medications alone.

Methods: The practice site for this study was an independently owned physician group consisting of 21 offices located throughout the Pittsburgh region. Patients with a documented active smoking status in the electronic medical record (EMR) of a patient-centered medical home (PCMH) beginning July 2013 through October 2015 were invited to attend a pharmacist-led tobacco cessation class titled The Courage to Quit. Study inclusion criteria for the intervention group included the use of nicotine replacement treatment (NRT), bupropion, or varenicline and attendance in at least 3 of the 4 the classes. An EMR report was used to identify patients for the control group who utilized NRT, bupropion, or varenicline during the same time frame but did not attend the class. Tobacco abstinence rates in both the control and intervention groups were assessed telephonically at 2, 4, 12, and 24 weeks following treatment. If any patient from the control or intervention group reported continued nicotine use, they were offered an opportunity to attend future smoking cessation classes.

Results: Of the 80 patients who had previously taken The Courage to Quit classes, 30 patients met the inclusion criteria and consented to involvement in the study. The control group of 30 patients was determined based on smoking cessation treatments utilized in the intervention group and by consent to study participation. The primary endpoint, cessation at 24 weeks, was identical between intervention and control groups (26.7 percent). The most prevalent reason for relapse amongst both control and intervention groups was identified as stress.

Conclusion: There are many factors that can influence success with smoking cessation including personal desire, motivation, co-morbid conditions, support, and additional resources. While overall cessation rates did not differ between the groups, patients who attended The Courage to Quit classes may be better equipped with the knowledge and resources necessary to be successful with future quit attempts.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 2-231

Poster Title: Antibiotic prophylaxis failure among patients with spontaneous bacterial peritonitis: influence of antimicrobial agent, body mass index and prognostic score

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Purpose: Patients with a history of spontaneous bacterial peritonitis (SBP) or who meet criteria for primary prophylaxis are prescribed antimicrobials based upon clinical guidelines, allergies and local susceptibilities. Several prophylactic regimens are prescribed and due to conflicting data, the ideal regimen to prevent subsequent infections is unclear in patients who are obese or across various MELD-Na (Model for End-stage Liver Disease [Sodium]) scores. The goal of this study is to compare the prophylactic failure for SBP by hospital admission among cirrhotic patients with SBP, with a focus on stratification across different body mass indices and MELD-Na scores.

Methods: This study was a retrospective health system cohort analysis of patients with cirrhosis receiving antimicrobial prophylaxis for SBP who presented to a network hospital. Data was extracted from the health system electronic medical record database via International Classification of Disease 9 – Clinical Modification (ICD-9 CM) coding for cirrhosis (571.2, 5, 6) and SBP (567.23) among hospitalized patients. The following data points were collected: patient demographics, laboratory values contributing to the calculation of MELD-Na scores, presenting symptoms, paracentesis results and microbial culture(s), prophylactic antimicrobial agent(s) used including dose and frequency, home medications, empiric SBP treatment and length of hospital stay. Patients were excluded if they were not on antimicrobial prophylaxis, were not treated for SBP during this admission or if there was a secondary source of intra-abdominal infection. The primary outcome was to determine the influence of body mass index (BMI) classification upon failure of SBP prophylaxis agents. BMI indices were defined based upon the

World Health Organization classification. Descriptive statistics were utilized for patient characteristics, and Chi-square analyses were used to compare prophylaxis failures between obese and normal body weight individuals. This study was approved by Duquesne University and University of Pittsburgh Medical Center institutional review boards.

Results: A total of 700 admissions were screened; 113 admissions (92 patients) were included for analysis. Among the cohort, 66.3 percent were male, 92 percent were Caucasian, and the average age was 56.5 years. The most prevalent etiologies of cirrhosis were alcohol (54.9 percent), hepatitis C (34.5 percent) and nonalcoholic steatohepatitis (19.5 percent). All but one admission received prophylactic treatment with either sulfamethoxazole/trimethoprim (SMX/TMP; 28.6 percent) or a fluoroquinolone (71.4 percent) prior to admission. A total of 42.5 percent of antibiotic failures were among underweight/normal patients, 31 percent were overweight and 26.5 percent were obese. The BMI distributions of patients between the SMX/TMP and fluoroquinolone treatments were approximately equal: underweight/normal (43.8 vs. 41.3 percent), overweight (31.3 vs. 31.3 percent) and obese (25.0 vs. 27.5 percent). The proportion of failures for SMX/TMP and fluoroquinolones stratified by BMI were similar, showing no indication that BMI or antibiotic choice affected prophylaxis failure. Among admissions with data available to calculate a MELD-Na score, more patients failed SMX/TMP with a MELD-Na less than 30 (70.97 percent) compared to patients receiving fluoroquinolones (43.43 percent). For patients with MELD-Na scores greater than 30, failures among patients receiving fluoroquinolones were higher (56.57 percent) compared to SMX/TMP (29.03 percent).

Conclusion: Based on the results of this study, there does not appear to be an association between BMI and prophylaxis failure among patients with SBP. However, failures varied according to antibiotic and MELD-Na score, with patients at lower MELD-Na scores experiencing less failures when treated with fluoroquinolone prophylaxis, and patients with higher MELD-Na scores experiencing less failures when receiving SMX/TMP prophylaxis. Further research is needed to see if discovered trends persist among larger sample sizes, and to further investigate the influence of weekly vs. daily dosing of fluoroquinolones.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 2-232

Poster Title: Evaluation of adding intravenous antibiotics to ICU automated dispensing cabinets and the effect on time to administration in patients with sepsis or septic shock

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Purpose: The Centers for Medicare & Medicaid Services (CMS) identify time to appropriate antibiotic administration as a core measure for the treatment of sepsis and septic shock due to studies showing its direct effect on mortality. In previous studies, automated dispensing cabinets (ADCs) have been demonstrated to enhance provider access to antibiotics for the prompt treatment of infections in hospitalized patients. The purpose of this study is to determine the effect of ADCs on time to antibiotic administration for patients in the ICU diagnosed with sepsis or septic shock.

Methods: The study was designed as a retrospective cohort, pre-post analysis of patients ages 18-89 admitted to the medical intensive care unit (MICU) who were first ordered and administered either intravenous ciprofloxacin or cefepime for the treatment of sepsis or septic shock while in the MICU at a tertiary care center. Patients were excluded if they received their first dose of ciprofloxacin or cefepime in the emergency department prior to admission to the MICU. Pregnant and incarcerated patients were also excluded from this study. The primary outcome looked at time to antibiotic administration prior to intravenous ciprofloxacin and cefepime being added as stock to ADCs compared to time to antibiotic administration after stock was added to ADCs. Secondary outcomes included CMS sepsis core measure compliance pre and post implementation, rate of compliance to CMS sepsis core measure, in-hospital mortality, and ICU length of stay. This study was approved by the Allegheny General Hospital Institutional Review Board.

Results: A total of 60 patients were included in the final analysis, 31 patients in the pre-intervention group who received intravenous ciprofloxacin or cefepime prior to these antibiotics being available in the MICU ADCs and 29 patients in the post-intervention group who received intravenous ciprofloxacin or cefepime after these antibiotics were placed in the MICU ADCs. The mean time to antibiotic administration pre-intervention was 384.8 minutes and post-intervention was 181.9 minutes, a difference of 202.5 minutes (a 47.3% decrease in time).

Conclusion: Adding intravenous antibiotics to automated dispensing cabinets decreased time to antibiotic administration in sepsis and septic shock patients admitted to the medical intensive care unit at a tertiary care facility.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 2-233

Poster Title: Pharmacokinetic assessment of oral voriconazole and posaconazole delayed release tablets in patients with acute myeloid leukemia

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Purpose: Hematologic malignancies, especially acute myeloid leukemia (AML) are associated with a higher incidence of invasive fungal infections, largely due to the prolonged duration of neutropenia during induction chemotherapy. Posaconazole and voriconazole are the most commonly prescribed agents for antifungal prophylaxis at our center. Posaconazole delayed release (DR) tablets claim to have no restrictions on fasting/fed state while also requiring little if any drug concentration monitoring, which was a major limitation of the suspension formulation of posaconazole. The goal of this assessment was to add to the limited pharmacokinetic data available for oral posaconazole DR and voriconazole during AML induction chemotherapy.

Methods: This single center retrospective cohort included all AML patients receiving induction chemotherapy at West Penn Hospital from October 2013 – June 2016 who received antifungal prophylaxis with either posaconazole ER or voriconazole. Patients were identified from the hospitals electronic medical record based on induction chemotherapy regimen of 7 plus 3 (cytarabine plus idarubicin). Patients were excluded if they did not receive induction-based chemotherapy or if they did not receive antifungal prophylaxis with posaconazole or voriconazole with a subsequent serum trough concentration. The following data was collected: patient demographics, choice of antifungal prophylaxis, the loading and maintenance doses of antifungal agents, patients' serum trough concentrations of posaconazole or voriconazole, and the number of days of antifungal prophylaxis the patient received prior to trough concentration. The primary outcome of this study was to compare the rates of therapeutic serum trough concentrations among patients on posaconazole DR and voriconazole tablets. Therapeutic posaconazole and voriconazole trough serum concentrations were defined as greater than or equal to 0.7 mcg/mL and 1–5 mcg/mL, respectively. An elevated Posaconazole

concentration was not defined due to the lack of correlation with toxicity in the literature. Fisher's exact test and descriptive statistics were used to describe nominal data and patient characteristics, respectively. Linear regression was used to correlate patient weight with serum concentration. This study was approved by the West Penn Hospital institutional review board.

Results: A total of 38 patients, 23 posaconazole DR and 15 voriconazole, were included. 32 (62.7percent) were male with a mean height of 170.55 centimeters, weight of 90.76 kilograms, and body mass index (BMI) of 31.23 kg/meters squared. All posaconazole DR patients received a loading dose of 300mg twice daily for 2 doses followed by 300mg daily. Most voriconazole patients (13/15) received a dose of 200mg twice daily without a loading dose. Patients received an average of 5.58 days of antifungal prophylaxis prior to serum trough concentrations. The mean serum trough concentrations of posaconazole DR and voriconazole were 1.1mcg/mL and 3.4mcg/mL, respectively. There was a higher percent of patients on posaconazole that had therapeutic concentrations compared to voriconazole, however not statistically significant (87 vs. 60 percent; p equals 0.12). By linear regression, weight did not correlate well with posaconazole or voriconazole trough concentrations with a R squared value of 0.05 and 0.01, respectively. Nevertheless, 67 percent (2/3) of patients with sub-therapeutic posaconazole concentrations weighed greater than 150kg. In the voriconazole group, 2 (11.8 percent) and 4 (26.7 percent) patients had troughs less than 1mcg/mL and greater than 5mcg/mL, respectively. However, patient weight did not appear to be associated with voriconazole troughs.

Conclusion: Based on these results, posaconazole DR tablets were associated with higher rates of therapeutic concentrations than voriconazole (87 vs. 60 percent). Therefore, therapeutic drug monitoring for posaconazole DR may not be necessary for most patients. However, morbidly obese patients may benefit from therapeutic drug monitoring as 67 percent of sub-therapeutic posaconazole patients weighed greater than 150kg. The majority of non-therapeutic voriconazole troughs were supra-therapeutic and patients' dosages were reduced without adverse effects. We would recommend therapeutic drug monitoring to prevent adverse effects associated with voriconazole. Further research is needed to see if these trends continue among a larger AML population.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 2-234

Poster Title: The association between MELD-Na and clinical outcomes in patients with cirrhosis hospitalized with spontaneous bacterial peritonitis

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Purpose: Spontaneous bacterial peritonitis (SBP) is the most common bacterial infection in patients with cirrhosis, associated with an estimated 30 percent mortality rate. The MELD (Model for End-stage Liver Disease) provides a severity/prognostic index informing on short-term mortality in patients with cirrhosis. The goal of this project was to evaluate clinical outcomes during hospitalization for SBP using the updated MELD score, which now includes serum sodium as a prognostic factor (MELD-Na).

Methods: The present study was a retrospective chart review that included hospitalized patients treated with antibiotics for diagnosed/suspected SBP between 2009-2014. Data was extracted from the health system electronic medical record using International Classification of Disease 9 –Clinical Modification (ICD-9 CM) coding for cirrhosis (571.2, 5, 6) and SBP (567.23). Data collected included relevant demographics, laboratory markers, treatment and selected clinical outcomes (length of stay, ICU admissions and mortality). SBP diagnoses were considered confirmed if the patient had either a PMN count greater than or equal to 250 cells/mm3, or presence of bacteria in the ascitic fluid; other patients were considered to have suspected SBP if they received empiric treatment during admission for SBP. Both MELD and MELD-Na scores were calculated to assess disease severity and stratified into established categories. MELD-Na scores were calculated according to Organ Procurement and Transplantation Network/United Network for Organ Sharing (OPTN/UNOS) criteria with a score range of 11-40; for MELD-Na scores less than 11, the MELD score was substituted for analysis. Clinical outcomes of interest included length of hospital stay, length of intensive care unit (ICU) stay and in-hospital

mortality. This study was approved by Duquesne University and University of Pittsburgh Medical Center institutional review boards.

Results: A total of 251 patients were included in this study. Of these patients, 182 (72.5 percent) had a confirmed diagnosis of SBP and 69 (27.5 percent) were empirically treated based on a suspicion of SBP. All 251 patients received empiric/targeted antibiotic therapy throughout the duration of their hospital stay. Patients were predominantly male (69 percent), Caucasian (92 percent), and had alcoholic cirrhosis (54 percent). The most common bacteria found in ascitic fluid cultures of confirmed SBP patients were S.aureus (39 percent), E.coli (31 percent), and S.virdians (18 percent). Among all patients, 36 percent were treated with cefotaxime, 17 percent with ceftriaxone, and 16 percent with piperacillin/tazobactam. Overall in-hospital mortality was 11 percent with an average length of stay of 11.5 days (standard deviation [SD] ±11). Average length of hospital stay was consistent among our patient groups, regardless of MELD-Na score. A total of 37 percent of patients required ICU admission, with a mean stay of 8.2 days (SD ±8.8). A disproportionately high mortality (50 percent) and incidence of ICU admission (68 percent) occurred in patients with MELD-Na scores greater than 30.

Conclusion: In our study, patients with SBP and higher MELD-Na scores had a higher risk of being admitted to the ICU as well an increased mortality. This contributes to the field of knowledge that MELD-Na scores can serve as a predictive outcome indicator in patients with cirrhosis that develop SBP.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Evaluative Study

Session-Board Number: 2-235

Poster Title: Revisits to the emergency department for community-acquired pneumonia: a four year experience

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Purpose: Community-acquired pneumonia (CAP) commonly presents to the emergency department (ED). For patients able to be discharged from the ED, current guidelines suggest treatment with a course of macrolide-only therapy, or use of either (1) macrolide plus a beta-lactam, or (2) a respiratory fluoroquinolone if the local resistance rate of Streptococcus pneumoniae to macrolides is greater than 25 percent. The purpose of this project was to determine the relationship between 30-day revisit rates of patients discharged from the ED with CAP according to antibiotic selection, with specific focus on trends pre- and post-treatment protocol implementation at an urban medical center.

Methods: A retrospective single center cohort study using data collected through chart review of adult patients with ED visits for CAP was conducted on two temporal cohorts: 2012-2013 and 2014-15. At the beginning of 2014, our institution's CAP empiric antibiotic protocol changed to reflect increasing resistance to macrolides. Azithromycin plus cefuroxime was recommended as a first line option and a respiratory fluoroquinolone as second line therapy for patients with a beta-lactam or macrolide allergy. In order to determine prescribers' compliance and to see if there was a clinical effect on the return rate following protocol implementation, the following data was collected: patient demographics, clinical characteristics (CURB-65 [confusion, urea, respiration, blood pressure, age] scoring and Charlson Comorbidity Index [CCI]), antibiotic therapies received at discharge, and if the patient revisited any ED in the healthcare system within 30 days due to worsening pneumonia or other causes. Exclusion criteria included patients who received antibiotics prior to coming to the ED, patients less than 18 years of age,

and patients who were admitted to the hospital from the ED. Descriptive statistics were utilized for patient characteristics, and Chi-square analyses were used to compare differences in return rates between treatment groups and characteristics between cohorts. This study was approved by Duquesne University and University of Pittsburgh Medical Center institutional review boards.

Results: A total of 741 patients were included in the study from 2012-2015 (411 patients during 2012-13 and 330 patients during 2014-15). Compared to the 2012-13 cohort, patients treated in 2014-15 had lower CURB-65 scores but higher CCI. The proportion of patients receiving macrolide monotherapy decreased from 70.1% to 42.7% between the two cohorts, with increases in utilization seen for macrolide/beta-lactam combination therapy (6.3% to 21.8%) and fluoroquinolones (15.1% to 23.6%). Revisit rates to the ED due to both general causes and worsening pneumonia were numerically higher in 2014-15 compared to 2012-1013, with a statistically significant increase in overall revisit rate for patients treated with fluoroquinolones (14.5% to 29.5%).

Conclusion: A significant decrease in macrolide monotherapy with a reciprocal increase in both macrolide/beta-lactam combination and respiratory fluoroquinolone monotherapy was observed in the two temporal cohorts, as anticipated due to the change in hospital protocol. There was no significant change in ED revisit rates due to worsening pneumonia between the two cohorts suggesting no difference in efficacy despite current guideline's recommendations. Larger prospective studies are needed though to validate this data and assess the current guideline recommendation of combination use of macrolide and beta-lactam or respiratory quinolone when a >25% resistance rate to Streptococcus pneumoniae is present.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 2-236

Poster Title: Clinical Use and Outcomes of Non-acetaminophen Acute Liver Failure Treated with N-acetylcysteine at a Academic Tertiary Care Center

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Purpose: N-acetylcysteine is the first line treatment for patients with acetaminophen toxicity due to accidental or intentional overdose. In patients with toxic serum levels of acetaminophen, the use of N-acetylcysteine has shown to improve overall health outcomes, particularly an improvement in patients' liver function. N-acetylcysteine eliminates the toxic amounts of acetaminophen metabolite through a known mechanism, however, may also improve the health outcomes of patients with non-acetaminophen induced acute liver failure according to more recent literature. Therefore, the purpose of this study was to determine prescribing practices as well as clinical efficacy markers for N-acetylcysteine at a tertiary care center.

Methods: The Allegheny General Hospital IRB approved this retrospective medication use evaluation which analyzed patients who presented with non-acetaminophen related acute liver failure that were treated with N-acetylcysteine. Outcomes assessed included describing dosing prescribing practices given varying doses studied in the literature, improvement in laboratory values commonly monitored in the clinical scenario of acute liver failure (AST, ALT, bilirubin levels, Alk Phos, INR), and analysis of cost associated with varying dosage strategies. Patients 18-89 years of age who presented with documented acute liver failure as a primary diagnosis and negative acetaminophen levels on presentation were included. Patients were excluded if they were prescribed N-acetylcysteine for the treatment of acetaminophen toxicity, had documented active liver malignancy, pregnant patients, and prisoners.

Results: A total of 23 patients were admitted between January 1, 2015 and May 2016 that were treated with n-acetylcysteine for non-acetaminophen induced acute liver failure. Of these patients, all were treated with conventional dosing strategies indicated for acetaminophen toxicity. Mean baseline laboratory values for the cohort included AST of 2993.6 units/L, ALT of 1467.5 units/L, INR of 2.8, and alkaline phosphatase of 131.5 units/L. Laboratory values trended down in the cohort at 24, 48 and 72 hours after n-acetylcysteine administration. At 72 hours, the mean AST value was 936.9 units/L, mean ALT was 1043.6 units/L, INR of 2.7, and alkaline phosphatase of 130.3 units/L.

Conclusion: Prescribers preferentially used dosing strategies indicated for acetaminophen toxicity in patients presenting with non-acetaminophen acute liver failure, which was influenced by easily accessible ordersets within the organizations CPOE. Additionally, laboratory values, including AST, ALT, alkaline phosphatase, and INR decreased at 24, 48, and 72 hours after n-acetylcysteine administration, possibly justifying its use in this patient population in addition to other published literature on the subject.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 2-237

Poster Title: Effect of intravenous versus enteral acetaminophen on opioid usage after cardiothoracic surgery

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Purpose: The high cost and limited evidence of effectiveness of intravenous (IV) acetaminophen in comparison to enteral acetaminophen products has brought the value of IV acetaminophen into question. The purpose of this study is to evaluate the opioid-sparing effects of IV compared to enteral acetaminophen in postoperative cardiothoracic (CT) surgery patients. We hypothesize that IV in comparison to enteral acetaminophen will produce no difference in total morphine equivalents used in postoperative CT patients who are receiving either IV or enteral acetaminophen. Antiemetic usage will be evaluated as a secondary endpoint.

Methods: The study was conducted at Conemaugh Memorial Medical Center. This quasi-experimental study consisted of retrospective data collected from two cohorts of patients. The first group included subjects undergoing CT surgery from January to August 2016 who received 3 doses of IV acetaminophen 1 gram every six hours after surgery. The comparison group included subjects receiving enteral acetaminophen 1 gram every six hours for 3 doses postoperatively. The same demographic and data variables were collected for both groups. Data variables collected from the subjects included non-opioid pain medications usage, opioid usage, antiemetic usage and home opioid usage. Data collection began at the conclusion of surgery, which was termed day 0, and ended at the first post-operation day, which was termed day 1. This study received institutional review board approval from Conemaugh Memorial Medical Center who waived the need for informed consent since this was a planned practice change by the cardiothoracic surgery service. A t-test with 95 percent confidence intervals was used to compare the outcomes of each cohort.

Results: Data were collected for a total of 101 subjects. 84 subjects were in the IV acetaminophen group and 17 subjects were in the enteral acetaminophen group with the mean age of all patients being 70 years old. The mean total IV morphine equivalents usage was 17.4 mg and 21.0 mg for the IV and enteral acetaminophen groups, respectively (p equals 0.38). The mean ondansetron usage was 4.5 mg for the IV acetaminophen group and 6.4 mg for the enteral acetaminophen group (p equals 0.28). A select number of patients received additional antiemetic coverage, but the number of patients was not enough to warrant exclusion from the study. The mean total acetaminophen usage was 1377 mg and 3794 mg for the IV and enteral acetaminophen groups, respectively. Patients in the enteral acetaminophen group received significantly higher amounts of acetaminophen than the IV acetaminophen group (p less than 0.01).

Conclusion: Although IV acetaminophen has been suggested to provide greater efficacy than enteral acetaminophen for as needed use, no difference was found for morphine equivalents when both are administered as a background. Patients in the enteral acetaminophen group received a greater amount of acetaminophen, but less than 4 grams in 24 hours. Enteral compared to IV acetaminophen is a cost-effective adjunctive pain management strategy in patients undergoing CT surgery.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 2-238

Poster Title: Use of barcode scanning technology during automated medication dispensing cabinet (AMDC) restocking and its effect on medication safety: A one year assessment.

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Purpose: Accurate restocking of medications into the AMDC is a crucial component for meeting hospitals' medication safety standards. Automated restocking via the use of barcode technology was identified as way to reduce the risk of restocking errors and overall medication errors. This project was designed to evaluate the role that barcode scanning technology plays in reducing medication errors that result from the incorrect stocking of medications into an AMDCs. In addition, technician feedback, usage statistics, and medication refilling workflow and procedure were evaluated.

Methods: On July 27th, 2015 a "scan on restock" protocol was implemented at St. Clair Memorial Hospital in an effort to reduce medication restocking errors. Training sessions were directed and held during the first month of implementation for all technicians. Medication restocking errors and occurrence reports were reviewed and analyzed over a 12 month period leading up to initiation of the barcode scanning protocol and 12 months following implementation. When reviewing each restocking error recorded, several factors were taken into account including: if barcode scanning was used to restock the medication, if the medication being restocked was able to be scanned, and if the automated dispensing cabinet had scanning capabilities (cabinets located in operating rooms did not have the ability to use barcode scanning technology). Usage statistics were also analyzed for individual technicians and on each individual unit. In addition, a survey was sent to all technicians that assessed overall adherence to "scan on restock" protocol, efficacy of protocol in reducing restocking errors, ease of use, restocking speed with use, current restocking procedure, efficacy of protocol, and suggestions on how to improve the current process. Completion of the survey was optional and it was made available to all technicians and interns on the pharmacy staff at the time of presentation.

Results: The total number of reported restocking errors from July 1st, 2014 through July 27th, 2015 was 9 out of 34334 total restocks. Following implementation of barcode scanning technology on July 27th, 2015 the total number of errors reported over the next 12 months was 3 out of 34334 total restocks. The P-value was < 0.0001, therefore the reduction in error was found to be statistically significant. There was a sixty-seven percent reduction in medication restocking errors 12 months after initiation compared with 12 months prior to initiation. Of these 3 reported medication refill errors, it was shown that on all three occurrences the new "scan on restock" protocol was not utilized by the technician restocking the cabinet. Twenty one pharmacy technicians participated in the survey. Ninety five percent of technicians said that they utilize the barcode scanning when possible. Sixty-two percent of technicians stated that the new scanning protocol only "sometimes" reduced the time spent restocking. Thirty-three percent stated that the new protocol "always" reduces the time spent restocking. The median and mode of the comfort level with the scanning protocol on a scale of one to five were 5 and 5 respectively.

Conclusion: Implementation of barcode scanning technology when restocking AMDC has successfully reduced the risk of medication restocking errors. Medication restocking errors dropped 67% in 12 months following implementation compared to 12 months prior. All of the post-intervention errors reported occurred on products that were not scanned during restocking. The majority of technicians followed the scan on restock protocol and felt the process helped to reduce errors. Technicians believed that "scan on restock" is more time consuming. Future plans for advancement with "scan on restock" include placing barcodes on all IV products compounded to make them compatible with the current restocking procedure.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-239

Poster Title: Investigation of the therapeutic potential of N-acetyl cysteine and the tools used to define nigrostriatal degeneration in vivo

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Purpose: N-acetyl cysteine (NAC) is a glutathione precursor molecule used to treat acetaminophen overdose and has shown potential in treating neurodegenerative diseases such as traumatic brain injury caused by explosives in veterans, and patients of Alzheimer's to a lesser extent. In this study, the therapeutic potential of NAC was investigated in an animal model utilizing a toxicant compound 6-hydroxy dopamine (6-OHDA) to mimic the loss of dopaminergic neurons at the nigrostriatal pathway seen in Parkinson's disease.

Methods: Animals were infused intrastriatally with either the oxidative neurotoxicant 6-OHDA (4 mcg) or an equal volume of vehicle. NAC or an equal volume of vehicle was administered intraperitoneally (100 mg/kg) immediately after the infusion of 6-OHDA for either 10 or 21 days. Tyrosine hydroxylase (TH) was used as the dopaminergic marker in the nigrostriatal pathway made up of the striatum and substantia nigra. As TH expression is affected by stress, the tracer FluoroGold (FG) was injected into the striatum one week prior to 6-OHDA infusions to label nigrostriatal neurons retrogradely. All animals received 0.015 mg/kg buprenorphine subcutaneously during recovery from surgery and antibiotic treatment of their scalp wound. Brain sections of these animals were mounted onto glass slides and scanned on an infrared Odyssey Imager for lower resolution analysis or under epifluorescent microscopy (Olympus) for higher resolution analysis. A blinded observer made infrared measurements of TH levels by tracing regions of interest (ROIs), while bilateral TH+ cell counts of the substantia nigra were made from the images stitched on the Olympus microscope. Two independent raters counted nigral cells on select sections and the results were found to be in agreement. Finally, sections

from FluoroGold-infused animals were viewed under confocal microscopy to assess colocalization of FluoroGold with TH.

Results: Four measures were taken to analyze the protective effects of NAC: striatal TH levels, nigral TH levels, nigral TH+ cell counts, and nigral FuoroGold levels. As expected, nigral FG staining and cell counts of FluoroGold+ profiles were both more sensitive measures of nigrostriatal degeneration than measurements relying on TH alone. After 10 days of injections, it was found that there was a significant increase of TH in the striatum, both in terms of overall expression and density, while the protection was muted in the substantia nigra. However, after 3 weeks of injection, NAC failed to show protection against the oxidative toxicity of 6-OHDA in both the striatum and substantia nigra.

Conclusion: NAC may offer protective effects against oxidative toxicity only transiently. When concerning a chronic disease such as Parkinson's, it is important to not only examine the short-term effects, but also the long-term effects of treatment agents as well. Accordingly, it would be imperative that future studies extend the timeline so that the results are more meaningful and relevant to the disease state.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 2-240

Poster Title: Impact of clinical pharmacy involvement on the management of hypertension and diabetes: a closer look at clinical outcomes and medication-related problems

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Purpose: According to the Centers for Disease Control and Prevention, 33.5% of adults in the United States have hypertension and 9.3% have diabetes. In 2012, healthcare costs exceeded $200 billion as a result of improper medication use. A major barrier to preventing and managing chronic conditions is the shortage of primary care providers, which necessitates the use of non-physician providers. The purpose of this study was to evaluate the clinical impact of two ambulatory care pharmacist faculty members and their advanced pharmacy practice experience (APPE) student-pharmacists on the management of patients with diabetes and/or hypertension in an outpatient primary care office.

Methods: Two pharmacist faculty members with advanced, specialized training in ambulatory care have spent approximately 30% of their time precepting APPE student-pharmacists while providing high-level clinical services for over five years. The practice site is a large, outpatient internal medicine primary care office within a large university medical center that is located in a socioeconomically depressed area of a large metropolitan area. This site serves as a primary teaching site for internal medicine medical residents who are accepted into a primary care track of their residency. This retrospective chart review included adult patients aged 18 years or older diagnosed with diabetes and/or hypertension who had their first visit with pharmacy between January 2014 and May 2016. Patients were excluded if they were scheduled to see pharmacy for reasons other than hypertension and/or diabetes, if they only had one visit with pharmacy in the past year, and if the initial visit with pharmacy was before January 1, 2014. Patient-specific data collected via retrospective chart review included demographic

information, baseline measurements (blood pressure and/or hemoglobin A1c), dates of initial and final pharmacy visits, type and number of clinical interventions made by the pharmacist to optimize disease-state management, and follow-up measurements (blood pressure and/or hemoglobin A1c at follow-up appointments). Clinical interventions were retrospectively classified according to a type of medication-related problem identified in the original SOAP note.

Results: For data collected during the study period, 646 patients were screened and 116 patients met the inclusion criteria. Patient demographics included 47% males and 53% females with an average age of 59 years (± 13.1). These patients were predominantly African American (75%), had an average of five chronic conditions (± 2.4), and were on seven medications (± 4.0) at the initial pharmacy visit. For diabetes management, a total of 533 interventions were made during the study period. The majority of these interventions were categorized as addressing diet and exercise counseling (35%), disease-state management (25%), and medication effectiveness (15%). By the first follow-up visit, the median baseline hemoglobin A1c decreased by 1.6%. This hemoglobin A1c reduction was maintained by subsequent follow-up visits, with a median hemoglobin A1c of 7% by the fourth follow-up visit. For the management of hypertension, 278 total interventions were made during the study period with the majority being categorized as addressing diet and exercise counseling (37%), disease-state management (15%), and adherence (14%). The initial median blood pressure was reduced throughout the study period with the largest effect on the systolic blood pressure, which was reduced by 4 mmHg.

Conclusion: During the study period, pharmacist involvement in the management of diabetes and hypertension lead to clinically significant improvement in clinical outcomes for diabetes according to the reduction in hemoglobin A1c and borderline clinically significant improvement in hypertension based on slight reduction in systolic blood pressure. There was a total of 811 interventions made by pharmacy during the study period for diabetes and hypertension visits combined, with an overwhelming majority including diet and exercise counseling, medication effectiveness, and disease-state management. This study suggests that pharmacist involvement in the management of diabetes and hypertension may lead to improved clinical outcomes.

Submission Category: Geriatrics

Submission Type: Evaluative Study

Session-Board Number: 2-241

Poster Title: Implementing a pharmacist-led, Individualized Medication Assessment and Planning (iMAP) program to improve medication use in ambulatory senior adult oncology patients

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Purpose: Medication-related problems (MRP) is a significant healthcare issue and accounts for $177 billion in medication-related morbidity and mortality. One approach to address MRP and optimize medication management is through utilization of pharmacists as part of the healthcare delivery model for interprofessional, team-based care.
The objectives of the pharmacist-led iMAP intervention pilot were to: examine the feasibility of the iMAP intervention, compare the number and rate of MRP between patient follow-up sessions [Day 0, 30, 60], and evaluate the proportion of MRP that are successfully addressed between follow-up sessions.

Methods: This was a prospective, exploratory, IRB approved study conducted at the Senior Adult Oncology (SAO) Center at Thomas Jefferson University. All ambulatory, English speaking patients aged at least 65 years who received a comprehensive geriatric-oncology assessment between June 2014 and October 2015 were eligible to participate. Patients brought in all their medications (prescription, non-prescription, and complementary and alternative) for the pharmacist-led assessment. The study was facilitated by two Advanced Practice Pharmacists and the follow-up sessions were conducted via telephone at 30 and 60 days post the initial face-to-face session. Identified MRP and recommendations were communicated to the patient, the SAO team, and forwarded to the primary provider. All planned statistical analysis was conducted using SAS version 9.3.

Results: Baseline demographics of 41 patients include a mean age of 79.1 years; 66% women, mean number of comorbidities was 7.76 excluding primary cancer, and the most prevalent malignancies were lymphoma, breast cancer and colorectal cancer. The mean number of medications used was 10.44 at baseline. The mean number of prescription medications was 6.7, 3.15 non-prescription, and 0.59 herbal medications. There was a total of 123 MRP with a mean of 3 per patient. The most common MRP categories were suboptimal drug use (i.e. no indication for drug therapy, safer medication alternatives), medication under-treatment and suboptimal medication dosing. There were 46% of the pharmacist recommendations that were accepted by the primary provider and/or the patient by the end of the 60-day follow-up period. The overall number of MRP was decreased by 45.5%, and number of patients with MRP decreased by 20.5%. The mean number of MRP per patient was significantly reduced from 3 to 1.6. The average time requirement to conduct the initial session was 22 minutes and 15 minutes for the follow-up phone sessions. Resources needed to conduct the iMAP intervention include a tracking system for scheduling follow-up calls and a database for tracking acceptance of recommendations.

Conclusion: In an effort to reduce MRP in the senior adult oncology population, the iMAP intervention was designed to assess the impact pharmacists can have in reducing these incidences. The iMAP model has the potential to address a significant and timely issue affecting senior adults: the burden of continuously managing and monitoring multiple medications.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 2-242

Poster Title: Evaluation of antimicrobial initiation and selection prior to a newly implemented microbial identification system

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Purpose: The utilization of innovative techniques, such as matrix-assisted laser desorption ionization time-of-flight mass spectrometry (MALDI TOF MS), for microbial identification and susceptibilities has the potential to greatly reduce pathogen identification time from days to minutes on the same day bacterial colonies are cultured. By both ensuring the pathogen isolated is covered by the antibiotics selected and ensuring that therapy is narrowed or discontinued in a timely manner, MALDI TOF MS can reduce the time to appropriate antibiotic treatment. MALDI TOF MS will be implemented at Abington Hospital, but in order to better evaluate its impact, retrospective pre-intervention data was collected.

Methods: Following institutional review board approval, all patients admitted to the hospital from January through February 2016 with positive blood cultures were included in this evaluation. Information retrospectively collected from patient charts included microorganism identification and susceptibilities, presumed source of infection, times of cultures, susceptibility reporting, antibiotic initiation, initial empiric therapy, and final appropriate regimen. Patients were excluded from the analysis if data was missing for the timing of antibiotic therapy. The primary endpoint was time to appropriate therapy, which was determined based on the average time to streamline therapy, average time to broaden therapy, and average time to therapy discontinuation. Secondary endpoints included time to microorganism identification, time to susceptibility information, and length of time on inappropriate therapy. This data, representing part one of the study, is based on the currently utilized Vitek microbial identification system. In the coming months, Abington Hospital will implement the MALDI TOF

MS system. The results reported here will be compared to the results after implementation of MALDI TOF MS to determine the effect on antimicrobial stewardship.

Results: Twenty four patients were included in the final analysis, of those, fifteen were eligible for a change in treatment. Among the patients who were streamlined (n=13), the average time to therapy streamlining was 3 days, 18 hours, and 36 minutes. For patients who had therapy broadened (n=1) the average time to therapy change was 2 days, 20 hours, and 40 minutes. In patients requiring therapy discontinuation (n=1), the average time to therapy discontinuation was 3 days, 19 hours, and 54 minutes.

Conclusion: Based on the results collected, we anticipate the time to therapy optimization with utilization of MALDI TOF MS will be reduced.

Submission Category: Geriatrics

Submission Type: Evaluative Study

Session-Board Number: 2-243

Poster Title: Retrospective evaluation of fall admissions in geriatric patients

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Purpose: The CDC Injury Center has stated that the number of fatal falls in older adults is estimated to reach 100,000 per year by 2030, with an associated cost of 100 billion dollars. Previous studies have closely associated selective serotonin/norepinephrine reuptake inhibitor (SSRI/SNRI) use to an increased risk of falls in elderly persons. The purpose of this evaluation was to evaluate 30-day readmission in a cohort of geriatric patients receiving SSRIs or SNRIs to determine if they were at an increased fall risk compared to geriatric patients not receiving those medications.

Methods: The study was a retrospective chart review of patients ages 65 years and older admitted to a community hospital in Erie, PA for a fall-related injury between January 1, 2007 and April 27, 2016. The primary study objective was to evaluate recurrent 30-day fall rate in patients who were prescribed SSRIs or SNRIs compared to those not receiving those medications. The study was approved by the Institutional Review Board.
A computerized list of patients was generated based on ICD-9 codes. Exclusion criteria included patients with incomplete medical records. We examined previously identified risk factors that may be associated with an increased fall risk. Risk factors included: common medical causes for falls such as blindness, seizures, concussion, SIADH, hypoglycemia, peripheral neuropathy, and hyponatremia. Sodium levels were obtained to identify potential fall risk. For the purposes of our study, hyponatremia was defined as mild (130-135 mEq/L), moderate (120-129 mEq/L) and severe (less than 120 mEq/L). Information on medications associated with an increased fall risk were obtained. These classes were identified based on the Beers' List criteria and from the "Meta-analysis of the impact of 9 Medication Classes on Falls in Elderly Persons". Demographic data, including overall comorbidity defined by the Charlson Score, was obtained.

Results: We identified 157 patients from our computerized list. 67 were included in the SSRI/SNRI group and 90 patients to the non-SSRI/SNRI group. The SSRI/SNRI group was younger (81.3 vs 84.7; p = 0.01), had improved renal function (CrCl (ml/min) 51 vs 43; p = 0.04), and had more baseline comorbidities defined by the Charlson Score (2.8 vs 2.2; p = 0.04). All other baseline characteristics were not significantly different.
There was no statistically significant difference in the incidence of fall-related readmission within 30 days between groups (0 vs 1; p = NS). Hospital length of stay was also not statistically different (7.6 vs 7.8; p = NS). Of interest, the average patient was on at least five medications with a known risk to potentiate falls in the elderly.

Conclusion: SSRI or SNRI use in geriatric patients does not appear to be associated with an increased risk of a fall-related readmissions. Limitations include the small sample size and retrospective nature of the study. Geriatric patients who were included in our study were taking on average five medications which have been proven to increase falls, with antihypertensives being the most commonly prescribed medications. Further studies could be designed with a larger patient population to evaluate whether the results of this study are valid or the result of a lack of power.

Submission Category: General Clinical Practice

Submission Type: Case Report

Session-Board Number: 2-244

Poster Title: Warfarin resistance with patients receiving enteral tube feeding

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Purpose: A few studies and case reports have examined warfarin administration with enteral tube feeding, however, this interaction is not widely publicized. The interaction of concern involves vitamin K in enteral feeds and its effects on efficacy of warfarin leading to resistance. Initial case reports of warfarin resistance date back to before the 1980s when vitamin K concentrations in enteral feeding products were above the recommended daily allowance. Since that time period, manufacturers have reduced the concentration to less than the United States recommended daily allowance. Additionally, in-vitro analyses have shown warfarin binding to proteins and macromolecules in enteral feeding products.
A 71 year old male presents to the emergency department in a community hospital with unilateral knee/lower leg swelling. Patient denied any fever, nausea, vomiting or chills. His past medical history included coronary artery disease, hypertension, hyperlipidemia, and myocardial infarction. Due to previous history, patient was admitted for further evaluation. Patient was on warfarin 2mg daily at home. A few days after the patient was admitted, an enteral feeding product was started and continued for 4 days. During that 4 day time period, on day 1 of enteral feeding the patient was on warfarin 2.5mg with an international normalized ratio (INR) of 2.2. Day 2, the patient was on warfarin 2mg with INR of 2.0. Day 3, patient was on warfarin 2mg with INR of 1.7. On day 4, patient was on warfarin 4mg with an INR of 1.4. The INR remained low at 1.5 on day 5 where the patient received 4mg of warfarin. Even with the increase in warfarin dose throughout enteral feeding, the INR remained subtherapeutic.
As with previous case reports, this case report suggests warfarin resistance due to involvement of enteral feeding products. Currently there are no standardized recommendations on whether to withhold enteral feeding while administering warfarin. It may be necessary to monitor INR and titrate warfarin dose to a therapeutic range in otherwise stable patient while receiving enteral feeding. Further research and evaluation of warfarin resistance with enteral tube

feeding will provide guidance to help solve the issue. Additionally, hospitals could consider instituting a protocol for anti-coagulation management throughout enteral feedings.

Methods:

Results:

Conclusion:

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 2-245

Poster Title: Increase in serum creatinine following the initiation of cobicistat or dolutegravir containing antiretroviral regimens

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Purpose: Cobicistat, a pharmacokinetic booster, and dolutegravir, an antiretroviral, are used in combination therapy for the treatment of human immunodeficiency virus (HIV). In clinical trials, both agents were associated with an increase in serum creatinine (SCr) within the first 8 weeks due to inhibition of renal transporters associated with renal tubule secretion. The purpose of this study was to determine whether patients in a real world setting, who initiated cobicistat or dolutegravir, experienced a SCr increase comparable with the 0.1 to 0.2 mg/dL median increase seen in clinical trials.

Methods: This retrospective chart review was approved by the institutional review board at Cooper University Hospital. All HIV infected adult patients that had been initiated on a cobicistat or dolutegravir containing antiretroviral regimen between August 1, 2012 and May 1, 2016 were included. Patients younger than 18 years of age and pregnant women were excluded. Subjects' SCr concentrations were recorded from the electronic medical record prior to initiation and at each clinic follow-up visit. Additional subject data collected included HIV-1 RNA viral load, CD4 cell count, concomitant nephrotoxic agents and concomitant inhibitors of renal transporters. The primary outcome measure was the change in SCr from baseline to the first follow-up after at least 8 weeks of treatment. Secondary outcomes included change in creatinine clearance from baseline to the first follow-up after 8 weeks of treatment, time to peak SCr from baseline, and frequency of drug discontinuation due to renal dysfunction. Data was collected for the first 48 weeks on therapy.

Results: A total of 39 patients were included in this analysis. The majority were treatment naïve (56.4 percent), males (69.3 percent) with a median age of 42 years (IQR 30 to 53 years). Of the 39 patients collected, 24 (61.5 percent) started cobicistat containing regimens, 14 (35.9

percent) started dolutegravir containing regimens, and 1 (2.6 percent) started on both. The median change in SCr from baseline to the first follow-up after at least 8 weeks of treatment was 0.07 mg/dL (IQR minus 0.02 to 0.23 mg/dL). A corresponding median change in CrCl from baseline to the first follow-up after at least 8 weeks of treatment was minus 5 mL/min (IQR minus 21 to 1 mL/min). The median time to peak SCr concentrations was 29 weeks (IQR 16 to 59 weeks). A majority of patients remained on their current regimen at the end of the study period (64.1 percent) while only 2 patients discontinued due to renal dysfunction (5.12 percent). Most patients (79.5 percent) were on tenofovir disoproxil fumurate (TDF) containing regimens which is a known nephrotoxic agent. Thirty-eight patients were on concomitant nephrotoxic agents (97.4 percent) and 14 were on concomitant renal transport inhibitors (35.8 percent).

Conclusion: There was an increase in SCr concentrations in patients following initiation of cobicistat or dolutegravir. The 0.07 mg/dL increase in SCr that was observed is similar to the 0.1 to 0.2 mg/dL increase from previous studies despite a real life clinic setting in a patient population with comorbid disease states and concomitant medications. Future directions for this project are to compare the results to a control group and explore the effect of comorbidities and concomitant medications. The control group will consist of patients with HIV initiated on a regimen that did not contain cobicistat or dolutegravir during the study period.

Submission Category: Infectious Diseases

Submission Type: Case Report

Session-Board Number: 2-246

Poster Title: A long-term hospitalization complicated by a pre-vancomycin-intermediate Staphylococcus aureus (pVISA) endocarditis and daptomycin-associated rhabdomyolysis: a case report.

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Lynn Kleina

Purpose: This case illustrates the concern of rising vancomycin minimum inhibitory concentrations (MICs) complicated by an adverse effect to alternative therapy. A 56-year-old female with a history of cerebral vascular accident (CVA), Type 2 Diabetes, toxic nodular goiter, deep vein thrombosis (DVT), morbid obesity (BMI>40), and chronic diastolic heart failure is hospitalized for a significant amount of time within a 7-month span.
She initially presents to the hospital with a right diabetic foot infection that requires surgical debridement. The medical team discovers tendonitis without bone involvement. She is empirically treated with IV vancomycin and piperacillin-tazobactam. Her MRI of the foot does not show osteomyelitis. Surgical cultures return positive for methicillin-sensitive Staphylococcus aureus (MSSA) and the patient's antibiotic regimen is modified to a 2-week course of IV ampicillin-sulbactam.
Before the completion of her antibiotic course, she is admitted back to the hospital with shortness of breath and respiratory failure. She is found to have health care-associated pneumonia (HCAP), requiring intubation and mechanical ventilation. During this prolonged hospital stay, the patient's right foot reveals a necrotizing infection, one requiring above-ankle amputation. Shortly after stump closure, the patient is permitted to leave the hospital. Initially, she receives cefepime for HCAP coverage. Her methicillin-resistant Staphylococcus aureus (MRSA) screen is negative. Following culture results, cefepime is changed to piperacillin-tazobactam to cover anaerobic organisms. Antibiotics are adjusted further to meropenem and vancomycin to cover the necrotizing foot infection. Following amputation, the patient receives 10 additional days of antibiotics with linezolid and cefepime. Linezolid had replaced vancomycin

due to fluctuations in kidney function. Operating room (OR) cultures return negative and the patient is discharged.

Two months later, the patient is readmitted with abdominal pain, nausea, and vomiting. She is found to have acute cholecystitis and is started on IV metronidazole and ciprofloxacin. A cholecystostomy tube reveals negative bile cultures. At this time, the patient also begins to show mental status changes in the form of lethargy and confusion, creating suspicion for meningitis. IV vancomycin, piperacillin-tazobactam, and acyclovir are started for expanded coverage. Lumbar punctures are unobtainable due to body habitus and blood cultures return negative. IV tigecycline is added on briefly to cover a suspected UTI with multi-drug resistant (MDR) Acinetobacter baumanii. As the patient's mental status begins improving, all antibiotics are discontinued. The peripherally inserted central catheter (PICC) in the right arm is maintained for ongoing IV requirements.

Several weeks into her admission, she develops new fevers prompting the medical team to send blood cultures. These cultures return positive for MRSA with isolates showing a vancomycin MIC of 1µg/mL. The PICC line is subsequently removed and IV vancomycin is started. Despite adequate vancomycin troughs, the MRSA bacteremia persists. A 2D echocardiogram (ECHO) shows no evidence of valvular vegetation, but a successive transesophageal echocardiography (TEE) confirms mitral valve vegetations, indicating endocarditis. Cardiothoracic surgery evaluates the patient and concludes that she is not a candidate for valve repair surgery due to her numerous comorbidities. The MRSA MICs for vancomycin later rise to 2.0µg/mL, signifying a trend towards vancomycin-intermediate Staphylococcus aureus (VISA). The patient is switched to IV daptomycin due to vancomycin's diminished ability to sterilize the blood. Upon receiving 1 week of therapy with daptomycin, the patient experiences an elevation in creatine phosphokinase (CPK) from 24U/L at baseline to 2559U/L, indicating rhabdomyolysis. Ceftaroline therapy is introduced, replacing daptomycin. Unfortunately, 10 days into therapy, the patient succumbs to her illness. Additional details of this case including antibiotic regimens, cultures and sensitivities, lab values, and general analysis are discussed in the poster presentation.

Methods:

Results:

Conclusion:

Submission Category: Pharmacy Law/ Regulatory/ Accreditation

Submission Type: Evaluative Study

Session-Board Number: 2-247

Poster Title: Readability and length of high-risk informed consent forms

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Purpose: The Food and Drug Administration requires informed consents forms to be written in "language understandable to the subject." The average American reads at a 7th or 8th grade level; consent cannot be informed if the subject is unable to understand the document. Prior research analyzed specific types or sections of informed consent forms to quantify the complexity. The purpose of this study was to assess the readability and length of informed consent forms used in high-risk studies.

Methods: This study analyzed informed consent forms for high-risk clinical trials approved in 2014 by a single institution. High-risk trials were defined as Phase I trials, Phase II trials, Phase III investigator-initiated trials, and trials involving vulnerable populations (children, pregnant women, prisoners). Each informed consent form was assessed for page length and readability using the following scales: Flesch-Kincaid Grade Level (FKGL), Simple Measure of Gobbledygook (SMOG), and Flesch Reading Ease (FRE). Analyses were performed using the program Readability Studio (2015 version, Oleander Software, Ltd. Vandalia, OH).

Results: Forty-eight informed consent forms from high-risk studies were analyzed. The mean FKGL was 9.5 plus or minus 0.8 (range 7.1-11.4), indicating a 9th-10th grade education readability. Three (6.3%) of the informed consent forms were written at an 8th grade level or lower. Sixteen (33.3%) of the informed consent forms were written at a 10th grade level or higher. The mean SMOG was 11.7 plus or minus 0.7 (range 9.8-13), indicating an 11th-12th grade education readability. None of the informed consent forms were written at an 8th grade level or lower. Forty-seven (97.9%) of the informed consent forms were written at a 10th grade level or higher. The mean FRE was 55.2 plus or minus 3.6 (range 48-67), indicating the text is "fairly difficult to read." Seven (14.6%) of the informed consent forms were written at

"standard difficulty" or easier. Forty-one (85.4%) of the informed consent forms were written at "fairly difficult" or harder. The mean page length was 20 plus or minus 5.2 pages (range 10-32 pages). None of the informed consent forms were shorter than 10 pages in length. Twenty-six (54.2%) of the informed consent forms were 20 pages or longer. Page length and readability were weakly correlated.

Conclusion: Informed consent forms from high-risk trials at this single academic institution were lengthy and written at a readability level higher than the desired 7th-8th grade level. The length of the informed consent forms and their difficult readability may compromise subject understanding.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 2-248

Poster Title: Impact of pharmacotherapeutics course on APPE students' performance during an interprofessional medical mission trip

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Jessica Adams

Purpose: The rigorous curriculum that students must learn to receive a Doctor of Pharmacy degree must continuously be assessed and improved upon to ensure students are prepared to pursue interprofessional partnerships in conventional and unique settings. There is currently a gap in the literature evaluating the impact of a pharmacy curriculum on APPE students' performance during interprofessional medical mission trips.

Methods: This prospective study was reviewed and was determined to be exempt by the appropriate Institutional Review Board. The aim of this study was to correlate the impact of the didactic pharmacotherapeutics courses on APPE students' performance during an interprofessional medical mission trip. Data was collected during a 7-day medical mission trip in Jamaica for any patient who received medical care and prescribed medication from either the medical or dental team. De-identified patient data collected from medical charts included: patient characteristics, type of recommendation for each disease state, number of patient medications, member of pharmacy team that made the intervention (pharmacy preceptor, pharmacy student, or pharmacy student + preceptor). The quantitative data collected was then correlated back to the number of hours spent on each disease state in the pharmacotherapeutics course.

Results: Out of a total 1,881 prescriptions dispensed from the pharmacy on this mission trip, pharmacy students made interventions on 29.9% of the total prescriptions dispensed and made 69.2% of the total recommendations. The therapeutic topics that had the most number of

hours were pain (9 hours), hypertension (7 hours) and diabetes (6 hours). Most other topics such as sexually transmitted infections, fungal infections and skin/soft tissue infections had 2 hours each in the therapeutic curriculum. Students on the mission trip made recommendations on 66% of sexually transmitted infection medications, 40% of fungal infection medications, 37% of hypertension medications, 33% of diabetes medications and 18.9% of pain medications. The total number interventions made by the students was 661 and the most frequent type of student intervention was evidence-based recommendations. These recommendations included dosage strength formulation change (107), frequency (103), disease- specific recommendations (98) and duration of therapy (89).

Conclusion: After evaluating the data collected, there was an indirect association between the hours spent on various pharmacotherapeutic topics and recommendations pharmacy students made during the interprofessional medical mission trip. However, there were many limitations to this study including a restrictive medication formulary, which may have subsequently confounded the results. Gathering the same data from other interprofessional practice sites during APPE rotations may help guide pharmacotherapeutic curriculum changes.

Submission Category: Pediatrics

Submission Type: Descriptive Report

Session-Board Number: 2-249

Poster Title: Performing an institution-wide gap analysis for pediatric medication safety using the Institute for Safe Medication Practices Survey on Pediatric Medication Safety Practices

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Purpose: According to the Institute for Safe Medication Practices (ISMP), pediatric patients are more likely than adults to experience harmful medication errors and adverse drug reactions due to their size, immature physiologic functions, inability to communicate adverse effects to caregivers, and calculation errors. ISMP developed an online Survey on Pediatric Medication Safety Practices in March 2015 asking physicians, pharmacists, and nurses to select the frequency with which they implemented key error-prevention strategies at their institutions. This project was designed to identify areas of medication safety improvement at Nemours Alfred I. duPont Hospital for Children using a gap analysis approach.

Methods: The results from this survey were verified by pharmacists, nurses, and informatics clinicians. Frequencies of implementation were documented with the options being always (>99% of the time), almost always (90-99% of the time), often (50-89% of the time), sometimes (20-49% of the time), rarely (1-19% of the time), or never (< 1% of the time). A likelihood of failure score, likelihood of detection score, and severity score were then assigned to strategies with the frequencies of often, sometimes, rarely, and never. The three scores were then multiplied to calculate a risk priority number (RPN) in order to prioritize the lowest ranking strategies. Based on the RPNs calculated, key areas of medication safety improvement were identified and recommendations were discussed with senior leadership.

Results: The keys areas of medication safety improvement identified included the use of barcode verification of ingredients in intravenous/oral liquid doses during preparation, the use of smart infusion pumps with an activated drug library to administer pediatric parenteral solutions, employing an independent double-check for high-alert parenteral drugs prior to administration, tracing the line from the medication/solution to the patient prior to

administration, having a clinical pharmacist present on patient care units to participate on rounds, and having prescribers order pediatric liquid medications in metric doses, not volume only. The results were shared with senior leadership and error-reduction strategies to fully implement these best practices were discussed.

Conclusion: The ISMP Survey on Pediatric Medication Safety Practices was useful in identifying medication safety gaps with prescribing, dispensing, and administration of medications at Nemours Alfred I. duPont Hospital for Children. The use of a gap analysis and RPNs allowed for the identification of gaps in best practices at this institution, along with prioritization of the gaps to implement error-reduction strategies.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 2-250

Poster Title: Systematic review: Evaluating cognitive and behavior factors affecting medication adherence

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Purpose: The World Health Organization (WHO) in 2003, declared that improving patient adherence will have better health implications than any other medical treatment can. According to the Center for Disease Control (CDC), medication adherence is when the patient properly conforms to the medication regimen recommended by the prescriber in respect to timing, dosage, and frequency. The aim of this systematic literature review is to examine causes of medication non-adherence, with an emphasis on behavioral and cognitive factors, and identify new trends in improving patient adherence and outcomes because it is crucial to educate clinical pharmacists about interventions to improve adherence.

Methods: A PubMed search was performed to identify new trends in medication adherence research using the criteria: Medication adherence (All Fields) AND methods (All Fields) AND chronic disease (all fields). The search was limited to abstracts in English. Abstracts were included if published between January 1, 2011 and January 15, 2015. 400 abstracts were identified. Articles were included if they examined medication adherence factors or used interventions in adult patients diagnosed with chronic diseases. If there was a disagreement regarding inclusion of any article, the authors met to discuss the article and arrive at a consensus. A flowchart was created to depict the number of articles that were included and excluded.
The articles were included if they evaluated medication adherence as an outcome that used a cognitive or behavioral intervention, or examined the association of these factors with adherence.

Articles were excluded if it evaluated non-cognitive/non-behavioral factors, was not a well-designed scientific study with results (review, protocol only, editorial, commentary, did not use pre-post measurement, control group, qualitative methods, validated scales), non-adults or non-chronic disease, not related to medication adherence, or a literature review.

Results: Out of 400 abstracts reviewed, 357 were excluded.
We included 43 articles which evaluated cognitive (20, 46.5%) and behavioral (4, 9.3%) factors influencing patients medication taking behaviors, or described interventions (16, 37.2%) based on these concepts. Additional articles described coordinated care interventions (3, 6.9%).
Emerging evidence on factors affecting patient adherence include:
Belief in God; self-efficacy and motivation (willing to take action and control of your disease); activation (confidence and knowledge to take action); perception toward treatment efficacy; perception of disease severity; motivation towards self-care; and quality of patient education/motivational interviewing.

Conclusion: Pharmacists must be aware of recent trends in order to engage patients in contemporary methods to promote adherence. Reasons for medication non-adherence include cognitive and behavioral factors such as perceptions/attitudes towards treatment, disease severity, and physician's expertise as well as motivation to improve their health outcomes. Pharmacists should integrate tools during patient encounters to identify if patients hold perceptions or beliefs that could be a barrier to taking their medications. Interventions using motivational interviewing and participation in workshops or disease management programs are also being investigated to educate patients and change their medication-taking behaviors.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 2-251

Poster Title: Evaluation of non-administered basal insulin doses at a community medical center

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Purpose: The Institute for Safe Medication Practices identified that basal insulin doses are often inappropriately not administered to hospitalized patients. Basal insulins, which have durations of action up to 24 hours, should not routinely be held as this impairs glycemic control and has been shown to increase morbidity and mortality. In hospitalized patients, blood glucose (BG) should be maintained at 140-180 mg/dL. Institutional policy requires prescriber notification when doses are non-administered, regardless of the reason. This study aims to describe nursing practices surrounding basal insulin administration at a community medical center.

Methods: This retrospective chart review included hospitalized patients, aged 18 years and older, admitted between June-July 2016 with at least one documented administration or non-administration of insulin glargine or insulin detemir. Orders were excluded if the dose of basal insulin was discontinued prior to scheduled administration time. IRB approval was granted with a waiver of informed consent. Assessment of patients included demographics, prescriber information, number of scheduled insulin administrations, number of administered doses, and number of non-administered doses. Patients with at least one non-administered dose were further analyzed for BG prior to non-administration, time from last BG to non-administration, BG 2-8 hours after non-administration, and documentation of prescriber notification. The primary outcome was the proportion of subjects with at least one inappropriately non-administered basal insulin dose. Secondary outcomes included the proportion of non-administered doses for which there was no prescriber notification documented, and the documented reason why the dose was non-administered.

Results: 294 patients (1,682 potential doses of basal insulin) were included in the analysis with 58 patients (19.7 percent) having at least one non-administered dose of basal insulin (113 doses held; 6.7 percent in total). 50 of those 58 patients (86.2 percent) were found to have at least one inappropriately non-administered dose. Of those 50 patients with inappropriately non-administered doses, 46 (92 percent) did not have a prescriber notification documented. In the remaining 4 patients (8 percent) notification to the prescriber or the prescriber's answering service was documented. However, in these 4 cases, the doses were documented as non-administered prior to follow-up communication from the prescriber. Documented reasons for the 113 non-administered doses were as follows: low blood sugar (23.9 percent, n equals 27), patient refused dose (18.6 percent, n equals 21), nothing by mouth (14.2 percent, n equals 16), medication unavailable (0.9 percent, n equals 1), medication discontinued by prescriber (1.8 percent, n equals 2) and unspecified (40.7 percent, n equals 46)). The mean BG prior to hold was 127 mg/dL, with an average time from last BG to hold of 1.81 hours and a median of 1 hour. Mean BG 2-8 hours after hold was 141 mg/dL.

Conclusion: This study demonstrated a large proportion of patients with orders for basal insulin had inappropriately non-administered doses. Based on the findings, education initiatives surrounding appropriate administration and use of basal insulin in hospitalized patients will be introduced to nursing staff. Importance of communication and documentation will be stressed during education. A future study will evaluate post-education practices with basal insulin.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 2-253

Poster Title: Impact of initiation of parenteral nutrition on glycemic control in elderly versus non-elderly patients

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Purpose: Hyperglycemia and insulin resistance have been described as metabolic features impacting elderly patients. However, the literature provides limited information about glycemic control in elderly patients receiving parenteral nutrition.
Advancing parenteral nutrition in patients with high blood glucose levels may lead to metabolic complications that can result in increased length of hospital stay along with increased morbidity and mortality. The purpose of this study is to determine the impact of parenteral nutrition on blood glucose concentrations in the elderly (age greater than or equal to 65) and non-elderly (age less than 65).

Methods: The institutional review board approved this retrospective study that included adult patients initiated on at least two days of parenteral nutrition during hospitalization from May 2014 to July 2016 at Cooper University Hospital. The primary outcome measure was a comparison of peak blood glucose concentrations and hyperglycemic episodes prior to initiation and on day 1 and day 2 of parenteral nutrition and total dextrose infusion rates for elderly versus non-elderly patients.. Categorical variables were analyzed using Chi-squared test and Fisher's exact test. Continuous variables were analyzed using Wilcoxon rank-sum test. The a priori significance level is 0.05.

Results: The peak blood glucose concentration was significantly higher in the elderly versus non-elderly patients on both day 1 (188.8 plus or minus 81.8 versus 164.3 plus or minus 60.8, P equals 0.0001) and day 2 (195.0 plus or minus 78.9 versus 171.2 plus or minus 67.8, P equals

0.0001) despite no difference in peak blood glucose concentrations prior to initiation (143.2 plus or minus 51.9 versus 129.7 plus or minus 49.8, P equals 0.0003). Similarly, there were more hyperglycemic episodes in the elderly on day 1 (0.79 plus or minus 1.62 versus 0.65 plus or minus 1.67, P equals 0.0402) and day 2 (1.13 plus or minus 1.85 versus 0.62 plus or minus 1.67, P less than 0.0001), while there was no difference prior to initiation (0.25 plus or minus 0.83 versus 0.16 plus or minus 0.7 , P equals 0.2174). Dextrose infusion rates (milligram/kilogram/minute) were not different between the elderly and non-elderly patients prior to initiation, on day 1, and day 2.

Conclusion: Initiation of parenteral nutrition led to more blood glucose abnormalities in elderly patients compared to non-elderly patients, as seen by higher peak blood glucose concentrations and more hyperglycemic episodes while receiving comparable dextrose infusion rates. Clinicians should be aware that elderly patients receiving parenteral nutrition are at a greater risk of this metabolic complication.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 2-254

Poster Title: Impact of time to initiation of parenteral nutrition on outcomes in critically ill patients

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Purpose: The optimal time to initiate parenteral nutrition in critically ill adults in whom enteral nutrition is not feasible is controversial. The American Society for Parenteral and Enteral Nutrition guidelines recommend withholding parenteral nutrition over the first seven days if the critically ill patient is at low nutrition risk, but initiating as soon as possible if at a high nutrition risk and early enteral nutrition is not feasible. The purpose of this study is to investigate in-hospital mortality and hospital length of stay based on initiation of parenteral nutrition within seven days or after seven days of poor nutrient intake.

Methods: This single-center, retrospective study included critically ill adult patients who received at least two consecutive days of parenteral nutrition during hospitalization from January 1, 2013 to July 15, 2016. Patients were excluded if they were pregnant, received concomitant enteral nutrition or if they previously received parenteral nutrition. The primary objective was to compare in-hospital mortality in patients initiated on parenteral nutrition within seven days or after seven days of poor nutrient intake (less than 50 percent of daily nutritional requirement). The secondary objective was to compare hospital length of stay in patients initiated on parenteral nutrition within seven days or after seven days of poor nutrient intake. A subgroup analysis stratified patients based on nutrition classification at baseline: malnourished (actual body weight was less than 89 percent of ideal body weight), normal (actual body weight 90 to 129 percent of ideal body weight), or obese (actual body weight was greater than 130 percent of ideal body weight).

Results: 110 patients received parenteral nutrition within seven days of poor nutrient intake while 49 patients received parenteral nutrition after seven days of poor nutrient intake. In the subgroup analysis, 12 patients were malnourished, 78 patients were normal, and 69 patients were obese. There was no statistically significant difference in the in-hospital mortality based on initiation within seven days or after seven days (29.09 percent versus 18.37 percent, P equals 0.1535). In-hospital mortality was similar in both groups regardless of nutrition classification. Patients initiated within seven days had a shorter mean hospital length of stay than patients initiated after seven days (25.36 plus or minus 18.30 days versus 33.82 plus or minus 21.87 days, P equals 0.0013). Hospital length of stay was similar in both groups for patients who were considered malnourished or normal. Obese patients initiated within seven days had a shorter mean hospital length of stay than obese patients initiated after seven days (22 plus or minus 17.16 days versus 37 plus or minus 19.69 days, P equals 0.0007).

Conclusion: Time to initiation of parenteral nutrition did not have a significant impact on in-hospital mortality. However, patients who received parenteral nutrition within seven days of poor nutrient intake had a shorter hospital length of stay compared to those who received parenteral nutrition after seven days of poor nutrient intake. The small number of malnourished patients may have limited our ability to find a statistically significant difference in patient outcomes for this high nutrition risk patient population.

Submission Category: Pain Management

Submission Type: Evaluative Study

Session-Board Number: 2-255

Poster Title: Pharmacy pain management interventions on a medical mission trip in rural Jamaica

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Purpose: The 2016 Jamaica Medical Mission interdisciplinary team was comprised of medical, dental, nursing, and pharmacy students along with their respective preceptors. Students worked alongside preceptors to provide overall patient care. Pharmacy students recommended interventions in an effort to address and improve pain management. The purpose of this study was to evaluate and quantify types of pain management interventions made by pharmacy students on an international, interprofessional medical mission advanced pharmacy practice experience rotation.

Methods: A retrospective analysis of collected data from prescription records and dispensing logs during a 10-day medical mission trip was conducted from June 7th to June 17th, 2016. Data analysis specifically included prescriptions that were written for pain management. Background data collected included patient age, gender, medication, indication, type of recommendation and by whom the recommendation was made. The primary endpoint analyzed was the percentage of pharmacy interventions made on pain prescriptions from the medical and dental teams out of the total pain prescriptions dispensed. Interventions were defined as: medication changes (allergy, non-formulary, out of stock, unnecessary drug or therapeutic alternative), dose changes (strength, frequency, duration of therapy, dosage form or route of administration), and/or new medication recommendation (disease specific or new diagnosis). Secondary endpoints included the percent of interventions accepted by the team, categorization of the types of interventions made, percentage of pain medications filled for the

medical team compared to the dental team, and percentage of pain interventions made by the pharmacy student, student and preceptor together, or pharmacy preceptor alone.

Results: Of the 1881 total prescriptions, 639 were pain prescriptions; 423 from the medical team and 216 from the dental team. Pharmacy interventions were made on 35.2 percent of medical pain prescriptions and 10.6 percent of the dental pain prescriptions. Of the total pharmacy interventions provided, 94.2 percent were accepted by the healthcare team. Interventions by category on medical and dental prescriptions, in percentage respectively, were as follows: non-formulary (2.8, 0), therapeutic alternative (14.2, 0); dose changes due to strength (17, 27.3), frequency (20.5, 31.8), duration of therapy (17.6, 13.6), dosage form (10.2, 27.3); and new medication that was disease specific (11.4, 0), or new diagnosis (6.3, 0). Among the 149 interventions made on medical prescriptions, 73.6 percent were given by pharmacy students, 18.2 percent were given by pharmacy preceptors, and 8.1 percent were given with input from both a student and preceptor. Of the 23 interventions made on dental prescriptions, 52.2 percent were given by students, 39.1 percent were given by pharmacists and 8.7 percent were given with input from both a student and preceptor.

Conclusion: Pharmacy students on a medical mission trip provide diverse recommendations for pain management prescriptions as contribution to overall patient care. Their role in pain management therapy was clearly defined and reflected by the interventions conducted and accepted by the healthcare team as a whole. Pharmacists and students play a major role in monitoring the pain formulary and making recommendation based on adjustments to that formulary. This data can be used to support the impact pharmacy students can have on future medical mission trips to enhance the interprofessional pain management team.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Descriptive Report

Session-Board Number: 2-256

Poster Title: Retrospective evaluation of direct oral anticoagulants and the impact of an in-patient pharmacist monitoring service

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Purpose: With the introduction of direct oral anticoagulants, routine therapeutic monitoring is not required. However, evaluation of dosage per indication, renal function, and associated drug-drug interactions are crucial. This project evaluated the impact of an in-patient pharmacist direct oral anticoagulant monitoring service when therapies of these agents are initiated in the hospital setting.

Methods: This is a retrospective chart review that evaluated hospitalized patients who received direct oral anticoagulation therapy during the month of May 2016 at Penn Medicine-Lancaster General Health. The institution's electronic medical record reporting system was used to generate a list of all patients who received anticoagulation. The only charts reviewed were of patients who received at least one dose of a direct oral anticoagulant, such as apixaban, dabigatran, edoxaban, or rivaroxaban, during their hospitalization. Patients were excluded from this study if they did not receive any doses of a direct oral anticoagulant or received anticoagulation other than direct oral anticoagulants. General patient demographics and laboratory values needed to evaluate therapy were recorded, as well as direct oral anticoagulant medication data from prescriber's orders. The primary outcome was to determine the number of pharmacist interventions facilitated through the monitoring service program of direct oral anticoagulants. Secondary outcomes included number of prescribed orders to each direct oral anticoagulant and interventions implemented to each agent. Additionally, pharmacist adherence to monitoring protocol, determination of the modes and types of pharmacist interventions, and acceptance of pharmacist interventions were reviewed. Furthermore, this study evaluated missed opportunities of potential pharmacist intervention for preventative harm. The Institutional Review Board has evaluated this research in an expedited process.

Results: During the month of May 2016, there were 233 pharmacist evaluations for direct oral anticoagulants. Two hundred twenty-four pharmacist evaluations were reviewed, due to 9 evaluations being duplicates of the same order or no direct oral anticoagulant was administered. Of those, 50 orders had pharmacist interventions. Apixaban was prescribed 134 times (59.8%) with 20 interventions (40%), dabigatran had 8 orders (3.6%) with one intervention (2%), rivaroxaban had 82 orders (36.6%) with 29 interventions (58%), and no edoxaban usage. Reasons for pharmacist interventions were due to drug-drug interactions (23 occurrences, 46%), renal dosing adjustments based on creatinine clearance and kidney function (18 occurrences, 36%), incorrect dosages (7 occurrences, 14%), and other clarifications (2 occurrences, 4%). Pharmacist interventions took place through automatic renal dose adjustment twice, 28 provider pages, and 28 sticky notes left for provider review. There were 8 occasions when both provider pages and sticky notes were used. Of the 50 pharmacist interventions, 22 were not accepted (44%), 13 partially accepted (26%), and 15 interventions fully accepted (30%). Incidences of missed opportunities for preventative harm in patients on the direct oral anticoagulants occurred at instances of new medication orders at discharge, unclear documentation, and loss to follow-up.

Conclusion: When evaluating direct oral anticoagulants, pharmacist interventions are fully accepted or at least partially accepted over half of the time. Further considerations include continued education to pharmacists on risk stratification for paging over placing a note for provider review, in order to establish a clearer mode of communication. Other opportunities to consider and optimize in the future, include yearly serum creatinine monitoring and discharge patient counseling to ensure patients have clear understanding in using their direct oral anticoagulant.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 2-257

Poster Title: Safety and tolerability of rapid titration of intravenous treprostinil

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Purpose: Treprostinil is a prostacyclin analogue approved to treat pulmonary arterial hypertension (PAH) and is associated with improved symptoms from this progressive, chronic disease. The approved dosing of treprostinil is based on weekly titration to clinical effect; however, this may lead to delays in achieving symptom relief upon initiation. Rapid titration of intravenous treprostinil beyond the approved frequency has been utilized with little data to support this approach. The purpose of this study is to assess the safety and tolerability of rapid titration of intravenous treprostinil in our institution.

Methods: This was a single-center, retrospective, chart-review study. Institution review board approval of the study was obtained prior to data collection. Potential study subjects were identified using the pharmacy informatics database of patients receiving parenteral treprostinil between January 2006 and April 2016. Patients at least 18 years of age with a PAH diagnosis and newly initiated on intravenous treprostinil were included if dose titrations occurred more frequently than on a weekly basis. Minors, pregnant patients, and prisoners were excluded from the study. Baseline characteristics collected included age, gender, race, weight, past medical history, medications prior to admission, World Health Organization (WHO) group, New York Heart Association (NYHA) functional class, and pulmonary artery pressure (PAP). Dose titrations were evaluated based on initial dose, titration frequency, titration dose, maximum dose, and time to maximum dose. Effects on PAP, blood pressure, and adverse events during hospitalization were collected. Additionally, intensive care unit (ICU) and hospital length of stay (LOS) were collected. The primary outcomes were dose limiting side effects and any serious adverse events that might cause hemodynamic instability. Hemodynamic instability was defined in this study as hypotension that requires intervention with fluids or vasopressors. Secondary outcomes consisted of ICU and hospital length of stay. Data were analyzed using descriptive statistics to determine common titration practices and frequencies of any measured or observed adverse effects.

Results: A total of 10 subjects between the ages of 30-76 were included. The median PAP of study subjects was 83/33 mmHg and all subjects were in NYHA Class IV. The majority of the subjects were identified as WHO group III pulmonary hypertension. Nine patients had previously diagnosed PAH, six had COPD, asthma, or interstitial lung disease, four had hypertension, three had diabetes mellitus, three had osteoarthritis, and two had heart failure. Prior to initiation of treprostinil, seven subjects were on phosphodiesterase inhibitors, two on endothelium receptor antagonists, and three were on inhaled prostacyclin. Initial doses of treprostinil were 1-2.5 ng/kg/min. Eight subjects had their infusion titrated every 24 hours, with two subjects titrated between every 2-8 hours. Doses were titrated mostly by 1 ng/kg/min (70%) with the median maximum dose of 7.75 ng/kg/min. The mean time to maximum dose was 8.75 days and ICU and hospital LOS 9 days and 18.2 days, respectively. The most common adverse event was hypotension, which occurred in four subjects. Two of these subjects required intervention, with one requiring dose reduction and another requiring fluids and vasopressors. One subject experienced vomiting and another had jaw pain.

Conclusion: Rapid titration of treprostinil occurs with variable dosing strategies and appears to be a safe option in achieving stable doses for chronic management of PAH. Few adverse effects were observed in this study and are commonly known effects associated with use of treprostinil. There appears to be a small risk of causing hemodynamic instability, which may be managed with supportive care. Based on these data, a reasonable approach may be starting infusions at 1 ng/kg/min and titrating by 1 ng/kg/min every 24 hours to effect. Further study is required to confirm our findings.

Submission Category: Pain Management

Submission Type: Descriptive Report

Session-Board Number: 2-258

Poster Title: Cebranopadol: novel dual opioid/NOP receptor agonist analgesic

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Purpose: Chronic pain is a worldwide problem due to the limited efficacy, limiting adverse effect profile, or abuse potential of current analgesic options. Cebranopadol is an innovative novel agent that combines an agonist action at opioid receptors with agonist action at nociceptin/orphanin FQ peptide (NOP) receptors. It demonstrates good efficacy and safety in a variety of preclinical models of acute pain, and potent efficacy in preclinical models of neuropathic pain. If approved, cebranopadol would represent the first truly novel centrally-acting analgesic in many years. Because of this, we review the basic pharmacology and clinical trials of this novel analgesic.

Methods: Published literature and Internet sources were searched to identify information related to the basic science (pharmacology and medicinal chemistry) and development (clinical trial) information on the mechanism of dual opioid and NOP receptor pharmacologic action in general, and for cebranopadol in particular. Literature searches were conducted using sources such as PubMed and Ovid including keywords related to pain (such as physiology, types, chronification, etc.), analgesics (opioid and nonopioid), mechanisms of analgesic action, opioid receptors, NOP receptors, adverse effects, tramadol, tapentadol, buprenorphine, and cebranopadol, among others. Clinical trial information was obtained from the United States National Institutes of Health clinical trials directory. The identified sources were reviewed and the information synthesized.

Results: Efficacy: Cebranopadol displays antinociceptive and antihyperalgesic effects in rat models of acute and chronic pain including tail-flick, rheumatoid arthritis, bone cancer, spinal nerve ligation, and diabetic neuropathy.

Adverse effects: The potential for effects on respiration or motor activity/sedation were assessed using whole-body plethysmography and rotarod test in rats. At the maximum test dose tested which was 3.2-fold the analgesic ED50 dose in the tail-flick test, cebranopadol did not produce any significant changes in the measured respiratory parameters or on motor coordination. In comparison, morphine induced respiration depression and dose-dependent inhibition of motor coordination.
Cebranopadol produced similar rates of constipation as tapentadol ER, but only at a much higher dose.
NOP receptors are widely distributed throughout the brain and peripheral tissues and may affect other physiological functions. NOP receptor agonists have been reported to produce motor disturbance, memory impairment, and hypothermia. Further studies are needed to identify the side effect profile of mixed opioid/NOP receptor agents.
Abuse potential: Based on opioid/NOP receptor interaction studies, it seems plausible that cebranopadol could also have reduced abuse potential compared to these drugs. No publications were found that reported preclinical or clinical assessment of the abuse potential. Phase 3 trials are in process.

Conclusion: Cebranopadol displays analgesic, antihyperalgesic, and antiallodynic properties in several rat models of acute nociceptive, inflammatory, cancer, and neuropathic pain. Cebranopadol is significantly more potent than morphine in these tests, and is relatively more potent in chronic than acute pain models. Presumably due to the NOP receptor component of cebranopadol, development of analgesic tolerance is delayed compared to an equianalgesic dose of morphine. Additionally, unlike morphine, cebranopadol did not disrupt respiration or motor coordination at doses within and exceeding the analgesic dose range in rats, indicating it may be a safer alternative than traditional single-mechanism opioids.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 2-259

Poster Title: Potential Rx-to-OTC Switch Drug Candidates

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Purpose: The purpose of this study was to gain insight in what Rx legend drugs pharmacists think have a good enough safety profile to sell as OTC and, if any, what OTC drugs pharmacists think should be legend only.

Methods: This study was performed as a non-directional survey asking the 2 following questions: "What are some prescription only medications that you think would be okay to sell as nonprescription (over-the- counter and behind the counter)" and following that "If any, what are some OTC/BTC medications that you think should be prescription only?" Pharmacists who were surveyed were those in the Philadelphia area within convenient traveling distance or whose contact information was available or accessible. There were three modes of collecting data. The first method was traveling to pharmacies in person and giving the pharmacist a physical survey to complete. The second method was the creation of a survey monkey, identical to the physical survey, which was sent electronically via email, text, or Facebook. The third method was telephoning pharmacies and conducting the survey over the phone. Demographics of respondents' age range, education, area of work, and gender were collected. All methods were done as similarly as possible; with the same greeting and wording of questions, etc. Data analysis was done based on noticeable trends of answers and tallying frequencies of responses.

Results: 101 pharmacists were contacted. The most frequent suggestion for Rx-to-OTC switch was oral contraceptives. The three following were albuterol, Epi-Pen, and naloxone.
The most frequent suggestions of OTC medications that should be moved to Rx were Plan B and herbal supplements.

Conclusion: There are many prescription medications that practicing pharmacists believe are safe to sell as OTC. The most common medication is of oral contraceptives. This finding is

potentiated by the fact that California and Oregon have recently passed laws allowing pharmacists to prescribe both oral and hormonal contraceptives. If there is success with California and Nevada in the advancement of women's health by allowing pharmacists to prescribe contraceptives, we can expect that other states will follow suit. It is not unreasonable to expect that contraceptives have potential to be sold as non-prescription in the future.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Case Report

Session-Board Number: 2-260

Poster Title: IVIG-induced aseptic meningitis case report

Primary Author: Sophie Hien Le, Temple University School of Pharmacy, Pennsylvania; **Email:** tuf09058@temple.edu

Additional Author (s):
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Purpose: IVIG-induced aseptic meningitis: a case report
Case report: A 39 year old Hispanic female was admitted to the emergency department (ED) with a chief complaint of intractable headache. Two days earlier, the patient received two doses of intravenous immunoglobulin (IVIG) at 1g/kg (100 g) for her recent diagnosis of immune thrombocytopenic purpura (ITP). The patient reported having a severe headache within 15 minutes after the infusion of second dose of IVIG. She was treated with ibuprofen 600 mg and acetaminophen with codeine, but there was no sign of relief. Upon hospital admission, she reported having photophobia, nausea, pain rated as 10/10 but denied fever, diplopia, stiffed neck, or back pain. Her platelet count was recorded at 58K and vital signs showed her temperature was normal. A CAT scan confirmed that she had no intracranial hemorrhage. Order for a lumbar puncture was cancelled and ceftriaxone was ordered as a precaution. Blood and urine culture showed no acute infection. She was diagnosed with IVIG-induced aseptic meningitis during her
hospital stays.
In addition to her ITP, her PMH also included a history of catamenial migraine headaches, cervical cancer with hysterectomy, chronic hepatitis C, and obesity. She has no known drug allergies, denies the use of home medications or non-prescription therapies/dietary supplements, tobacco, alcohol or recreational drug use. She was not being treated for hepatitis C, as many of the treatments are contraindicated with her ITP/thrombocytopenia in general. IVIG is a standard treatment for primary and secondary ITP. In relation to ITP, IVIG is theorized to inhibit platelet phagocytosis by the macrophages. Macrophages have FcyR receptors on their surfaces that mediate inflammatory pathway, and IVIG contains Fc components that would inhibit the FcyR receptors.

Overall, drug induced aseptic meningitis (DIAM) is a rare adverse drug reaction associated with numerous agents. IVIG is one of the more common agents associated with this uncommon adverse effect. Mechanisms for DIAM include hypersensitivity reactions, stabilizing products in drugs, cytokine release, cerebrovascular sensitivity, and direct meningeal irritation. This patient being obese was given a high dose of IVIG based on her actual weight. This combined with her history of migraines; more than likely made her more susceptible to IVIG induced aseptic meningitis. Slow infusions of low-concentration IVIG products along with hydration may help reduce the risk of DIAM, especially in higher risk patients. For obese patients, IVIG packet inserts have no mention of any dose adjustments using an ideal or adjusted body weight, and perhaps this may need to be studied or explored.
Method: N/A
Result: N/A
Conclusion: N/A

Methods:

Results:

Conclusion:

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Case Report

Session-Board Number: 2-261

Poster Title: Clenbuterol-induced Rhabdomyolysis: A Case Report

Primary Author: Arun Mohanan, Temple University School of Pharmacy, Pennsylvania; **Email:** tua82118@temple.edu

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Purpose: The patient is a 32 year old male who presented to the emergency department in mild distress complaining of diffuse myalgias, tachycardia, weakness, arm pain, and muscle twitching for the past 4-5 days. During the past week, he had started a vigorous exercise program. Two days prior to his admission, he started taking clenbuterol tablets based on a recommendation from his trainer to assist in reducing fat and increasing muscle mass. On admission, his laboratory results showed hypokalemia with a serum potassium of 3.3 meq/L and an elevated creatine kinase of 3873 IU/L. . His condition was noted as “acute toxin-related myopathy consistent with clenbuterol injury, hypokalemia- induced muscle injury, and rhabdomyolysis without current evidence of pigment nephropathy:” The patient’s condition improved with fluid hydration and was discharged a few days later.

Clenbuterol is a “dietary supplement” used by athletes and bodybuilders for its supposed performance enhancing and fat burning properties. It is not FDA approved for human use, although outside the U.S. it is approved for bronchial asthma. It is a long-acting ß-adrenoceptor agonist that exerts a potent broncholytic effect by preferential action on ß2-adrenoceptors in smooth muscle, resulting in the relaxation of bronchial smooth muscle and a decrease in airway resistance.

The mechanism of action of the clenbuterol induced rhabdomyolysis seen in this case is not fully elucidated although it is suspected it may be related to beta-2 agonist properties. In high doses clenbuterol can increase protein deposition and lipolysis similarly to anabolic steroids. The myotoxic effects could be due to the depletion of muscle energy stores possibly related to potassium depletion. Normally, during exercise, muscles release intracellular potassium causing local pockets of hyperkalemia which triggers vasodilation and increases perfusion to the active myocytes. Total body potassium depletion and hypokalemia decrease local hyperkalemia preventing the vasodilation, which results in tissue hypoxia and rhabdomyolysis.

Consumers often regard workout supplements as not 'true medications' and overlook their safety issues. Since the use of clenbuterol for fat-loss or for exercise endurance is not FDA approved, clenbuterol supplements are not required to have proper labeling and warnings. Additionally, dosing recommendations and regimens do not come from medical professionals or clinical trials, but from anecdotal evidence from users and there can be much variability; which is another factor that can contribute to its toxicities.

Methods:

Results:

Conclusion:

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Case Report

Session-Board Number: 2-262

Poster Title: Neuroleptic malignant syndrome

Primary Author: An Shao, Temple University School of Pharmacy, Pennsylvania; **Email:** tue48043@temple.edu

Additional Author (s):
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Wykeem Parker

Purpose: A 55-year-old female with an altered mental status presenting as severe distress with decreased level of consciousness, hyperthermia, and agitation was brought to the emergency. The patient had a PMH of schizophrenia and dementia and was on a combination of typical and atypical antipsychotic medications that included haloperidol and quetiapine. Upon examination, the patient was tachycardic and with increased respiratory rate, along with an elevated creatine kinase, and bradyreflexia with reports of muscle rigidity. In addition to these findings she was also on dual SSRI therapy with fluoxetine and paroxetine, so concerns of serotonin syndrome was also considered. Initial therapy was primarily supportive with benzodiazepines for clonus activity, cooling blankets for hyperthermia, and fluid resuscitation. All her antipsychotic and antidepressant medications were not restarted upon presentation. After her initial treatment in the emergency room, neurology and psychiatry consults felt her presentation was more consistent with neuroleptic malignant syndrome, and therapy with dantrolene, and dopamine agonists, namely bromocriptine and ammantidine were initiated. Based on her good response to the skeletal muscle relaxant, dantrolene and dopamine agonists, a final diagnosis of neuroleptic syndrome was made. Unfortunately during her initial unresponsive state, she aspirated and developed pneumonia with sepsis and expired due to a secondary sepsis syndrome due to aspiration pneumonia.
Neuroleptic malignant syndrome (NMS) is an idiosyncratic, adverse drug reaction. It can be described as a cascade of dysregulation involving different organs of the body, ultimately leading to end-stage hypermetabolic syndrome. The exact mechanism of action of NMS cause by antipsychotic drugs is unknown. Their mechanism of action involves decreasing dopamine levels in the hypothalamus, nigrostriatal pathways, and spinal cord, which lead to increased muscle rigidity and tremor via D2 receptor antagonism. Peripherally, antipsychotics lead to increased calcium release from the sarcoplasmic reticulum in the muscle, resulting in increased

contractility, which results in muscle cell breakdown. In addition, reductions in the dopaminergic tone in the hypothalamus also contribute to the elevated temperature and impairment of heat-regulating systems, which induce further dysregulation of the autonomic response.
Despite the difficulties in a definitive diagnosis of NMS, health care providers should be familiar with presenting findings of this syndrome and provide initial supportive care to prevent further harm.
Methods: N/A
Results: N/A
Conclusion: N/A

Methods:

Results:

Conclusion:

Submission Category: Cardiology/ Anticoagulation

Submission Type: Case Report

Session-Board Number: 2-263

Poster Title: Intracranial hemorrhage with the use of apixaban

Primary Author: Melanie Zaniewski, Temple University School of Pharmacy, Pennsylvania;
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Additional Author (s):
David Froelich
Patrick McDonnell

Purpose: Intracranial hemorrhage and apixaban use

The patient is a 76-year old male who presents to the emergency department with symptoms indicative for stroke. Prior to his arrival at the emergency department, his wife had found him with altered mental status and the inability to stand that later resulted with him becoming unresponsive. His past medical history was significant for cerebrovascular accident and atrial fibrillation and was taking apixaban (no dose reported) for secondary stroke prevention. He arrived at the emergency department with a blood pressure of 229/142, acute headache, left-side weakness, and slurred speech. A computerized tomography scan of the patient's head revealed a massive right-sided basal ganglia hemorrhage with extension into the temporal lobe. The patient was diagnosed with a right intraparenchymal hemorrhage and required a craniotomy with evacuation of the hemorrhage. The patient's condition continued to decline, and on hospital day eight, he was discharged to hospice.

Bleeding is a significant adverse event associated with the use of anticoagulant medications. Although intracranial hemorrhage is relatively rare, when it does occur, it is associated with poor survival outcomes. The introduction of the novel anticoagulants has raised some questions about the safety of these medications, especially in the elderly. These medications are renally eliminated, and the liable nature of kidney function in elderly populations may pose problems such as drug accumulation. Unlike warfarin, these medications do not require blood testing for monitoring per their labeling nor do they have established defined coagulation test ranges for either efficacy or toxicity. Secondly, there are no known FDA approved reversal agents for apixaban or its competitor rivaroxaban, both oral Factor Xa inhibitors. Clinicians must rely on supportive therapy, blood products, and clotting factor products.

With the increase in popularity of the novel anticoagulants, the need for agents that can reverse the actions of these medications is apparent. Last year, the FDA approved

idarucizumab, a reversal agent for direct thrombin inhibitor, dabigatran. There are currently several agents in phase I clinical trials that have shown promise as possible reversal agents for both apixaban and rivaroxaban. In addition, prudent patient selection, particularly in the elderly, is greatly needed when using these newer agents without defined objective parameters for monitoring anticoagulant therapy.

Methods:

Results:

Conclusion:

Submission Category: General Clinical Practice

Submission Type: Case Report

Session-Board Number: 2-264

Poster Title: Diabetes insipidus induced by lithium toxicity: a case report

Primary Author: Cory Ryhal, Temple University School of Pharmacy, Pennsylvania; **Email:** ryhalcj@temple.edu

Additional Author (s):
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Patrick McDonnell

Purpose: Diabetes insipidus induced by lithium toxicity: a case report
Case Report: A 50 year old Caucasian female presented to the emergency department with a chief complaint of worsening movement disorders possibly due to tardive dyskinesia over the previous two weeks affecting her quality of life. Vomiting and diarrhea along with decreased oral intake were also noted over the previous two weeks.
The patient had been on lithium therapy for about 8 years for the treatment of bipolar disorder and it was continued on admission. On hospital day 3, a lithium level was found to be toxic at 2.3 mEq/L and her sodium levels began rising towards dangerous levels (several levels > 150 mEq/L). Increased free water loss was noted but dismissed as being secondary to fever and tachycardia. Her urine osmolality was found to be low at (207 mOsm/kg) while the serum osmolality was elevated (349 mOsm/kg). The etiology of the patient's hypernatremia was thought to be secondary to free water deficits and possible nephrogenic diabetes insipidus from lithium toxicity. The patient received D5W (250 ml/hr) to correct for free water deficit. Desmopressin was considered to treat lithium-induced diabetes insipidus, however this recommendation was not taken. Tachycardic findings prompted a review of thyroid function tests, and she was found to be hyperthyroid and started on methimazole therapy. Lithium therapy was held, and fluid and electrolyte imbalances were corrected. The delay in diagnosis of this "drug induced disease" resulted in a prolonged hospital stay for this patient.
Lithium has a narrow therapeutic index and signs and symptoms of lithium toxicity need to recognized, particularly fluid loss and electrolyte imbalances. Also a spectrum of lithium toxic effects (hypernatremia, diabetes insipidus and hyperthyroidism) were not recognized or immediately connected as drug toxicity. Although commonly known to cause hypothyroidism, lithium has also been linked with hyperthyroidism. Identification of lithium toxicity as the underlying cause would have greatly reduced the patient's hospital stay. The objective findings

of a low urine osmolality coinciding with elevated serum osmolality strongly suggests diabetes insipidus. While focus remained on treating tardive dyskinesia, attention should have been paid to toxic lithium levels. The exacerbation of hyperthyroidism when combined with increased free water loss and elevated sodium levels implicates lithium toxicity.
Lithium is a complicated drug with a relatively unknown mechanism of action. Due to the narrow therapeutic index, lithium therapy requires serial drug level monitoring. Lithium's similarities with sodium ions can often lead to complex adverse reactions relating to renal function and electrolyte levels. Toxicity can lead to confusion, lethargy, and slurred speech. Severe toxicity can result in permanent neurological impairment, seizures, cardiovascular collapse, coma, stupor, and even death. Lithium induced diabetes insipidus results from accumulation of the drug within renal collecting duct cells, interfering with the actions of ADH and leading to polyuria and very dilute urine. In this patient case, this water loss along with lack of intake due to dyskinesia symptoms lead to severe hypernatremic dehydration, with sodium levels as high as 166 mEq/L. Early recognition of fluid and electrolyte imbalance both predispose a patient to lithium toxicity, as well as resulting from lithium toxicity.
Results: N/A
Conclusion: N/A

Methods:

Results:

Conclusion:

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 2-265

Poster Title: Narrow Therapeutic Index Drugs: How the FDA and the Worlds Regulatory Agencies Raised the Bar for Bioequivalence

Primary Author: Jonathan Douek, Temple University School of Pharmacy, Pennsylvania; **Email:** tuf22799@temple.edu

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Purpose: Define Bioequivalence (BE) and Narrow Therapeutic Index (NTI)
Characterize the qualifications of BE standards for NTI drugs in different regulatory agencies
Discuss the new FDA BE standards for NTI drugs and how they are different from those of other regulatory agencies around the world
Discuss how the new FDA reference-scaled BE approach will affect the landscape of generic drug approvals for NTI drugs

Methods: Our review was done through comparing guidances and guidelines from the FDA, EMA, and Health Canada, on criteria for conducting bioequivalence studies, as well as by reviewing relevant studies on this topic. Studies include articles on the deficiencies of the FDA in evaluating generic formulations of NTI drugs, and "Novel BE approach for NTI Drugs", an evaluation of this reference-scaled approach, and case studies on generic substitution of NTI drugs.

Results: -How the previous BE standards did not work for NTI drugs
-FDA's reference-scaled, 4-way, fully replicated crossover design is the preferred method of conducting BE studies for NTI drugs, as it is more flexible in accounting for "within subject variability" (WSV).
-The EMA and Health Canada have instituted a "cookie-cutter" approach, setting BE standards as AUC and Cmax of 90-111.11% for any new applications of generic NTI drugs.

Conclusion: Even though many regulatory agencies around the world have tightened up their BE standards for NTI drugs, FDA's approach also takes into account the WSV for their BE

requirements. This approach helps limit the approvals of NTI generic drugs that may have significant therapeutic differences from the Reference Listed Drug (RLD).
FDA may consider doing post-marketing reviews on NTI generic drugs that are approved with new reference-scaled BE approach to see if there are any therapeutic differences between generic and RLD.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Case Report

Session-Board Number: 2-266

Poster Title: IVIG induced aseptic meningitis: A case report

Primary Author: Loan Phan, Temple University School of Pharmacy, Pennsylvania; **Email:** tue47621@temple.edu

Additional Author (s):
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Purpose: Case report: A 39 year old Hispanic female was admitted to the emergency department (ED) with a chief complaint of intractable headache. Two days earlier, the patient received two doses of intravenous immunoglobulin (IVIG) at 1g/kg (100 g) for her recent diagnosis of immune thrombocytopenic purpura (ITP). The patient reported having a severe headache within 15 minutes after the infusion of second dose of IVIG. She was treated with ibuprofen 600 mg and acetaminophen with codeine, but there was no sign of relief. Upon hosptial admission, she reported having photophobia, nausea, pain rated as 10/10 but denied fever, diplopia, stiffed neck, or back pain. Her platelet count was recorded at 58K and vital signs showed her temperature was normal. A CAT scan confirmed that she had no intracranial hemorrhage. Order for a lumbar puncture was cancelled and ceftriaxone was ordered as a precaution. Blood and urine culture showed no acute infection. She was diagnosed with IVIG-induced aseptic meningitis during her hospital stays.
In addition to her ITP, her PMH also included a history of catamenial migraine headaches, cervical cancer with hysterectomy, chronic hepatitis C, and obesity. She has no known drug allergies, denies the use of home medications or non-prescription therapies/dietary supplements, tobacco, alcohol or recreational drug use. She was not being treated for hepatitis C, as many of the treatments are contraindicated with her ITP/thrombocytopenia in general. IVIG is a standard treatment for primary and secondary ITP. In relation to ITP, IVIG is theorized to inhibit platelet phagocytosis by the macrophages. Macrophages have FcyR receptors on their surfaces that mediate inflammatory pathway, and IVIG contains Fc components that would inhibit the FcyR receptors.
Overall, drug induced aseptic meningitis (DIAM) is a rare adverse drug reaction associated with numerous agents. IVIG is one of the more common agents associated with this uncommon adverse effect. Mechanisms for DIAM include hypersensitivity reactions, stabilizing products in

drugs, cytokine release, cerebrovascular sensitivity, and direct meningeal irritation. This patient being obese was given a high dose of IVIG based on her actual weight. This combined with her history of migraines; more than likely made her more susceptible to IVIG induced aseptic meningitis. Slow infusions of low-concentration IVIG products along with hydration may help reduce the risk of DIAM, especially in higher risk patients. For obese patients, IVIG packet inserts have no mention of any dose adjustments using an ideal or adjusted body weight, and perhaps this may need to be studied or explored.
Method: N/A
Result: N/A
Conclusion: N/A

Methods:

Results:

Conclusion:

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Case Report

Session-Board Number: 2-267

Poster Title: Neutropenia and leukopenia secondary to immunosuppression after orthotopic heart transplantation: a case report

Primary Author: Julia Lees, Temple University School of Pharmacy, Pennsylvania; **Email:** tuc43302@temple.edu

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Purpose: The patient is a 62 year old African American male on an immunosuppressive regimen including tacrolimus, mycophenolate mofetil, prednisone, along with sulfamethoxazole/ trimethoprim, nystatin, and valganciclovir status post orthotopic heart transplant. Valganciclovir is a necessary medication because the patient was a cytomegalovirus mismatch. Shortly thereafter, the patient is admitted to the hospital with an absolute neutrophil count of 680/microliter, white blood cell count of 1000/microliter, hemoglobin as well as hematocrit counts of 13 grams/deciliter and 40.8% and platelet count of 102,000/microliter. He received colony stimulating factors to increase the production of neutrophils and was discharged from the hospital when the absolute neutrophil count rose to 2000/microliter, and white blood cell count increased to 2700/microliter. The patient was diagnosed with neutropenia and leukopenia secondary to mycophenolate mofetil use, which was subsequently discontinued. However, a hematology consult reported that a different agent was responsible. Mycophenolate mofetil is a reversible blocker of inosine monophosphate dehydrogenase, therefore affecting lymphocyte production, which diminishes cytotoxic T cell responses and antibody formation against the allograft. It is important to note that the mycophenolate mofetil dosage was reduced to half prior to the hospitalization due to decreased neutrophils at an outpatient visit. Any mycophenolate mofetil dose reduction increases the risk of acute rejection and graft loss.
Within a month, the patient is hospitalized again with an absolute neutrophil count of 430/microliter, white blood cell count of 1500/microliter, and a platelet count of 148,000/microliter. After this second hospitalization, valganciclovir was discontinued, which was the agent that hematology attributed to the initial neutropenia and leukopenia.

Cytomegalovirus protocol states that patients need to be on therapy for 3-6 months to decrease the risk of infection, but valganciclovir is known to have enhanced synergistic immunosuppression in combination with mycophenolate mofetil. Severe leukopenia, neutropenia, thrombocytopenia, bone marrow aplasia, and aplastic anemia have been reported in patients treated with this combination. Pancytopenia is included in the labeling and concomitant use of these agents can lead to a worsening hematologic effect for the patient. This case explores the clinical scenario when a patient is neutropenic and/or leukopenic but requires cytomegalovirus prophylaxis after receiving solid organ transplantation.

Methods:

Results:

Conclusion:

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-268

Poster Title: Evaluation of tacrolimus monitoring in solid organ transplantation at a single center teaching institution

Primary Author: Sneh Patel, Temple University School of Pharmacy, Pennsylvania; **Email:** tub55051@temple.edu

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Julia Lees

Purpose: The purpose of this drug use evaluation (DUE) was to assess the appropriateness of tacrolimus therapeutic drug monitoring at Temple University Hospital (TUH) with respect to patient-specific serum concentrations, appropriateness of dose changes, and conversions between oral and sublingual formulations.

Methods: This evaluation was a retrospective, observational DUE of tacrolimus monitoring at TUH. Patients with orders for tacrolimus between July 1 and September 30, 2015 for immunosuppression post-transplant were included in the evaluation. Patients were excluded if they were less than 10 days post-transplant, received tacrolimus therapy for anything other than organ transplant, or were hospitalized less than 3 days due to readmission. Due to the half-life of tacrolimus, dose adjustments were considered appropriate if changes were made 48 to 72 hours after the previous dose change to allow tacrolimus to reach steady-state concentrations. Pertinent information obtained included the goal range, if documented, time post-transplant (less than 6 months or greater than 6 months), tacrolimus serum concentrations, dosages and formulations that were administered.

Results: Fifty-six out of 93 patients were included in this evaluation. One-hundred eighty-nine out of 432 (44 percent) tacrolimus concentrations obtained were in goal range while 18 percent of concentrations were supratherapeutic and 38 percent were subtherapeutic. There were 151 dose adjustments made where 69 (46 percent) adjustments were determined to be appropriate and 82 (54 percent) adjustments were deemed to be inappropriate. For secondary outcomes,

there were 177 out of 432 (41 percent) tacrolimus concentrations obtained that were determined as excessive. Twelve out of 16 patients (75 percent) were converted incorrectly between sublingual (SL) and oral (PO) dosage forms.

Conclusion: We found that dose adjustments and therapeutic monitoring were not conducted at optimal intervals. Inappropriate dosage changes resulted from frequent dose adjustments and failure to adjust dose due to sub- or supratherapeutic serum level. Tacrolimus serum concentrations were largely spent outside of goal range. We also found that the conversion between the SL and PO formulations were consistently incorrect.

Submission Category: Oncology

Submission Type: Case Report

Session-Board Number: 2-269

Poster Title: Nivolumab and Clostridium difficile colitis: a case report

Primary Author: Mary McIntyre, Temple University School of Pharmacy, Pennsylvania; **Email:** tuc06097@temple.edu

Additional Author (s):
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Purpose: The patient is a 68-year-old male with a past medical history including stage IV renal cell carcinoma, adrenal insufficiency and stage IV chronic kidney disease. The patient began nivolumab 2 mg/kg IV every 3 weeks off label for his renal carcinoma. Three months later, the patient began complaining of loose stools, but nivolumab was continued. Nivolumab was not discontinued until five months later, when his GI symptoms had progressed to 3-4 loose stools per day. The patient began treatment for sinusitis with amoxicillin and levofloxacin three days after his last dose of nivolumab. He was also taking pantoprazole 40 mg daily, chronically.
The patient was admitted to the hospital approximately two weeks after the last dose of nivolumab and completed courses of antibiotics. Upon admission, he was diagnosed with Clostridium difficile colitis and was treated with oral vancomycin. Three days later, the patient was transferred to the ICU with sepsis and 20 bowel movements per day. He was given oral vancomycin, IV metronidazole and steroids. A colonoscopy revealed pseudomembranes and friable mucosa. Two weeks later, the patient was evaluated for fecal microbiota transplant (FMT). He was scheduled for FMT, but never received the procedure. Hours prior to it, the patient complained of chest pain, and an electrocardiogram revealed a non-ST elevation myocardial infarction. The following day, the patient elected for comfort care. He was then discharged to inpatient hospice.
Nivolumab can cause colitis due to its mechanism as an immune checkpoint inhibitor through PD-1:PD-L1 pathway blockade. This pathway plays a role in GI mucosal regulation which is disrupted by this medication. The patient presented with these symptoms of early colitis 12 weeks into treatment with nivolumab, at which time the medication should have been held. However, the patient continued treatment for another 20 weeks.
During this time, he was given antibiotics, which were not renally adjusted for his estimated creatinine clearance of 30 ml/min. This patient took these high-risk antibiotics while also on a proton pump inhibitor. The combination created the ideal environment for C. difficile to thrive.

The patient's PMH of adrenal insufficiency may have also been a precipitating factor, as this is a reported adverse effect of nivolumab as well as a known risk factor for diarrhea. Additionally, FMT has a much higher cure rate after recurrence of C. difficile, and this patient may have benefited by receiving the procedure earlier.

Methods:

Results:

Conclusion:

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-270

Poster Title: Evaluation of naloxone use in hospital associated opioid overdose

Primary Author: Jennifer Ho, Temple University School of Pharmacy, Pennsylvania; **Email:** jenniferho@temple.edu

Additional Author (s):
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Olivia Stanton-Ameisen
Sara Walton
Jennifer Andres

Purpose: The purpose of this drug use evaluation was to analyze Temple University Hospital's (TUH) action prior to and following the inpatient administration of the opioid reversal agent, naloxone. The mu opioid antagonist counteracts symptoms of opioid overdose such as respiratory depression, sedation, and hypotension.

Methods: This is a retrospective chart review which analyzed patients admitted to TUH who received at least one dose of intravenous naloxone between July 2014-September 2015. The primary outcome was to determine if TUH's response following naloxone use was appropriate, defined as a decrease in the dose or frequency of the opioid regimen (in oral morphine equivalents) within 24 hours following naloxone administration. Secondary outcomes included evaluation of patient characteristics such as renal or hepatic function, opioid naivety, and age, as well as opioid regimen within 24 hours prior to naloxone, reversal rate of opioid overdoses, and documentation of clinical improvement.

Results: Five hundred and twelve patients were screened and 38 were included in the analysis. TUH had an appropriate response following naloxone administration in 86 percent (31/36) of the cases. On average, TUH gave higher risk patients, such as elderly with renal dysfunction and opioid naive patients, lower opioid doses than younger patients and those with normal organ function. Overall, the most common opioid implicated in overdose was morphine (31 percent) and 63 percent (24/38) of patients had renal dysfunction. 95 percent (36/38) of opioid overdoses were reversed with naloxone, and 92 percent (35/38) of the cases had documentation of clinical improvement. As for documentation, there was inconsistency in

regards to the time of naloxone administration, number of doses, and the patient's clinical response.

Conclusion: TUH's response to opioid overdoses was appropriate, however we would recommend that a standardized method for documenting naloxone use and response be implemented.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Case Report

Session-Board Number: 2-271

Poster Title: Etanercept-induced cardiomyopathy: a case report

Primary Author: Stephen Morgado, Temple University School of Pharmacy, Pennsylvania;
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Additional Author (s):
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Purpose: Case Report: A 36 year old male recently presented to the emergency room with a 3-4 day history of chest pain with no radiation, shortness of breath and generalized weakness. He denied cough, expectoration or orthopnea. Pertinent lab results include an elevated WBC count of 12.8x 109 cells/L. Other pertinent findings included acute respiratory distress, tachycardia and tachypnea. He was then admitted to the telemetry unit with suspected community acquired pneumonia. Upon cardiology consult to investigate the cause of chest pain, he was found to have an EF of 25% and BNP of 182 pg/mL, both indicative of systolic dysfunction. The patient has a past medical history of psoriasis for which he was treated with etanercept on and off for the past 20 months. His discharge diagnosis included community acquired bilateral pneumonia and non-ischemic cardiomyopathy. Etanercept therapy for his psoriasis was not resumed on discharge.

Although it is a very uncommon adverse reaction, it has been shown in post-marketing reports that etanercept can cause worsening or new-onset heart failure. The patient did not have any significant risk factors for heart failure outside of etanercept use. It is rarer to see a drug induced-heart failure occur in young patients without comorbid conditions.

It was found that TNF-α levels are elevated in patients with severe heart failure, but the pathogenicity of etanercept causing cardiomyopathy is undetermined at this time. Although the mechanism is unclear, there are promising theories to explain this reaction. One theory involves TNF-α damaging cardiomyocytes due to increased free TNF-α levels in peripheral circulation. Free levels of TNF-α have been shown to display negative inotropic effects, and activate metalloproteinases responsible for increasing extracellular matrix remodeling. Another mechanism involves the selectivity that etanercept displays in inactivation of soluble TNF-α. This causes unopposed transmembrane TNF-α signaling, leading to anti-apoptotic and pro-inflammatory actions including increased TNF synthesis.

Methods: N/A

Results: N/A

Conclusion: N/A

Submission Category: Oncology

Submission Type: Case Report

Session-Board Number: 2-272

Poster Title: Nivolumab-induced diabetic ketoacidosis: a case report

Primary Author: Lauren Kobren, Temple University School of Pharmacy, Pennsylvania; **Email:** tuf23468@temple.edu

Additional Author (s):
Alexandria Charno
Melissa Ranieri
Patrick McDonnell

Purpose: Case Report: This case report highlights a novel adverse drug reaction that occurred after administration of nivolumab, an anti-PD-1 (anti-programmed cell death) monoclonal antibody, which is used as second- or third-line targeted therapy in a variety of cancer treatment regimens.

A 34-year-old African American female with a history of metastatic non-small cell lung cancer presented to the hospital with a chief complaint of nausea, vomiting, and abdominal cramping. On admission, she presented with a blood glucose of 739 mg/dL, BUN 38 mg/dL, SrCr 1.97 mg/dL, pH of 7.24 and an anion gap of 30 mEq/L, which was consistent with a diagnosis of diabetic ketoacidosis. She had been initiated on nivolumab one month prior for metastatic non-small cell lung cancer and had received two doses. The patient was diagnosed with diabetic ketoacidosis with acute kidney injury despite having no personal history of diabetes mellitus, which suggested that it was secondary to the recent initiation of nivolumab.The patient was treated in intensive care, where she received an insulin infusion and IV fluids. Her hospital stay was marked by uncontrolled blood glucose. She was ultimately discharged after an eleven-day hospital stay on all of her home medications (excluding nivolumab), and the following medications were added: insulin glargine 10 units subcutaneously at bedtime and insulin aspart 5 units subcutaneously three times daily before meals.

This patient incurred two subsequent hospital admissions, each within 24 hours of discharge, for diabetic ketoacidosis. Each time, she was treated in the intensive care unit with IV fluids and an insulin infusion, and her blood glucose was difficult to control. This resulted in eleven additional days of hospitalization and a delay in alternative antineoplastic treatment for her non-small cell lung cancer. Ultimately, the patient was initiated on an insulin pump for optimal control of her blood glucose levels.

This was a severe adverse drug reaction, as the patient developed diabetes mellitus secondary to nivolumab, a permanent complication. As this case demonstrates, the patient and the healthcare team must assess the risks versus benefits when initiating nivolumab, an anti-PD-1-monoclonal antibody, for the treatment of non-small cell lung cancer. The risk of diabetes mellitus, although rare, has been documented with this class of drugs. This potential adverse effect must be balanced with the treatment benefits of nivolumab for patients with advanced non-small cell lung cancer.

Methods: N/A

Results: N/A

Conclusion: N/A

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 2-273

Poster Title: Clinical impact of a novel interprofessional dental and pharmacy student tobacco cessation education program on dental patients

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Purpose: The dental setting is an ideal place to address tobacco use; however, many dentists feel unprepared in some aspects of tobacco cessation education, particularly recommending pharmacologic treatments. Pharmacists promote safe and effective pharmacologic treatment options for tobacco dependence. A interprofessional education (IPE) effort between dentistry and pharmacy may address this need for more extensive tobacco cessation education in the dental setting. This purpose of this study was to compare IPE versus standard care (SC) groups regarding dental patients' knowledge gained about tobacco cessation, intentions to quit tobacco use, quit attempts at follow-up, and perceptions of IPE care.

Methods: This was a pilot prospective study. Patients included in the study were seen at Temple University's Kornberg School of Dentistry admissions clinic, current tobacco users, eighteen years of age or older, able to speak, read, and write in English, able and willing to give informed consent, and able to provide a telephone contact number in order to complete the follow-up assessment. Both groups completed an initial survey during their dental appointment as well as a four-week follow-up phone survey. The initial survey questions included demographic data, tobacco use, previous quit attempts, perception of knowledge gained regarding tobacco cessation, intentions to set a quit date and to use pharmacologic tobacco cessation agents, and perceptions regarding IPE care. Questions assessing patient satisfaction were added to the IPE care survey. The four-week follow-up survey questions included perceptions of knowledge regarding tobacco cessation, quit intentions and quit attempts made since the dental appointment. A 5-point Likert-type scale was used to assess perceptions of

knowledge gained, quit intentions, and perceptions of IPE care. Non-parametric tests (Mann-Whitney U, chi-square) were utilized to determine between-group differences in knowledge gained, quit intentions, and quit attempts at follow-up. Descriptive and correlational analyses were conducted to describe patient perceptions of IPE care.

Results: Fifty patients were enrolled [IPE (n = 25), SC (n = 25)]. The mean age was 48.02 (±12.93). The majority of patients were female (64%), Black/African-American (66%), Non-Hispanic/Latino (80%), smoked cigarettes for an average of 20.61 years (± 12.54), and had made at least one prior quit attempt (68%). IPE patients reported more knowledge gained immediately post-appointment and at four-week follow-up (median composite score 28 versus 13, respectively; $p < 0.001$ and 30 versus 25; $p = .009$); Although there was no statistically significant difference in the number of quit attempts at the four-week follow-up, IPE patients that attempted to quit reported a higher incidence of setting a quit date (63.6%) compared to SC patients (20%) ($p = .044$) and contacting a provider for further assistance with quitting (81.8%) compared to SC patients (40%) ($p = .049$). The majority of IPE patients (82.6%) were extremely satisfied with their tobacco cessation education and the majority of SC patients were interested in talking with a dentist and pharmacist team about various aspects of tobacco.

Conclusion: Overall, the IPE group reported more knowledge gained regarding tobacco cessation, were more likely to take steps toward quitting, and were satisfied with the IPE care. These findings suggest that a novel interprofessional program between dental and pharmacy students may enhance patient outcomes in the area of tobacco cessation.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 2-274

Poster Title: Pharmacists impact on secondary stroke prevention

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Purpose: Patients admitted to Temple University Hospital with a cerebrovascular accident (CVA) or transient ischemic attack (TIA) are referred to the pharmacist-run Stroke Prevention Clinic (SPC) for medication management. Once an initial CVA/TIA has occurred, the risk for another event is higher. The goals of the SPC are to reduce hospital admissions for CVAs/TIAs, myocardial infarction (MI), and peripheral artery disease (PAD). Surrogate markers including blood pressure, LDL, and hemoglobin A1c values are tracked. The purpose of this study was to determine if patients receiving SPC care have improved outcomes compared to patients that did not visit the clinic.

Methods: This was a retrospective chart review of patients referred to the SPC. Data was collected from the electronic medical record, EPIC. At the time of CVA/TIA, associated risk factors and pertinent medications were recorded. For patients that attended clinic, the number of appointments with the SPC was recorded and if new medications were added. Blood pressure, LDL, Hemoglobin A1c, and smoking status were collected at the time of CVA/TIA, before initial visit to the SPC, and after last SPC visit. Hospital admissions were reviewed to assess for secondary CVA, MI, and PAD. Data was collected for patients that did not attend clinic visits and was used as a control.

Results: Records were reviewed for 456 patients scheduled over 2 years. Patients that visited the SPC had 4 percent less hospital admissions for CVA/TIA, 1.71 percent less hospital admissions for MIs, and 1.63 percent less hospital admissions for PAD than patients that did not visit the SPC. The primary composite endpoint of readmission for stroke, MI, or PAD occurred in only 9.3 percent of the SPC patients compared to 17 percent in the patients that did not come

to clinic. This composite endpoint was statistically significantly lower in the SPC group (p=0.013). This represents a 43.4 percent relative risk reduction, a 7.4 percent absolute risk reduction, and a number needed to treat of 14. Additionally, all surrogate markers improved in the SPC group.

Conclusion: Improvements in surrogate markers indicate that patients receiving pharmacist intervention in the SPC are more likely to achieve goals than if they did not come to clinic. These results demonstrate that pharmacists in the SPC reduce patient risk factors for secondary CVA/TIA and can prevent future hospital admissions.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-275

Poster Title: Clinical evaluation of fosfomycin use at a community hospital

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Purpose: Fosfomycin is a broad-spectrum antibiotic administered as a single oral dose for the treatment of urinary tract infections (UTIs) with activity against multidrug resistant (MDR) uropathogens such as extended-spectrum beta-lactamase (ESBL) producing bacteria and carbapenem-resistant Enterobacteriaceae (CRE). In select patients, fosfomycin may help reduce the need for costly intravenous (IV) antibiotics and expedite patient discharge as well as prevent hospital admissions. The purpose of this evaluation is to review the clinical outcomes in patients who received fosfomycin for UTIs. In addition, the economic impact of using fosfomycin will be assessed at our community teaching hospital.

Methods: This retrospective drug use evaluation included patients who received at least one dose of fosfomycin for UTI between January 2013 and December 2015. Patients were identified from a generated report using Discern Analytics in Cerner. Medical records were reviewed and data collection included patient demographics, past medical history, level of acuity, concurrent infections and antibiotics, cultures and susceptibilities, length of stay (LOS), and adverse effects. Reported outcomes included clinical cure, defined as documented infection improvement based on clinical findings and investigator determination, and 30-day UTI-related readmissions or emergency department (ED) visits. The estimated cost avoidance for inpatient days and hospital admissions prevented were also evaluated based on the expected LOS on a case-by-case basis. The institutional review board at Atlanticare Regional Medical Center granted approval for this evaluation.

Results: Twelve patients with an average age of 69 (range 30 to 97 years) were included. Eight of 12 patients were female, 8 had a history of UTI, and 1 had a chronic Foley catheter. Eleven patients were treated on general medical unit with an average LOS of 5.6 days. One patient was treated in the ED and discharged. Results of 9 urine cultures were available for analysis with 3 polymicrobial results. Cultures revealed 6 ESBL producers (4 Escherichia coli and 2 Klebsiella pneumoniae). Other uropathogens identified were CRE Klebsiella, Pseudomonas aeruginosa, non-ESBL Escherichia coli, Enterococcus, and Staphylococcus epidermidis. Five patients had started antibiotic treatment before switching to fosfomycin. After treatment with fosfomycin, 11 of 12 patients achieved clinical cure and 1 patient developed bacteremia secondary to UTI which required IV antibiotic therapy. No patients had a 30-day UTI-related hospital readmission or ED visit and no adverse effects were reported. A total of 39 inpatient days were estimated to be avoided due to 10 early hospital discharges and 1 prevented admission with the use of oral fosfomycin instead of IV antibiotics. This avoided LOS resulted in an approximate cost-savings of 85,800 dollars, or an average savings of 7,150 dollars per patient.

Conclusion: Fosfomycin appears to be an effective, well tolerated, and convenient treatment for patients with UTIs including those caused by MDR uropathogens. In stable patients who are candidates for oral therapy, fosfomycin may be used as a cost-saving option to expedite hospital discharge and prevent hospital admissions. Further pharmacoeconomic studies are warranted to determine the value of fosfomycin in decreasing LOS and hospital admissions.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-276

Poster Title: Drug Use Evaluation of Aspirin 325 mg at a large academic teaching institution

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Purpose: The purpose of this drug use evaluation (DUE) is to determine whether aspirin 325 mg is being prescribed appropriately based on guideline recommendations and patient specific risk factors at Temple University Hospital (TUH).

Methods: This DUE was a retrospective patient chart review of all patients admitted into Temple University Hospital (TUH) during July 2015 who received at least 1 dose of aspirin 325 mg. Patients were excluded if they received aspirin 325 mg for pain, rheumatologic diseases, pericarditis, or VTE prophylaxis for orthopedic procedures. The primary objective of this study was to assess the overall appropriateness of aspirin 325mg use at TUH based on guideline recommendations. The secondary outcome aimed to evaluate the safety of aspirin 325 mg based on whether or not bleeding occurred. Risk of bleeding was assessed by calculating a CRUSADE bleeding score for each patient.

Results: 64 patients were screened and 54 were included. Aspirin was used most frequently for acute management of ACS and CAD. Based on the appropriateness criteria, 35 patients (65%) appropriately received aspirin 325 mg and 19 patients (35%) inappropriately received aspirin 325 mg. For the 19 deemed inappropriate 18 (95%) were contrary to guideline recommendations for each specific indication. One patient (2%) experienced a bleed during their hospital stay.

Conclusion: There is certainly a modest degree of inappropriate prescribing of aspirin 325 mg at TUH. The majority of guideline recommendations preferentially recommend low-dose aspirin

over aspirin 325 mg due to its propensity to cause bleeds without any added efficacy. Future practice at TUH should reflect these guidelines, as evidence continues to show that that the risks of high dose aspirin outweigh any benefits.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 2-277

Poster Title: Evaluation of the use of ceftaroline at Temple University Hospital

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Purpose: Ceftaroline is a relatively new antibiotic; therefore, many off-label uses are being implemented in clinical practice. This DUE was executed to assess how clinicians are using ceftaroline fosamil at Temple University Hospital (TUH), along with the incidence of C. difficile infection.

Methods: This was a retrospective chart review of patients 18 years and older who received at least 24 hours of ceftaroline therapy between August 2014 and September 2015 at TUH. Renal function, organisms, culture-sensitivity data, indications, doses, and incidence of C. difficile infection were collected from medical records. The primary outcome was to assess organisms, indications, doses, and appropriateness of renal dosage adjustments of ceftaroline at TUH. The secondary outcome was to evaluate the occurrence of C. difficile infection from the start of therapy to seven days after the end of therapy.

Results: 56 patients were screened and 47 were included. A total of 55 organisms were found in cultures, 40 (72.7%) of which were S. aureus (38 MRSA & 2 MSSA). The most common indication was bacteremia (31 patients [45.6% of indications]). Thirty-seven patients (78.7%) received a dose of 600 mg; 23 received 600 mg every 8 hours and 13 received 600 mg every 12 hours, indicating an interval of every 8 hours is used more frequently. Thirteen patients (27.7%) had a CrCl less than or equal to 50 mL/min, 7 of which received an appropriately adjusted dose, while 6 did not. C. difficile infection only developed in 1 patient.

Conclusion: Our data indicate that ceftaroline was used most commonly for S. aureus infections, specifically MRSA. At TUH, it is most commonly used for bacteremia and given more frequently than indicated by FDA. Ceftaroline is not being sufficiently dose adjusted for renal impairment and C. difficile infection is not common. These results suggest that clinicians need to be educated on dose adjusting ceftaroline in renal impairment.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-278

Poster Title: Evaluation of basiliximab induction therapy in nonrenal solid organ transplantation

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Purpose: Basiliximab is FDA approved for the prophylaxis of acute rejection in de-novo renal transplant recipients, but is often used off-label in nonrenal transplant recipients who may have relative contraindications to more potent lymphocyte depleting agents or do not meet criteria to forgo induction. Based on increasing use at Temple University Hospital, we evaluated the appropriateness of use of basiliximab in the heart, lung, liver, and combined solid organ transplant populations.

Methods: This was a retrospective chart review of all patients admitted from January 2011 to June 2015 who received at least one dose of basiliximab for induction therapy for a nonrenal transplant. The primary objective was to determine the appropriate use of basiliximab in nonrenal transplant recipients as it relates to appropriate dosing, administration regimen, and patient selection criteria based on internal transplant protocols. At 1 year post-transplant, the secondary outcomes evaluated incidence of rejection, Hepatitis C recurrence in liver recipients only, malignancy, and patient survival.

Results: Of 324 patients, the first 59 were included in the study. Overall incidence of appropriate use was seen in 27/59 (45.8%) of patients in the total transplant population. Of those patients deemed inappropriate, the most frequent cause was inappropriate timing of therapy, seen in 18/59 (30.5%) patients, followed by protocol driven indication and inappropriate dosing, seen in 14/59 (23.7%) and 9/59 (15.3%) patients, respectively. 11/59 (18.6%) patients experienced rejection, 2/10 (20%) experienced a recurrence of Hepatitis C,

2/59 (3.4%) patients experienced post-transplant malignancy, and 1/59 (1.7%) patients died within 1 year post-transplant.

Conclusion: Our data showed there were deviations from basiliximab induction protocol in dosing, time of administration, and clinical indication in nonrenal transplant recipients. These results suggest a need to reassess adherence to the protocol. The implementation of a bar coding system would provide global communication of an ordered medication between physicians, pharmacy, and nursing, thus reducing protocol deviations and adverse events.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 2-279

Poster Title: Analysis of national health insurance formularies for treatment of hepatitis C virus infection

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Purpose: With the emergence of novel and highly efficacious direct-acting antivirals (DAAs) for treatment of hepatitis C virus (HCV) infection, it is crucial for physicians and pharmacists to understand the limitations of patients' private insurance coverage. Insurance companies may be reluctant to provide coverage for HCV treatment, due to the cost of these medications. Information regarding private insurance coverage for HCV treatment is lacking, and it is unclear which regimens are preferred by insurance companies. The purpose of this research is to provide insight into common limitations private insurance companies impose on HCV treatments via formulary analysis.

Methods: Focusing on treatment options for treatment-naïve patients with genotype 1 HCV, national private insurance formularies accessed online from January 2016 to May 2016 were examined to assess potential coverage limitations. Data from Kaiser was used to determine the top three national insurance companies by enrollment in each state. The following DAAs were included in the formulary analysis: daclatasvir, sofosbuvir, ledipasvir/sofosbuvir, simeprevir, telaprevir, boceprevir, elbasvir/grazoprevir, and ombitasvir/paritaprevir/ritonavir/dasabuvir. Formularies were assessed for the following parameters: preferred regimen designation, prior authorization requirement, tier location, quantity limit designation, specialty pharmacy designation, and year of last formulary update. HCV treatment guidelines from the time of review were consulted and compared with the results of the formulary analysis to determine if insurance companies' contained complete, preferred regimens.

Results: A total of 81 companies were identified, with 49 of the companies having accessible formularies. Forty-eight out of the 49 (98%) formularies analyzed had been updated for 2016. Overall, greater than 80% of the formularies denoted that DAAs required prior authorization, and over 75% of formularies explicitly classified these agents as specialty medications. Elbasvir/grazoprevir, telaprevir, boceprevir were found to be included in the fewest number of formularies; whereas, ledipasvir/sofosbuvir and sofosbuvir were found to be included in the most formularies. Ledipasvir/sofosbuvir was found to be the preferred, first-line, treatment regimen among available DAAs, but there was great variance between formularies when it came to information provided, parameters, and preferences.

Conclusion: In general, private health insurance formularies are easily accessible by an internet search, and they provide information, albeit limited, regarding their coverage of medications. From the information garnered as a result of formulary analysis, it is possible to draw conclusions and make predictions about which medications may be more easily obtained. Although the formularies evaluated offer some insight into coverage of HCV treatment options, it still remains unclear as to what specifications must be met by patients and healthcare providers in order for the patient to receive treatment with any of these medications.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 2-280

Poster Title: Quality assessment of pharmacist-managed warfarin therapy at Temple medicine group practice

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Purpose: Warfarin is a medication that requires routine monitoring of the international normalized ratio to make sure it is being used safe and effectively. In January 2015, the pharmacists at Temple Medicine Group Practice initiated a formal follow-up for patients missing international normalized ratio appointments. The purpose of this study was to compare the management of warfarin therapy before and after implementation of the formal follow-up

Methods: This study was a retrospective chart review of patients on warfarin who were actively followed by a pharmacist from January 2014 to December 2014 (before follow-up) and from January 2015 to December 2015 (after follow-up). Outcomes evaluated were: percentage of therapeutic international normalized ratio values, percentage of therapeutic international normalized ratios plus/minus 0.2, numbers of missed appointments, and number of patients having their international normalized ratios checked at least every four weeks.

Results: A total of 45 patients were included. Mean age was 61 and most patients were on warfarin for atrial fibrillation or history of venous thromboembolism. Percentage of therapeutic international normalized ratios was 49.9% in 2014 and 46.9% in 2015 (P= 0.33). Percentage of therapeutic international normalized ratios plus/minus 0.2 was 62.9% in 2014 and 60.3% in 2015 (p= 0.36). The number of missed appointments decreased from 6.6 to 5.1 (p=0.03) and international normalized ratios done at least every 4 weeks increased from 22% to 27% (p=0.41).

Conclusion: Percentage of therapeutic international normalized ratios were suboptimal and did not improved in 2015.

Submission Category: Pharmacokinetics

Submission Type: Evaluative Study

Session-Board Number: 2-281

Poster Title: Physiologically Based Pharmacokinetic Modeling Using SIMCYP Predicts Sertraline Exposure in Pregnant Patients

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Purpose: Sertraline is approved for the treatment of depression and is primarily metabolized by CYP2D6 and CYP3A4, and is also renally excreted. Activity of CYP2D6, CYP3A4, and glomerular filtration rate increase in pregnancy. This is expected to decrease exposure of sertraline and its therapeutic effect. Our objective is to predict exposure of sertraline during pregnancy using physiologically based pharmacokinetic (PBPK) modeling, so that necessary dose adjustments can be made in pregnant women.

Methods: Full PBPK modeling and simulations were conducted using SIMCYP V15 simulator. Data for physiochemical properties, absorption, distribution, metabolism, and elimination were obtained from published literature or from population prediction using SIMCYP. Sertraline exposure was evaluated in 10 virtual healthy patients using a single 100 mg dose over 72 hours. The model was then validated by evaluating the exposure of a single 100 mg dose over 120 hours in 10 independent virtual patients. Then using the virtual pregnant population in SIMCYP, simulations were conducted to determine sertraline plasma concentration time profiles at various gestational weeks.

Results: Models correctly assessed sertraline pharmacokinetics and accurately predicted sertraline exposure in both healthy volunteers and in the pregnant population. In the first observed study of a single 100 mg dose monitored over 72 hours, there was a 4.5% difference in the Tmax, a 9.5% difference in the Cmax, an -8.7% difference in the AUC, and an 8.1% difference in the Cl/F when compared to the model predictions. In the second study used to

validate the model, a single 100 mg dose monitored over 120 hours was seen to have a 9.9% difference in the Tmax, a 9.7% difference in the Cmax, a 0.207% difference in the AUC, and a -.207% difference in the Cl/F, when compared to the model predictions. In the simulated pregnant population, at 8-15 hours post dose, after the drug has reached steady state, the PBPK model predicted a decrease in the concentration: dose ratio of 27.8%. This is similar to the decreased reported concentration: dose ratio of 40% in a published study of 6 pregnant women on sertraline.

Conclusion: A new robust model was built and validated using single dose administration of 100 mg of sertraline in healthy volunteers. Dosing adjustments can be made after using the model to predict the exposure of the drug. This model can now be used to make predictions at steady state in pregnant patients to optimize therapeutic effects of the drug at various gestational ages to combat physiological changes that occur during pregnancy.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 2-282

Poster Title: Implementation of a pharmacist-based renal monitoring and dosing program in a community hospital: Outcomes one month later

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Purpose: Impairment in kidney function affects pharmacokinetic parameters such as renal drug elimination, which may result in suboptimal drug dosing. During a hospital stay, a patient's renal function may change due to disease state or kidney damage. Many medications have recommended doses specific to markers of kidney function to ensure its safe and efficacious use. A renal monitoring and dosage adjustment policy was implemented to facilitate pharmacist-based management of targeted medications in a community hospital.

Methods: A targeted list of medications that may warrant dose adjustment in patients with decreased renal function were defined with specific dosing guidelines for each medication. High risk patients who were more likely to require renal dose adjustments were determined based on age, serum creatinine, and calculated creatinine clearance. On a daily basis, pharmacists reviewed these patients through the electronic health record to evaluate the appropriateness of the dosing for targeted medications utilizing the estimated creatinine clearance calculated by the Cockcroft-Gault equation. Pharmacists also considered the indication for the medication, severity of illness, duration of medication use, and other markers of renal function such as blood urea nitrogen and urine output when assessing the medication dosage. A procedure was outlined through which pharmacists were able to directly adjust these medication orders automatically by protocol or through communication with the prescriber based on the specific medication if necessary based on the patient's renal function. Through the protocol pharmacists were also able to order serum creatinine levels to be drawn to ensure appropriate monitoring of the patient's renal function. The pharmacists documented the medications that were reviewed and any interventions made in the patient's electronic health record.

Results: In one month, a total of two-thousand two-hundred and sixty-eight medication orders were reviewed by pharmacists through the protocol. The most frequently reviewed

medications were famotidine, cefepime, and vancomycin which comprised approximately twenty percent, twelve percent, and eleven percent of all orders reviewed respectively. Of the twenty-nine medications included in the protocol, six medications were not ordered for patients within this time frame, including amikacin, cefotaxime, pamidronate, streptomycin, tobramycin, and zoledronic acid. Of the medication orders that were reviewed, two-thousand and fifty-five orders were appropriately dosed based on the patient's renal function. A total of one-hundred and ninety medication doses were changed by pharmacists through the protocol; one-hundred and seventeen doses were decreased and seventy-three doses were increased. Of the doses that were adjusted, approximately fifty-six percent were changed on the first dose of the drug that was ordered for the patient and approximately forty-four percent were changed on a later dose of the drug. The dose of a given medication was changed through the protocol multiple times within a single patient encounter for twenty-four patients. Prescribers opted-out of the pharmacist renal dosing protocol for twenty-three drug orders during the month.

Conclusion: A pharmacist-based renal dosing protocol was successfully implemented in a community hospital, allowing medication orders to be reviewed through a systematic approach. Patient-specific characteristics were used to inform the pharmacist if medication dosing changes were necessary. Numerous dosing changes were made during the first month after protocol implementation, proving the impact pharmacists can have on renal medication dosing.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 2-283

Poster Title: Assessing off-label medication use in the ICU that diverges from guideline recommendations

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Purpose: Over 40% of medications administered in the intensive care unit (ICU) are off-label. Off-label medication use signifies that the US Food and Drug Administration (FDA) does not approve of specific indications, doses, routes, or populations. Guidelines and consensus statements function to provide an evidence evaluation that advises clinicians on safe and effective off-label medication use; however, scenarios exist in clinical practice that are inconsistent with guideline recommendations. The aim of this evaluation is to determine the frequency of off-label medication use without support by guidelines and consensus statement recommendations and explore the reasons behind these inconsistencies.

Methods: Off-label medication use for indications in the medical ICU was assessed in three academic centers over a three-month period. Separate PubMed and National Guideline Clearinghouse searches were conducted to find relevant guidelines or consensus statements on the identified off-label indications. Following a review by two individuals (ST, BS), medication uses that were found to be inconsistent with recommendations were included in this evaluation. These recommendations were evaluated for explanations why guidelines did not support use in practice. These included the potential for adverse drug reactions, availability of superior agents, or lack of efficacy.

Results: One hundred forty-four off-label medication indications were identified as having 253 guidelines with recommendations. Eleven percent (27/253) of guidelines or consensus statements contained recommendations which were inconsistent with the off-label medication use in practice. Of the recommendations that provided grading, 33% (7/21) of medications had

a strong recommendation against its use for the indication. Some guidelines cited multiple reasons for advising against the use of the medication indication. The most common reason for not recommending an off-label medication was due to the lack of clinical efficacy for the medication for the indication (37%, 10/27). Other reasons included the potential for adverse drug reactions (30%, 8/27), the lack of evidence for providing a recommendation (22%, 6/27), the availability of superior agents (7%, 2/27), and other miscellaneous reasons (15%, 4/27). Of interest, 25% (6/24) of off-label medications indications also had conflicting guidelines that did support the off-label use.

Conclusion: Use of unsupported off-label indications should be heavily weighed for risks versus benefits as a majority of indications show a lack of efficacy and increase the risk for adverse drug reactions. This evaluation also recommends that clinicians look at multiple guidelines and consensus statements in making decisions as conflicting evidence may be identified.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 2-284

Poster Title: The role of student pharmacists in evaluating drug therapy problems in dual diagnosis patients

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Purpose: Patients with dual diagnosis are vulnerable to drug therapy problems. Drug therapy problems (DTPs) are defined as events involving medication therapies that result in undesirable effects for the patient, interfere with goals of therapy, and require professional judgment to resolve. Pharmacists play an important role in identifying and resolving DTPs, and are underutilized when working with dual diagnosis. The objective of this analysis is to describe common DTPs found in a dual diagnosis patient population receiving services at a drug and alcohol treatment program in Pittsburgh, Pennsylvania. Further, we aim to determine the prevalence of abusable substances in this population.

Methods: The pharmacy team consisted of two fourth year student pharmacists on an advanced practice pharmacy experience (APPE) and a pharmacist preceptor. In this quality improvement project, patients at the Salvation Army Harbor Light Center were included if they were seen by the pharmacy team for medication therapy management and medication education between May 9, 2016 to July 22, 2016. DTPs from the visits were identified and analyzed on the basis of type and rate of occurrence. Medications included as “abusable” included gabapentin, quetiapine, and buproprion. Data was analyzed using descriptive statistics.

Results: A total of 17 patients were included with 51 drug therapy problems identified (average 3 DTP/pt). The most prevalent drug therapy problem was noncompliance (71%). Other common drug therapy problems were lack of understanding (65%), needs additional drug therapy (53%), and adverse drug event (29%). Patients were on an average of 6 medications (range 1-10) Common concomitant psychiatric disorders of these dual diagnosis patients included

depression (59%), bipolar disorder (59%), and anxiety (35%). Out of the 17 patients seen by the pharmacy team, 53% were prescribed potentially abusable medicines (gabapentin, quetiapine, bupropion).

Conclusion: Based on the results of this small population, patients with dual diagnosis have important DTPs and can benefit from further pharmacist involvement and additional medical attention. Care should be taken to adequately educate these patients on their medications, their disease states, and the importance medication adherence. They should also be made aware of various medication adherence tools including mobile applications, alarms, pillboxes, and dose packages in order to improve medication compliance. The high rate of potentially abusable medications in this population is quite worrisome.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 2-285

Poster Title: Proton Pump Inhibitor Adjuvant Combinations for the Management of Typical and Extraesophageal Gastroesophageal Reflux Disease: A Systematic Review

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Purpose: Gastroesophageal reflux disease (GERD) is the most common principal gastroenterological diagnosis in the United States, manifesting as a broad spectrum of disease with varying typical and extraesophageal presentations. Treatment for GERD classically encompasses management strategies beginning with lifestyle modifications then escalating to pharmacologic, and finally, surgical intervention. Proton pump inhibitors (PPIs), remain the mainstay of GERD treatment although approximately 40% of patients are refractory to PPIs alone, inducing the need for more aggressive pharmaceutical treatment modalities. The purpose of this systematic review is to assess objective and subjective GERD outcomes of PPI adjuvant combinations compared to PPI treatment alone.

Methods: Databases of MEDLINE, EMBASE, and Cochrane, were searched from 1946 through May 20, 2016 using prespecified search terms and key words including but not limited to: gastroesophageal reflux disease, extraesophageal reflux, combinations, antacids, H2 receptor antagonists, proton pump inhibitors, muscle relaxants, cytoprotective barrier agents, and pain modulators. We applied the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines for systematic reviews and developed PICO (population, intervention, comparison, and outcome) questions using GRADE (grading of recommendations, assessment, development and evaluation). Abstracts were screened for the following inclusion requirements: randomized clinical trials, nonrandomized intervention studies, observational studies, age ≥ 18 years, humans, full-text articles, and English language. All abstracts were reviewed independently by two reviewers using an online reference management system (DistillerSR) until the reviewers reached adequate agreement (kappa score ≥0.90). Full text

articles of the selected abstracts required either a typical or extraesophageal GERD patient population with pharmacologic PPI adjuvant combination intervention and a PPI comparator arm.

Results: Literature searches using the criteria described above yielded 7084 references and 49 articles were deemed appropriate for further review. Four studies were excluded upon full text review leaving 45 articles for inclusion. Of the 45 articles, there were three GERD population subsets: 30 typical reflux, 8 extraesopahgeal reflux, and 7 mixed typical and extraesophageal reflux. Additionally a total of 24 studied a PPI refractory population defined as troublesome symptoms despite once daily PPI and the other 21 articles did not specify. The 45 articles addressed five therapeutic mechanisms of action including: antisecratory acid suppression (8), prokinetic motility (22), transient lower esophageal sphincter relaxation inhibition (8), cytoprotective barrier protection (5), and pain modulation (2). A total of 37 investigated some form of quality-of-life measure utilizing 20 different scales with the most frequent scales utilized being the frequency scale for the symptoms of GERD (7) and gastrointestinal symptom rating scale (5). The combination adjuvant treatment group as a whole demonstrated significant quality-of-life improvement over PPI alone in 15/37 (41%) studies. A total of 12 articles investigated total esophageal pH % time < 4 of which overall the addition of an adjuvant agent resulted in 6/12 (50%) demonstrating statistically significant improvements.

Conclusion: Currently in the literature there exists much heterogeneity in patient populations studied, quality-of-life symptom questionnaires, and objective pH measures used to evaluate therapeutic success of GERD. Adjunctive combinations of pharmacologic agents known to combat GERD may play a role in aiding patients intolerant or unwilling to elect anti-reflux surgery. More specifically, any adjunctive agent that may negate reflux symptoms could be helpful to those with difficult-to-treat subtypes of GERD such as refractory and extraesophageal manifestations.

Submission Category: Pain Management

Submission Type: Descriptive Report

Session-Board Number: 2-286

Poster Title: Assessing the impact of initiating an intravenous narcotic dose rounding program on patient safety and cost saving benefits in a large academic hospital setting

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Purpose: Initiating a dose rounding program for narcotic intravenous medications, specifically hydromorphone, is a program intended to prevent errors, improve patient safety, reduce wasted drug product and nursing labor, resulting in a net cost savings to the health system. This study was initiated to evaluate the potential benefits of an intravenous hydromorphone dose rounding protocol University of Pittsburgh Medical Center Presbyterian Hospital.

Methods: Patient and medication dosing data was collected using QUESTVISTA and CERNER to quantify the distribution of doses. Data was reviewed and categorized to determine how many doses were appropriate candidates for future dose rounding considerations. Pharmacy team members at University of Pittsburgh Medical Center Presbyterian Hospital and the University of Pittsburgh Medical Center Pharmacy and Therapeutics committee determined ideal dosage ranges and corresponding appropriate rounded doses of based on clinical expertise. The rounding parameters approved by the committee included: dosing ranges 0-0.3 mg rounded to 0.25mg, 0.31-0.6 mg rounded to 0.5mg, 0.61-0.8 mg rounded to 0.75mg, 0.81-0.19 mg rounded to 1 mg, 1.2-1.75 mg rounded to 1.5mg, and 1.76-2.4mg rounded to 2mg. The primary endpoint of the analysis was to determine the percentage of doses which required nurse wasting. The secondary was calculated estimated cost savings from dose rounding strategies based on production of large batched doses using automated technology, reducing pharmacy labor as well as reduction in potential risk for error. There would still be potential patient populations not associated with the dose rounding program, including doses for the Post-Anesthesia Care Unit and any frail, elderly patients who are older than 75 years of age and also weight less than 60 kilograms.

Results: The data showed that out of 160,433 prescribed and administered doses of intravenous hydromorphone, 134,108 doses (84%) of all doses were partial doses requiring waste. 26,325 doses (16%), were dosed as whole syringe volumes. Nurse time wasting a dose is estimated at 3-5 minutes per dose, averaging at 4 minutes per dose for a total of 8940 hours per year spent wasting doses. The numbers and percentages of rounded doses of the total 158,327 doses were 85,592 doses (54%) rounded to 0.25mg, 43,680 (27.6%) rounded to 0.5mg, 1,183 (0.8%) rounded to 0.75mg, 23,556 (14.9) rounded to 1mg, 2,184 (1.4) rounded to 1.5mg, and 2,132 (1.3) rounded to 2mg. Notable excluded groups were patients greater than 75 years and less than 60 kg, and patients from the Post-Anesthesia Care Unit.

Conclusion: University of Pittsburgh Medical Center Presbyterian Hospital had to waste partial doses of hydromorphone after 84% of annual intravenous hydromorphone administrations. By rounding intravenous hydromorphone doses to standardized preapproved doses compared to previous practices of allowing prescriber preference, the hospital will be able to decrease medication errors and improving patient safety while simultaneously reducing costs to the health system.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 2-287

Poster Title: Analysis of Tramadol Use in A Pediatric Tertiary Care Population

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Purpose: Tramadol, a centrally acting synthetic opioid analgesic, is not currently FDA-approved for use in the pediatric population, although it has been used for post-operative pain, most notably after tonsillectomy or adenoidectomy. An FDA Med Safety Communication in September 2015 highlighted intent to evaluate possible risks in children, especially in ultra-rapid metabolizers, who may generate higher plasma O-desmethyltramadol concentrations, increasing risk of respiratory depression. The purpose of this project was to determine frequency of tramadol use and analyze patterns of prescribing at the Children's Hospital of Pittsburgh of UPMC (CHP).

Methods: This project was approved by the University of Pittsburgh Medical Center (UPMC) Quality Improvement Review Committee. A retrospective chart review was conducted in patients identified from electronic health records ages ≤ 17 years treated with 1 or more tramadol doses during hospitalization during a 12 month period. Patient data collection included demographics (age, weight, disease state, MD prescribing service), dosage regimen (dose, frequency, duration of treatment), stated indication for prescribing, use of other analgesics, and medication allergy.

Results: A total of 70 pediatric patients were identified. Median patient age was 15 years, with age distribution of 11 children ≤12 years (16%) and 44 (63%) ages 12-16 years. The most frequent physician prescribing services were Pain Management Services (49% orders, n=34) and Rheumatology Services (23%, n=16). Tramadol was prescribed "as needed" rather than as a scheduled analgesic agent (81%, n= 57). Notable was tramadol use for non-surgical pain

management (86%, n=60), rather than following surgical procedures. Median single doses were slightly higher in patients ≤ 12 years vs. patients 12 to 17 years (1.1 mg/kg vs. 0.8 mg/kg).

Conclusion: A recent FDA warning reported intent to evaluate tramadol use, highlighting risk of respiratory depression in post-operative pediatric settings such as tonsillectomy, possibly due to ultra-rapid drug metabolism. However, in this tertiary pediatric institution, tramadol was most frequently prescribed as opioid alternatives for non-surgical pain management. Greatest drug use appeared more in the setting of chronic pain management, as demonstrated by 2 predominant prescribing services and utilized an “as needed” frequency for dose titration. This evaluation confirms tramadol prescribing occurs across pediatric ages, with most common use in the adolescent population and in the setting of chronic pain conditions.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 2-288

Poster Title: Impact of selective serotonin reuptake inhibitor (SSRI) treatment on major adverse coronary event incidence in patients receiving dual antiplatelet therapy after percutaneous coronary intervention

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Purpose: Dual antiplatelet therapy, consisting of a P2Y12 inhibitor and aspirin, is prescribed after percutaneous coronary intervention (PCI) to prevent major adverse cardiac events (MACE). Patients receiving percutaneous coronary intervention often have comorbid depression, which is associated with poorer cardiac prognosis. Selective serotonin reuptake inhibitors (SSRIs), which are first line pharmacotherapy for depression, inhibit the uptake of serotonin into platelets, which may reduce platelet aggregation. The aim of this study was to assess if the use of (SSRIs) in this patient population affected MACE incidence.

Methods: In this retrospective study, eligible patients were identified by ICD-9 code and outpatient procedure codes for percutaneous coronary intervention during the study period of July 1, 2010 to December 31, 2013 at the University of Pittsburgh Medical Center (UPMC) Presbyterian hospital. Antidepressant use was identified by inpatient hospital administration charges and the primary endpoint was MACE incidence at 1 year. To avoid confounding by P2Y12 inhibitor, we only included patients treated with clopidogrel, which was the most common agent in its class during this time period. Depression is an established risk factor for coronary events, so to prevent reversal causality, we used patients receiving the non-SSRI antidepressant mirtazapine as our comparator group. Mirtazapine has no appreciable effect on the serotonin transporter and is not known to be cardio-protective or cardiotoxic. MACE was defined as a composite outcome of cardiovascular death, non-fatal MI, stroke, and target vessel revascularization. Student's t-test and chi square test with an alpha of 0.05 were used to

analyze baseline characteristics and perform crude analysis of MACE incidence by medication group. A binary logistic regression model was used to adjust for clinical covariates.

Results: A total of 875 patients were included (SSRI n=812, mirtazapine n=63) and one-year major adverse coronary event (MACE) incidence was 21.7% (n=190). In crude analysis, selective serotonin reuptake inhibitor (SSRI) patients had reduced odds of major adverse coronary event (MACE) (OR 0.49, 95% CI 0.28-0.84, p=0.008). In a logistic regression model adjusted for age, sex, diabetes, heart failure, dyslipidemia, stroke, kidney disease, and valvular disease, SSRI use was suggestive of a protective effect although the association was not statistically significant (OR 0.58, 95% CI 0.32-1.03, p=0.06). In a secondary analysis excluding patients on the CYP2C19 inhibitors fluoxetine and fluvoxamine (n=92), SSRIs were protective in crude (OR 0.48, 95% CI 0.28-0.83, p=0.01) and adjusted analyses (OR 0.56, 95% CI 0.31-0.99, p=0.05).

Conclusion: With the exclusion of fluoxetine and fluvoxamine from the adjusted analysis, selective serotonin reuptake inhibitors showed a protective major adverse coronary event (MACE) effect in this patient population. Further studies will be done to assess long term and short-term effects on major adverse coronary event (MACE) incidence.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 2-289

Poster Title: Impact of SSRI treatment on bleeding outcomes in patients receiving dual antiplatelet therapy after percutaneous coronary intervention

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Purpose: Dual antiplatelet therapy, consisting of a P2Y12 inhibitor and aspirin, is effective for prevention of ischemic events in patients who undergo a percutaneous intervention (PCI) but increases the risk of bleeding. Selective Serotonin Reuptake Inhibitors are frequently used for affective and anxiety disorders that commonly co-occur with coronary artery disease. An increased risk of bleed in patients taking SSRIs has been demonstrated in some patient populations but has not been adequately examined in the context of dual antiplatelet therapy. Serotonin is a mediator of platelet aggregation, and SSRIs inhibit the uptake of serotonin by platelets thus potentially increasing bleeding risk.

Methods: This study was a retrospective analysis of the electronic medical record system at the University of Pittsburgh Medical Center (UPMC) Presbyterian. Patients were identified by ICD-9 code for PCI procedure or outpatient code. Patient antidepressant use and non-use was determined by inpatient medication charge codes for administration. Only patients taking clopidogrel were included in the analysis. The primary endpoint was any bleed within 30 days of the PCI procedure. The secondary endpoint was any bleed within one year of the procedure. Clinically significant bleeds were defined using a modified TIMI and GUSTO criteria. Baseline characteristics were analyzed using the student's t-test and chi square test. A multinomial logistic regression model was used to assess the incidence of bleed at 30 days and one year with a significant P-value of less than 0.05

Results: Of 6874 patients who underwent PCI from July 2010 to December 2013 started on dual antiplatelet therapy with clopidogrel, 6062 patients were not on an SSRI and 812 patients were

on an SSRI. In a model of 30-day bleed incidence, adjusted for age, race, gender, and the history of the following: hypertension, dyslipidemia, heart failure, chronic obstructive pulmonary disease, chronic kidney disease, prior coronary artery bypass graft, and prior valve replacement, there was a statistically significant incidence of bleeding events in 1 year in the SSRI group p=0.033 (OR 1.21; 1.02-1.44). There was no difference in bleeding incidence at 30 days p=0.58 (OR 1.09; 0.81-1.45).

Conclusion: Selective Serotonin Reuptake Inhibitors were not associated with additional bleed incidence in the 30-day post-PCI period. At one year, there was a 20% greater incidence of bleeding events in the SSRI group, suggesting additional caution and risk to using SSRIs in patients already at a higher risk of bleed on dual antiplatelet therapy.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 2-290

Poster Title: Weight-Based Antimicrobial Agents in Obese Patients: A Focused Literature Review of Pharmacokinetic and Clinical Data Across Obesity Classifications

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Purpose: The prevalence of obesity has shown an increasing trend in American adults from 1999 through 2014 according to the US Department of Health and Human Services. Antimicrobials that are dosed on a milligram per kilogram (mg/kg) basis can have altered pharmacokinetic (PK) parameters in the obese that may increase toxicity or affect outcomes. This literature evaluation was conducted to determine relevant gaps in data regarding antimicrobial dosing in the obese.

Methods: A systematic review of current literature was conducted using PubMed and Ovid MEDLINE databases, and ClinicalTrials.gov was queried to assess ongoing or future studies. The antimicrobial agents evaluated included: Colistin/Colistimethate, Daptomycin, Quinupristin-Dalfopristin, Sulfamethoxazole-Trimethoprim, Voriconazole, and Acyclovir. Studies were evaluated and grouped based on two categories: case reports and clinical trials versus PK studies. Obesity classifications among subjects were evaluated in clinical and PK studies (BMI-based Class I, II, and III obesity or percentage of ideal body weight). PK studies were specifically evaluated based on parameters measured. Data from an academic medical center that stratified patients by BMI were also evaluated for obesity prevalence (BMI ≥ 30).

Results: Fourteen studies, comprising 357 subjects, were identified across all antimicrobial agents. Of these, 6 were PK studies assessing Daptomycin (n=3), Voriconazole, and Acyclovir. All PK studies identified in obese patient populations evaluated standard PK parameters (Cmax, CL, Vd) with the exception of AUC, Tmax and Half-life (T½), which were not evaluated in all 6 studies. Voriconazole lacked any data regarding T½ in the obese population. Quinupristin-Dalfopristin, Sulfamethoxazole-Trimethoprim, and Colistin/Colistimethate lacked any published

PK studies in any obesity classification. In all 14 studies the majority of patients (n=190; 53.2%) were enrolled in Daptomycin studies (n=6), while Sulfamethoxazole-Trimethoprim had no studies involving obese patients. Of the overweight/obese patients evaluated across all studies, overweight patients accounted for 11.2% (n=40); Class I obesity accounted for 38.3% (n=137); Class II obesity accounted for 24.9% (n=89); and Class III/morbid obesity accounted for 25.5% (n=91). Studies of Quinupristin-Dalfopristin only included 11 Class I obese patients. Over half of the studies (64.3%) involved either Daptomycin 42.9% (n=6) or Voriconazole 21.4% (n=3). Sulfamethoxazole-Trimethoprim, Quinupristin-Dalfopristin, and Voriconazole lacked any data in Class III/morbid obesity. Additionally, BMI data collected from an academic medical center between April 2015-March 2016 found that 13.8% (n=42) of obese patients had a BMI ≥ 40kg/m2

Conclusion: Antimicrobial PK studies in the overweight and obese were dramatically lacking, even as obesity prevalence increases. In those few studies conducted, obesity classifications were grouped inconsistently, which may have led to bias by potentially disguising significant PK or outcome related differences. Additionally, all PK studies were conducted using sample collection schemes for normal weight patients, which may present a biased picture of PK parameters in the obese. As the prevalence of obesity continues to increases more studies in this population are warranted along with consistent classifications.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-291

Poster Title: Evaluation of intravenous minocycline utilization at a community teaching hospital

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Purpose: The use of intravenous (IV) minocycline has garnered interest due to its antimicrobial activity against gram-positive and gram-negative bacteria, including multidrug resistant (MDR) Acinetobacter infections. Atlanticare Regional Medical Center (ARMC) added IV minocycline to formulary in July 2015 for the treatment of MDR infections. We conducted a medication use evaluation of patients who have received IV minocycline at ARMC. The objective of this evaluation is to assess each case for appropriate antibiotic utilization and outcomes as a function of our antimicrobial stewardship program.

Methods: Patients included in our study were those admitted to ARMC who received at least one dose of IV minocycline between July 2015 and July 2016. Patients were identified by a report generated from Discern Analytics in Cerner. A retrospective electronic medical record review was performed and data collection included demographics, pertinent past medical history, level of care, length of stay (LOS), source of infection, culture and susceptibilities, and concurrent infections. The IV minocycline dose and duration as well as previous and concomitant antibiotic therapies were recorded. Progress notes were examined to assess the rationale for IV minocycline, and both clinical and microbiologic outcomes were assessed. Clinical cure was determined by investigators based on clinical findings consistent with infection improvement. Microbiologic cure was defined as subsequent negative cultures in evaluable patients. Appropriate antibiotic utilization was determined by investigators on a case-by-case basis considering cultures, susceptibilities, infection type, and past medical history. Antibiotic dose and duration was documented as well as the employment of combination therapy for a given infection. The Institutional Review Board at ARMC granted approval for this project.

Results: Five patients received at least one dose of IV minocycline in our study. Patients had an average LOS of 19 days (range 5-47 days). The average age was 58 (range 28-79 years) and no patients were considered immunocompromised. Acinetobacter was cultured in three patients with two having positive sputum cultures and pneumonia, and one patient with bacteremia confirmed by positive blood cultures. Chryseobacterium was cultured in the blood of one patient. Only two doses of IV minocycline were given empirically for one patient with a wound infection. Clinical cure was demonstrated in four of four patients considered evaluable. Microbiologic cure was observed in all four of these patients, including two bacteremias (one Acinetobacter, one Chryseobacterium) and two pneumonia patients both with Acinetobacter. The most frequent dosing regimen of IV minocycline was 100 mg twice daily with only two patients receiving a 200 mg loading dose. The use of IV minocycline was deemed appropriate in all five patients, although the dosing was considered suboptimal at 100 mg twice daily in four cases. The duration of IV minocycline therapy ranged from 1 to 7 days. The employment of combination therapy was considered underutilized with IV polymyxin B prescribed in one patient.

Conclusion: Intravenous minocycline has been found to be effective for treating patients with MDR infections. Our evaluation demonstrated the value of IV minocycline for Acinetobacter infections in a small number of patients. Our antimicrobial stewardship program recognizes a need for education to ensure dose optimization and consideration for combination therapy when treating MDR infections involving IV minocycline. Further study is warranted to determine the ideal antimicrobial treatment regimen for MDR infections, including Acinetobacter, at our institution.

Submission Category: Infectious Diseases

Submission Type: Case Report

Session-Board Number: 2-292

Poster Title: Telavancin use in patients with a documented vancomycin allergy

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Purpose: Telavancin is a semisynthetic lipoglycopeptide antibiotic and a derivative of vancomycin. Telavancin is indicated for the treatment of complicated skin and skin structure infections and hospital-acquired and ventilator-associated bacterial pneumonia caused by susceptible Gram-positive bacteria in adult patients. Due to its similar glycopeptide structure, there is concern of cross-reactivity with telavancin in patients who have a documented vancomycin allergy. This report describes three patients with documented vancomycin allergies who were safely administered telavancin for the treatment of Gram-positive infections.
Patient 1 was a 42-year-old female weighing 90 kg who experienced respiratory distress requiring treatment following administration of intravenous (IV) vancomycin in 2000. She presented to the emergency department (ED) in 2016 with complaints of generalized pain secondary to sickle cell crisis. She was diagnosed with methicillin-resistant Staphylococcus aureus (MRSA) bacteremia, multidrug resistant Enterobacter cloacae bacteremia, and native mitral valve endocarditis. Her documented antibiotic allergies include ceftriaxone, erythromycin, and vancomycin. Patient 1 was initiated on daptomycin 6 mg per kg. Blood cultures failed to clear on daptomycin despite an increase in treatment dose to 10 mg per kg, the addition of gentamicin, and removal of an infected port catheter. Telavancin 875 mg (9.7 mg per kg) was initiated. The patient was premedicated with diphenhydramine 25 mg IV before telavancin doses. Telavancin was tolerated for the course of therapy without any adverse reactions of infusion related events.
Patient 2 was a 49-year-old female weighing 54 kg who presented to the ED with complaints of abdominal pain status post mechanical injury. She had received vancomycin in the past and developed generalized itching, which resolved after the infusion rate was decreased. After

premedication with IV diphenhydramine 25 mg, patient informed consent was obtained to re-challenge with IV vancomycin at a slower infusion rate. She still experienced a reaction and pruritus with vancomycin infusion. Following the reaction to vancomycin, Patient 2 was switched to telavancin 500 mg (9.25 mg per kg), and no adverse events were reported throughout the 5 day course of therapy.

Patient 3 was a 30-year-old female who presented to the ED from her provider's office with a persistent right foot infection. She weighed 120 kg and had a history of diabetic ulcers that resulted in the amputation of the left foot. She had documentation of an allergic reaction to vancomycin during a previous admission. Wound cultures of the right foot revealed MRSA and Streptococcus agalactiae. She was treated with piperacillin/tazobactam 3.375 g IV every eight hours and telavancin 750 mg IV daily (6.25 mg per kg). Two doses of telavancin were administered without adverse events or reactions. Patient 3 was discharged on piperacillin/tazobactam 3.375 g IV every eight hours and with instructions to follow up with outpatient wound care.

Further reports evaluating telavancin as an alternative in patients with a vancomycin allergy are needed to confirm a lack of cross reactivity. These three patients had documented vancomycin allergies in their medical records, although skin testing and the detection of antibodies were not reported to confirm a true vancomycin allergy. This case series represents a real world scenario with documented patient allergies encountered at a community teaching hospital.

Methods:

Results:

Conclusion:

Submission Category: Infectious Diseases

Submission Type: Case Report

Session-Board Number: 2-293

Poster Title: Use of oritavancin in a patient with a documented vancomycin allergy

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Purpose: Oritavancin is a lipoglycopeptide antibiotic derived from a glycopeptide structure closely related to vancomycin, but with significant differences in pharmacology and activity. Oritavancin is indicated for the treatment of acute bacterial skin and skin structure infections (ABSSSI), and treatment consists of a single 1200 mg intravenous (IV) infusion over 3 hours. The structural similarities between oritavancin and vancomycin may pose a possible risk of cross-sensitivity in patients with a vancomycin allergy. The following case report describes the use of oritavancin for the treatment of cellulitis in a patient with a documented vancomycin allergy. A 31 year old female with a past medical history of intravenous drug abuse (IVDA) was admitted to the emergency department (ED) with a chief complaint of lower right leg pain and swelling that had progressively worsened over four days. Upon arrival, the patient was afebrile and normotensive. She was diagnosed with an ABSSSI on her right leg due to IVDA. At our institution, vancomycin is typically initiated in patients that present with cellulitis who are not considered candidates for oral antibiotic therapy. The patient was not a candidate for vancomycin because she had previously experienced an allergic reaction to vancomycin, which resulted in shortness of breath, hives, and a large bilateral rash on her arms and legs. The infectious disease physician consulted pharmacy and a decision was made to administer oritavancin due to concerns of noncompliance with oral antibiotics and a prior history of cellulitis infections. During the 3-hour infusion, the patient was monitored closely for any hypersensitivity reaction or adverse effects to oritavancin. It was noted that the drug was well tolerated and the patient did not experience any adverse reactions. The patient was subsequently discharged from the ED with a follow-up appointment with an infectious disease physician. Although this vancomycin allergic patient tolerated oritavancin, we did not have

extensive evidence to validate whether this was a true vancomycin allergy. Published data is lacking regarding the cross-sensitivity between oritavancin and vancomycin and this case illustrates a real world scenario with a pragmatic approach where oritavancin was administered successfully and prevented a hospital admission. Further studies are warranted to evaluate the risk of cross-sensitivity between these antibiotics.

Methods:

Results:

Conclusion:

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 2-294

Poster Title: Efficacy of default electrolyte selection for initial parenteral nutrition order

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Purpose: Patients receiving default electrolytes in their parenteral nutrition may be at risk for electrolyte abnormalities as they are not receiving individualized amounts, potentially leading to an increase in IV supplementation of individual electrolytes. The purpose of this study is to evaluate the need for boluses of IV electrolytes in patients receiving institution-specific, default electrolytes (Standard: calcium gluconate 9.6 g, magnesium sulfate 10 g, potassium chloride 40 mEq, potassium phosphate 15 mmol, sodium chloride 70 mEq; Renal: calcium gluconate 9.6 g, sodium chloride 20 mEq) as compared to those that did not receive default electrolytes in parenteral nutrition.

Methods: The Institutional Review Board approved this retrospective study. All adult patients admitted to Cooper University Hospital between January 1, 2013 and July 15, 2016 who received parenteral nutrition were included and only their first encounter with parenteral nutrition was recorded. Patients were excluded if they were less than 18 years old, pregnant, had an incomplete medical record, were receiving concomitant enteral nutrition, or experienced refeeding syndrome. Of the 476 patients that were included, 374 received default electrolytes and 102 did not receive default electrolytes. Their electronic medical record was reviewed for sources of IV electrolytes (included potassium chloride, potassium phosphate, magnesium sulfate, sodium phosphate, calcium gluconate and calcium chloride) in addition to their parenteral nutrition during day 1 and day 2 of parenteral nutrition. The primary outcome was the need for IV electrolyte bolus supplementation during day 1 of parenteral nutrition and was analyzed using the chi-square test and logistic regression to control for confounders. The secondary outcomes included need for IV electrolyte bolus supplementation during day 2 and

specific IV electrolyte supplementation required during day 1 and day 2 of parenteral nutrition. The secondary outcomes were analyzed using the chi-square test.

Results: The primary outcome, need for IV electrolyte bolus supplementation during day 1 of parenteral nutrition, was 14 percent greater in patients who received default electrolytes as compared to those that did not receive default electrolytes (56.42 percent vs. 42.16 percent, relative risk 1.34, P equals 0.0105). After a multivariate analysis of effect of default electrolyte order on requirement of IV electrolyte supplementation controlling for confounders, the difference between the two groups was still found to be significant (odds ratio 1.776, 95 percent confidence interval, 1.141 to 2.766, P equals 0.0110). The secondary endpoints of need for potassium chloride during day 1 (30.21 percent vs. 17.65 percent, P equals 0.0118) and need for sodium phosphate supplementation during day 2 (15.51 percent vs. 7.84 percent, P equals 0.0471) were also significant.

Conclusion: Ordering our institution-specific, default electrolytes in parenteral nutrition results in a greater need for IV electrolyte supplementation. The current default provision of potassium and phosphorous at our institution may be reconsidered due to the significant increase in IV supplementation required for these electrolytes.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-295

Poster Title: Treatment of urinary tract infections in a community hospital pediatric emergency department

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Purpose: Urinary tract infections (UTIs) are one of the most common infections that occur in the pediatric population. In recent years, antibiotic resistance has been increasing resulting in pediatric UTIs that are more difficult to treat. The purpose of this study was to establish the foundation for a pediatric antimicrobial stewardship program via retrospective analysis of UTI treatment at a community hospital. Implementation of such a program will result in prevention of unnecessary antibiotics, ensure appropriate drug selection and dosing, and improve patient outcomes.

Methods: After gaining approval from the IRB, a retrospective chart review of all pediatric patients diagnosed with a urinary tract infection (UTI) in the previous year was performed. The appropriateness of the dose and choice of initial and discharge antibiotics was analyzed for each case. The primary reference used for determining appropriateness of the dose and spectrum of coverage was the Harriet Lane Handbook. Upon the return of cultures at day three, the continued appropriateness of discharge antibiotics was assessed. It was also recorded if a change in discharge antibiotics was made based on the availability of cultures and susceptibilities.

Results: In one year, 51 patients were treated for UTI at this community hospital. According to the Harriet Lane Handbook, 55 percent of patients received appropriate antibiotics based on the dosage or coverage of typical causative organisms. Only 36 percent of patients received appropriate antibiotics upon discharge. At the time of evaluation, 45 (88 percent) patients had a urine culture performed and out of the 45 patients who were given one, 57 percent had

positive cultures by day three. Out of 26 patients with positive urine cultures, 6 (23 percent) were now considered to be taking inappropriate antibiotics and only 4 of those patients were switched to a medication that the cultured organism was susceptible to. Out of 19 patients that had negative urine culture results at day three, zero patients had documentation of a call to the family members telling them that they no longer need to continue taking the full course of antibiotics they were originally prescribed. Additionally, nearly half of all orders (47 percent) were automatically verified by the computer system as compared to being verified by a pharmacist prior to dispensing.

Conclusion: The results of this study indicate the necessity of an antimicrobial stewardship program for the pediatric population. The authors propose several recommendations to establish the foundation of antimicrobial stewardship practices. The first recommendation is to remove computer automated verification of antimicrobials. A urine culture at presentation should be standardized for all suspected UTIs. When cultures are finalized the pharmacist should call the patient's family, adjust antibiotics accordingly, and document the intervention. Similarly, if cultures return negative, the family should be contacted and antibiotics discontinued. Implementation of these recommendations provides the beginning of pediatric antimicrobial stewardship practices at this institution.

Submission Category: Clinical Services Management

Submission Type: Descriptive Report

Session-Board Number: 2-296

Poster Title: Determination of the clinical impact of a dedicated transplant pharmacy service

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Purpose: We hope to determine the impact on patient safety, continuity of care, and inpatient workload for a dedicated transplant service compared to baseline for inpatient service. In addition, we want to determine the value of a pharmacist in a transplant clinic.

Methods: Baseline includes data from one donor and recipient pair managed by the fragmented service. The following month, a dedicated pharmacy service was implemented when a pharmacy student was on solid organ transplant rotation. During this time, we collected data from two donor and recipient pairs and one recipient from a cadaveric donor. Patient safety was compared using pharmacy intervention documentation and the associated patient outcomes that were recorded in the baseline period versus the dedicated service period. We also compared cost savings from pharmacy interventions. For inpatient workload, we compared the time used for transplant patient care activities, including rounding, counseling, and documentation in the medical record, as well as the number of notes written. Additionally, a satisfaction survey was distributed to transplant providers managing all of our study patients to quantify the value of the transplant pharmacy service. For outpatient service, we characterized the number, type of interventions, and patient encounters accomplished by the pharmacy resident who attended clinic.

Results: A dedicated service resulted in a greater mean number of interventions (8 per recipient in baseline vs. 13.7 per recipient in the dedicated service period) and greater cost savings (468 dollars vs. 1212 dollars per recipient). In addition, there was greater time spent on rounds per patient with the medical team (60 minutes vs. 80 minutes (averaged for recipients)) and a greater number of progress notes written (3 vs. 4.7 (averaged for recipients)). For the

total time spent writing progress notes, it was similar in comparison between the two periods, despite more notes being written during the dedicated service period. Of the two responses to the provider satisfaction survey, both indicated that they were very satisfied with the dedicated service compared to the current fragmented service, and they would prefer to have a dedicated service. They indicated that their interactions with pharmacy, prescribing support, and patient safety improved with daily involvement in patient care. Finally, the providers indicated that pharmacy plays an important role in discharge counseling and that daily involvement of pharmacy in patient care is associated with a cost-benefit. In the outpatient clinic, the pharmacist saw 46 patients and made 362 interventions over 11 weeks.

Conclusion: A dedicated service allowed for daily participation in team rounds and more daily progress notes compared to baseline services. There appears to be a significant improvement in the number of interventions along with greater cost saving. The dedicated service wrote a greater number of notes in the same average total time per recipient, possibly as a result of becoming more familiar with each case with daily involvement. Prescribers provided positive feedback about their experience with a dedicated service. Finally, there is also great opportunity in the outpatient clinic environment for pharmacists to provide improved medication management for transplant patients.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-297

Poster Title: Antiretroviral Use Evaluation at a Tertiary Care Academic Medical Center

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Purpose: In 2015, the list of recommended, alternative, and other initial combination antiretroviral (ARV) regimens for treatment-naïve patients was updated in the HIV/AIDS guidelines in accordance to available data. Recommended first line options include four integrase inhibitor based-regimens and one protease inhibitor (PI) based-regimen. Alternative and other regimens are considered to have clinical disadvantages associated with them compared to the recommended regimens, but may be preferred for some patients. At UTMB Health, we sought to update and streamline our ARV formulary to reflect current HIV/AIDS treatment practices

Methods: A retrospective usage review of all ARV strengths and dosage forms on formulary was conducted with utilization data from October to December 2015. Patient demographics, HIV-related clinical characteristics, and medications comprising the HIV regimen were collected and assessed. ARVs were recommended to be removed from formulary if the medication had no usage or minimal usage. An additional usage analysis from July to September 2015 was conducted on agents that were recommended to be removed due to minimal usage. Findings and recommendations were presented at the UTMB Health's August 2016 Antimicrobial Advisory Subcommittee meeting.

Results: Of 91 patients included in the evaluation, 48.3 percent of patients were on a recommended regimen, while 27.4 percent of patients were on an alternative or other regimen. In addition, 24.1 percent of patients were on a regimen that is no longer endorsed by the HIV/AIDS guidelines. We recommended the removal of atazanavir 100 mg, 150 mg, and 200 mg capsules, darunavir 400 mg tablet, indinavir, nelfinavir, saquinavir, tipranavir, didanosine, stavudine, zidovudine capsule, delavirdine, efavirenz 50 mg and 200 mg capsules, and abacavir-

lamivudine-zidovudine combination tablet due to no usage. We recommended the removal of maraviroc 300 mg tablet, fosamprenavir, lopinavir-ritonavir oral solution, ritonavir oral solution, nevirapine oral suspension, and emtricitabine capsules due to minimal usage. Based on the medication use evaluation, the Antimicrobial Advisory Subcommittee approved the removal of all non-usage products and all except for three minimal usage agents from the formulary based on our recommendations. The three minimal use products that were kept on formulary included lopinavir-ritonavir oral solution for pediatric patients, nevirapine oral suspension for prevention of maternal-fetal transmission of HIV, and emtricitabine capsules since only single agents are allowed to be administered to the prison patient population.

Conclusion: All of our recommendations for removal from formulary were approved with the exception of three dosage forms due to use in specific patient populations. A total of 29 ARV dosage forms were removed from the formulary.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 2-298

Poster Title: Customized electronic parenteral nutrition prescribing reduces overfeeding and better meets patient protein needs

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Purpose: When optimized, parenteral nutrition is administered with the goal of improving the clinical course and outcome in appropriate patients; but maybe also cause or exacerbate metabolic complications and organ function. Our subjective clinical experience was that patients receiving parenteral nutrition in our facility were overfed without meeting their protein needs; which puts our patients at risk for metabolic complications without helping them meet their goals. The purpose of our intervention was to institute a new process for prescribing parenteral nutrition utilizing the electronic prescribing system to provide customized calculations in an attempt to optimize patient's protein and non-protein calorie needs.

Methods: The institutional review board approved this observational study, assessing the impact of a clinical quality project aimed at improving the safety and efficacy of the parenteral nutrition prescribed within a 250 bed community hospital by altering the prescribing process. Prior to March 2016 prescribers utilized a paper form containing two standards (central and peripheral) and a customized solution option. The paper form only allowed for prescribers to enter the total volume, percent dextrose and amino acids in the final solution, and volume and percent of lipids. The concern was that lack of patient specific calculations lead to inappropriately high doses of carbohydrates and lipids, and sub-optimal dosing of amino acids. The new electronic process created a customized algorithm where prescribers determined all macronutrients based on grams/kilogram/day or kilocalorie/kilogram/day with recommendations based on clinical stress levels; then the computer system did the math based on a specific patient weight. A total of 60 inpatients, requiring parenteral nutrition via central

access during a six month period were assessed for four endpoints based on the initial order. Patient cohorts were divided into those prescribed parenteral nutrition using the paper form, compared to those prescribed after the customized, weight-based electronic process was implemented. The endpoints evaluated were total kilocalories/kilogram/day, percent and magnitude of actual macronutrients compared to the recommended weight based macronutrients.

Results: When prescribers order macronutrients by specifying the final solution concentration and the total volume, patients infrequently received macronutrients within 15 percent of the recommended amount. In the paper form group (30 patients), the initial order was within 15 percent of goal only 23, 23, and 27 percent of the time for dextrose, lipids and amino acids, respectively. For patients in the electronic prescribing cohort (30 patients), prescribers hit weight based recommendations 100 percent of the time for all macronutrients, as the prescribing is weight based. Patients were over fed dextrose on the initial day of parenteral nutrition 60 percent of the time, with 37 percent receiving 65 percent or more than recommended. Thirteen percent of patients received more than double recommended daily dextrose load on the first day of therapy. Sixty percent of patients were overfed lipids, with 10 percent between double and triple the recommended daily amount in the initial bag. Protein needs were more than 15 percent less than goal in over 50 percent of patients treated by a prescriber being limited to entering a final solution amino acid concentration.

Conclusion: The goal of this clinical quality improvement process was to optimize safety and outcomes in patients receiving parenteral nutrition through customized, weight based dosing of macronutrients. Overfeeding was reduced for lipid and carbohydrates, which should translate to less hyperglycemia. Protein requirements were better optimized which should translate to improved healing, but assessing this was outside the scope of this study. The clinical effects of parenteral nutrition must be evaluated in larger, randomized controlled trials due to the site specific variability in indications and manner for which parenteral nutrition is prescribed.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-299

Poster Title: Evaluation of aminoglycoside therapy at an academic medical center

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Purpose: The aminoglycosides are a class of bactericidal antibiotics that are active against aerobic, gram-negative bacteria and commonly used in hospitalized patients. There are several considerations that must be made when using aminoglycosides, including dosing strategy and monitoring parameters. They can be administered once, twice, or thrice daily and recommended doses and target serum levels differ depending on indication and dosing strategy. Additionally, while gentamicin and tobramycin are usually dosed the same, amikacin has unique dosing. The purpose of this drug use evaluation is to characterize aminoglycoside use at the Hospital of the University of Pennsylvania (HUP).

Methods: This pilot for a formal drug use evaluation examined seven patients who were ordered and received at least one dose of an aminoglycoside at the HUP from January 1st to December 31st 2015. The following variables were recorded and then compared to the recommended values from hospital guidelines: dosing strategy, dose in total milligrams, milligram per kilogram dosing, evaluation of renal function and renal adjustment if warranted, as well as any serum levels. Additional variables recorded included specific drug used, indication, and duration of therapy in number of doses. The principal questions that we sought to answer were: did initial and subsequent doses meet internal guidelines and did peak and trough concentrations meet internal goals? This evaluation was determined to be quality improvement by the University of Pennsylvania's Institutional Review Board.

Results: In this pilot investigation, seven patients who received extended interval were evaluated of which 50% were male, with a mean age of 52 + 6 years, median weight of 86 kg (range 48 – 164), and a mean creatinine clearance of 90 mL/min + 11. Of those receiving

extended interval, indication was varied as was location with three patients in the medical intensive care unit, three on oncology floors and one in the neurology step down during time of administration. All but one patient received amikacin with a mean dose of 15mg/kg +1.74 on adjusted body weight. The other patient received tobramycin at a dose of 5mg/kg on adjusted body weight. Appropriate peak level timing was completed in one patient. Random levels were obtained in all but one patient and four patients had two levels drawn.

Conclusion: Per institutional guidelines, use of an extended interval dosing strategy was appropriate in all patients based on renal function. The attainment of peak levels was suboptimal, however multiple random levels were frequently obtained allowing the determination of patient specific kinetics and optimization of dosing. Appropriate timing of aminoglycoside peaks would allow for more accurate interpretation of patient pharmacokinetics data by pharmacists and should be improved.

Submission Category: Small and Rural Pharmacy Practice

Submission Type: Descriptive Report

Session-Board Number: 2-300

Poster Title: Antimicrobial stewardship on a rural health medical mission trip in Jamaica

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Purpose: Antimicrobial stewardship is a coordinated global approach to promote the proper use of antimicrobial medications utilizing the appropriate agent, dosing, and duration of therapy for the pertinent indication. The goal of this approach is to improve patient outcomes and prevent the spread and development of drug-resistant microorganisms. The purpose of this study was to evaluate the antimicrobial stewardship interventions that were made by a pharmacy team consisting of pharmacists and P4 Advanced Pharmacy Practice Experience (APPE) students on a rural health medical mission trip to Jamaica in June 2016.

Methods: A retrospective analysis of all pharmacy interventions for antimicrobial orders during a 10-day medical mission was performed. The pharmacy team was required to document interventions made on the back of each prescription. Age, gender, number of antimicrobial prescriptions, and the indications were recorded. The prescriptions were divided into the types of antimicrobial prescribed: antibiotic, antiparasitic, or antifungal and whether the order was written by medical or dental. Interventions were assigned to one of 12 categories: Medication change due to preferred therapeutic alternative, allergy, non-formulary agent, non-formulary dosage form, or out of stock agent, change in strength, frequency, duration of therapy, or route of administration, medication added or deleted, or disease specific recommendation. Disease-specific recommendations were when the pharmacy member recommended an antimicrobial based upon the diagnosis provided by the medical team. Whether the intervention was made by a pharmacist or student was also recorded. The study was given exempt status by the IRB at the University of the Sciences in Philadelphia. Descriptive statistics were performed. The primary endpoint was the percentage of all antimicrobial prescriptions that required pharmacy

intervention. Secondary endpoints included rates of each type of intervention, percentage of interventions on antimicrobials filled for medical compared to dental patients, percentage of interventions made by pharmacy students versus pharmacists, and the median number of interventions per individual antimicrobial prescription.

Results: Of the patients requiring antimicrobial prescriptions, 74.5% were female. The median (interquartile range IQR) age was 39 years (22-52). There were 325 (92.0%) and 28 (8.0%) prescriptions written by the medical and dental team, respectively. Of the antimicrobial prescriptions,189 (53.9%) of 353 required 241 interventions by pharmacy. A mean (standard deviation SD) of 0.68 (+ 0.76) interventions were made per prescription. Of 189 interventions, 180 (95.2%) were accepted by attending physicians or dentists. Of those antimicrobial prescriptions, 175 (49.9%) were antibacterial agents, 165 (47.6%) were antifungal agents, and 9 (2.6%) were antiparasitics. Pharmacy interventions included 44 (18.3%) medication changes due to non-formulary dosage form, 41 (17.0%) changes in the duration of therapy, 41 (17.0%) changes in the frequency of administration, 37 (15.4%) disease-specific recommendation, 28 (11.6%) dosage strength changes, 19 (7.88%), therapeutic alternative recommendations, 16 (6.6%) non-formulary medication changes, 11 (4.6%) interventions involved new medication addition, 2 (0.8%) out of stock changes, and 2 (0.8%) route of administration changes. Of the 241 antimicrobial interventions, 151 (62.7%) interventions were made by students and 47 (19.5%) interventions were made by pharmacists.

Conclusion: Antimicrobial stewardship provided by the pharmacy team resulted in medication optimization for suspected infections with the intention of aiding the global effort to reduce antimicrobial resistance rates. Due to a restricted formulary, consisting of primarily oral agents, many interventions were formulary management decisions. Given the rural health setting, we were unable to draw cultures, test sensitivities to antibiotics, and lacked the diagnostics to confirm infections; therefore, the pharmacy interventions made were crucial to antimicrobial stewardship during this medical mission trip.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 2-301

Poster Title: Evaluation of vancomycin dosing strategies in elderly patients

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Purpose: Vancomycin is largely considered the drug of choice in treating infections caused by methicillin-resistant Staphylococcus aureus. The optimal dosing and monitoring methods are still yet to be determined, especially in the elderly patient population where several pharmacokinetic parameters change. The primary objective of this study is to compare the weight-based dosing strategies of intravenous (IV) vancomycin used to achieve target serum trough concentrations between non-elderly and elderly patients (greater than 65 years old). Secondary objectives will include the incidence and associated outcomes of supratherapeutic IV vancomycin dosing.

Methods: The Institutional Review Board approved this single center, retrospective study using a pre-existing vancomycin dosing database. Adult patients initiated on vancomycin during hospitalization from January 1, 2009 through December 31, 2015 at Cooper University Hospital were included. Patients were at least 18 years of age and received a scheduled regimen of IV vancomycin for at least 36 hours and at least one interpretable vancomycin serum trough concentration. Patients on a scheduled regimen of IV vancomycin for less than 36 hours with a supratherapeutic vancomycin serum trough concentration were also included. Vancomycin serum trough concentrations between 15-20 mg/L were considered therapeutic; concentrations less than 15 mg/L were considered subtherapeutic and concentrations greater than 20 mg/L were supratherapeutic. An interpretable vancomycin serum trough concentration is defined as a serum level drawn within 2 hours of the next scheduled dose. Nephrotoxicity is defined as a 0.5mg/dL increase for 2 days or 50 percent increase from the serum creatinine baseline. Patients were categorized into 2 groups based on age: non-elderly (age less than 65

years) and elderly (age greater than or equal to 65 years). A subgroup analysis, defined a priori, compared the elderly demographic of ages 65-74 years, 75-84 years, and greater than 85 years.

Results: Of the 561 patients included that met inclusion criteria, 201 were elderly (65-74 years (n equals 105); 75-84 years (n equals 57); greater than 85 years (n equals 39)). Loading doses were administered in 46.3 percent of the elderly and 29.7 percent of the non-elderly patients (P less than 0.001). The initial mean maintenance dose administered in the elderly was 23.4mg/kg/day compared to 32.35mg/kg/day in the non-elderly (P less than 0.001). Initial maintenance dose frequency for the elderly was either every 24 hours (64.04 percent) or every 12 hours (35.96 percent). The non-elderly maintenance dose frequency also included every 24 hours (7.5 percent), every 12 hours (90.5 percent), and every 8 hours (2 percent). Mean initial trough concentrations were therapeutic at 15.235mg/L and 15.010mg/L in the elderly and non-elderly, respectively (P equals 0.757). Supratherapeutic levels were drawn in 37.3 percent of elderly compared to 35.4 percent in non-elderly (P equals 0.647). Concomitant nephrotoxic agents were used in 20.4 percent of the elderly patients compared to 67.5 percent of non-elderly (P equals 0.002). Nephrotoxicity was not significantly different in the elderly and non-elderly population (9 percent vs. 11.7 percent, P equals 0.319).

Conclusion: Vancomycin dosing in elderly patients and subsequent achievement of an initial therapeutic trough concentration require consideration of patient-specific factors. This includes, but not limited to age, drug indication, concomitant nephrotoxins, and other comorbid conditions. Elderly patients require less total daily drug to achieve the same initial trough concentrations seen in non-elderly patients. Furthermore, despite similar initial trough concentrations, the incidences of nephrotoxicity and supratherapeutic concentrations did not significantly differ despite less frequent use of concomitant nephrotoxins in the elderly.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-302

Poster Title: Evaluation of appropriateness and prescribing patterns of daptomycin use in methicillin resistant staphylococcus aureus (MRSA) infections in three community hospitals

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Purpose: Infections due to multi-drug resistant organisms are gradually increasing. One of the most challenging gram-positive organisms concerning nosocomial infections includes MRSA. In an effort to better understand institutional use of daptomycin, the primary objective of this study was to evaluate the appropriateness and prescribing patterns of daptomycin usage in MRSA infections. A subgroup evaluation was to determine the safety and efficacy of daptomycin dosing in obese and morbidly obese patients. The secondary objective was to measure the institution's rates of resistance of MRSA and vancomycin minimum inhibitory concentration (MIC) trends.

Methods: An institutional review board approved retrospective chart review was performed on patients receiving daptomycin therapy between January to June 2016. Inclusion criteria were patients with age greater than or equal to 18 years who received at least one dose of daptomycin for documented MRSA infections. Patients were excluded if they were immunocompromised, pregnant or had previous exposure to daptomycin. Appropriateness was defined based on adherence to institutional protocol for prescribing daptomycin along with indication, dose, length of therapy (LOT) and rationale for daptomycin use. For subgroup analysis, patients were characterized as obese if body mass index (BMI) was 30 kilograms per square meter or greater, and morbidly obese if BMI was 40 kilograms per square meter or greater. Local resistance patterns were analyzed for MRSA and variations in MIC for vancomycin, daptomycin, and linezolid were reported.

Results: This study included 75 patients who received daptomycin therapy. Median age was 53.5 (24-99) years with 48.6 percent females. Most common indications were skin and soft tissue infection (SSTi) (26.6 percent), osteomyelitis (20 percent), and endocarditis (13.3 percent). Bacteremia was observed in 48 percent of patients. Daptomycin was appropriately prescribed in 84 percent of patients. Most common reasons for daptomycin were MRSA bacteremia with vancomycin MIC greater than 1 (29.3 percent) and vancomycin allergy (25.3 percent). Median length of stay was 8 (2-52) days and median LOT was 7 (2-47) days. Sixty one percent of patients received doses at 6mg/kg compared to 13.3 percent and 10.7 percent who were dosed at 8 and 10 mg/kg respectively. All patients were dosed by actual body weight. Fifteen percent of patients were obese and 29.3 percent of patients were morbidly obese, and of these daptomycin was appropriately indicated in 70 percent of patients with most common reason for use being vancomycin failure. In 2016, we observed 1018 isolates of MRSA with 4.8 percent having vancomycin MIC greater than 1, and with 1.3 percent expressing vancomycin MIC of 2. However, overall daptomycin use was higher in 2016 compared to 2015 (6.68 vs. 4.88 DOT/1000PD).

Conclusion: In managing MRSA infections, daptomycin use is highly appropriate at our institution. The most common reason for use was elevated vancomycin MIC, and the most common indication was SSTi. Vancomycin kinetics remain a challenge in obese population leading to increased daptomycin usage. Rates of elevated vancomycin MICs remain low at our institution; however, the overall usage of daptomycin is on the rise.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 2-303

Poster Title: Medication list discrepancies discovered during medication reconciliation in an outpatient family medicine clinic

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Purpose: The purpose of this study was to determine the amount and type of discrepancies discovered during medication reconciliation by a pharmacy student. The study also analyzed the amount of time it took to reconcile and document the entire process. In doing so, the medication reconciliation process could be streamlined, thus, increasing the pharmacist's ability to expand the role of pharmacy in the family medicine clinic.

Methods: The pharmacy student initiated all home medication interviews by collecting demographics for each patient either verbally or through the electronic medical record. This information was vital in identifying the clinic's specific patient group and allowed the process to be tailored accordingly. Before entering the room, the student accessed the electronic medical record and assessed the current medication list to identify duplications, inaccurate doses, gaps in therapy, and whether refills might be needed. Then, the student conducted individual medication reconciliation interviews. These sessions were held in private patient rooms, which not only allowed for accurate medication reconciliation, but also provided a chance for any medication questions to be answered and prescription counseling opportunities to be taken advantage of. Once the interview was complete, interventions were documented in an Excel spreadsheet along with the patient's demographic information. This spreadsheet was also used to run statistical analyses at the conclusion of the study. Concerns about the patient's current medication list, adherence, and any other problems were reported to the medical residents and attending preceptors.

Results: Patients enrolled into the study were 18 years of age or older and must be patients within the St. Joseph medical group. Patients who did not have any home medications were excluded from the study. Data was collected over a 3-week period at one site in downtown Reading, PA. 43 patients were enrolled into the study and medication reconciliations were completed. The average time that it took to complete each interview, document the interventions, and report discrepancies to the appropriate provider was 8.7 minutes. A majority

of the patients were female (62.7%) and 48.8% were of Hispanic ethnicity. The average age was 47 years old and the average number of home medications was 8.36. Detailed medication list reviews revealed 161 discrepancies when compared to the electronic medical record. These discrepancies were distributed amongst missing medications (49), extra medications (44), duplicate (18), improper frequencies (22), and inaccurate doses (28). A total of 10 patients were determined to be non-adherent. Medication-specific counseling was provided to these patients during the interview, and the importance of adherence to their medications was reinforced.

Conclusion: Pharmacy involvement in the medication reconciliation process may lead to better patient outcomes and improved patient care. Discrepancies were resolved with the resident physicians and correctly updated in the EMR. A need was identified for a permanent pharmacy presence at the clinic, which has led to the development of a business case for an ambulatory care pharmacist. In addition to performing medication reconciliations, this pharmacist will help integrate the outpatient clinic and on-site retail pharmacy, make recommendations to providers, and counsel patients as necessary in order to provide direct patient care and generate revenue for the health system.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 2-304

Poster Title: Outcome measures for pharmacy anticoagulation monitoring program

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Purpose: The Joint Commission established a National Patient Safety Goal (NPSG) that identified anticoagulants as a medication class that requires routine monitoring. Upon initial conception, our institution's anticoagulation monitoring program aimed at improving anticoagulation efficacy and safety through the interdisciplinary implementation of best practice guidelines, specialized ordersets, and an official anticoagulation policy. For the last eight years, our pharmacy department has participated in the program utilizing computerized monitoring, protocols, and pharmacist-directed surveillance. Using pharmacy intervention data and monthly reports, the purpose of this study was to determine the patient safety outcomes and cost savings of pharmacy monitoring in 2015.

Methods: Monitoring initiated originally for our three formulary anticoagulants (enoxaparin, heparin, and warfarin). Over time, the list of anticoagulants has grown and now pharmacists monitor all anticoagulant therapy, even if the agent is non-formulary. Pharmacists were directed to follow patients on anticoagulation treatment dosing, long-term prophylaxis, and short-term prophylaxis lasting greater than seven days. Pharmacists are provided with a dynamic list of patients on anticoagulation in our medication ordering software (Epic, Verona WI) and a home-grown web-based program to document monitoring. Daily, the pharmacists document the patients' efficacy and toxicity outcomes within this program. Recommendations to improve a patient's therapy are made by the pharmacist directly to the prescribing provider. Utilizing Epic, pharmacists document all anticoagulation interventions. The pharmacists' intervention documentation includes the specific anticoagulant, type of intervention, time spent generating the intervention, acceptance by the interdisciplinary team, description of the intervention, and the patient's clinical situation surrounding the documented intervention. Based on the type of intervention, an outcome is associated along with a cost savings amount determined by literature standards.

Results: Ninety-nine percent of patients who met criteria were followed by pharmacy with a total of 160 patients and 186 orders. Ninety-six percent of the initial anticoagulant doses were found to be appropriate with an orderset being utilized for 72 percent of those initial doses. Ninety-three percent of the 211 pharmacist interventions were accepted by the multidisciplinary team when applicable. Fifty-five (26 percent) of the 211 pharmacist interventions prevented an anticoagulant adverse drug reaction, toxicity, or medication error with the most common interventions including bridging recommendations, inappropriate doses, inappropriately drawn anti-Xa levels, and need for anti-Xa levels. Of the 55 pharmacist interventions that prevented an anticoagulant adverse drug reaction, toxicity, or medication error, 34 (85 percent) involved enoxaparin, 5 (13 percent) involved heparin, and 1 (2 percent) involved warfarin. Of the 211 total pharmacist interventions, 105 enhanced therapeutic effect of the anticoagulant, 44 prevented toxicity, 30 involved order clarification, 17 involved policy compliance, 11 prevented a medication error, and 4 provided cost savings. Throughout the 2015 year, 18,209 dollars of cost savings has been provided by our anticoagulation monitoring program.

Conclusion: We have identified that pharmacists can ensure that initial anticoagulant doses as well as dosage adjustments are safe and warranted based on drug levels. Documented pharmacist interventions and outcomes data have provided us with the information we need to refine our anticoagulation ordersets and policies, promoting exemplary patient safety. By developing a standard of anticoagulation practice which includes pharmacy monitoring, our institution has succeeded in decreasing the number of adverse drug events, toxicities, and mediation errors associated with anticoagulant use. Finally, we were able to establish cost-savings as an additional benefit to our anticoagulation monitoring program implementation.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 2-305

Poster Title: Integration of pharmacy students into an interprofessional education model in a patient-centered medical home

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Purpose: Ambulatory care is increasingly being provided in a patient centered, team based system. In order to provide effective team-based care, interprofessional education is necessary to train future providers. Interprofessional education occurs when students from two or more professions learn about, from, and with each other to enable effective collaboration and improve health outcomes.[1] Pharmacy students benefit from this learning method as it prepares them to enter their careers as valued members of the collaborative practice team.
The purpose of this initiative was to expand interprofessional education in a patient-centered medical home to include pharmacy students.

Methods: Students were incorporated into the existing physician-centric learning model first by becoming active participants in the team huddle that occurs prior to the clinic session. During the huddle, all upcoming patients are discussed which includes reviewing clinical information and triaging anticipated needs (ie: education, laboratory tests or procedures and pharmacotherapy needs) with all members of the team. The pharmacy student added valuable input during the huddle, using this time to provide information about optimizing pharmacotherapy and patient education opportunities while also determining which patient visits should be targeted.
The pharmacy student then participated in the identified patient appointments, during which the medical student and/or resident would perform the history and physical and work with the pharmacy student to determine the assessment and plan. Finally, the pharmacy student and the medical resident presented the case together to the family medicine attending and/or pharmacy attending. The student then provided counseling and addressed any medication therapy issues identified. This model served to enhance the education of the medical students

and residents by having them work collaboratively with a pharmacy student, gaining a deeper insight into appropriate pharmacotherapy, compliance and monitoring parameters. Working together with the medical students and residents allowed the pharmacy student to gain a deeper understanding of physical assessments and social needs and set the framework for effective teamwork in the provision of primary care.

Results: Pharmacy students became more engaged when they were actively involved in all aspects of the patient's appointment. Communication skills and collaboration among all team members increased with the addition of a pharmacy student into the learning model. Medical students and residents as well as pharmacy students reported that better patient care was provided with the integration of the pharmacy student into the learning model.
The biggest challenge identified during the first weeks incorporating a pharmacy student into the learning model was reservation from some of the first year medical residents (who were not as accustomed to working with a pharmacist), which created a passive environment for the student. Engaging the medicine attending to allow the pharmacy student to take on an active role in the patient visit (ie: by having the student present the case to the medical attending directly) helped create a more collaborative and inclusive learning environment for the pharmacy students in a trickle-down fashion. In addition, having the medical residents present the case directly to the pharmacy preceptor (who served as an "attending pharmacist" to the residents) allowed for the residents to establish a relationship of trust with a pharmacist, necessitating relying on their expertise.

Conclusion: Creating an interprofessional learning environment where pharmacy students train directly with all members of the team enhances the education of both pharmacy and medical students and residents. It also provides the opportunity to practice collaborative care by working together towards a common goal. Ultimately, this model not only engages all different disciplines, but also ensures that patients are able to have better quality of care that is specific to each individual. This is important in contributing to the ability of students to participate in an effective team-based patient-centered model of care in the future.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Descriptive Report

Session-Board Number: 2-306

Poster Title: Implementation of a medication transfer bag pilot for patient-specific insulin pen dispensing during patient transfers

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Purpose: Inpatients in The Johns Hopkins Hospital (JHH) relocate between nursing units during the hospital stay for changing healthcare needs. A nurse is responsible for directing patient-specific medications to receiving units during patient transfers. However, additional insulin pens are dispensed for patients upon arrival to new units due to an absence of medication transfer, resulting in excessive patient charges and pharmacy costs. Preliminary data indicated new pens dispensed on 35% of transfers. The JHH Department of Pharmacy implemented a pilot of medication transfer bags inserted in patient charts for easier transfer of medications with patients to avert unnecessary dispensing.

Methods: Clinical Customer Service Representatives (CCSR) inserted 3-hole punched medication transfer bags in patient charts on three inpatient nursing units serving the neurosciences population at different levels of care (Neurosciences Critical Care Unit and associated step-down units). Prior to the patient leaving the sending unit, a checklist item in the Patient Flow worksheet prompted nursing to place patient-specific medications in the bag. The intervention was implemented on November 2015 and the process change and use of the medication transfer bag was reviewed with the nurses and pharmacists. Pharmacists were educated to not dispense pens secondary to transfer orders unless pens were requested by a nurse. Information on dispensed insulin pens was gathered from triggered charges within the pharmacy system and reviewed across visit movement between the three units. The dispensing and patient charges on transfer were analyzed for the time period prior to (June to December 2014) and after (January to March 2016) the implementation of the medication transfer bags to evaluate for changes in insulin pen dispensing patterns.

Results: Pre-intervention data collected in 2014 indicated that amongst transfers between the Neurosciences Critical Care Unit and the associated step-down units, 47 new insulin pens were dispensed within twelve hours of patient transfer to a new unit out of 136 total transfers. This indicated that new insulin pens were dispensed on 35% of total patient transfers, which represented 41% of the 100 patients analyzed in 2014. After implementation of the medication transfer bag pilot on these units, 35 new insulin pens were dispensed within 12 hours of transfer out of 126 total transfers. This represented 28% of the total patient transfers and 37% of the 94 patients evaluated in 2016.

Conclusion: Trends seen from pre-intervention data in 2014 indicated a significant number of patient transfers between the NCCU and associated units that resulted in new insulin pens dispensed within 12 hours of transfer. Due to the unlikely necessity of multiple insulin pens in this patient population, patients transferring between these units have been inappropriately dispensed multiple pens throughout their stay. Data from the medication transfer bag pilot indicate a method for reducing unnecessary dispensing of insulin pens, and potentially other patient specific medications, for patients during movements throughout the hospital stay. Additional cost savings analysis for the intervention is underway.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 2-307

Poster Title: Shared decision making and anticoagulation: Results of a patient survey

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Purpose: The introduction of new oral anticoagulants (NOACs) has been practice changing in thromboembolism treatment and prevention in nonvalvular atrial fibrillation. Despite potential patient-oriented advantages, emerging practice observations suggest that patients are still less likely to choose NOACs over traditional warfarin therapy. These emerging therapies present an opportunity for health-care providers to engage patients in shared-decision making discussions. A lack of education and patient-provider discussion decreases the likelihood of making clinical decisions that incorporate patients' individual needs and concerns. The purpose of this study is to evaluate the education patients received regarding safety, efficacy, and cost prior to initiating anticoagulation therapy.

Methods: A questionnaire containing nine elements was developed, and eligible patients were surveyed after informed consent was obtained. The questions addressed patient knowledge of choice alternatives, costs, safety, and efficacy in their current anticoagulation therapy. Survey items were scored on a five-point Likert scale from strongly disagree to strongly agree. Patients completed surveys from April to September 2016. Patients who received oral anticoagulation therapy were identified by the department of pharmacy services at Allied Services Rehabilitation Hospital, Scranton PA. Patients unable to complete the survey due to of cognitive impairment or medical condition without a responsible party capable of consent or refusal to participate were excluded. Institutional review board approval was secured prior to initiation of the study. Mann-Whitney U Tests were used to assess the survey responses for patients taking warfarin as compared with NOACs.

Results: In total, 78 patients receiving oral anticoagulation therapy consented to participation and were surveyed. 37 patients were taking a NOAC (dabigatran n=2, rivaroxaban n=5, Apixaban n=30) and 41 patients were receiving traditional warfarin therapy. The survey results showed that majority of patients, regardless of anticoagulation therapy, disagree that they

have been previously educated regarding anticoagulation therapy options (69.2%, n=54), disagree that they were capable of choosing the anticoagulation therapy option of their choice (84.6%, n=66), disagree that they are aware of the varying costs of anticoagulation therapy options (68%, n=53), disagree that they have been educated regarding the differences in effectiveness between anticoagulation therapy options (61.5%, n=48), and agree that they prefer to be part of the decision-making process when selecting an anticoagulant (62.8%, n=49). Majority of patients taking NOACs agree that they understand the importance of medication compliance as compared with warfarin (59.4%, n=22). They also agree that they feel confident that their provider has supplied them with adequate information regarding the available anticoagulation therapy options and their varying options for reversal of effects if necessary (54.1%, n=20). Majority of patients taking warfarin disagree that they understand the differences in laboratory monitoring between warfarin and NOACs (78.0%, n=32).

Conclusion: In conclusion, the data suggests that patients receiving oral anticoagulation therapy are lacking knowledge regarding the safety, efficacy, and costs of the varying medication options available to them. Patients can potentially benefit from other therapy options; however, without adequate education, patients may not fully understand the optimal medication for their clinical and personal needs. These results show the need for a patient-centered approach and the need to engage patients in shared decision-making discussions. With the broader selection of oral anticoagulants available, assisting patients in choosing a therapy option based on clinical and personal circumstances can be essential for optimal care.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 2-308

Poster Title: Validation of an evidence-based screening process through correlation with medication-related problems detected during evaluation by a clinical pharmacy service.

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Purpose: Screening with evidence-based criteria for medication reconciliation can effectively identify and prioritize patients at risk of medication-related problems (MRPs). Institution-specific screening criteria should identify patients who are most at risk so that time and resources are directed at patients who will most likely benefit. Screening criteria should exclude patients unlikely to benefit from clinical intervention.
The purpose of this study is to validate an evidence-based screening tool by correlating the priority score assigned to the patient upon screening to the number and severity of MRPs discovered so that a pharmacy service can intervene and aid in resolving discovered MRPs.

Methods: Patients were included if they had been screened using our evidence-based screening tool and had undergone full work-up by the clinical pharmacy service. This service consists of clinical pharmacists and pharmacy students who collaboratively provide pharmaceutical care to patients. As part of screening, each patient was assigned a Comorbidity-Polypharmacy Score (CPS) and a pharmacy risk factor score (PRS). A CPS score is calculated by awarding one point for each disease state and one point for each home medication, representing a broad depiction of the patient's specific risk of MRPs.
A PRS score is calculated by awarding one point for each of the following disease states: heart failure, hypertension, history of myocardial infarction, coronary artery disease, COPD, diabetes, or chronic kidney disease. One additional point per medication was added if the targeted medication is classified as either an antihypertensive, anticoagulant, antiarrhythmic, inhaler, or glycemic control agent. One point is then allotted if the patient is taking ≥ 5 chronic

medications, and one additional point for each of the following: VTE, antiplatelets, anti-infectives, age > 65, age > 80, alcohol/drug abuse, smoking, history of falls.
MRPs found during evaluation were recorded by error type and drug class and were then assigned a severity score based on the potential harm they could cause as categorized by the National Coordinating Council for Medication Error Reporting and Prevention (NCC-MERP) index.

Results: A total of 87 hospitalized patients were included for analysis. The data was analyzed by comparing the screening CPS and PRS scores of each patient to the number of errors detected upon full evaluation and to the subsequent classification of severity of those errors. A positive correlation ($r^2 = 0.297$) was noted between the patient's score on the CPS scale and the absolute number of errors identified for each patient. The upward correlation indicates that comparing these two values together suggests that the CPS component of the screening criteria successfully identified high risk patients. A weaker positive correlation was observed between the pharmacy risk score and the total number of errors for each patient ($r^2 = 0.077$). The PRS is more specific to our institution and contains a more restricted evaluation of patient population, thus creating a weaker trend line. Combining the PRS and CPS scores also resulted in a positive correlation trend ($r^2 = 0.283$), indicating that a composite scoring approach would also successfully allow for identifying high risk patients.

Conclusion: This study showed that our evidence-based screening criteria did identify patients with the highest number of MRPs identified during evaluation. While our screening criteria utilized two separate scores to help identify the high-risk patient, it appears that the broader CPS system was better at identifying patients with potential MRPs. However, the PRS contains criteria that was specifically relevant to our institution's needs and therefore is a complementary data point to the CPS. Together, the positive correlation seen by comparing these two data points expresses that the screening criteria aids in selecting patients most likely to benefit from our clinical service.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 2-309

Poster Title: Establishment of an evidence-based screening criteria for an inpatient clinical pharmacy service focused on transitions of care.

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Purpose: While all patients admitted to the hospital receive a basic reconciliation of their home medication use, patients at high-risk of medication related problems (MRPs) would benefit from a more thorough evaluation of their acute and chronic medication therapy. Identifying patients who would benefit the most from a comprehensive medication review will improve safety when transitioning the patient from hospital to home. Establishing an evidence-based tool for patient screening will facilitate the work of a clinical pharmacy service by targeting their efforts towards patients at greatest risk of MRPs.

Methods: The literature was searched for publications that evaluated risk factors predisposing patients to medication errors and readmissions within 30 days. A policy and procedure document was developed from this information outlining the risk factors gathered from the research and the screening process to be followed by the clinical pharmacy service.
Patients were considered eligible for the service if they were admitted from a non-institutional setting and did not have active cancer or admission for elective surgery, obstetric care, or active psychiatric issues. If a patient was considered eligible for the service, they were then scored on two separate scales - the pharmacy risk score (PRS) and the comorbidity-polypharmacy score (CPS). The CPS was calculated by adding the total number of comorbidities to the total number of home medications.
The (PRS) alots one point for the following criteria - disease states (heart failure, hypertension, history of myocardial infarction, coronary artery disease, COPD, diabetes, or chronic kidney disease), medications (antihypertensives, anticoagulants, antiarrhythmics, inhalers, and glycemic control agents), and risk factors (>5 chronic medications, VTE, antiplatelets, anti-infectives, age > 65, age > 80, alcohol/drug abuse, smoking, history of falls). Patients with higher

scores in each scale as well as in total were considered more at risk and of higher priority for intervention.

Results: After screening three floors (72 patients), a total of 32 patients were found to be eligible for the service (44%). PRS score was divided into four quartiles, with the lowest 25% being patients at the lowest risk for MRPs and the highest 25% being patients at highest risk for MRPs. The lowest 25% of scores ranged from 1-4, the middle two quartiles ranged from 5-8 and 9-12, and the highest 25% of scores were above 12. 9% of patients fell into the lowest 25%, while 18% of patients fell into the highest 25% of scores. The remainder (36%) of patients fell in the middle two quartiles.
The CPS scoring broadly evaluated patients at risk for MRPs. CPS scores are able to further distinguish between low risk and high risk patients and ranged from 6 to 31, with 31 being the most at risk patients. The lowest 25% of scores ranged from 1-12, the middle two quartiles ranged from 13-17 and 18-22, and the highest 25% of scores above 23. 6% of patients fell into the lowest 25%, while 48% and 27% of patients fell into the middle two quartiles, and 15% of patients fell into the highest 25% of scores.

Conclusion: Developing evidence based screening criteria allowed us to find, score, and prioritize patients to be cared for by a clinical pharmacy service. Score distribution analysis showed most patients had scores in the middle but that there was a proportion of patients scoring either very high or very low. Given this information, we can establish guidelines for patient prioritization and when patients should be seen by a service with limited time and resources. Patients with the highest PRS along with the highest CPS score would benefit most from this service, as they are considered to be at highest risk for MRPs.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 2-310

Poster Title: Evaluation of Pharmacy Interventions in a Primary Care Physician Office

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Purpose: Medication errors can occur at various stages including prescribing, transcribing, dispensing, administration, and patient follow up. According to a report from the Institute of Medicine, medication errors injure 1.5 million Americans each year and cost $3.5 billion. However, complete pharmaceutical care has shown to decrease these risks.
Pharmacists joined a collaborative agreement at The Wright Center, a primary care clinic where they interact with a variety of patients with complex drug regimens. The implementation of a pharmacist and their knowledge of pharmacotherapy into this care team is an important component in the management of illness and chronic diseases.

Methods: An observational retrospective chart review was performed to compare the number of interventions made per number of patients seen from two separate six month periods, October - March 2014/2015 and October - March 2015/2016. During this time, 1,017 patients were documented as receiving pharmacist intervention. A Mann-Whitney test was used to compare the two groups.

Results: The Mann-Whitney test indicated that there was no significant difference between interventions made between years (P-value was 0.337).

Conclusion: No significant difference of number of pharmacy interventions was found between the two years. This shows that the number of interventions made by pharmacists were consistent for two years which signifies the willingness of the medical team to take pharmacists

on board in a state where inpatient pharmacy is new and unfamiliar. These results demonstrate the benefits of a pharmacist in collaborative practice and warrant further investigation.

Submission Category: Geriatrics

Submission Type: Descriptive Report

Session-Board Number: 2-311

Poster Title: Implementation of a twice-daily medication pass program in a long term care facility

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Purpose: Administration of medications in long term care facilities is a labor intensive process that consumes a large portion of nursing time. Complex medication regimens contribute to this extensive time commitment which may limit nursing time available to provide residents with high quality, individualized care. Pharmacists can help address this problem by finding ways to simplify the daily medication administration process. This project was designed to reduce the complexity of resident medication regimens in order to decrease the nursing time dedicated to medication administration in a long term care facility.

Methods: Over a two-month period between December 2015 and January 2016, a "Twice-Daily Medication Pass Program" was implemented at a long term care facility in Carbondale, Pennsylvania. An inter-professional team of pharmacists, physicians, and nurses worked together to augment the medication regimens of 80 residents to conform to a twice-daily administration schedule when possible. Monthly physician order sheets were faxed and reviewed by a pharmacist on a weekly basis. The pharmacist evaluated the medication regimen of each individual patient and used clinical judgment to make appropriate recommendations to change complex medication orders to twice-daily regimens. Typed recommendations were sent to the director of nursing and then forwarded to the prescribing physician. Prescription orders were changed to reflect the pharmacist recommendations when deemed appropriate by the prescribing physician and the simplified medication regimen was then employed. Following implementation of the program, data was collected to quantify the acceptance rate of pharmacist recommendations. Residents involved in the program that were discharged or deceased at the time of data collection were not included.

Results: A total of 66 residents were considered in the collection of data following implementation of the program. The average number of maintenance prescription orders per resident was 10.9 and the total number of prescription orders for all residents was 723. There were a total of 45 pharmacist recommendations that were made to simplify complex medication regimens to follow a twice-daily schedule. Of these recommendations, 36 (80 percent) were accepted by the physician and resulted in a prescription order change and 9 (20 percent) were rejected. The 36 accepted pharmacist recommendations equated to approximately one medication regimen change for every two patients considered in the data collection.

Conclusion: Implementation of a Twice-Daily Medication Pass Program was an effective strategy to simplify medication administration in a long term care facility. Through a collaborative effort between facility staff, prescription orders were changed to adhere to a simplified twice-daily regimen. This program provides one example of an important role for pharmacists on an integrated healthcare team. Simplifying a complex medication regimen provides an inexpensive and feasible opportunity for pharmacists to help decrease nursing time devoted to medication administration.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 2-312

Poster Title: Inter-professional collaboration between pharmacy and nursing to improve hospital wide medication distribution process

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Purpose: Medications that are unavailable to nursing at time of medication administration can impede on patient care and create additional work for both nursing and pharmacy staff. Furthermore dispensing an additional dose of a medication costs an average of 25 dollars, equating to more than 225,000 dollars per year for the institution. To understand the cause and decrease the amount of missing medications at time of administration, the Black Belt Committee was formed. The committee consisted of pharmacy staff and nurses independent of management.

Methods: The Black Belt Committee created standard work for nursing, pharmacy, and department leadership. All pharmacy staff and participating nursing units utilized the standard work during the pilot. Three medication distribution workflows were piloted by the pharmacy technicians to examine the amount of unavailable medications at the time of administration, with a goal of 8 percent improvement from baseline. Secondary metrics included medication preparation cycle time and length of hourly medication delivery runs. Goals of secondary metrics were to improve medication preparation time by 43% and no increase in medication delivery run time. Additionally daily steps were monitored for each pharmacy technician to consider workflow burden. Workflow A utilized two pharmacy technicians for delivery runs to the entire hospital and one technician to prepare medications in the pharmacy. Workflow B along with the baseline workflow utilized three pharmacy technicians for delivery runs; all technicians shared medication preparation responsibilities when they returned from runs.

Results: Workflow B, which utilized three pharmacy technicians, was adopted by the pharmacy department based on a 19% decrease in unavailable medications at time of administration from baseline (357 vs. 289 errors per 1000 patient days). Medication preparation time was decreased by 43% from baseline (52 vs. 29 minutes). Medication run cycle time did not change.

Conclusion: Collaboration between pharmacy and nursing staff provides a well-rounded evaluation of the medication distribution process from processing to administration. Utilizing staff that are directly involved in the medication distribution process, specifically nurses, pharmacy technicians, and pharmacists allows the team to best identify the challenges faced in the process. An ongoing effort must be made to ensure safe and efficient medication distribution by the Black Belt Committee through monthly monitoring.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 2-313

Poster Title: Hospital consumer assessment of healthcare providers and systems (HCAHPS) survey results after implementation of unit-based pharmacists into key hospital services

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Purpose: Since the implementation of hospital value based purchasing, health systems strive to improve patient outcomes and patient satisfaction survey results. The Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey currently serves as the standardized measuring tool to evaluate a hospital's performance. Recently, our institution increased the number of unit-based pharmacists to collaborate within inter-professional teams and improve patient–focused outcomes. This retrospective review evaluates if recent implementation of expanded pharmacist services in the acute care medicine service line impacted HCAHPS scores.

Methods: Patient satisfaction data from a defined inpatient medicine service nursing unit at our health-system were reviewed over two consecutive time periods (July 2014 to June 2015 and July 2015 to June 2016), consistent with an increase in intensity of pharmacy services provided during year two. Responses to HCAHPS surveys were evaluated, focusing on questions associated with potential for direct pharmacist bedside educational interventions. The three analyzed questions included patient understanding of both purpose and indication of prescribed medications, and explanation of potential side effects associated with new medications administered during the inpatient hospitalization. Acute care medicine services lines were defined as patients discharged from either internal medicine or family community medicine. These two services received the most benefit from expanded unit-based pharmacist roles during the time frame analyzed, with expansion of service occurring during year two. Documented pharmacy interventions specific to education of patient and/or family members were compared during the two time periods. Results were evaluated against improvement in patient satisfaction scores in the communication regarding medication categories.

Results: Documented pharmacist bedside education interventions specific to medicine service patients admitted to our health-system totaled 81 during year one and 969 in year two during the evaluation period, representing a 12-fold increase in educational bedside medication counseling interventions during year two. The top three most frequent medication categories associated with patient bedside educational interventions performed by pharmacy included anticoagulant (38.2%), diabetes (17.3%), and respiratory inhaler-related (13.8%) regimens. Increases in the percentage of responses categorized as “always” were reported in all three medication related communication domain questions surveyed. Compared to year one, increases of 5.9% and 6.9% were demonstrated in positive “always” responses to understanding indication and purpose of medications, respectively, during year two. Additionally, a 2.6% improvement in “always” response to hospital staff describing medication side effects was also noted during year two. No new practices regarding medication communication were implemented by other non-pharmacy disciplines during the evaluation period.

Conclusion: Pharmacist’s further integration into inter-professional teams as demonstrated by enhanced patient bedside medication education had a positive impact on HCAHPS scores when examining medication related communication domains of the HCAHPS survey. This correlated with a substantial increase in pharmacy interventions year-over-year for our institution. Over the specified one-year period, aggregate scores improved, indicating enhanced patient perceived quality of care surrounding medication communication.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-314

Poster Title: Medication use evaluation: Appropriate aspirin use for treatment and prevention of cardiovascular disease

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Purpose: Aspirin 325 mg is very effective for certain indications, but inappropriate chronic use can cause an increased risk of bleeding. Aspirin 325 mg can be used as a single dose for pain or when an acute coronary syndrome or cerebrovascular accident has just occurred. It can also be used daily to prevent thromboembolism in patients with atrial fibrillation who are not candidates for other therapy. The purpose of this study was to determine if the appropriate aspirin dose is being administered in the hospital, and if patients are being discharged on the appropriate dose.

Methods: The Wilkes-Barre Veterans Affairs Medical Center approved this medical use evaluation. The medical health records of twenty-four patients on the general inpatient ward from a six month time period were analyzed. Every administration of aspirin 325 mg was investigated to determine the indication. Patient's home medication list on admission and discharge were also analyzed to track any change in aspirin use.

Results: When administered in the hospital, aspirin 325 mg was used for appropriate indications in fourteen patients (58.3%). Twelve patients had indications for treatment of acute coronary syndrome or cerebrovascular accident. Two patients had indications for atrial fibrillation anticoagulation. Ten patients (41.6%) had no appropriate indication for aspirin 325 mg. The indication and dose of aspirin was also analyzed upon patient discharge. Upon discharge, eleven patients (45.8%) were prescribed appropriate aspirin treatment. Nine patients continued or were switched to aspirin 81 mg for cardiovascular disease prevention. Two patients appropriately continued aspirin 325 mg for atrial fibrillation. One patient (4.2%) discontinued the use of aspirin for cardiovascular disease prevention. In comparison, twelve patients (50%) were prescribed inappropriate aspirin treatment upon discharge. Ten patients

initiated or continued aspirin 325 mg for cardiovascular disease prevention. One patient continued aspirin 325 mg with no indication and one patient switched from aspirin 81 mg to 325 mg.

Conclusion: Aspirin 325 mg is frequently being used for inappropriate indications in the hospital setting. It is also being prescribed for cardiovascular disease prevention upon discharge even though aspirin 81 mg has been shown to provide the same benefit with lower risk of bleeding. Proper evaluation of aspirin dose and indication could potentially prevent future patient morbidity and mortality.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 2-315

Poster Title: Evaluation of Opioid Prescribing Amounts in a Primary Care Physician Office.

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Purpose: The opioid crisis in America may be attributed to several factors, one of which is overprescribing. In an effort to provide structure to the use of opioids for chronic pain, the Centers for Disease Control (CDC) issued guidelines recommending max daily doses of opioid medication (≥90 mg MME). These guidelines served as a compliment to the existing recommendations set by the Pennsylvania Medical Society (≥100 mg MME), currently used as clinic policy. The aim of this study is to determine the amount of patients in a primary care physician office taking more than the recommended amount of opioid per day.

Methods: All patients prescribed any opioid medication from a clinic provider between 8/1/16 and 9/20/16 were included. Prescription information, including medication, dose and frequency, was queried from the electronic health record for the designated date range. All opioids prescribed for each qualified patient was totaled for a calculated daily dose represented as mg of morphine or morphine equivalent (MME). Total daily doses were then placed into one of three groups: 0-49 mg, 50-99 mg, and ≥100 mg, in order to correspond with both CDC and Pennsylvania Medical Society recommendations.

Results: 39 patients were included in the study. 69% (27) were found to be in the range of 0-49 mg/day MME. 21% (8) were within 50-99 mg/day of MME, though none of the patients were above 90 mg/day of MME. 10% (4) were found to exceed the limit of ≥100 mg/day of MME.

Conclusion: Four patients were prescribed over the recommended daily amount of opioid medication per Pennsylvania Medical Society and CDC recommendations. In an effort to better comply with these guideless, this patient population will be scheduled for a joint visit with the physician and a pharmacist within one month. At this visit, various methods will be discussed to

reduce the total opioid use and use other pharmacologic and non-pharmacologic methods to address their pain control.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 2-316

Poster Title: Risk stratification of patients with diabetes mellitus in an inpatient internal medicine service at an academic medical center

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Purpose: Evaluating patient factors assists pharmacists target those at higher risk for hospitalization and thereafter, readmission. Readmission within 30 days of discharge is a major contributor to decreased reimbursement rates and dissatisfying to patients. Identifying risks for readmission may decrease readmission and maximize pharmacist time by focusing on those most in need of counseling. Patients with diabetes are at an increased risk of complications including frequent hospitalizations. This project was designed to identify factors pertinent to pharmacist recognition of which patients admitted with diabetes are most likely to be readmitted and help understand which interventions benefit these patients most.

Methods: A literature search was conducted to identify patients with diabetes and how their medications or other disease state management characteristics may impact educational needs. Subsequently an eight question survey was designed and validated to assess which characteristics clinical pharmacists within our institution believed were most important influencers of patient complexity, including likelihood of readmission. Survey content included patient assessment of various laboratory parameters, medication number and type, and comorbid conditions related to prioritization practices of pharmacists for patient selection of medication counseling. Multiple diabetic medication choices were assessed including insulin, metformin, sulfonylureas, meglitinides, and thiazolidinediones. Comorbid conditions in patients with diabetes including heart failure, autoimmune disorders, chronic kidney disease, pain management, infection, and chronic obstructive pulmonary disease were considered. Frequency of diabetic medication therapy changes during the acute hospitalization and continuation post-discharge were included. The survey also identified the percentage of patients who receive proper education regarding diabetes management and related counseling barriers based on pharmacist experience.

Results: Thirteen of 17 clinical pharmacists at our institution completed the survey (77% response rate) regarding their experience managing patients with diabetes and related inpatient care. Pharmacists identified hemoglobinA1c (92%), blood glucose levels (69%), and insulin dependency (54%) prior to admission as the three most important factors to assess a patient with diabetes during daily chart review. Characteristics which were perceived as highest priority for identifying the need to counsel patients with diabetes included low health literacy (62%), elevated hemoglobinA1c (62%), and extremes of blood glucose levels upon presentation (77%). The diabetic medications most frequently associated with pharmacist-based counseling were insulin (92%), metformin (46%), and sulfonylureas (38%). Based on survey responses, heart failure (92%), chronic obstructive pulmonary disease (77%), and chronic kidney disease (46%) were the comorbid conditions most often related to frequent hospitalizations in patients with diabetes. Pharmacist-initiated medication therapy changes occur in 42% of patients per report. Proper diabetes education is necessary in 66% of patients based on pharmacist experience. The greatest obstacle identified to successful patient counseling during the inpatient stay was low health literacy.

Conclusion: At our institution, pharmacists have an important role in identifying patients with diabetes who may benefit from further education and bedside counseling.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 2-317

Poster Title: Are statins associated with muscular complaints in dialysis patients? Results from a double blind cross-sectional study.

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Purpose: There is little research involving the use of statins in hemodialysis patients as it relates to drug interactions and side effects. During routine medication reviews in our hemodialysis unit, it appeared that patients on statin therapy were experiencing a high incidence of muscle symptoms. There is no data on the relationship between muscle pain and statin therapy in hemodialysis patients. These anecdotal observations prompted this study in order to answer the clinical question, “Do hemodialysis patients on moderate or high intensity statins have a higher incidence of muscular complaints compared to dialysis patients not on statins?”

Methods: The institutional review board at Wilkes University approved this double-blind cross sectional study. This study was conducted at three local Fresenius Medical Care Hemodialysis Units in April of 2016. A questionnaire inquiring about muscle complaints (pain, discomfort, cramping, weakness) was developed and administered orally to patients at the dialysis units. Study investigators were blinded to the use of statins during the interviews. Patients were blinded in that they were unaware of the purpose of this study. After all questionnaires were completed, home medication lists were generated for all participants from the electronic medical record system at the dialysis units. Participants were grouped by the use (or non-use) of statin therapy (predictor variable). In patients on statins, the medication name, dose, and frequency were documented. Patients were excluded from the analysis if they were taking a low intensity statin. The primary outcome of the study was the incidence of muscular complaints in statin versus non-statin patients compared using chi-square analysis.

Results: Questionnaires were administered in April of 2016. There were 202 patients eligible for participation. Of these, 10 patients were not approached due to language barrier (6), nursing recommendation (2), dementia (1), and hearing loss (1). In addition, 17 patients declined participation, leaving 175 patients consented for participation. Ten patients were subsequently excluded from analysis because they were on a low intensity statin (9) or had no active medication list (1). 72 percent of patients on statins reported muscular symptoms within the past four weeks compared to 71 percent not on statins. An equal proportion described the complaints as bilateral (59 percent vs. 62 percent). However, 52 percent of the patients on statins reported having other potential causes of pain compared to 81 percent of the non-statin group (p-value less than 0.05), putting into question the overall lack of contribution of muscular complaints by statins.

Conclusion: Based on results from this study, moderate and high intensity statin therapy does not appear to be associated with an increased incidence of muscular complaints in hemodialysis patients, but more research is needed.

Submission Category: I.V. Therapy/ Infusion Devices/ Home Care

Submission Type: Descriptive Report

Session-Board Number: 2-318

Poster Title: Pharmacy students improve medication management through home care visits

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Purpose: Patients receiving home health often have complex medication regimens and an increased risk for medication-related problems. Currently, pharmacists have a limited role in home health, however there is great opportunity to optimize medication management by visiting patients in their home. In this environment, pharmacists or pharmacy students can assess medication management, identify opportunities to improve adherence, and provide patient education. The purpose of this research is to quantify and categorize the number of medication-related problems that pharmacy students identify that lead to improved medication management.

Methods: At Wilkes University, pharmacy students in their third professional year are enrolled in a service-learning course where they meet with a patient in their home bi-monthly throughout the academic year. A survey was developed and piloted to quantify and categorize student clinical activities during these home visits. Within 48 hours after each home visit, the pharmacy student completes the survey, answering questions pertaining to the time spent with the patient, the quality of the interaction, actions taken during the visit, the type of medication-related problem(s) identified, any recommendations made, and if the student communicated with another healthcare professional to resolve medication-related problems. Medication-related problems were categorized as undertreatment (untreated condition or additional treatment recommended), suboptimal regimen (recommend change in dose, duration, administration or frequency), medication monitoring recommended, suboptimal drug (no indication, duplication, not effective, unsafe, or cheaper alternative available), adverse drug event, and medication non-adherence.

Results: Seventeen responses representing 17 visits were collected from 13 pharmacy students after the first few home visits of the 2016 Fall semester. Over half of the students spent more than 60 minutes with their patient with nine reporting they had a "high quality experience." Most students indicated that they provided care and comfort to their patient or developed a rapport with the patient. Students provided patient education pertaining to over-the-counter medication use during 11 of 17 visits (65 percent). Another common intervention was a discussion with patients about the importance of medication adherence as reported by eight students. Education was also provided about medications, disease states, or allergies by six students. Six medication-related problems were reported for the 17 responses. Of the six medication-related problems, 3 were classified as suboptimal treatment and there was one each classified as undertreatment, medication monitoring, and non-adherence. Four students provided patient education based on a medication-related problem with one student referring a patient to their health care provider. There were four reports of students communicating with their patient's other healthcare providers including a community pharmacist, care manager, nurse, and physical therapist.

Conclusion: Pharmacy home visits are an opportunity to improve the quality of care for patients with complex medication regimens. From the very beginning of this service-learning course, pharmacy students identified medication-related problems, provided patient education, and collaborated with other healthcare providers to improve care. This is an effective format for providing a meaningful and educational experience for students while also promoting the safe and effective use of medications.

Submission Category: Clinical Services Management

Submission Type: Descriptive Report

Session-Board Number: 2-319

Poster Title: Evaluation of medication related problems and errors identified during pharmacist-led medication reconciliation

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Purpose: Moses Taylor Hospital is a 217 bed facility located in Scranton, PA. Currently, admission medication reconciliation is completed by a non-pharmacist. When medication reconciliation is completed by pharmacists, it can be used as the initial step in a comprehensive medication review. Pharmacist-led medication reconciliation can lead to a more accurate home medication list and facilitate a comprehensive assessment of medication management to identify medication-related problems (MRPs). The purpose of this study is to quantitatively and qualitatively analyze medication errors identified on the home medication list and MRPs identified during pharmacist-led medication reconciliation and review in high-risk patients.

Methods: We defined high-risk patients as those taking at least five chronic medications and having multiple chronic disease states. Only patients with a planned discharge to home were invited to participate. Exclusion criteria included active cancer, significant cognitive impairment, hospice care, and admission for elective surgery. After identifying high-risk patients, pharmacists completed a medication reconciliation and a comprehensive medication review. The admission home medication list previously completed by a non-pharmacist was verified during a conversation between a pharmacist and patient, then any medication errors were corrected. These errors in the home medication list and any additional MRPs identified by the pharmacist were quantified and categorized based on drug class and type of error or problem. Medication errors were classified as an incorrect dose or frequency, medication not prescribed, medication omission or allergy clarification. MRPs were categorized as under-treatment, suboptimal regimen, monitoring recommended, non-adherence, adverse drug event, or patient

education needed/provided. Medication errors and MRPs were further classified based upon validated severity criteria, ranging in severity from 1 to 9 (1: no error, 2: error did not reach patient, 3: likely no harm, 4: required monitoring to confirm no harm, 5: temporary harm, 6: initial or prolonged hospitalization, 7: permanent harm, 8: life support, 9: death). A total of 87 patients enrolled between August 2015 and June 2016 were included in this data analysis.

Results: During the study period, we identified a total of 680 medication errors and MRPs (average of 8 per patient) which were further divided into 499 errors and 181 MRPs. When considering both errors and MRPs, the majority of issues involved cardiovascular (20 percent), analgesic (12 percent), and pulmonary (11 percent) medications. The most common categories of medication errors identified was change in the dose, frequency, or formulation of the medication (43 percent), medication omission (31 percent), and medication not prescribed (11 percent). The most common MRPs identified were the need for patient education (60 percent), patient non-adherence (10 percent), and medication under-treatment (9 percent). The severity level of all errors was also assessed as follows: level 1 (no error) 15.3 percent, level 3 (likely no harm) 74.6 percent, level 4 (required monitoring to confirm no harm) 6.4 percent, level 5 (temporary harm) 2.4 percent, level 6 (initial or prolonged hospitalization) 1 percent, level 7 (permanent harm) 0.3 percent. There were no errors or MRPs identified for levels 2, 8, or 9. While the percentage of patients with a severity of five or higher was low, this represented 23 higher-severity issues involving 20 patients.

Conclusion: Pharmacist-led medication reconciliation is an essential step in developing an accurate medication list and completing a medication review. We have demonstrated that medication reconciliation completed by non-pharmacists results in errors. Furthermore, pharmacist involvement in this process leads to improved medication safety especially related to cardiovascular, analgesic, and pulmonary medications. It is unlikely that these MRPs would have been addressed without a pharmacist-led process. While most errors or MRPs did not cause harm, 23 contributed to temporary or permanent harm. These results suggest investment in pharmacist-led medication reconciliation can improve the quality and safety of patient care through better medication management.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 2-320

Poster Title: Role and preliminary impact of a clinical pharmacist in a nephrology practice within a patient-centered medical neighborhood

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Purpose: Chronic kidney disease is a complex disease state and patients experience multiple comorbidities including diabetes, hypertension, heart failure, anemia and more. Drug related problems are common in this population, which highlights the opportunity for clinical pharmacist services. While the role of pharmacists with hemodialysis and kidney transplant patients have been studied, there is less known about the benefits of a clinical pharmacist in an ambulatory care nephrology practice that is part of a medical neighborhood model of care. The objective of this project is to describe the role and preliminary results of a clinical pharmacist in this setting.

Methods: The clinical pharmacist was introduced to the nephrologists of the patient-centered medical neighborhood in June 2014 and collection of structured data in the electronic medical record for pharmacist services were reported from November 2014 through March 2016. Additionally, select patients for a regional payer had pharmacist interventions documented into a payer-contracted medication therapy management platform to estimate cost avoidance and return on investment of these services. Patients with chronic kidney disease identified for co-management between the nephrologist and primary care physician received a comprehensive medication review. Other pharmacy services were identified and implemented during this time period, most notably a protocol for using erythropoietin stimulating agents in the management of anemia for non-dialysis chronic kidney disease patients. Billing invoices were used as a proxy for demonstrating reduced pharmacy costs at one of the practices in the group. Pharmacy services were categorized in four groups: clinical services, disease state management, prescriber education and patient education.

Results: All clinical pharmacy services identified in the nephrology practice within the patient-centered medical neighborhood had preliminary results that indicate benefit. There were 294 chronic kidney disease patients co-managed by the pharmacist, 50 of which were included in the payer-contracted medication therapy management platform. The clinical pharmacist completed 291 encounters with 189 patients and identified 724 drug therapy problems, thus averaging 4 drug therapy problems per patient. Preventing inappropriate use of drugs and educating physicians about less expensive alternatives was observed to have great cost saving potential in this setting. Discontinuation of corticotropin (Acthar) in two patients avoided potential drug costs of over one million dollars in the 2015 calendar year. Protocol development for erythropoietin stimulating agents use influenced safe prescribing habits and decreased utilization of expensive drugs. The office spending on darbepoetin alfa (Aranesp) decreased by over eighty percent when invoices from October 1, 2014 through September 30, 2015 were compared to those from October 1, 2015 through Sept 30, 2016. Other valuable pharmacy services included blood pressure checks, ordering labs, patient education, adherence monitoring, prior authorization support and more. However, there was insufficient data to provide accurate cost savings and outcome information for all pharmacist interventions.

Conclusion: The patient-centered medical neighborhood presents valuable intervention opportunities for clinical pharmacists to improve patient care in a nephrology centered practice. Preliminary interventions have resulted in reduced costs; however, the true cost savings potential cannot be determined at this time.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 2-321

Poster Title: Assessing the usefulness of an online chat room in the integrated renal and cardiovascular courses

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Purpose: Pharmacy students in their first professional year (P1) often struggle to adapt to the demands of the rigorous curriculum. The integrated renal and cardiovascular courses at the University of Rhode Island (URI) College of Pharmacy facilitate learning of renal and cardiovascular disorders and the medications used to treat them. The primary goal of this project was to evaluate the usefulness of an online chat room as a supplemental learning tool in these courses.

Methods: The online chat room function of the course management system at URI (Sakai) was offered throughout the spring semester to P1 students. Two students in their third professional year (P3) collaborated with the professor who taught a particular topic to determine the optimal time and date to hold the chat room. This time and date was communicated to students via Sakai announcements and email. In the chat room, P1 students were able to submit questions in a real-time list format. The P3 students or professor then responded to the questions and posed questions to the students to encourage discussion.
At the end of the semester, the students were asked to fill out a brief, electronic survey via Survey Monkey. The survey asked 12 questions about the chat room, including asking if they attended the chat room and, if they did not, the reason(s) why, and the impact of the chat room on their learning. The survey was approved by the URI Institutional Review Board.

Results: A total of 63 students completed the survey. Seventy percent reported that they attended the live chat room, and 95 percent viewed the archived chat room.
Thirty-nine percent of respondents agreed that the chat room encouraged them to stay up-to-date with their studying versus 16 percent who disagreed and 45 percent who neither agreed nor disagreed. Seventy-seven percent of respondents agreed that the chat room encouraged student-faculty interaction outside of class versus 3 percent who disagreed and 20 percent who neither agreed nor disagreed. Sixty-two percent agreed that the chat room helped them learn more by asking their own questions and seeking answers versus 7 percent who disagreed and 31 percent who neither agreed nor disagreed. Seventy percent of respondents agreed that the chat room facilitated their learning versus 5 percent who disagreed and 25 percent who neither agreed nor disagreed. Eighty-two percent of respondents agreed that the chat room clarified material that they did not understand versus 3 percent who disagreed and 15 percent who neither agreed nor disagreed. Sixty-four percent agreed that it encouraged them to ask questions about the material versus 11 percent who disagreed and 25 percent who neither agreed nor disagreed.

Conclusion: Based on the results of the survey, the online chat room is a useful adjunct that P1 students can use to enhance their understanding of the renal and cardiovascular course material. Overall, the chat room encouraged students to stay up-to-date in their studying, encouraged student-faculty interaction outside of class, helped them learn more by asking their own questions, facilitated their learning, clarified material they did not understand, and encouraged them to ask questions about the material. The feedback provided by the students who participated can be used in the future to further improve the chat room.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 2-322

Poster Title: Adherence to the 2013 American college of cardiology/American heart association cholesterol guideline recommendations in patients with stroke

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Purpose: Ischemic stroke accounts for 87% of all stroke events and about 14% of stroke survivors experience a recurrent stroke within a year. Adjusting for hypercholesterolemia with statin therapy has contributed to reducing stroke mortality. The 2013 ACC/AHA Cholesterol Guideline includes recommendations for both the primary and secondary prevention of ischemic stroke by modifying LDL-C levels in four statin-benefit groups. The purpose of this study was to evaluate if patients admitted for ischemic stroke or transient ischemic attack (TIA) were discharged with a statin and whether the statin prescribed was appropriate in accordance with the 2013 ACC/AHA Cholesterol Guideline.

Methods: A single-center, institutional review board-approved, retrospective chart review was conducted using electronic medical records from April 1, 2015 to April 1, 2016. Patients who were at least 21 years of age and diagnosed with either ischemic stroke or TIA were considered for inclusion (n equals 368). Patients whose electronic medical records lacked a lipid panel, who were misdiagnosed with ischemic stroke or TIA on admission, who were transferred to another hospital or hospice, or who expired were excluded (n equals 56). The primary outcome was the proportion of patients who were discharged on an appropriate statin for the secondary prevention of stroke. Using the 2013 ACC/AHA Cholesterol Guideline, statin intensity was determined to be appropriate based on the patient's age, renal function, history of rhabdomyolysis and statin intolerance, history of heart failure, and whether the patient was undergoing maintenance hemodialysis. Secondary outcomes included pharmacist intervention and 30-day readmission with ischemic stroke or TIA. Subgroup analysis was performed in patients more than 75 years of age, patients with a history of heart failure, and patients who were undergoing maintenance hemodialysis.

Results: A total of 189 (60.58%) patients were diagnosed with ischemic stroke and 123 (39.42%) were diagnosed with TIA. There were 130 (41.67%) appropriate discharges with statin therapy, 97 (31.09%) inappropriate discharges, and for 85 (27.24%) patients it was uncertain whether statin therapy at discharge was appropriate as the guideline did not make clear recommendations in individuals more than 75 years of age, patients with a history of HF, and patients undergoing maintenance HD. NYHA HF class was not included in electronic medical records therefore all patients who had a documented history of heart failure needed more information to determine if statin therapy at discharge was appropriate. A total of 55 pharmacist interventions were recorded and out of the interventions that were evaluated (n equals 42), only four were determined to be inappropriate. Six out of the 40 patients who were readmitted experienced a subsequent ischemic stroke or TIA, however not enough patients were readmitted within 30 days of discharge with ischemic stroke or TIA to develop a correlation between statin therapy at discharge and readmission.

Conclusion: Educating the recommendations provided by the 2013 ACC/AHA Cholesterol Guideline and initiating a protocol for determining the appropriateness of statin therapy at discharge for the secondary prevention of ASCVD events would benefit both patients and health care professionals at Kent Hospital. As the Expert Panel suggested, future guidelines could examine subgroups of individuals with HF and/or individuals undergoing maintenance HD who might benefit from statin therapy. Likewise, more guidance is needed to determine appropriate statin intensity in individuals more than 75 years of age who are continuing statin therapy.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 2-323

Poster Title: The impact of student led onsite academic detailing on pneumococcal vaccinations in retail pharmacy

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Purpose: The ease of accessibility of retail pharmacists to patients allows for the opportunity to provide influential immunization outreach. With the Advisory Committee on Immunization Practices approving the release of revised immunization schedules annually, pharmacists' approach for screening patient eligibility for immunizations remains ever changing, establishing potential demand for reinforcing education of recommendations. This project assessed whether retail pharmacists had greater knowledge and confidence about the Center for Disease Control and Prevention (CDC) recommendations on pneumococcal vaccination administration in adults following academic detailing.

Methods: A pharmacy student was trained by a retail pharmacist to independently lead academic detailing sessions based on a two page pneumococcal vaccination pathway assembled by the Drug Information Services at the University of Rhode Island to highlight the appropriate screening process for eligible patients. Detailing at local pharmacies was scheduled cognizant to workflow and lasted a maximum of ten minutes. At the conclusion of each session a copy of the vaccination pathway was given to the pharmacists as an in store reference guide. A self-administered pre-survey was given immediately following detailing in closed answer format using the following scale: SA=Strongly Agree, A=Agree, N=Neutral, D=Disagree and SD= Strongly Disagree to assess pharmacists' expectations on how student led academic detailing would impact pharmacist knowledge and confidence on screening patients based on the recommended changes to pneumococcal vaccines in adults. All responses were anonymous and eligible subjects were able to decline participation. An open response section was provided for feedback on how to improve detailing sessions or the educational material provided. Three months later, a telephonic post-survey to measure how pharmacist applied academic detailing into their vaccination practices assessed if administration of pneumococcal vaccinations increased.

Results: Five pharmacists completed the IRB approved pre and post survey. The pre-survey demonstrated immediately following academic detailing, majority of pharmacists (80%) indicated they agreed baseline knowledge of identifying patients requiring pneumococcal vaccinations improved, with 20% of pharmacists indicating they strongly agreed. All pharmacists strongly agreed the two-page pneumococcal vaccination pathway was easy to understand and all strongly agreed with applying the vaccination pathway in practice. In regard to influencing vaccination practices after detailing, 20% indicated neutral expectations of change, 20% indicated they agreed with expecting change and 60% indicated they strongly agreed with expecting change. The post-survey demonstrated 80% agreed that they administered more pneumococcal vaccinations as a result of academic detailing, with 20% disagreeing with observing changes in their vaccination practice. All pharmacists indicated that they were more confident after one-on-one educational academic detailing and that they would benefit from academic detailing in the future about major immunization updates.

Conclusion: Student led academic detailing on a major vaccination update helped to identify a demand among pharmacists to receive periodic one-on-one clinical outreach on major changes in vaccination practice to enhance pharmacist knowledge and confidence in retail pharmacy.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 2-324

Poster Title: Prescriber adherence to documentation of indication and duration of antimicrobials in a community teaching hospital

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Purpose: Several government organizations have proposed regulations that require hospitals to implement an antimicrobial stewardship program (ASP). The CDC has published seven ASP core elements providing detailed examples of actions to support optimal antibiotic use and the need to track outcomes such as adherence to documentation of indication and anticipated duration. The purpose of the study is to determine if a specific indication and anticipated duration of therapy is documented, either at order entry or in the medical record, for any patient receiving an antimicrobial agent during their stay in order to assess compliance and identify ways to improve documentation.

Methods: The institutional review board approved this observational retrospective chart review at a 359 bed community teaching hospital. Patients over the age of 18 years were included if they spent at least one consecutive night in an inpatient unit between May 1, 2016 and June 30, 2016 and were prescribed an antimicrobial during their stay. Patients admitted only to the emergency department were excluded, as were surgical patients without electronic surgical antibiotic prophylaxis orders. Patients were identified from an electronic report generating all antimicrobial orders during the study period, and five patients per antimicrobial were randomly selected to a final sample size of 250 patients. Data collection included the prescriber type (eg. hospitalist, surgeon, etc.) in order to assess trends, whether or not the indication and anticipated duration was documented, and details regarding the location of documentation, whether or not an indication was empiric, definitive based on culture results, or prophylactic, and whether the actual antimicrobial duration was shorter, longer, or the same as the documented anticipated duration. Any recommendation left by a pharmacist regarding

antimicrobials was also captured. The primary outcomes were the percent of patients who were prescribed an antimicrobial with a documented 1.) indication and 2.) anticipated duration.

Results: An indication was documented in 81% of patients. Of those with documentation, 62% were recorded either in the admission note or day one progress note; however, 7% were not documented until later in the stay or the discharge summary. The majority of indications were empiric (74%), followed by definitive (16%) and prophylactic (10%). The providers who prescribed the majority of antimicrobials had high rates of indication documentation (hospitalists 88%; infectious disease 96%; residents 87%), while surgeons had the lowest rate (27%). An anticipated duration was documented in 44% of patients. Of those with documentation, 77% were either ordered with a stop date/single dose or documented in the admission note/day one progress note. The most common anticipated durations documented were “until culture results” (16%), seven days (14%) and five days (8%); 63% of the time, the actual duration was the same as anticipated (19% shorter and 14% longer than anticipated). Anticipated duration documentation was inconsistent among common prescribers (hospitalists 33%; infectious disease 57%; residents 48%) and primary care providers had one of the lowest rates of documentation (18%). Twenty-five percent of patients had a pharmacist intervention, and the indication or duration were mentioned in 10% and 8% of patients, respectively.

Conclusion: Antimicrobial indications are documented frequently but not always in an ideal location, while anticipated durations are documented in less than half of patients. This data supports the creation of mandatory fields during computerized prescriber order entry to provide a single place where this information can be accessed. Improved documentation will enhance the ability of the ASP to determine if antimicrobials are appropriate and aid in the process of discharge planning. This baseline adherence data identifies an issue where the ASP can implement policies and interventions and track improvement as an ASP outcome measure.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 2-325

Poster Title: Evaluation of free clinic adherence with the joint national committee 8 (JNC 8) guidelines

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Purpose: According to the Centers for Disease Control, about 75 million Americans are affected by high blood pressure. Additionally, statistics show that about 28.6 million Americans are uninsured. Many uninsured patients seek treatment from emergency departments, community health centers, or free clinics in their area. The Joint National Committee 8 (JNC 8) defined evidence-based guidelines for the treatment of hypertension in 2014. The purpose of this project was to determine whether uninsured patients with hypertension at a local free clinic were receiving evidence-based treatment for hypertension and whether patients attained generally accepted goal blood pressure targets.

Methods: Performing a retrospective chart review to compare current treatment of Clinica Esperanza/Hope Clinic (CEHC) patients to the JNC 8 evidence-based guidelines. Patients between the age of 29 to 78 years with hypertension with or without diabetes were identified using ICD-10 diagnosis codes for hypertension (I10) and type 2-diabetes (E11). Data collection included gender, race, blood pressure readings from the two latest clinic visits, information about chronic kidney disease, age and antihypertensive medication. Patients meeting the inclusion criteria and receiving care for hypertension and type 2 diabetes between January 1, 2015 to September 1, 2016 were evaluated. A patient age 60 or greater is considered to be at blood pressure goal if they had an average of two systolic blood pressure readings of less than 150 and diastolic blood pressure of less than 90. Patients aged 60 or less, any race, with or without type 2 diabetes was considered to be at blood pressure goal if the average of two systolic blood pressure readings was less than 140 and diastolic blood pressure of less than 90.

Results: A total of 68 patients with a primary diagnosis of hypertension or hypertension with diabetes and with a mean age of 55.8 ± 11.99 years were identified in this retrospective chart review. Demographically, 46 percent of the hypertensive patients were women, 85 percent were Latino, and 15 percent were African American, African or Haitian. Overall, 79 percent (54/68) of patients at this free clinic were at blood pressure goal and 95 percent (41/43) were prescribed the correct medications. Of the 58 Latino patients, twenty-two Latino/Hispanic patients did not receive drug therapy because they were at blood pressure goal without requiring medication. The remaining uninsured Latino patients (n=36) with hypertension with or without diabetes or chronic kidney disease were given recommended treatment and 84 percent (49/58) met JNC8 recommended blood pressure goals. Of the 10 uninsured African American, African and Haitian patients, 9 were prescribed evidence-based antihypertensive treatment (two patients required no drug therapy because their blood pressure was at goal) while 1 received no drug therapy despite slightly elevated blood pressure. Five of the African American, African and Haitian patients were at goal blood pressure (62 percent).

Conclusion: This retrospective chart review of hypertensive patient care at a local free clinic demonstrated that the majority of hypertensive patients were receiving evidence-based treatment for hypertension and had attained blood pressure targets defined by the JNC 8 guidelines.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-326

Poster Title: Assessing students' use and knowledge of common pain relievers

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Purpose: Recently, there has been concern with over-the-counter (OTC) analgesics, especially acetaminophen, which is a common cause of overdose and hepatotoxicity. Currently, there is limited research on the use of analgesics in the college-age population. The goal of this study was to assess students' use and knowledge of common OTC analgesics.

Methods: We conducted this assessment using a brief, one-time paper survey given to students at the University of Rhode Island (URI). Upon informed consent, students completed the survey at random locations across campus including residence halls, dining halls, and student organizational meetings. This survey was approved by the URI Institutional Review Board.
The survey asked students to identify the uses for OTC analgesics from a checklist of common, treatable conditions. To assess knowledge of analgesics, students were asked to identify which drugs were nonsteroidal anti-inflammatory drugs (NSAID) from a list of OTC analgesics. Students were also asked about the duration of analgesic use, whether they read the drug facts panel, if they exceeded the maximum daily dosage, if they took the medication around the clock or as needed, if they were aware of the risks of the medications, if they received help when choosing the medication, and if they drank alcoholic beverages.

Results: A total of 126 students took part in the survey. Of those surveyed, 55.4 percent were in their freshman year of college and 67.8 percent were female. Those who consumed alcohol were more likely to exceed the maximum daily dose than those who did not report drinking alcohol (p equals 0.002). Fourteen percent of respondents were able to score a 6 out of 8 possible points in correctly identifying NSAIDs, while those achieving a score of 4 out of 8 and 5 out of 8 were 20 percent and 22 percent, respectively. In addition, the difference in knowledge

between health majors and non-health majors on NSAID knowledge was not significant (p equals 0.672). Eighty percent of students reported using a pain reliever for less than seven consecutive days, while 20 percent reported taking it for greater than a week. Fifty percent of participants reported frequently or always reading the instructions on the package of the medication. Of those that read the directions, 21 percent have exceeded the maximum daily dosage. Seventy percent of respondents claimed to be aware of the risks of taking analgesics. Only 12.4 percent received help when choosing their medication at the pharmacy.

Conclusion: The results of this study highlight the need to educate consumers about the proper use of NSAIDs. Pharmacists are the most accessible healthcare professional and have the opportunity to help with appropriate and safe use of OTC analgesics.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 2-327

Poster Title: Characterizing the Use of Procalcitonin Concentrations to Inform Antibiotic Therapy at a Community Hospital

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Purpose: Procalcitonin (PCT) has become an important marker in the diagnosis of and treatment direction for sepsis and lower respiratory tract infections (LRTI). The development of PCT-guided treatment algorithms allows clinicians to discontinue antibiotic therapy earlier or avoid antibiotic therapy altogether, in qualifying patients, without detrimentally affecting outcomes. The goal of this project was to optimize clinician ordering of PCT concentrations and subsequent appropriate antibiotic therapy based on PCT-guided treatment algorithms at Hackettstown Medical Center (HMC) in Hackettstown, New Jersey.

Methods: A retrospective analysis included patients with at least one PCT result during a one-month period from June 1 to June 30, 2016. Data was abstracted from included cases and information regarding indication for antibiotic treatment, antibiotics given, length of stay, PCT results, and appropriate use of PCT-guided treatment algorithms were obtained and analyzed. The retrospective analysis used an evidence-based PCT-guided treatment algorithm produced by Nebraska Medicine's Antibiotic Stewardship Program. Accurate use of the PCT-guided algorithm was based strictly on PCT thresholds and indications for follow-up PCT monitoring recommended in the algorithm.

Results: Sixty-nine patient cases were identified as having at least one PCT result and were included for further analysis. Ninety-six PCT tests were ordered, an average of 1.42 ± 0.7 tests per patient. Forty-four patients (63.8%) had PCT tests ordered for the evidence-based indications of sepsis and LRTI. Twenty-two patients (34.8%) did not have appropriate PCT follow-up based on the treatment algorithm. Among those, 18 did not receive follow-up when it was indicated and six received follow-up when it was not. Antibiotic therapy was changed

appropriately, based on the PCT treatment algorithm, in only 22 patients (31.9%). Upon completion of the analysis, it was determined that further education was needed to optimize use of the evidence-based PCT-guided algorithm, thereby improving use of PCT concentrations and appropriate antibiotic therapy.

Conclusion: Retrospective analysis was helpful in establishing a baseline for use of PCT concentrations to guide antibiotic prescribing. Follow-up PCT testing for patients with initially high PCT levels and appropriate avoidance or discontinuation of antibiotic therapy based on the PCT-guided algorithm were determined as the two areas requiring improvement. Education targeted at optimizing both areas was provided to HRMC physicians in a memo by the head of Infectious Diseases. Follow-up to determine the effectiveness of educational activities will be conducted in December 2016.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 2-328

Poster Title: Vancomycin dose adjustments based on incorrectly drawn trough levels: A role for antimicrobial stewardship and education

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Purpose: Vancomycin is commonly prescribed to hospitalized patients and frequently a target for antimicrobial stewardship programs. Vancomycin trough levels are obtained during therapy to assess whether dosing is therapeutic, and to avoid toxicity based on clearance of the drug. Appropriately drawn troughs require at least 3 doses administered to reach steady-state, within 30 minutes of the next dose, and at the correct interval from the preceding dose. Incorrectly drawn troughs and subsequent dose adjustments can lead to negative patient outcomes. Our objective was to assess the appropriateness of vancomycin dosing and monitoring within the Providence Veterans Affairs Medical Center (VAMC).

Methods: Two pharmacy students and a pharmacy research fellow performed a retrospective chart review to evaluate the use of vancomycin. This study was performed as part of the antimicrobial stewardship program, with Institutional Review Board approval and waiver of informed consent. Patients were randomly selected to achieve a sample size of 50 from all intravenous vancomycin orders between January 1, 2015 and December 31st 2015 at the Providence VAMC. Patients were excluded if vancomycin treatment was < 48h, if they were < 18 years old, or if the vancomycin was being taken orally. Electronic medical records were searched for baseline demographics including age, gender, race, height, weight, and baseline serum creatinine. The Providence VAMC provides our clinicians with guidelines on vancomycin dosing in adult patients, including a validated dosing nomogram. We assessed whether the initial vancomycin order matched the nomogram recommendations. Data was also collected on vancomycin dosing, trough monitoring, dose adjustments, vancomycin days of therapy, and

serum creatinine changes. Descriptive statistics including means, standard deviations, and percentages were used to describe the data.

Results: There were 411 unique patients at our institution who received intravenous vancomycin in 2015 and we reviewed 89 charts to include 50 patients. Our chart review revealed that patients were generally white (92%) males (92%), with a mean age of 71.0 +/- 14.3 years. Baseline serum creatinine was 1.1 +/- 0.5 mg/dL, with an estimated creatinine clearance of 68 +/- 30 mL/min (per Cockcroft Gault). Vancomycin was administered for a mean of 4.2 +/- 1.8 days during the admission. Initial doses followed our dosing nomogram in 44% of patients. In patients dosed at 1 gram Q12H (n=19), only 52.6% (n=10) were appropriate based on the nomogram. Forty (80%) patients had at least one vancomycin trough drawn, with an average of 1.9 +/- 0.8 troughs drawn. The initial trough was drawn on average day 2.4 +/- 1.0 of therapy. However, 65% (n=26) of the initial troughs were drawn inappropriately. Following the initial trough, 21 regimens were adjusted. Of those, 66.7% (n=14) were adjusted based on inappropriately drawn troughs. Nine (18%) patients experienced an increase in serum creatinine of 0.5mg/dL or greater during vancomycin therapy, indicating acute kidney injury according to the Risk, Injury, Failure, Loss, and End-stage kidney disease criteria.

Conclusion: This study demonstrates the importance of appropriate vancomycin dosing and monitoring. Correctly drawn troughs can be a useful tool in evaluating vancomycin therapy. At our institution, however, there is a high percentage of incorrectly drawn troughs, with subsequent dose adjustments. There is an opportunity for staff education (nursing, pharmacy, medicine) on appropriate vancomycin dosing and trough timing to assist in antimicrobial stewardship and medication safety at our facility. Future studies should assess the impact of provider education on vancomycin appropriateness and patient outcomes.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 2-329

Poster Title: Efficacy and cost effectiveness of proprotein convertase subtilisin/kexin type 9 (PCSK9) inhibitors in familial hypercholesterolemia: a systematic review

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Purpose: Two proprotein convertase subtilisin/kexin type 9 (PCSK9) inhibitors, evolocumab and alirocumab, are approved for familial hypercholesterolemia (FH) disorders. In patients with FH, conventional lipid lowering therapies are often unsuccessful in reducing low-density lipoprotein cholesterol (LDL-C), cardiovascular risk, and mortality. Priced significantly higher than traditional cholesterol lowering medications, PCSK9 inhibitors have the potential to pose a significant financial burden on the US health care system. The objective of this project was to evaluate the evidence for PCSK9 inhibitor use in patients with FH disorders and classify its relative cost effectiveness for payers.

Methods: A systematic search of the PubMed and EMBASE databases was conducted to identify clinical trials specifically enrolling patients with either homozygous or heterozygous FH. Each trial was evaluated for quality, reliability, and internal validity by two independent reviewers based on the Jadad scale. Differences in scoring were resolved through discussion between the two reviewers. A Jadad score for inclusion of three or greater was set prior to beginning evaluation. Six trials received a Jadad score of greater than three and were included in the analysis. Key attributes such as sample size, inclusion criteria, exclusion criteria, interventions, study duration, and results of each trial were tabulated for comparison. Specifically, the calculated LDL-C mean change from baseline at week 12 or 24 was analyzed for each trial based on the desired primary endpoint. Other lipid parameters including HDL-C and fasting triglycerides were assessed secondarily when available. Additionally, reported adverse events from each trial were tracked and organized by drug to assess safety. Value-based pricing benchmarks and cost effectiveness data were obtained from the PCSK9 Inhibitors for Treatment of High Cholesterol draft report produced by the Institute for Clinical and Economic

Review. These measures were specifically applied to the FH patient population to assess budget impact and costs based on estimated reductions in adverse events.

Results: Efficacy data from each trial was assessed based on the calculated LDL-C mean change from baseline. Early PCSK9 inhibitor trials do not present cardiovascular outcomes data, which poses a problem for assessing true efficacy of the agents. RUTHERFORD-2 (Raal et al) demonstrated the largest percent reduction in LDL-C from baseline in patients with heterozygous FH receiving evolocumab 140mg every two weeks. Measured at week twelve, LDL-C decreased by 61.3% from baseline in treatment arm patients compared to an increase of 2.0% in patients receiving placebo. The smallest reductions in LDL-C seen in treatment arm patients were noted in TELSLA Part B (Raal et al). TELSA Part B only enrolled patients with homozygous FH, netting reductions in LDL-C of 23.1% with evolocumab 420mg administered every four weeks compared to a 7.9% LDL-C increase in placebo recipients. PCSK9 inhibitors come at an estimated cost of $14,600 per person for one year of treatment. In patients with FH, assuming approximately 75% of patients receive treatment over the course of five years, PCSK9 inhibitors will attribute $19 billion in spending to the health care system (Tice et al).

Conclusion: Efficacy data currently available for PCSK9 inhibitors in the FH population focuses solely on LDL-C reductions. While reductions in LDL-C are important in achieving lower total cholesterol levels, cardiovascular impact is difficult to determine. Longer-term trials must be conducted in order to ensure LDL-C reduction translates to reductions in cardiovascular risk events and mortality. At their current market price, PCSK9 inhibitors are not considered to be an affordable intervention. Payers would require significant price reductions or substantial outcomes data to offset quality adjusted life year parameters in order to justify the expense.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 2-330

Poster Title: Changes in antimicrobial use and resistance rates pre- and post-implementation of an antibacterial stewardship program

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Purpose: Antimicrobial stewardship programs have the potential to reduce antibiotic use and slow the development of resistance in various pathogens. This can be beneficial to both patients and institutions by avoiding costly treatment complications such as Clostridium difficile infection and extended hospital stays. The purpose of this study was to evaluate the changes in antibiotic use and pathogen resistance rates following the implementation of an antibacterial stewardship program.

Methods: An antimicrobial stewardship program (ASP) which utilized prospective audit and feedback was formally implemented at the VA Medical Center in Providence, RI in September 2012. The Providence VA Medical Center is a small teaching hospital licensed for 119 beds. Using the CDC's National Healthcare Safety Network (NHSN) Antimicrobial Use and Resistance options, we retrospectively analyzed antibiotic use using days of therapy per 1000 patient days pre- and post-implementation of this program. Resistance rates in pathogens were also evaluated.

Results: We evaluated antibiotic use and resistance rates from 2008 to 2015. Resistance rates were consistently high prior to implementation of the ASP in 2012. Post-implementation of the ASP antibiotic use decreased for several agents (amoxicillin/clavulanate, azithromycin, cefotaxime, cefoxitin, cephalexin, ciprofloxacin, linezolid, metronidazole, moxifloxacin, trimethoprim/sulfamethoxazole) and pathogen resistance rates also decreased from 2012 to 2015 for Pseudomonas aeruginosa treated with imipenem (5%) and cefepime (5%).

Conclusion: Post-implementation of the ASP, resistance rates of many pathogens remained similar to rates pre-implementation. Total antibiotic use decreased for most antibiotics post-implementation of the ASP. Antimicrobial stewardship programs are important for reducing antibiotic use and limiting the propagation of antimicrobial resistance.

Submission Category: Geriatrics

Submission Type: Evaluative Study

Session-Board Number: 2-331

Poster Title: Rates of correct inhaler technique in high-risk, community-dwelling older adults with chronic obstructive pulmonary disease (COPD)

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Purpose: Patients with chronic obstructive pulmonary disease (COPD) are often managed with multiple inhaler devices. There are several different devices available, with unique steps that can make correct administration challenging. Older adults may have a higher risk of misusing inhalers due to cognitive and functional limitations. Improper technique can lead to poor disease control, greater rates of hospitalization, and reduced quality of life. The purpose of this study was to determine the ability of older adults to appropriately self-administer three common inhaler devices.

Methods: This study was a retrospective chart review of older adults enrolled in the Program of All-inclusive Care for the Elderly of Rhode Island (PACE-RI). Participants were included if they had an International Classification of Disease Ninth or Tenth Edition (ICD-9 or ICD-10) diagnostic code related to COPD, lived in the community, self-administered inhalers, and were evaluated by a clinical pharmacist between January and August 2016. The three devices evaluated were the metered dose inhaler (MDI), the trademarked Diskus, and the trademarked HandiHaler. The clinical pharmacist used standardized lists of inhaler steps to categorize participant technique as correct or incorrect. Lists were generated for each device based on the instructions for use in the prescribing information. Technique was incorrect if one or more steps were performed incorrectly, forgotten, or required assistance to complete. The primary endpoint was the overall rate of correct inhaler technique among older adults with COPD. Secondary endpoints included rates of correct technique for each of the three devices, a comparison of the two dry powder inhalers (DPIs), and an analysis of problematic inhaler steps. Each individual inhaler step was further classified as “universal” across all devices, or as an “inhaler-specific” step.

Results: A total of 42 encounters from 20 participants were included. N equals 21 encounters were evaluations of the MDI, n equals 13 were evaluations of the Diskus, and n equals 8 were evaluations of the Handihaler. Participants were between the ages of 58 and 80 years old, with a mean age of 68 years old. The majority of participants were female (65 percent).
The overall rate of correct inhaler use was 66.7 percent (28/42). Of the three devices, the lowest rate of correct technique (57.1 percent or 12/21) was demonstrated with the MDI. The most common reason for MDI technique failure was forgetting to shake the canister before use. Shaking before use was considered an inhaler-specific step.
In regards to the two DPIs, correct inhaler technique was demonstrated 69.2 percent of the time with the Diskus and 87.5 percent of the time with the HandiHaler. The most common mistakes observed with the Diskus were not properly clicking the lever and not rinsing mouth after use. Only one participant using the HandiHaler failed due to difficulty adding the capsule to the container.

Conclusion: Results indicate that one in every three inhaler administrations in high-risk older adults with COPD could be compromised due to improper inhaler technique. Improper technique was observed most often for participants using an MDI, despite the low number of additional, inhaler-specific steps. Identifying the high rate of misuse of MDIs (42.9 percent) should encourage providers to counsel on the importance of shaking the inhaler. Results also suggest that the HandiHaler may be easier for older adults with COPD to use compared to the Diskus.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 2-332

Poster Title: Multidisciplinary ambulatory intravenous diuretic clinic improves short-term mortality and rehospitalizations in veterans with decompensated heart failure

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Purpose: Multidisciplinary ambulatory intravenous diuretic clinics for volume management in patients with heart failure have been found to be safe and effective at promoting significant urine output. This strategy may provide an alternative to hospitalization for the management of selected heart failure patients. Data on the effectiveness of this strategy to prevent rehospitalization and mortality are limited. Therefore, the primary objective of this research is to evaluate the effectiveness of an outpatient multidisciplinary intravenous diuretic clinic versus standard observational hospitalizations of less than 48 hours for decompensated heart failure on the time to rehospitalization or death.

Methods: We conducted a retrospective cohort study of patients with heart failure (n equals 88) at the Providence Veterans Affairs Medical Center. Patients were included in the analyses if they received at least one multidisciplinary ambulatory intravenous diuretic clinic visit or an observational hospitalization of less than 48 hours for decompensated heart failure between January 1, 2014 and June 30, 2016. Patients were referred to the multidisciplinary outpatient diuretic clinic based on clinical judgment of the cardiology staff and treated according to a pre-established protocol and treatment algorithm. Patients were followed from their index event, defined as the date of first intravenous diuretic clinic visit or date of first observational hospitalization for heart failure, until death or end of study. Using both unadjusted and adjusted Cox proportional hazards modeling, we compared the time to any hospitalization or death between the multidisciplinary intravenous clinic and the observational hospitalization cohort over 180 days of follow-up. The time to heart failure hospitalization or death was also compared between the two intervention arms. Sensitivity analyses were also conducted to determine the impact of hospice enrollment and palliative care on the study interventions. Our

study was approved by the Providence Veterans Affairs Medical Center Institutional Review Board and conducted in accordance with the Declaration of Helsinki.

Results: In the ambulatory diuretic clinic group, 27 patients (mean age 78.4, plus or minus 8.18 years) were treated over a median of 3 visits per patient (range of 1-84 visits per patient). In the comparison group, 61 patients (mean age 80.9, plus or minus 11.38 years) were hospitalized for observation. Patients in the ambulatory diuretic clinic had a higher body mass index (32.1 plus or minus 7.87 versus 28.5 plus or minus 5.79 kilograms per meter squared, p equals 0.02); and more comorbidities including: chronic obstructive pulmonary disease (55.6 versus 27.9 percent, p equals 0.01), pulmonary hypertension (29.6 versus 11.5 percent, p equals 0.04), and obstructive sleep apnea (59.3 versus 24.6 percent, p less than 0.01). Adjusting for age and imbalances in baseline characteristics, the hazards of any hospitalization or death (adjusted hazard ratio 0.29, standard deviation 0.14, 95 percent confidence interval 0.11 to 0.76, p equals 0.01) and heart failure hospitalization or death (adjusted hazard ratio 0.30, standard deviation 0.20, 95 percent confidence interval 0.08 to 1.13, p equals 0.08) were reduced for patients in the multidisciplinary ambulatory diuretic clinic versus those in the hospitalization cohort. Sensitivity analyses for hospice enrollment and palliative care did not change our findings.

Conclusion: In veterans with decompensated heart failure, a multidisciplinary ambulatory intravenous diuretic clinic was protective against any readmission or death over 180 days of follow up when compared to a strategy of observational hospitalization for less than 48 hours. Future research should prospectively analyze outpatient intravenous therapy in a larger and more diverse population.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 2-333

Poster Title: Prescriber adherence and pharmacist interventions when adding blood pressure parameters on inpatient orders of antihypertensive medications

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Purpose: At a 294-bed community hospital, a medication event occurred where a patient received doses of three antihypertensive medications, became hypotensive, and was admitted to the intensive care unit. Medication use policy was then revised to require holding parameters on all antihypertensive medications. A department wide email and educational sessions to all pharmacists highlighting a mandate for intervention on all orders without holding parameters was sent in May 2016. The purpose of this study is to determine if prescribers and pharmacists are compliant with this policy and if the department wide education made an improvement on overall compliance to this policy.

Methods: A retrospective chart review was conducted using electronic medication records to identify if the prescriber included blood pressure holding parameters, and whether a pharmacist intervention was implemented. A randomized sample of all patients admitted to the hospital with antihypertensive medications was included via a computer-generated list. A total of 406 medication orders were reviewed, 174 of which were between April 1, 2016 and May 2, 2016 (before the department wide communication) and 232 orders were between August 1, 2016 and August 31, 2016 (after the department wide communication). The primary outcomes were the percent of orders including blood pressure parameters and the percent of orders with an intervention from the pharmacist to the prescriber to add blood pressure parameters.

Results: Of all 406 antihypertensive orders reviewed, 33.25% included blood pressure parameters, of which 47.4% required a pharmacist intervention. Of the 66.75% of orders without blood pressure parameters in the total sample, 23.25% had a pharmacist intervention to include parameters however there was no prescriber follow up. Of the 174 orders reviewed in April, 16.67% had blood pressure parameters, 37.0% of which required a pharmacist

intervention. Of the 83.33% that did not contain blood pressure parameters from the April sample, 20.0% included interventions from the pharmacist yet there was no follow up by the prescriber. Of the 232 orders reviewed in August, 45.7% had holding parameters, of which 50% required an intervention from the pharmacist. Of the 54.31% of orders reviewed that did not include parameters from the August sample, 26.98% had a pharmacist intervention with no prescriber follow up. Overall, there was a 12.45% increase in blood pressure holding parameter inclusion after the implementation of the revised medication use policy.

Conclusion: Medication events leading to hypotension are a major cause of complications and extended stay amongst hospitalized patients. This data displays a need for better compliance to including blood pressure holding parameters among prescribers and pharmacists to ensure patients are not receiving antihypertensive medications inappropriately. This data also shows that department wide communications via email and educational session are effective in improving pharmacist compliance to updated hospital policies. Possible solutions to further improve compliance include allowing pharmacists to add blood pressure parameters on antihypertensive medication orders, or building blood pressure holding parameters into electronic medication order sets.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 2-334

Poster Title: Causative factors contributing to clinical inertia at a family medicine clinic

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Purpose: Clinical inertia – defined as the lack of appropriate therapy intensification when indicated – is a well-known impediment to appropriate patient treatment, especially in patients with type 2 diabetes. National trends suggest that diabetes treatment regimens are only properly modified 39 percent of the time, and the odds of achieving target hemoglobin A1C (A1C) goals are five times lower when treatment is not properly modified. Further investigation into causes of clinical inertia at a family medicine clinic may help illuminate causative factors, and more precisely identify where intervention strategies should be focused.

Methods: Retrospective review of electronic medical records of patients with type 2 diabetes presenting to a family medicine clinic was conducted to determine: if clinical inertia was present, its associated causative factors, and if the course of action following the appointment was concordant with the 2015 American Diabetes Association (ADA) diabetes management guidelines. Guideline concordance was defined as the increase in dose or addition of a new antihyperglycemic medication in response to an A1C value greater than or equal to 7 percent in the general population, or an A1C value greater than or equal to 8 percent in patients with extensive comorbidities or at high risk for hypoglycemia. True non-concordance, and thus true clinical inertia, was defined as the unjustified lack of guideline concordance. If there was a justifiable reason for non-concordance (i.e., factors outside the providers' control), that case was not considered to be one of true clinical inertia. Patient A1C levels were recorded at baseline and at seven months to determine if there was any difference. This study included patients 18 years or older with type 2 diabetes whose A1C was greater than or equal to 7 percent. Patients were excluded if they were more than 75 years of age, had type 1 diabetes, were pregnant, or had fewer than two A1C readings within the study window.

Results: A total of 62 patients were included in the study. Clinical inertia was initially found to be present in 60 percent of cases (n equals 37) within the study window, while guideline concordance (without clinical inertia) occurred in 40 percent of cases (n equals 25). Reasons contributing to clinical inertia were subsequently explored, including: other primary problems (e.g., active infection, cancer, or pain) taking precedence during the appointment (8 percent of total, n equals 5), patient unavailability for follow-up during the study window (5 percent of total, n equals 3), and patient refusal of recommended therapy modification (5 percent of total, n equals 3). These cases were considered to be outside of the providers' control, and not true cases of clinical inertia. True clinical inertia, with no discernible justification, occurred 42 percent of the time (n equals 25). The clinical inertia group experienced a decrease in mean A1C from a baseline of 8.4 percent (standard deviation plus or minus 1.20) to 8.3 percent (plus or minus 1.23), whereas the group without clinical inertia experienced a decrease in mean A1C from a baseline of 8.8 percent (plus or minus 1.00) to 8.4 percent (plus or minus 1.41).

Conclusion: Cases without clinical inertia experienced a decrease in A1C levels, whereas the A1C levels of cases with clinical inertia remained approximately the same. After accounting for causative factors, true instances of clinical inertia were 18 percent less frequent than initially observed, but still occurred almost half of the time. Patient educational interventions may further decrease the rates of clinical inertia. Additional study is required to determine the effectiveness of educational interventions, if causative factors of clinical inertia differ in other clinical settings, and if other types of interventions are necessary.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 2-335

Poster Title: Evaluation of urinalysis, urine culture, and antibiotic utilization in two community, teaching hospitals

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Purpose: According to the Centers for Disease Control and Prevention, 20-70% of antibiotics prescribed in hospitals are inappropriate. Asymptomatic bacteriruia is frequently mistreated with antibiotics. Cambridge Health Alliance (CHA), a system of two community, teaching hospitals has had an active Antimicrobial Stewardship Team (AST) since 2007.The goal of the AST is to improve clinical outcomes and minimize cost and unintended consequences associated with antimicrobials, including toxicity and selection of resistant organisms. The purpose of this quality improvement project was to evaluate practices at CHA surrounding urinalysis (UA), urine, culture (UC), and antibiotic utilization in order to identify opportunities for stewardship intervention.

Methods: The CHA Institutional Review Board did not require review of this quality improvement project. All urinalyses from 7/12/16-7/28/16 in patients >18 years admitted to Cambridge or Whidden Hospitals, or seen in emergency departments, were included. Chart review was conducted to determine appropriateness of UC and antibiotic therapy. Data collected included time of UC in relation to UA, organisms, contamination, documented genitourinary symptoms, indication for UC, UA results (leukocyte esterase, nitrates, and white blood cells), diagnosis, presence of catheter, empiric and definitive antibiotic therapy, total duration of therapy, and location. UC was deemed appropriate in pregnant and urologic surgery patients. UC was justified in non-catherized patients with acute dysuria, fever and a genitourinary symptom, 2 genitourinary symptoms without fever, or sepsis without an established source. In patients with indwelling bladder catheters, UC was indicated with fever plus one of the following: neutropenia, post urologic surgery, known obstruction, unexplained

suprapubic/ flank pain, hematuria, delirium, or spinal cord injury with worsening condition. Empiric antibiotics were appropriate if they met ISDA guideline recommendations and ≥85% E. coli susceptibility per CHA's antibiogram. Definitive antibiotics were appropriate if the causative organism was susceptible. Duration was appropriate if total antibiotic days were < 5 for uncomplicated infections (up to 7 days for beta-lactams), and 7-14 days for complicated infections or pyelonephritis. Fluoroquinolones were considered inappropriate for treatment of uncomplicated urinary tract infections.

Results: 99 patients had UA ordered in the 17 day period. Per chart review, the majority of UA orders were justified, however, 4 elderly patients and 3 orthopedic surgery patients had no indications for UA or UC. 75 total patients (75.7%) had a UC and 59 (78.7%) were ordered at the same time as the UA . The UC contamination, positive, and negative culture rates were 42.7%, 28%, and 29.3%, respectively. There were 6 patients with indwelling catheters, 5 were cultured and 4/5 had bacteriuria (80%). Excluding five pregnant and nine urologic surgery patients, 21/61 (34.4%) patients with a negative UA and no urinary symptoms were cultured. Of the 21 cultures, 9 were negative, 9 were contaminated, and 3 had a significant isolate resulting in 69 minutes and $90 of microbiology lab resources wasted in a 17 day period. That equates 24.6 hours and $1,932 annually. Twenty patients were diagnosed and treated for urinary tract infections. Empiric, definitive, and duration of therapy was inappropriate in 10/20 (50%), 6/20 (30%), and 6/20 (30%), respectively. The most common agent selected for inappropriate empiric therapy was ciprofloxacin at 50%. Of note, 29% of E coli are resistant to ciprofloxacin per CHA's inpatient antibiogram.

Conclusion: This review allowed CHA to identify several opportunities to improve diagnosis and treatment of urinary tract infections including: defer UC pending UA review in patients without urinary symptoms (excluding pregnancy and urologic surgery), emphasize better urine collection technique to decrease contamination, avoid routine urine studies in elderly psychiatric patients and pre-op orthopedic patients, and target education to prevent overuse of fluoroquinolones and prolonged antibiotics (>5 days) for treatment of uncomplicated urinary tract infections. As a result of this project, the AST will work with the lab to implement reflux UC based on UA results and deliver education surrounding fluoroquinolone use.

Submission Category: Preceptor Skills

Submission Type: Descriptive Report

Session-Board Number: 2-336

Poster Title: Adherence simulation: an adaptable tool for promoting empathy among student pharmacists

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Purpose: The Center for the Advancement of Pharmacy Education (CAPE) 2013 Educational Outcomes emphasize the value of effective approaches to pharmacy practice and patient care. These standards advise pharmacy educators to place importance in the domains of personal and professional development. This project was designed to provide a learning tool for both faculty and preceptors to evaluate and promote self-awareness and empathy in their student pharmacists.

Methods: Student pharmacists in their first professional year at the University of Rhode Island adhered to a complex medication regimen simulated with candy for four weeks during an introductory pharmacy experience. Students were required to fill six prescriptions weekly at a mock pharmacy with limited hours located on campus. They were encouraged to implement personal strategies for remembering to take their prescribed medications. Pre- and post-simulation surveys were administered to determine change in empathy. Surveys consisted of demographic information along with seven questions assessing students' familiarity with adherence complications, level of empathy and understanding of the responsibilities of pharmacists in medication adherence. Each question was rated using a likert scale between one and five (1 - strongly disagree, 5- strongly agree). Students were also required to write a one-page reflection on their experience.

Results: Ninety seven percent (n=29) of students successfully completed both the pre- and post- simulation surveys. The Wilcoxon Signed Rank Test was used to analyze survey data. There was a significant increase in appropriateness of each participant's own empathy in

patient care (p = 0.001) as well as the overall perception of the importance of empathy (p = 0.0007). Student reflections highlighted common barriers faced throughout the four weeks, including limited pharmacy access, difficulty remembering to take medications dosed more than once a day, and medication administration interfering with daily activities.

Conclusion: Simulating a complex medication regimen is associated with increased empathy for patient burdens in the healthcare system. Our results showed a significant improvement specifically in students' perceptions of their own ability to be empathetic in pharmacy practice. This project is easily adaptable and can be implemented in many educational settings to further promote empathy in future health care professionals.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 2-337

Poster Title: Antimicrobial stewardship in a long-term acute care hospital

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Purpose: The purpose of this study was to examine the prevalence of antimicrobial use among residents in a long-term acute care hospital, assess the appropriateness of empiric antibiotic choices used to treat genitourinary infections, and provide solutions to enhance the proper use of antibiotics in this population.

Methods: Patient data was collected at a 284 bed long-term acute care hospital by a registered nurse from May 12, 2015 until February 9, 2016. Antibiotic use was recorded daily in various patient care units on a rotating schedule throughout the study period. For each patient that received an antibiotic the indication for use, duration of treatment, cultures ordered, organisms cultured, patient temperature and white blood cell count were recorded if available. Data for each patient was updated daily as lab and susceptibility results became available. At the end of the study period, the data was analyzed to assess specific indications for antibiotic use, commonly cultured organisms, antibiotics prescribed for particular indications, and duration of treatment. The hospital's antibiogram was used to assess resistance patterns and the appropriateness of antimicrobial choices. Results from the study were communicated to the hospital's medical staff at an antimicrobial stewardship meeting. Data related to genitourinary infection rates and prescribing methods were highlighted during the meeting and recommendations for future antibiotic prescribing were discussed.

Results: Between May 12, 2015 and February 9, 2016, a total of 173 orders for antibiotics were recorded. Genitourinary infection was the most common indication for initiating an antibiotic accounting for 22.5% (n=39) of antibiotic orders followed by skin and soft tissue infection, and lower respiratory tract infection. Levofloxacin and sulfamethoxazole/trimethoprim were

frequently prescribed antibiotics for genitourinary infections accounting for 26% (n=10) and 19% (n=7) respectively. The most common organisms that were cultured from the genitourinary tract were Klebsiella pneumoniae and Pseudomonas aeruginosa. According to the hospital antibiogram, Klebsiella pneumoniae isolates were only 58% susceptible to levofloxacin and 60% susceptible to sulfamethoxazole/trimethoprim. Pseudomonas aeruginosa isolates were only 47% susceptible to levofloxacin according to the hospital antibiogram. Escherichia coli and Enterococcus faecalis were also common organisms isolated from the genitourinary tract. Escherichia coli and Enterococcus faecalis isolates were both 100% susceptible to nitrofurantoin according to the hospital antibiogram. Overall, the mean duration of antibiotic treatment for genitourinary infections was 6.5 days.

Conclusion: Due to the low susceptibility of cultured genitourinary isolates, alternative antibiotics may be considered in place of fluoroquinolones for the treatment of genitourinary infections. Based on the hospital antibiogram, nitrofurantoin and sulfamethoxazole/trimethoprim are appropriate oral step-down agents for susceptible infections. Knowledge of patients' recent antibiotic therapy and utilization of the hospital antibiogram are necessary to ensure proper antibiotic selection.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-338

Poster Title: Increasing naloxone distribution through pharmacies to combat opioid epidemic in Rhode Island

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Purpose: Increasing naloxone distribution through community pharmacies in Rhode Island can help combat opioid overdose fatalities. Rhode Island ranks seventh highest in the nation for fatal overdose rates per capita with 23.4 deaths per 100,000 people versus the national average of 13.8 per 100,000 recorded in 2014. Educating health care professionals about naloxone and increasing its accessibility can influence the public ultimately helping impede the opioid epidemic. Several initiatives in RI have come forth to promote the distribution and administration of naloxone including the collaborative pharmacy practice agreement for naloxone (CPAN) in 2014 and The Good Samaritan Act established in 2012.

Methods: The data was obtained through the Rhode Island Department of Health to determine the total amount of naloxone dispensed through pharmacies and opioid overdose deaths from 2009 to 2015 in 3-month intervals. The primary focus is based around data from 2014 to 2015, which follows the major naloxone initiatives such as the implementation of CPAN. The data was analyzed to determine if there is an established relationship between the amount of naloxone dispensed by pharmacies and opioid overdose mortality, ultimately determining if this is a feasible approach to combat the opioid epidemic. The data was also assessed to determine a goal for the amount of pharmacy dispensed naloxone to help decrease overdose mortality in RI.

Results: Following CPAN 572 pharmacy based naloxone kits were dispensed between January 2014 and June 2015, representing about a 2-fold increase in community-based distribution of naloxone during 2014. Pharmacies were responsible for 24 percent of all naloxone distributed in RI during that time period. From April to September of 2014 dispensing peaked reaching 235 kits compared to the previous 6 months of 94 kits. During that time overdose deaths decreased by 42 percent (146 to 85). Throughout the next 6 months dispensing decreased by 31% (235 to

164) and overdose deaths increased 56% (85 to 135). From 2014 to the middle of 2015 an inverse relationship was established between pharmacy dispensed naloxone and overdose mortality.

Conclusion: Initiatives supporting naloxone distribution through pharmacies had an impact on decreasing overdose mortality, but distribution must remain high to sustain the mortality reduction. To attain mortality reduction, a pharmacy dispensing goal of 235 naloxone kits over 6 months should be set. Community pharmacies are imbedded within the community and provide easy, convenient access to naloxone kits along with the appropriate education and training. More initiatives are warranted to help increase the amount of naloxone being dispensed through pharmacies to help combat the opioid epidemic in RI.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 2-339

Poster Title: Traffic lights in a hospital: the pharmacists' role in transitional care rounds

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Purpose: The transitional care rounds model in health systems is emerging to enhance the patient discharge process and reduce preventable readmissions. Contrary to traditional multidisciplinary rounds, pharmacist involvement in transitional care rounds has been minimal at non-teaching community hospitals because of time limits. Pharmacists are medication experts and should be allowed to participate in the overall medical care of patients. The purpose of this research was to promote the necessary involvement of pharmacists in transitional care rounds by assessing pharmacist intervention opportunities from medical-surgical units.

Methods: Case management-led transitional care rounds were implemented as a new initiative at a non-teaching community hospital. Color-coded Red/Yellow/Green "traffic lights" were used to communicate patients' discharge probability. During transitional care rounds, the script was limited to specific expectations including hospitalization day number, brief clinical summary, clear clinical endpoint needed for discharge, specific care needs, and barriers to discharge. Pharmacy participation is excluded in this new rounding system, so intervention reports were collected from medical-surgical units to measure pharmacist intervention opportunities. Data from pharmacist intervention reporting was collected over a six-week period, which included three weeks prior to and following the initiation of transitional care rounds. The medical-surgical units included respiratory and telemetry/pediatrics which represented a total of 60 inpatient beds. TheraDoc, a comprehensive surveillance tool, was used to identify clinical intervention opportunities and document pharmacist interventions. The grouping of nine clinical activities included: inappropriate therapy avoided, therapy changes, therapy recommendations, institutional support, IV to PO conversion (antimicrobial), IV to PO conversion (non-microbial), antibiotic stewardship program, high-risk intervention and

recommendation, and vancomycin consults. Each clinical activity was further classified into 32 different sub-categories including (but not limited to) dose adjustments, dosing and drug consultations, duplicate therapy identifications, and new therapy recommendations. The assessment focused on the impact of transitional care rounds on pharmacist opportunities to identify and document clinical interventions prior to and following implementation.

Results: The total number of pharmacist interventions in medical-surgical units was 140 during the three weeks prior to implementation of transitional care rounds. In the respiratory unit, both institutional support and therapy changes accounted for 23 percent of total interventions. In the telemetry/pediatrics unit, institutional support accounted for 31 percent, and therapy changes accounted for 28 percent of the total. Together, these categories comprised nearly half of reported clinical activities. The interventions made in both medical-surgical units showed a similar trend where institutional support and therapy changes were the leading clinical activities amongst interventions reported. After the initiation of transitional care rounds, the overall number of interventions decreased by approximately 16 percent. The clinical activities reported were primarily institutional support and therapy changes; this included 19 percent and 36 percent, respectively, for the respiratory unit, and 26 percent each for the telemetry/pediatrics unit. The limitation of accurately measuring the number of interventions included fluctuation in patient census and inability to identify clinical interventions communicated verbally. The availability of data was insufficient to definitively assess the impact of transitional care rounds on pharmacist interventions. However, the metrics used helped to identify overall negative effects within the first three weeks of implementation.

Conclusion: The newly implemented transitional care rounds limited the role of pharmacists in a non-teaching community hospital. The use of interventional measurements showed the importance of pharmacists' active involvement and illustrated the negative impact that excluding pharmacists in transitional care rounds had on documented pharmacist interventions. In order to work inside this new transitional care rounding model, the pharmacy department will need to develop a systematic approach to achieve effective communication and collaboration with other healthcare providers.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 2-340

Poster Title: Characterization of early sepsis care at a community teaching hospital prior to the implementation of a sepsis protocol

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Purpose: Sepsis remains one of the most expensive and deadliest reasons for hospitalization. In-hospital mortality rates for sepsis are 8 times higher than mortality rates for all other hospitalizations. The Surviving Sepsis Campaign (SSC) has published 3-hour and 6-hour sepsis bundles to improve sepsis care and reduce sepsis-related mortality. In 2015, the Centers for Medicare and Medicaid Services (CMS) adopted these bundles as a new core measure, which prompted sepsis protocol implementation at Kent Hospital. The primary objective of our study is to assess SSC bundle compliance at our facility prior to protocol implementation.

Methods: We conducted a retrospective study to assess SSC bundle compliance. The study was approved by the institutional review board. Electronic health records were reviewed for patients who met severe sepsis or septic shock criteria during their hospital stay and who were discharged during April 2016. Patients were identified using the tenth revision of the international statistical classification of diseases and health related problems (ICD-10) diagnosis codes. Major exclusion criteria included age less than 18 years, documented refusal of care, death within 3 hours of severe sepsis presentation, and death within 6 hours of septic shock presentation. Baseline demographics collected included patient age, gender, weight, admission category, and time of severe sepsis and septic shock presentation. Data was collected for each component of the 3-hour bundle (serum lactate level, blood cultures collected prior to antibiotic administration, administration of broad-spectrum antibiotics, and adequate fluid resuscitation for hypotension or initial serum lactate level greater than 4 millimoles per liter). Data was also collected for each component of the 6-hour bundle (serum lactate level if initial

level was greater than 2 millimoles per liter, initiation of vasopressors for hypotension unresponsive to fluid resuscitation, and volume status reassessment). All data was analyzed using descriptive statistics.

Results: A total of 100 patients were identified using ICD-10 codes. Fifty-five patients met inclusion criteria. Of these patients, 32 (57 percent) were women, 49 (88 percent) met severe sepsis criteria in the emergency department, and the mean age was 70 years. Of the 55 patients, 45 (80 percent) had a lactate level drawn, 40 (71 percent) had blood cultures drawn prior to antibiotic administration, and 50 (93 percent) received broad-spectrum antibiotics within 3 hours of severe sepsis presentation. A total of 25 patients should have received 30 milliliters per kilogram of intravenous (IV) crystalloid. Of those 25 patients, only 7 (28 percent) received adequate fluid resuscitation within 3 hours of presentation. A second lactate level should have been drawn within 6 hours of severe sepsis presentation in 31 patients. Of those, only 12 (39 percent) had a second level drawn. Of the 55 patients included, 12 patients met criteria for vasopressor initiation and 15 patients met criteria for volume status reassessment. Vasopressors were initiated promptly in 4 (33 percent) of the 12 patients and volume status was reassessed in 8 (53 percent) of the 15 patients.

Conclusion: Opportunity for improvement in the management of sepsis was identified at our facility. Sepsis bundle compliance was low for IV fluid resuscitation, re-evaluation of serum lactate level, prompt initiation of vasopressors, and volume status reassessment. The data collected will be used as a comparison for evaluation of bundle compliance after implementation of sepsis protocols at our facility. The results will be used to enhance ongoing staff education.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 2-341

Poster Title: Assessing medication adherence and the use of technology in hypertensive patients.

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Purpose: Drug therapy for chronic illness is effective in combating illness if they are taken as prescribed. Patients have poor adherence due to many reasons, such as the cost of the medicine and healthcare visit, low health literacy, and side effects. The purpose of this study is to assess medication adherence and if healthcare-focused mobile apps affect patient adherence, specifically in patients with hypertension. This will provide pharmacists and other healthcare professionals a better understanding of why patients have low medication adherence and if an app can help improve it.

Methods: Participants were recruited to take our survey through Facebook posts. Our Facebook post encouraged participants to take the survey if they had hypertension and were taking medication(s) to control their blood pressure. A Google Forms survey was used to collect responses. The Google Forms survey was set to only obtain one result per participant, and all of the surveys were completed anonymously. In addition to the Google Forms survey, paper surveys were also distributed for participants who were unable to use computers or without access to the internet. Participants were included in the study if they had high blood pressure and were taking prescriptions to control their blood pressure. Since many subjects with hypertension may also be taking medications for other chronic and acute conditions, the data obtained from these patients were also included in our results. Patients were excluded if they did not have a prescription for hypertension. The survey assessed medication adherence using the Morisky scale (MMAS-4), reasons for poor adherence, and the use of technology through apps to assist in improving adherence. The Morisky scale assessed patient adherence levels and classified then as having high, medium, or low adherence.

Results: Twelve participants completed the survey and the overall Morisky score was 2.3 with a standard deviation of 1.2. The most commonly reported adherence issues were: forgetfulness (66.7%), busy lifestyle (41.7%), not picking up prescriptions on time (33.4%), high drug cost (33.4%), and no insurance (33.3%). Forty one percent of those surveyed have ever used a phone app to improve overall health, and 83.3% would use an app that reminded the user when to take medications. Seventy-five percent of the participants answered that an app would be “helpful” or “very helpful” in improving the number of missed doses. Only 25% of those surveyed would pay 99 cents to obtain a medication adherence app, all other survey participants would expect the app to be free to the consumer. Linear regression modeling found no statistically significant difference with the use of technology on adherence or Morisky score (coefficient of determination is 0.183).

Conclusion: This survey shows that some of most common reasons for missing a dose of medication are forgetfulness, busy lifestyle, not picking up prescriptions on time, and cost issues. The use of a phone app to increase adherence was not found to improve the Morisky score, which suggests that use of a phone health app is not strongly correlated with increased adherence. Future studies should assess the effectiveness of an app that can provide useful adherence data to a health professional and help identify or address the factors responsible for decreased medication adherence.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 2-342

Poster Title: Student pharmacist integration into an outpatient infectious disease clinic

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Purpose: Infections are among the most common causes for hospital admissions and are associated with a high economic burden. However, novel patient care strategies have allowed for early discharge of infectious disease (ID) patients, which has demonstrated improved patient satisfaction and decreased patient cost. Outpatient parenteral antibiotic therapy (OPAT) is a subtype of outpatient therapy that is now widely used throughout the United States. However, outpatient treatment of ID patients and particularly OPAT call for increased patient education and clinical decision support for clinicians. Fourth-year student pharmacists are well-prepared to step up to these challenges.

Methods: Two student pharmacists were enrolled in an infectious disease (ID) advanced pharmacy practice experience (APPE) rotation at a Texas county hospital lasting six weeks. Throughout the course of the rotation, students were given various projects to complete to meet the needs of the hospital's ID team, each geared towards improvement of the outpatient ID clinic.

Results: Three separate and unique projects were started and completed. An outpatient IV antibiotic stability guide comparing stability lengths of all formulary IV antimicrobials was developed to ease physician workflow and improve patient convenience. A patient letter discussing tips, adverse effects, and management strategies for patients on long-term outpatient trimethoprim-sulfamethoxazole was developed to improve patient understanding. A combination patient letter and pocket guide for a subset of patients with recurrent or complicated UTIs was developed to improve patient understanding and cost. Each of these products are also in the process of being translated to Spanish in order to reach a larger patient population.

Conclusion: By the end of the six-week rotation, the four finished products were already being utilized by clinicians in the outpatient ID clinic for clinical decision support or being handed out to patients for education, depending on the purpose of the specific product. This type of example should be followed by other ID APPE elective rotations to increase student learning and inter- professional collaboration. Overall, response to the projects was positive, and student pharmacist assistance with and integration into the outpatient ID clinic was well-received.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 2-343

Poster Title: Evaluation of the timing of physician intervention in ambulatory diabetic and hypertensive patients

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Purpose: Diabetes mellitus and hypertension are two of the leading causes of morbidity and mortality in the United States. Currently, the standard of care for diabetes and hypertension management are defined by the Eighth Joint National Committee and American Diabetes Association. Initiating timely and appropriate pharmacotherapy in uncontrolled diabetic and hypertensive patients is imperative to mitigate long-term comorbidities from developing and reducing healthcare costs. The purpose of this study is to evaluate when ambulatory physicians initiate interventions in diagnosed diabetes and hypertension patients in an outpatient clinic in order to identify where ambulatory pharmacy services may improve patient care.

Methods: The institutional review board waived this single center, retrospective, cohort study. All patients who were scheduled for an outpatient visit from July 1, 2016 to September 10, 2016 who had a documented diagnosis of diabetes, hypertension, or both, were included in the study. Data elements included age, gender, hemoglobin A1c, blood pressure, utilization of first line therapy for hypertension or diabetes, utilization of statin therapy, and types of interventions that physicians made. The primary endpoint was to determine the percent of patients with uncontrolled blood pressure or hemoglobin A1c value who did not receive an intervention by a physician. Secondary endpoints included the average blood pressure and hemoglobin A1c when an intervention was made, and percent of patients on appropriate first line therapy for hypertension or diabetes. The primary and secondary endpoints were analyzed using descriptive statistics.

Results: Of 121 patients seen by the ambulatory physicians from July 1, 2016 to September 10, 2016, 112 eligible patients were included in the study. Of the 103 diabetic patients, 34 percent had uncontrolled diabetes, and 63 percent of these patients did not receive an intervention during office visit. Of the 96 hypertensive patients, 39 percent were uncontrolled, and 81 percent of these patients did not receive an intervention during office visit. The average hemoglobin A1c value where physicians made an intervention was 9 percent and the average systolic and diastolic blood pressures value were 165 and 79 mmHg, respectively. Appropriate first line therapy was prescribed to 39 percent of diabetic patients, and 65 percent of hypertensive patients.

Conclusion: Majority of uncontrolled diabetic and hypertensive patients did not receive pharmacological intervention during ambulatory care visits. These results revealed a gap in appropriate patient care and also provide a foundation for the implementation of pharmacy services in the ambulatory care setting.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 2-344

Poster Title: Evaluation of sequential compression device compliance in adult general medical patients at three consecutive time points: a point-prevalence study

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Purpose: Venous thromboembolism (VTE), comprised of deep vein thrombosis and pulmonary embolism, is the most common preventable cause of in-hospital mortality. Use of a sequential compression device (SCD) may be one intervention to prevent VTE occurrence in a hospital setting. While a limited number of studies have evaluated SCD compliance in critical care and surgical patients, recent studies have yet to evaluate SCD compliance in general medical patients over consecutive time points. Therefore, the purpose of this study is to assess SCD compliance in adult general medical patients.

Methods: The institutional review board waived this observational, single-center point-prevalence study which evaluated the proportion of SCD compliance over consecutive time points. Patients were included in the study if there was an active SCD order in the current admission electronic medical record, and they were available for assessment during at least one time point. Patients were excluded from any of the time points if they were discharged, moved to a different unit, or unavailable during time of data collection. Data collection occurred between 0600-0800, 1400-1600, and 2000-2200 hours. The primary endpoint was to determine and compare the proportion of adult general medical patients compliant with an active SCD order at 3 individual time points during a 24-hour period. A patient was considered compliant during a time point if the patient was in bed or sitting in a chair with SCDs appropriately worn and turned on, or if the patient was ambulating. The following data were collected for each patient: demographic information, pharmacological prophylaxis, and Caprini Risk assessment.

Minitab was utilized to calculate SCD compliance percentage for each time point and p-values comparing percent compliance among the consecutive time points.

Results: Of the 189 available patient beds, SCD compliance was assessed for 68 patients who had an active SCD order. The number of patients meeting inclusion criteria from first, second and third time points were 66, 51, and 46, respectively. Percent compliance at each time point was 12.1 percent, 15.7 percent, and 15.2 percent, respectively. Two-tailed p-values comparing the first and second time point, second and third time point, and first and third time point were 0.6, 1.0, and 0.78, respectively.

Conclusion: A large proportion of patients were noncompliant with their active SCD order, raising concern for the development of an in-hospital VTE. Data from this study demonstrate no significant difference in SCD compliance in general medical patients among consecutive time points within a 24-hour period. Results may have been impacted by the small sample size and should be repeated with a larger sample in order to detect a difference in compliance among the time points and reduce type II error probability. Our results support conducting a larger point prevalence study.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-346

Poster Title: Evaluation of hydromorphone (Dilaudid®) PCA usage at a large quaternary hospital

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Purpose: Opiates, including hydromorphone, represent one of the four drug categories causing more than 60% of serious adverse events in the United States. Leading factors attributed to the misuse of hydromorphone include misunderstanding of the equi-analgesic dosing of hydromorphone compared to morphine and improper labeling practices. It is important to develop effective management strategies to optimize patient safety when utilizing hydromorphone. The purposes of this medication use evaluation are to assess prescribing practices for hydromorphone PCAs, to assess the appropriate use of hydromorphone, and to determine if the use of hydromorphone is correlated to adverse events.

Methods: This is a retrospective chart review of randomly selected patients who were admitted to CHI St. Luke's Health – Baylor St. Luke's Medical Center (BSLMC) from October 1, 2015 through December 31, 2015. A list of all patients receiving hydromorphone who fit the inclusion and exclusion criteria was obtained from the electronic health record database. At BSLMC, the PCA order set provides a defined strategy for PCA dosing, which includes the following options: low dose for opiate naïve patients, medium dose for moderate opiate usage, high dose for opiate tolerant patients and "other" dosing as specified by the physician. For each eligible patient, information was obtained from the patient's medical record including demographic (age, gender, etc.), indication for therapy, dose based on the order set, and adverse effects related to hydromorphone PCA use.

Results: This study randomly reviewed 150 patient profiles. Hydromorphone PCA was used for post-operative pain (44/150, 29%) and cancer pain (23/150, 15%); however, 82/150 or 55% of PCA use was for other types of pain. Amongst 53/150 (35%) patients with a past history of

opioid use, the average morphine equivalent dose per day (MEDD) was 33 mg. Patient education, which documents the assessment of patient competency and understanding of PCA teaching, was completed for 123/150 (82%) patients. Twenty patients (13%) received a bolus dose prior to PCA administration with an average dose of 0.5 mg and average pain score of six. Fifty-three (35%) patients with an average pain score of 5.7 received higher doses of PCA than the low-dose opioid naïve order set despite being opioid naïve. Sixty (40%) patients received a change in their PCA dose and 80% (120/150) of the prescribers used the "other" dosing PCA option instead of using moderate-dose PCA. The main reason for discontinuation of the PCA was conversion to alternate therapy (99/150, 66%). During this study period, no patient discontinued the PCA due to adverse drug events, nor was naloxone administered and none of the patients had required a call to the Rapid Response Team.

Conclusion: The results of this study demonstrated some opportunity for improvements with the use of hydromorphone PCA at our institution. Since we have many new staff members at our institution, a plan to help educate these newly hired employees on our PCAs or update our PCA policy would be beneficial to help improve patient safety. Pharmacists should be proactive in making sure all PCAs prescribed adhere to our institution's policy and proper documentation is within the patient's chart

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 2-347

Poster Title: Incidence of postoperative acute kidney injury after exposure to prothrombin complex concentrate in patients undergoing orthotopic liver transplantation

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Purpose: Patients who are undergoing orthotopic liver transplantation (OLT) may experience major blood loss during surgery. Strategies to prevent or mitigate blood loss in these procedures includes administration of prothrombin complex concentrate (PCC). Acute kidney injury (AKI) is associated with use of PCC in cardiac surgery. Proposed mechanisms include thromboembolic events and/or hypovolemia secondary to acute blood loss. We hypothesized that use of PCC is associated with AKI in OLT. The purpose of this study is to describe the incidence of AKI in patients undergoing OLT who are exposed to PCC versus patients who do not receive PCC during transplantation.

Methods: This is a single centered, retrospective, observational study of patients undergoing OLT from December 2013 to April 2016 at Houston Methodist Hospital. This study was expedited by the institutional review board. Patients were included in the study if they were greater than 18 years of age and undergoing OLT. Patients were excluded from the analysis if they were undergoing simultaneous heart or lung transplantation, or no documented anesthesia operative note was in the electronic medical record. The primary endpoint was a measure of the incidence of AKI as defined by the KDIGO criteria. For the primary analysis, a chi-square test was utilized to compare the incidence of AKI among the two cohorts. The secondary endpoint of this study was to observe the difference between patients who required intermittent hemodialysis (IHD) or continuous renal replacement therapy (CRRT) preoperatively versus postoperatively.

Results: Amongst the 211 patients observed, 204 met the inclusion criteria. The two cohorts consisted of 39 patients (19 percent) who received PCC intraoperatively and 165 patients (81 percent) who did not. Between the two groups, no significant difference was observed in the incidence of AKI as defined by the KDIGO criteria. The primary outcome of AKI was observed in 13 out of 39 patients (33.3 percent) in the PCC group as well as 55 out of 165 patients (33.3 percent) in those who did not receive PCC. Excluding patients who were on hemodialysis prior to OLT, no significant difference was observed in patients who required hemodialysis postoperatively in the PCC group compared to the control (P-value 0.3). Patients who received PCC intraoperatively were observed to have a reduced dialysis requirement pre to postoperatively (OR, 0.143 [95 percent CI, 0.003 to 1.112]). The control group was observed to have an increased hemodialysis requirement pre to postoperatively (OR, 2.714 [95 percent CI, 1.093 to 7.641]).

Conclusion: Patients undergoing OLT who were exposed to PCC were found to have no significant difference in the incidence of AKI compared to those who were not exposed. Additionally, in patients who received intraoperative PCC that required hemodialysis prior to transplantation, there was an observed reduction in the postoperative requirement of hemodialysis. Further, larger scale studies are recommended to reduce the risk of type II error.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 2-348

Poster Title: Observe the role of pegfilgrastim via on-body injector on neutrophil production

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Purpose: Patients undergoing chemotherapy have diminished capacity to fight off infection due to neutropenia experienced as a result of the agents utilized in their treatment regimen. OnPro™ is a wearable on-body injector that infuses peg-filgrastim, a pegylated form of recombinant human granulocyte colony stimulating factor (GCSF). Patients who are treated with GCSF have an increased neutrophil count as a result of stimulating the bone marrow to increase the production of neutrophils that enhance patient's immune function. This study is designed to observe the increase in neutrophil production post exposure to GCSF via the on-body injector.

Methods: This is a single centered, retrospective, observational study of patients undergoing chemotherapy that required the use of GCSF from January 2016 to August 2016 at Memorial Hermann Cancer Center in Houston, Texas. Patients were included in the study if they were greater than 18 years of age, undergoing chemotherapy, and were exposed to GCSF via an on-body injector. Patients were excluded from the analysis if they had missing pre-exposure lab data, missing follow-up visits within 30 days, or had missing laboratory data post-exposure. The primary endpoint of this study was to measure the mean change in absolute neutrophil count (ANC) from baseline. The secondary endpoint of this study was to observe the mean increase in white blood cell count (WBC) from pre-exposure to post-exposure of GCSF.

Results: A total of 72 on-body injection doses were included in the study, of which, 21 met the inclusion criteria. The mean age was 63 years; 52 percent (n= 11) were male and 48 percent (n= 10) were female. The primary outcome of mean change in ANC was observed to decrease as compared to baseline by 16 percent in patients who were exposed to GCSF utilizing an on-body

injector. The secondary outcome of mean change in WBC was observed to be a decrease by seven percent compared to baseline in patients who received GCSF.

Conclusion: Patients undergoing chemotherapy who were exposed to GCSF via on-body injector were observed to have a mean decrease in ANC by 16 percent within 30 days of exposure. Additionally, there was a mean decrease in WBC by seven percent post-exposure to GCSF. Larger studies are needed to increase the external validity of this study and reduce the risk of a type II error.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-349

Poster Title: Retrospective assessment of appropriate usage of oritavancin in the treatment of cellulitis at a healthcare system

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Purpose: Oritavancin diphosphate (Orbactiv) is a lipoglycopeptide with concentration-dependent bactericidal activity. The pharmacodynamics/pharmacokinetic profile of oritavancin indicate an extended half-life elimination of over ten days (245 hours). This unique characteristic of oritavancin allow for one dose infusion to treat susceptible organisms. The focus of this medication use evaluation is to assess appropriate usage of oritavancin and the clinical, social, and pharmacoeconomic impact of one dose treatment of patients in two emergency centers of a healthcare system. The two emergency centers are of a level one and level three trauma center.

Methods: The institutional pharmacy and therapeutics committee approved the evaluation of oritavancin usage. A daily generated information technology report captured patients that were administered oritavancin within a period of 5 months (April-August 2016). A total of 20 patients were identified thus far and evaluated with regards to clinical efficacy and social factors impacting patient nonadherence. The following data were collected for each patient; demographics, indications, ordering physicians, dosage of oritavancin, antibiotics used prior to oritavancin for the same indications, failure of home oral antibiotics, cultures and sensitivity, clinical safety, radiology studies, temperature, white blood count, socioeconomic issues, and psychiatry disease or cognitive impairment that will impede medication management. In addition to data collected above, oritavancin use was also evaluated with regards to observation period of patients prior to physician ordering oritavancin, any compliance issues, reoccurrence of recently diagnosed infection that was previous treated with oral or intravenous antibiotics, documentation for the use of oritavancin in patient chart, additional antibiotics used with or after oritavancin dose, duration of treatment, patient monitoring, and adverse

events. These patients were also assessed whether they were candidates for admission based on factors like nonadherence or severity of the infection. Considering the cost of the drug, compliance, and admission, the pharmacoeconomic assessment was performed.

Results: Of the 20 patients, 16 were males and 4 were females. Overall, ninety percent of the patients (18) treated with oritavancin showed clinical improvement. Out of the twenty patients, eight were homeless, two are disabled, and four had psychiatric related conditions. Out of twenty patient cases, forty-five percent (9) had previous treatment with oral or intravenous antibiotic. The oral antibiotics prescribed that failed were clindamycin and cephalexin. Twenty five percent (5) of the patients were deemed to be noncompliant following failure of home oral antibiotics and consequentially were treated with oritavancin. Twenty percent (4) were compliant with their oral medications but yet were not cured with these prescribed oral antibiotics. Fifteen percent (3) experienced an adverse event following oritavancin treatment, which included itching, rash, and hand burning. All these patients who were candidates for admission benefited from one dose oritavancin.

Conclusion: Oritavancin usage of one dose regimen allowed for the successful treatment of patients who could otherwise be admitted. This led to cost of admission avoidance and cost of medication incompliance. The institution also utilized patient assistance program that minimized any incurred cost. More data will be collected to confirm our initial findings.

Submission Category: Automation/ Informatics

Submission Type: Descriptive Report

Session-Board Number: 2-350

Poster Title: Automated robot compounding technology: How does it fit into your oncology pharmacy?

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Purpose: Automated robotic compounding technology (ARCT) provides a promising future for the compounding of hazardous medications by improving preparation safety and accuracy. Limited literature exists regarding reported versus actual preparation times and may hinder the adoption of ARCT by hospitals and health-systems. In addition, data is lacking on the acceptance of ARCT by pharmacy personnel after implementation into daily workflow. The technology acceptance model (TAM) is considered an accurate measurement tool to assess information systems adoption. The purpose of this study is to assess actual versus reported ARCT preparation time and acceptance of ARCT based on the TAM.

Methods: The Houston Methodist Hospital (HMH) oncology satellite dispenses over 30,000 IV hazardous preparations per year. ARCT was implemented to provide safety and operational efficiency to our satellite pharmacy. This study consisted of two analyses: an observational time study comparing actual versus reported preparation time of all compounds made by the ARCT (i.v.STATION ONCO, Health Robotics) during a 3 week period in September 2016, and a questionnaire provided to all staff interacting with i.v.STATION ONCO. The time study included four antineoplastic products: cyclophosphamide, carboplatin, cisplatin, and oxaliplatin. Actual preparation times consisting of preparation start and end time were extracted from the robotic database. Actual preparation times were compared to manufacturer reported preparation times. The results were stratified by each medication compounded by the ARCT. The primary endpoint of the time study was to determine the difference in actual versus reported preparation time.
Two weeks post implementation of i.v.STATION ONCO, a 25-item TAM questionnaire was administered to pharmacy staff. The TAM questionnaire assesses individuals' perceived

usefulness (PU), perceived ease of use (PEOU), and attitude towards the adoption of technology. Questionnaire items were scaled from 1 (strongly disagree) through 5 (strongly agree) on a Likert Scale. The primary endpoint of the questionnaire was to determine the pharmacy staff's PU, PEOU, and attitudes towards using i.v.STATION ONCO. The Institutional Review Board waived this observational study.

Results: During a 3 week period in September 2016, 56 preparations were made in i.v.STATION ONCO: 34 carboplatin, 16 cyclophosphamide, 4 cisplatin, 2 oxaliplatin. The mean preparation time for all products was 7.6 minutes (plus or minus 3.1 minutes), and the mean preparation times for carboplatin, cyclophosphamide, cisplatin, and oxaliplatin were 7.5 minutes, 6.4 minutes, 11.5 minutes, and 11.1 minutes, respectively. The mean difference in preparation time of i.v.STATION ONCO was 2.4 minutes greater than the reported preparation time (p-value less than 0.01).
Of the 16 pharmacy personnel who completed the questionnaire, 10 pharmacists and 6 pharmacy technicians participated. The mean years of practice among the pharmacy personnel who completed the questionnaire was 12 years. All of the respondents believed i.v.STATION ONCO would decrease or not change the number of medications errors. The pharmacy staff perceived the ARCT as neither easy nor difficult to use (median equals 3). Questionnaire responses showed that participants attitude towards the use i.v.STATION ONCO is positive (median equals 3.5). Staff responses revealed the PEOU was high (median equals 4).

Conclusion: The actual preparation time of hazardous products by i.v.STATION ONCO was significantly greater than the reported preparation times. Using the TAM, employees at HMH found the ARCT useful in preventing medication errors, not difficult to operate, and a positive attitude towards the robot 2 weeks after implementation. Other institutions must consider actual versus reported time studies to appropriately evaluate efficiency of the robot as well as assess employee's willingness to adopt ARCT to ensure successful implementation of the technology.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 2-351

Poster Title: Comparing the efficacy of palbociclib with letrozole versus palbociclib with fulvestrant in an accredited institutional cancer setting

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Purpose: Palbociclib is a cyclin dependent kinase 4/6 inhibitor that is effective in patients who are Hormone Receptor-positive and Human Epidermal Growth Factor Receptor 2-negative, who have built first line resistance to endocrine therapy. Palbociclib inhibits the progression of cancer cells from G1 to S phase, which thereby prevents the proliferation of breast cancer cells. This process is regulated by cyclin dependent kinases 4 and 6. The purpose of this study is to observe the efficacy of two treatment groups at a regulated cancer center: palbociclib plus fulvestrant with or without goserelin to palbociclib plus letrozole with or without goserelin.

Methods: The data was collected from Memorial Hermann Oncology Clinic within the Texas Medical Center, under the supervision of Dr. Rodney J. Hunter, who is the clinical oncology pharmacist as well as a spokesperson for Pfizer. In this prospective, open label, observational, intention-to-treat study, pre/peri/postmenopausal women (n=15) with advanced metastatic Hormone Receptor-positive, Human Epidermal Growth Factor Receptor 2-negative breast cancer were enrolled, who had previously not received systemic chemotherapy. Patients either received palbociclib (125 mg intravenously 3 weeks on/ 1 week off) with letrozole (2.5 mg by mouth, once daily), or palbociclib (125 mg intravenously 3 weeks on/ 1 week off) with fulvestrant (500 mg intramuscularly on days 1, 15, and 29 for the first month, then 500 mg once monthly), with or without goserelin depending on patient's menopausal status. Treatment was continued further until disease progression, intolerance to therapy, or death. The primary endpoint is progression-free survival and overall survival to determine the efficacy of palbociclib that was shown in previous data. The secondary endpoint is the objective response,

which is the tumor size shrinkage, in relation to palbociclib treatment. Patient accrual is ongoing with an anticipated completion date of February 2017.

Results: A total of 15 patients were treated (palbociclib with letrozole with or without goserelin (n=8); palbociclib with fulvestrant with or without goserelin (n=7)), and the progression-free survival for patients that had progressed through treatment was 11.9 months versus 7.14 months, respectively. Objective response (tumor size shrinkage) was reported showing a decrease in the diameter of tumor in patients who were taking palbociclib with letrozole. One patient was deceased before receiving the full treatment cycle; however their data has been included in the study. Another patient who received palbociclib with fulvestrant was Human Epidermal Growth Factor Receptor 2-positive, which may cause skewing of the data. The study is ongoing and data may vary in the future.

Conclusion: In summary, palbociclib with letrozole showed an increased progression-free survival as first line treatment agent when used in pre/peri/post-menopausal women. However, there was a decreased progression-free survival seen in palbociclib with fulvestrant when used as second or third line therapy for metastatic breast cancer. Median progression-free survival and median overall survival has yet to be reached in the study. Studies with larger sample sizes should be conducted in the future for better results.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 2-352

Poster Title: Incidence of early hepatic artery thrombosis in orthotopic liver transplant patients receiving intraoperative epsilon-aminocaproic acid (EACA) and/or four-factor prothrombin complex concentrate

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Purpose: The most deleterious vascular complication to occur post orthotopic liver transplantation (OLT) is hepatic artery thrombosis (HAT), which occurs in 2 to 9 percent of OLT recipients. The mortality and re-transplantation rate in liver transplant patients that undergo HAT is approximately 50 percent. Many factors influence the development of HAT including operative and non-operative elements. The use of four-factor prothrombin complex concentrate (PCC4) and epsilon-aminocaproic acid (EACA) intraoperatively may promote an intrinsic hypercoagulative state that may lead to the development of thrombotic complications. The purpose of this study is to assess the safety of administering PCC4 and/or EACA during OLT.

Methods: This study is a single-center, retrospective, cohort study conducted at a large academic medical center. Patients greater than or equal to 18 years of age who underwent OLT from December 2013 to April 2016 and had a documented anesthesia operative note in the electronic medical record were included in the study. Patients who received a heart or lung transplant during the OLT were excluded from this study. The primary safety endpoint was the proportion of patients receiving OLT who developed early postoperative HAT after receiving EACA, PCC4, or both compared to patients who did not receive these medications. Patients were assessed for HAT from postoperative day zero to postoperative day 3. Postoperative day 3 was defined as 72 hours immediately after the end of surgery documented in the anesthesia notes. Abdominal Doppler ultrasounds were reviewed to measure the occurrence of any signs of thrombosis in these patients as well as documented reasons for patients returning to the operating room. SAS v9.3 statistical software was used for all statistical analysis, and chi-square test was used to assess the primary endpoint.

Results: Amongst the 211 patients observed, 204 met the inclusion criteria. Thirty-nine patients (19 percent) received PCC4 intraoperatively, 101 (50 percent) patients received EACA, and 25 (12 percent) received both medications. Fifty patients (25 percent) had documented abdominal Doppler ultrasounds, and 4 patients returned to the OR due to suspicion of HAT. Three of the 4 patients that returned to the operating room were confirmed to have HAT after exploration of the hepatic artery (1.5 percent incidence of HAT). The development of early HAT was documented in the operative/procedure report, however abdominal Doppler ultrasounds did not validate these findings. None of these patients received PCC4, 2 patients received EACA intraoperatively, and 1 patient did not receive either medication intraoperatively.

Conclusion: Patients undergoing OLT who were exposed to PCC4 as well as the combination of PCC4 and EACA were found to have no difference in the incidence of HAT as compared to those who did not receive either therapy. Those patients who received EACA alone seemed to be at an increased risk of developing HAT, however this was not proven statistically. No conclusions can be made from the study due to the small sample size and short term observation. Additional studies should be conducted to evaluate the incidence of thrombosis in this patient population beyond postoperative day 3.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 2-353

Poster Title: Ethnic difference in glucose control and weight loss after gastric bypass surgery in a diabetic population

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Purpose: Type 2 diabetes is one of the major comorbidities associated with obesity. Roux en Y gastric bypass (RYGB) procedures have emerged as an important treatment modality for the obese patients with diabetes. However, demographic factors such as ethnicity may affect the procedure outcomes and the information regarding the impact of ethnicity on glucose control after gastric bypass is limited. The purpose of this study is to investigate whether differences in glucose control and excess weight loss exist among ethnic groups in a type 2 diabetic population undergoing RYGB.

Methods: This retrospective observational study was approved by the Institution of Review Board. Eighty-three of ninety-one adult patients with type 2 diabetes who underwent RYGB from 2012 to 2014 at Houston Methodist Hospital in Texas were included in the study. Two patients were excluded due to lack of follow up data and six were excluded because of unknown ethnicity. The data for this study were obtained from electronic databases and medical records at pre operation and at 3, 6, and 12 months after surgery. Information on patients' height, age, gender, and ethnicity were obtained prior to surgery; whereas weight and pertinent lab values were obtained both prior to surgery and at each follow-up visit. The difference in hemoglobin A1c (HbA1c) value and percent excess weight loss were calculated for each patient at each follow up visit from the preop value. Patients were grouped according to their ethnicity, i.e. Caucasian, African Americans, and Hispanic. The primary endpoint measurements were the difference in mean change of HbA1c and mean percent excess weight

loss among the ethnic groups, using analysis of variance (ANOVA) and Tukey HSD post hoc analysis. A p-value of less than 0.05 was considered statistically significant.

Results: From 83 patients included in the study, 52 were Caucasians (77 percent females), 21 were African Americans (81 percent females), and 10 were Hispanics (50 percent females). The mean age was 53 plus or minus 11 years. The differences in mean HbA1c among the three ethnic groups were not statistically significant at 3, 6, or 12 months after RYGB. However, African Americans showed the highest decrease in mean HbA1c at 12 months after surgery (1.59 with SD 0.84), as compared to Caucasians (1.27 with SD 1.09), and Hispanics (0.3 with SD 0.35). The percent excess weight loss among the three ethnic groups was only significantly different at 12 months after surgery where Caucasians showed the highest weight loss with mean percent excess weight loss at 62.6 with SD 16.4, as compared to African Americans (52.5 with SD 20.4) and Hispanics (46.1 with SD 23.2), although Tukey HSD post hoc analysis did not show significant differences between the groups.

Conclusion: Our finding from this study was consistent with the published information that no significant difference was found among ethnic groups regards to HbA1c reduction up to 12 months after RYGB procedure. In addition, a significant difference in percent excess weight loss at 12 months after surgery was found among the ethnic groups, and Caucasians had a higher excess weight loss at this time point as compared to the African American and Hispanic counterparts. These findings would need to be confirmed in a larger size and prospective study.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 2-354

Poster Title: Retained symptomatic control following discontinuation of proton pump inhibitors after extended use: a pharmacist-led medication use evaluation

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Purpose: Gastroesophageal Reflux Disease (GERD) is usually not a life-threatening disease; however, symptoms affect patients' quality of life. Proton-pump inhibitors (PPIs) are first-line agents in treating GERD, which affects 40 percent of American adults monthly. Esomeprazole (Nexium) ranked third in total sales, with 13.2 million prescriptions costing $4.7 billion in the US for the year 2015. Overutilization of PPIs occurs primarily in patients requiring long-term treatment. The objective of this project is to determine whether patients of a local charity clinic maintain symptom control after discontinuing PPIs when clinically indicated, under evaluation of a pharmacist-led medication utilization program.

Methods: The study was conducted as a prospective, medication use evaluation (MUE). This study was exempted by the International Review Board at Texas Southern University and was approved by the clinic administration. Data was collected and recorded without patient identifiers to ensure patient confidentiality. Reports were generated through the electronic medical record system, Sevocity, identifying all clinic patients receiving PPI therapy from January 2013-June 2015. After one year, patients were contacted for a trial discontinuation of PPI therapy after a pharmacist-led educational session. Pharmacist interns followed-up with these patients by phone on a monthly basis to assess their quality of life through a survey assessing severity and frequency of symptoms. Patients unable to maintain symptom control after six months of the intervention were referred back to their primary care physician for further evaluation.

Results: One hundred patients were contacted via telephone from May through September 2016 to assess their GERD symptoms after discontinuation of PPI therapy; each patient was contacted two times. The initial call was a 15 minute counseling session, asking patients to consider implementing a healthy lifestyle, and using an over the counter (OTC) H2-antagonist if symptoms occurred. After three months, patients received a second call and administered a survey that assessed their symptoms to date. In conclusion 25% (n=25) of patients were no longer using a PPI, but adjusted their diet if symptoms occurred. After a three week trial, 75% (n=75) of patients continued to have symptoms and were unable to be completely off of a PPI; 22.6% (n=17) of these patients used OTC H2-antagonist daily to control their symptoms, and 12% (n=9) used PPIs as needed for symptom control. A total of 57.3% (n=43) of patients continued taking PPIs because they were not ready for lifestyle changes or OTC H2-antagonist did not relieve their symptoms. Patients that agreed to discontinue PPI use were generally 49 years or younger and took fewer maintenance medications. Six percent (n=6) of patients were dropped from the study after 3 failed attempts to contact them.

Conclusion: Discontinuation from PPI therapy or step-down therapy with an OTC H2-antagonist was possible for patients with mild-moderate GERD symptoms when mediated by pharmacist counseling and telephone follow-up. Longer follow-up times will be evaluated in the future in order to assess long-term success of the intervention.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-355

Poster Title: Treatment Experience with Metastatic Breast Cancer with the use of Novel Agent CDX-011

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Purpose: The purpose of this study is to evaluate the use of novel agent CDX-011 in treating patients who have metastatic, triple negative breast cancer. Metastatic breast cancer, also referred to as advanced or stage IV breast cancer, has the opportunity to spread to other parts of the body. Triple negative breast cancer, which accounts for approximately 10-20% of breast cancers, refers to cancer that is negative for estrogen receptors (ER-), progesterone receptors (PR-), and human epidermal growth factor receptor 2 (HER2-), thus “triple negative”. This type of cancer is sometimes associated with a poor prognosis, and therapy is limited.

Methods: This study is a randomized controlled trial conducted in a comprehensive Cancer Center, approved through the hospital’s institutional review board. The primary outcome is to evaluate the use, efficacy, and toxicities of the novel agent CDX-011 in metastatic, triple negative breast cancer expressing glycoprotein NMB (gpNMB). CDX-011 is considered targeted therapy that targets and binds to cancer cells overexpressing the gpNMB. This binding allows the drug to interfere with cell growth of the cancer cell and leads to cell death. Eligible patients enrolled in the study will be randomly assigned to receive CDX-011 treatment, and will be monitored for safety, efficacy and toxicity. The primary end points include disease-free progression and overall survival. Secondary end points consist of adverse side effects, response rates, and treatment failure.

Results: Patient accrual has been stagnant secondary to the infrequent expression of the gpNMB protein in breast cancer tissue. Two patients at the Cancer Center have been enrolled on the trial thus far. The median progression free survival and overall survival have not yet been reached in the respective trial. Interim data from Cancer Center yields a PFS of 4.5 months and OS could not be determined at the time of analysis.

Conclusion: Patient accrual is still underway for clinical trial. Expected completion of patient accrual in March of 2017, and median primary end points have not been achieved to date. Patient outcomes currently available suggest that the treatments have modest activity in metastatic breast cancer.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Descriptive Report

Session-Board Number: 2-356

Poster Title: Evaluation of switching from charge on dispense to charge on administration on pharmacy revenue

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Purpose: As healthcare institutions adopt barcode medication administration (BCMA) technology, medication charging models often change from charge on dispense (COD) to charge on administration (COA). When changing from COD to COA, hospital pharmacies may see a decrease in revenue due to medications not having barcodes, nurses not scanning medications upon administration, and other factors. No published literature exists regarding the impact of switching from COD to COA and its effect on pharmacy revenue. The purpose of this study was to evaluate the immediate financial impact of transitioning from COD to COA one-month after BCMA go-live.

Methods: The investigational review board waived this quasi-experimental quality improvement project. Medication charge records were collected in June 2015 and June 2016 to compare the transition from COD to COA. The compiled medications were analyzed based on inpatient charge amount, outpatient charge amount, and total charge amounts for each respective year. All medications were assigned their corresponding American Hospital Formulary Service Pharmacologic-Therapeutic Classification code and therapeutic class in order to identify high cost medication usage. The number for total charge quantity, inpatient charge quantity and outpatient charge quantity was determined. We hypothesized a 5 to 10 percent decrease in pharmacy revenue after converting to COA from COD. The primary endpoint of the study was to determine the percent change in pharmacy charges one-month post go-live in comparison to the same month the previous year.

Results: All medication charges from the hospital during the months of June 2015 and June 2016 were analyzed, which included a total of 4584 unique medications. The total number of unique medications charged in June 2015 was 2417 compared to the total number of medications recorded in June 2016 which was 2167. Total charge amount increased by 16.3% from June 2015 to June 2016. Inpatient and outpatient medications charge amount increased by 12.9% and 21.9% respectively from 2015 to 2016.

Conclusion: After transitioning from COD to COA, an increase in pharmacy charges was observed one-month post go-live without controlling for other factors. This macro assessment revealed the opposite of the hypothesis made by the study team. The increase in pharmacy revenue is multifactorial and could be due to more patient days, increase in medication costs, and increased capture rates. Future studies should control for these variables in order to isolate the changes in revenue.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 2-357

Poster Title: Characteristics of patients enrolled in a medication therapy management program for pediatric African-Americans with asthma

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Purpose: African-American children are 7 times more likely to die of asthma and three times more likely to be admitted to the hospital for asthma than non-Hispanic white children. Uncontrolled asthma leads to increased exacerbations, hospitalizations, impaired quality of life, and even death. The purpose of this study is to discuss the characteristics of the patients who participated in the medication therapy management (MTM) services, provided by pharmacists, to increase the level of control of asthma.

Methods: The study design is a pre-post study where each patient serves as his or her own control. Participants enrolled provided signed consent from their parents or legal guardians and were African-American children between the ages of 4-17, who have Texas Medicaid and uncontrolled asthma. For the purpose of this study, uncontrolled asthma was defined as patients who filled a prescription for an oral corticosteroid, had an asthma-related emergency room visit or hospitalization, or excessive fills of their rescue inhaler. A total of 150 participants were initially enrolled and received in home MTM services provided by a pharmacist. Pharmacists who provided the MTM services received specialized asthma MTM training prior to meeting with participants. Each pharmacist was provided a protocol to use for each visit where asthma knowledge, severity and level of control were assessed as well as drug therapy and medication adherence.

Results: Of the 150 patients who enrolled, 130 (87 percent) were between the ages of 4 to 11 years old and 20 (13 percent) were between 12 to 17 years old. The average asthma knowledge test score was a 7 out of 15 possible points, with 65 of the participants scoring above 7. The average medication adherence score was 8 out of a possible 15 points, with 71 participants having a score greater than 8. Overall, 47 percent of participants adhered to their medication and 43percent had average asthma knowledge. Asthma control test were given and scored based on patient ages. For the age group of 4 to 11 years old, the average control test score was 19 out of 25 points with 54 percent of the age group scoring above 19. For the age group of 12 to 17, the average control test score was 17 out of 25 points with 55 percent of the age group scoring above 17. 54 percent of the participants classified as well controlled, 37 percent were not well controlled and 9 percent poorly controlled.

Conclusion: This study provides demographics of pediatric African-American asthma patients willing to participate in MTM services provided by pharmacist. It also provides evidence of the continuing need for education about asthma and medication adherence for the population of pediatric African-American asthmatic patients.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 2-358

Poster Title: Assess the incidence of pablociclib-related toxicities at a cancer center

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Purpose: About 1 in every 8 women in the United States will develop breast cancer in their lifetime and it is the leading cancer in women. In February 2015, the FDA approved Ibrance (palbociclib), a cyclin-dependant kinase (CDK) 4 and 6 inhibitor, to be used in combination with letrozole, an aromatase inhibitor, for treatment of metastatic breast cancer. Despite significant success in treatment, a number of toxicities were recorded. The primary outcome of this study is to assess and document the toxicities related to palbociclib since the approval of this drug at a cancer center in Texas.

Methods: This is an open-label study conducted since February 2015 in a cancer center in Texas. The primary outcome is to assess and document the number of incidence of Palbociclib-related toxicities since the approval of this drug. The study includes pre-menopausal, peri-menopausal and post-menopausal women older than 18 years of age with estrogen receptor (ER)-positive metastatic breast cancer. The clinical pharmacist in the research team identified the patients with the above inclusion criteria and determined the study arms. The first arm received oral palbociclib 125 mg once daily for 21 days (followed by 7 days off treatment) plus subcutaneous goserelin 3.6 mg every 28 days, and a loading dose of intramuscular fulvestrant 500 mg once daily on days 1, 15, and 29 followed by a maintenance dose of fulvestrant 500 mg once monthly. The second arm received oral palbociclib 125 mg once daily for 21 days (followed by 7 days off treatment) plus a loading dose of fulvesterant 500 mg once daily on days 1, 15 and 29 followed by a maintenance dose of fulvestrant 500 mg once monthly, and the third arm received oral palbociclib 125 mg once daily for 21 days (followed by 7 days off treatment) plus continuous oral letrozole 2.5 mg daily. This study was approved through the hospital's institutional review board.

Results: A total of 17 patients participated in the study but only 16 were analyzed due to one death, which was not related to palbociclib treatment. The most common adverse effects associated with palbociclib were anemia (88 percent), leukopenia (88 percent), and neutropenia (35 percent). Neutrophil counts below median at baseline were associated with a higher chance of developing neutropenia later in the course of treatment with palbociclib. The other side effects noted were mucositis, alopecia, fatigue, and gastrointestinal complications. The palbociclib dose was reduced in 4 out of 17 patients (24 percent) due to adverse effects.

Conclusion: The main adverse effects associated with palbociclib in treating estrogen receptor (ER)-positive metastatic breast cancer were anemia, leukopenia, and neutropenia. The palbociclib-related adverse effects were managed by dose reduction.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 2-359

Poster Title: Initiation and optimization of drug therapy in patients with dyslipidemia at a local charity clinic

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Purpose: Practical approach to statin therapy has been the main prescribed treatment in the United States after the 2013 ACC/AHA Guidelines on the Treatment of Blood Cholesterol to Reduce Atherosclerotic Cardiovascular Risk in Adults (2013 cholesterol guidelines) were published. Based on the application of new cholesterol guidelines to a population-based sample study, the number of adults receiving or eligible to receive a statin should have increased. The objective of this study was to analyze prescribing habits in a non-profit, urban, low-income charity clinic and to determine the appropriateness of statin therapy initiation and optimization based on the 2013 cholesterol guidelines.

Methods: This retrospective, observational study evaluated patients who had a compelling indication or who were in a statin benefit group based on the 2013 cholesterol guidelines from January 01, 2014 to May 31, 2016. A total of 1285 patient's were identified, from which random samples of 119 patients were chosen. Structure query language queries were used to randomly select patients. Patient profiles were individually analyzed and pertinent information was extracted into an excel spreadsheet. Inclusion criteria were limited to patients who had at least 2 physician visits, age greater than 21 years old, diagnosis codes that included: dyslipidemia, clinical atherosclerotic cardiovascular disease, diabetes, hypertension, obesity, smoking status, and lipid panel lab. Exclusion criteria included, patients who lacked a lipid panel lab and patient's who were not in a statin benefit group after the 10-year atherosclerotic cardiovascular disease (ASCVD) risk was calculated. The 10-year ASCVD risk was calculated based on the patient's earliest visit and lipid panel lab within the study period. The primary outcome was the

proportion of patients who were appropriately initiated and optimized on statin therapy or other appropriate therapy as per 2013 cholesterol guidelines.

Results: After the selection of 119 random patients, seven patients did not meet the criteria for the study and 13 patients did not meet criteria for one of the four statin benefit groups after the ASCVD risk was calculated. The median age was 55; 63% (n=71) of patients were female, 37% (n=41) were male. Race distribution was as follow: Hispanic 52% (n=58), White 28% (n=31), African American 16% (n=18) and Asian 4% (n=5). The patients who were prescribed appropriate therapy, optimized to suitable therapy and/or who were council on lifestyle modification was 45% (n=45). The majority of patients, 55% (n=54), did not have appropriate optimized therapy after the 2013 cholesterol guidelines, were inappropriately maintained on an agent other than a statin, and/or had inappropriate conversion between low, moderate or high-intensity.

Conclusion: Patients at this local charity clinic were found to be appropriately initiated and optimized on proper therapy 45% of the time based on the 2013 ACC/AHA Guidelines on the Treatment of Blood Cholesterol to Reduce Atherosclerotic Cardiovascular Risk in Adults. The prescribing habits therefore should mirror the predicted increase in the use of statin therapy after the 2013 cholesterol guidelines were published. As a result of the study, perhaps an in-service or discussion with providers to discuss 2013 cholesterol guidelines versus observed prescribing trends would provide better outcomes.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 2-360

Poster Title: Impact of insulin detemir administration time on glycemic excursion rates

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Purpose: The 2016 ADA Standards of Care state insulin is the preferred strategy for glycemic control for inpatients. Hypoglycemia, the major side effect of insulin, is associated with mortality and increased hospital length of stay. The most common long-acting insulin agents used are detemir and glargine. Glargine has a 24-hour duration of action with sparse data suggesting AM administration may result in less hypoglycemia. In contrast, detemir has a shorter duration that may lead to inferior glucose control and hypoglycemia. The purpose of this study was to evaluate hypoglycemic episodes between subjects administered detemir in the morning, evening, or twice daily.

Methods: A retrospective review of medical records was used to identify subjects admitted between January 1, 2014 and December 31, 2015 after being initiated on detemir > 48 hours. The study population included patients 18-89 years of age with a length of stay > 48 hours. Patients were excluded if they were prisoners or wards of the state, pregnant females, received continuous infusion insulin, or if the schedule of insulin was changed during their hospital stay. One thousand fifty-two patients were screened and 695 were excluded. Three hundred fifty-seven patients were included in the study, of which 71 were in the AM group, 158 in the PM/HS group, and 128 in the BID group. The primary outcome of this study was the number of patient days of hypoglycemia per patient stay. Secondary outcomes included the number of patients who experienced hypoglycemia, hypoglycemic episodes per patient stay, rates of severe hypoglycemia, episodes of refractory hypoglycemia, maximum and minimum blood glucose level each hospital day, and rates of hyperglycemia.

Results: The primary objective of patient days of hypoglycemia per hospital stay was reduced in the AM versus PM group and statistically significant after a post-hoc chi-square test with a Bonferroni adjustment (7.9 vs. 11.9%, p = 0.008). The BID group demonstrated a trend of less hypoglycemic days when compared to the PM group, though this result was not statistically significant after Bonferroni adjustment (9.1% vs. 11.9%, p = 0.03). The number of patients who were hypoglycemic was 35%, 47.5 %, and 39.8% in the AM, PM, and BID group, respectively (p = 0.173). Severe hypoglycemia was noted in 7%, 5.7%, and 5.4% in the AM, PM, and BID groups respectively (p = 0.896). The average daily minimum, maximum, and variation of blood glucose appeared to be lowest in the PM versus AM versus BID groups, respectively. The percentage of blood glucose readings defined as hypoglycemia per the 2016 ADA guidelines (BG < 70 mg/dL) were highest in the PM group, with the AM group demonstrating the lowest rate of hypoglycemia. The percentage of blood glucose readings defined as hyperglycemia per the ADA guidelines (BG>180 mg/dL) were lowest in the PM group and highest in the BID group.

Conclusion: The primary outcome of hypoglycemic days per patient stay was lower in the AM versus BID versus PM group, respectively. Patients in the AM group also experienced less overall episodes of hypoglycemia. Overall glucose variability was the lowest in the PM group, though this result appears to be driven mainly by a decreased rate of hyperglycemia and an increased rate of hypoglycemia in the PM group. During hospitalization, administration of insulin detemir in the morning may be preferential to avoid episodes of hypoglycemia.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Descriptive Report

Session-Board Number: 2-361

Poster Title: To quantify the teaching component and activities of residents in an academic-affiliated residency program.

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Purpose: Residents provide an invaluable skill and resource for teaching and precepting pharmacy students. The purpose of this project was to evaluate and quantify the teaching involvement of Texas Tech Health Sciences Center School of Pharmacy (TTUHSC SOP) affiliated residents.

Methods: Both PGY1 and PGY2 residents completed an annual self-evaluation report which summarized the activities they completed or participated in during the residency program. The annual report included information that was subdivided into 4 main categories: Teaching, Precepting, Facilitating, and Student-Related Professional activities. We pooled the data and analyzed the amount each resident invested in those categories by campus (Dallas, Lubbock, Amarillo, and Abilene) and by year (2012-2015). Data was also collected regarding the number of residents who completed the teaching certification program.

Results: In between 2012-2016, 107 total residents went through the TTUHSC SOP residency program for which we were able to obtain 104 out of 107 annual reports that summarized the resident activities during the year. Based on the annual reports, 104 residents provided 168 classroom lectures, facilitated 2237 discussion groups and labs, precepted 151 intermediate pharmacy practice experience (IPPE) rotations, precepted 48 advanced pharmacy practice experience (APPE) rotations, and precepted a total of 359 students across 4 years. Additionally, 72 out of the 104 residents completed the teaching certificate offered by TTUHSC SOP (67%). Across the 4 years, the total number of student-related professional activities was 240.

Conclusion: Due to essential role that residents play as educators, we sought to identify the extent of teaching involvement of residents quantitatively. The results of the annual reports reveal that a noteworthy amount of pharmacy student's learning is taught by residents. The development of residents as educators is an important element of the ASHP residency accreditation standards. Based on these standards, residents are expected to progress through the four roles of precepting which include: direct instruction, modeling, coaching, and facilitation. The results from the annual reports show that the TTUHSC SOP residents are fulfilling and excelling in each of those responsibilities.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Descriptive Report

Session-Board Number: 2-362

Poster Title: Career pathways following the PGY1/ PGY2 TTUHSC residency programs

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Purpose: Securing a first job after completion of a residency is a concern for P4 students as they consider a possible future as a resident. It is also a concern for current residents who have invested time and money to further their education. The purpose of this review was to evaluate the first jobs or career path chosen by residents upon completion of either a PGY1 or PGY 2 at Texas Tech University Health Sciences Center School of Pharmacy (TTUHSC SOP) within the last 4 years.

Methods: Information regarding PGY1 and PGY2 post-residency career paths and first jobs from the last 4 years was obtained from school administration records, the residency director, and the Tech Times. The Tech Times is a newsletter that is published quarterly for the graduates of TTUHSC SOP residency program; it contains the future plans of the residents. The Tech Times only contained information for the years 2014-2015 and 2015-2016. Information for residents for 2012-2013 and 2013-2014 was obtained via other resources such as administration records and information provided by the PGY2 residency director of TTUHSC SOP.

Results: Across 4 years, 63 residents completed a PGY1 and 44 residents completed a PGY2 at TTUHSC SOP. Out of the 63 PGY1 residents, 5 obtained an academic position, 20 obtained a clinical position, 35 went on to complete a PGY2, and 3 residents were categorized as miscellaneous. Out of the 44 PGY2 residents, 8 obtained academic positions, 33 obtained clinical positions, and 3 residents were categorized as miscellaneous.

Conclusion: Career planning is an essential part of the final year of PharmD training. Many P4 students spend the last year of pharmacy school trying to decide if they want to further their education and training by pursuing a residency. Students make this decision based on a number of factors; one of these factors includes the ease of employment post-residency. Based on the results, the majority of PGY2 residents were able to secure a clinical position. Many PGY1 residents were able to secure a clinical position just after one year of residency, while the majority went on to complete a PGY2.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Evaluative Study

Session-Board Number: 2-363

Poster Title: Retrospective review evaluating dosing strategies of three-factor prothrombin complex concentrate (3F-PCC) in the reversal of factor Xa inhibitors

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Purpose: Factor Xa inhibitors are becoming the favorable choice for prevention of thrombosis in patients with atrial fibrillation and venous thromboembolism. However, the lack of a direct antidote to these agents adds risk to their utility. Guided by limited available literature, our institution (720-bed, level-2 trauma, community hospital) developed a protocol for management of emergent anticoagulation reversal secondary to factor Xa inhibitors. The protocol includes a dose of 3F-PCC at 35 units per kilogram. Our retrospective review investigates two dosing strategies and their effects on prothrombin time, international normalized ratio, anti-factor Xa, the development of new venous thromboembolism and in-hospital mortality.

Methods: Retrospective data was gathered for all patients who received 3F-PCC between August 2013 and August 2016. A chart review was performed for patients greater than or equal to 18 years of age who received 3F-PCC for the reversal of factor Xa inhibitors including: apixaban, rivaroxaban and edoxaban. Data collection included age, sex, creatinine clearance (CrCl), prescribed anticoagulant, indication for anticoagulation, indication for reversal, dose of 3F-PCC (units per kilogram), supplementary doses of 3F-PCC, adjunctive therapy (fresh frozen plasma, platelets, activated factor VII, packed red blood cells), surgery type/length and associated blood loss, baseline prothrombin time (PT), international normalized ratio (INR), anti-factor Xa (anti-Xa) plus four serial follow up levels for each, in-hospital mortality, development of new venous thromboembolism (VTE), and bleeding enlargement confirmed by computed tomography. Indications for bleeding were categorized as follows: spontaneous

intracerebral hemorrhage (ICH), traumatic ICH, extracranial hemorrhage, traumatic injury or emergent surgery for non-bleeding/non-traumatic reasons. ICH was defined as subdural hematoma, subarachnoid hematoma or intraparenchymal occurring spontaneously or from traumatic injury. Extracranial bleeding was that which occurred spontaneously outside of the brain. Variation in dosage was studied by organizing patients into two distinct groups: those who received less than 35 units per kilogram of 3F-PCC ("low-dose") and those who received greater than or equal to 35 units per kilogram ("high-dose"). This study was submitted to the Institutional Review Board for approval.

Results: We identified 285 patients who received 3F-PCC between August 2013 and August 2016. Of these 79 patients were receiving factor Xa inhibitors as their anticoagulation therapy (46 on rivaroxaban, 32 on apixaban and 1 on edoxaban). Baseline characteristics included a mean age of 77 years, 46% male, mean CrCl of 51 mL/min. Out of the 79 patients, 16% had spontaneous ICH (N=13), 32% had traumatic ICH (N=25), 28% had extracranial hemorrhages (N=22), 10% had hemorrhages from traumatic injury (N=8), and 14% of patients required emergent surgery for other reasons (N=11). A total of 49 patients received the "low dose" and 30 patients received "high dose." The "low dose" group had a larger decrease in both PT and INR from baseline to first follow up lab (-4.8 vs. -2.5 seconds, r=-0.138, p=0.335 and -0.63 vs. -0.27, r=-0.21, p=0.389, respectively) while the mean change in anti-Xa from baseline to first follow up lab for the same group was less (-0.27 vs. -0.46 IU, r=0.209, p=0.215). Both the rate of new VTE development and mortality were lower in the "low dose" group (4.1% vs. 16.7%, OR =1.42, 95% CI 0.26 to 7.87 and 10.2% vs. 16.7%, OR=1.76, 95% CI 0.26 to 7.87), respectively.

Conclusion: Among all calculated results from our study, the one of most interest is the association of "high dose" 3F-PCC with a higher mortality rate. The odds ratio of death in patients receiving the higher dose was 1.76. While this number did not meet statistical significance, clinical significance may still exist. Further investigation is needed to determine why higher doses were chosen and the possibility that underlying indications for higher dosed reversal are inherently correlated to worse prognoses. If the higher doses were truly chosen at random then larger prospective trials are needed to determine if lower doses have better outcomes.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 2-364

Poster Title: Comparative-effectiveness of ceftaroline and daptomycin as first-line therapy for patients with diabetic foot infection in the United States Veterans Health Care System

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Purpose: Up to 25% of patients with diabetes experience a diabetic foot infection (DFI) in their lifetime. DFI are often difficult to treat, both due to the pathology of diabetes and the nature of the infecting organisms, as many DFI are polymicrobial and the incidence of resistant infections such as methicillin-resistant Staphylococcus aureus (MRSA) are increasingly common. However, evidence supporting specific drugs in the treatment of DFI is lacking. This study compared hospital readmission and mortality rates among patients receiving ceftaroline fosamil or daptomycin for DFI to compare the clinical effectiveness of these potential treatment options.

Methods: This was a retrospective, cohort, comparative--effectiveness study of adults (age 18+ years), admitted to hospitals in the United States Veterans Health Care System, with diabetic foot infections (by ICD9 codes), between 10/1/10--9/30/14, and who received ceftaroline or daptomycin as first--line therapy within 14 days of admission. Patients who received both study drugs were excluded. Chi--square, Fisher's exact, and Wilcoxon rank sum tests were used to compare baseline characteristics. Multivariable logistic regression models with Hispanic race, prior hospitalization, dyslipidemia, and Charlson comorbidity score as covariates were used to compare differences in hospital readmission and patient mortality.

Results: A total of 223 patients were included (ceftaroline=71 and daptomycin=152). At baseline, ceftaroline patients were more likely to be Hispanic (18% vs. 6%, p=0.0043) and to have been hospitalized in the past 90 days (34% vs. 19%, p=0.0161). Median (25th--75th percentile) time from hospital admission to study drug initiation was 0 (0--1) days for

ceftaroline and 1 (0--1) day for daptomycin. Unadjusted hospital readmission rates for ceftaroline versus daptomycin were: 30--day (30% vs. 40%), 60--day (31% vs. 47%), and 90--day (34% vs. 49%). Unadjusted mortality rates were: 30-day (0% vs. 4%), 60--day (0% vs. 7%), and 90--day (1% vs. 8%). In multivariable models, ceftaroline patients were less likely than daptomycin patients to experience 60--day hospital readmission (OR=0.46, 95%CI=0.24--0.86), 90--day hospital readmission (0.46, 0.25--0.85), and 90--day mortality (0.14, 0.01--0.77). Comparisons of 30--day hospital readmission and 30/60--day mortality were not statistically significant. Adverse effects were also similar, with no difference among the two cohorts, though a non-significant trend towards higher incidence of leukocytosis (WBC of at least 15,000) in patients treated with daptomycin was observed (16% versus 7%, $p < 0.0875$).

Conclusion: In this population, ceftaroline was associated with lower 60/90--day hospital readmission and 90--day mortality, as compared to daptomycin, when used as first--line therapy for diabetic foot infection. Larger samples sizes are needed to compare these study endpoints at 30 and 60 days.

Submission Category: Pain Management

Submission Type: Case Report

Session-Board Number: 2-365

Poster Title: Dronabinol for the treatment of veterans with chronic pain: a retrospective case series

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Purpose: Opioid therapy continues to be the most common pharmacologic treatment for most chronic pain diagnoses. Unfortunately, chronic opioid therapy involves many risks and controversial benefits. Per the Centers for Disease Control and Prevention, in 2014, 61% of drug overdose deaths in the US involved some type of opioid, including heroin. It has been shown that receiving prescription opioids is associated with increased risk of adverse clinical outcomes, including opioid-related accidents and overdoses, which is particularly elevated in veterans with PTSD. Alternatives and adjuvants to opioid pain management strategies are necessary. Growing evidence suggests that cannabinoids may be useful in the setting of chronic pain. Cannabinoids affect the endogenous endocannabinoid system through cannabinoid receptors 1 and 2 (CB1, CB2). CB1 is found in high densities in the central nervous system, and CB2 is found primarily in the periphery, including the immune system. Activation of these receptors, especially CB1, can cause psychological effects as well as analgesia, muscle relaxation, and appetite stimulation. To date, more than 60 active compounds have been identified from cannabis, including (-)trans-delta-9-tetrahydrocannabinol, which has been reported to have analgesic properties. Dronabinol is a synthetic form of delta-9-tetrahydrocannabinol, activating CB1 and CB2 receptors. Dronabinol has FDA-labeled indications to include appetite stimulation in AIDS patients and chemotherapy-induced nausea and vomiting.

Three veterans with chronic pain prescribed chronic opioid therapy were initiated on dronabinol for opioid weaning. Patients' electronic medical records were retrospectively reviewed over a nine-month period (December 2015-August 2016). Data collected included patient demographics, opioid regimen throughout dronabinol therapy, morphine equivalent

daily dose (MEDD) at dronabinol initiation and throughout dronabinol therapy, and Defense and Veterans Pain Rating Scale scores. Data were collected at the initiation of dronabinol therapy, at 3 months, at 6 months, and at 9 months post-initiation.

The average age of the three veterans (one female, two males) was 45 years. All three patients were prior enlisted. The three veterans were prescribed an average of 263 MEDD prior to dronabinol initiation. To date, dronabinol treatment has shown an average decrease of 182 MEDD, or 72% decrease in MEDD. Patient 1's pain score decreased from 10/10 to 9/10. Patient 2's pain score increased by one point from 6/10 to 7/10. It should be noted that during this time, patient 2 was completely weaned off opioid therapy. Patient 3's pain score decreased two points from 9/10 to 7/10.

Dronabinol may prove to be an effective analgesic, allowing for reduction or potential elimination of chronic opioid requirements in patients with chronic pain diagnoses. Dronabinol may represent a safer and possibly more effective option than opioids for chronic pain. We anticipate these veterans' MEDDs to continue to decrease as they are weaned from high-dose opioids and as dronabinol therapy is optimized. Dronabinol has the potential to reduce the number of pain medications a patient needs for optimal pain management.

Methods:

Results:

Conclusion:

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 2-366

Poster Title: Development of a prediction tool for recurrent Clostridium difficile infection in a veteran population

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Purpose: Clostridium difficile infection (CDI) is the main cause of bacterial infectious diarrhea in nosocomial settings. Not only does recurrent CDI heavily burden patients by increasing morbidity and mortality and diminishing quality of life, it is also costly. Prior clinical trials identified several patient-specific factors that increase risk for recurrent CDI; however, clinicians lack guidance on how to use these risk factors to improve patient care. The objective of this study was to derive and validate a clinical prediction rule for CDI recurrence, in hopes of improving health outcomes and quality of life of patients with CDI.

Methods: This was a retrospective cohort study of CDI patients receiving care at any of the approximately 150 Veterans Health Administration (VHA) hospitals and 800 VHA clinics in the United States from October 1, 2002 through June 30, 2012. Patients 18-89 years old with an International Classification of Diseases, 9th Revision Clinical Modification (ICD-9-CM) code for CDI (008.45) were included. Patients were excluded if they had an ICD-9-CM code for CDI in the previous year or if they died within 60 days of treatment discontinuation for initial CDI episode. A CDI 60-day recurrence prediction rule was derived in one-third of the cohort, using backward stepwise logistic regression. Of 42 variables tested, factors significant at $p < 0.05$ in the model were assigned an integer score proportional to the beta-coefficient. The model was validated in the derivation cohort and in a validation cohort, representing the remaining two-thirds of the cohort, using the area under the receiver-operating-characteristic curve (AUROC) and correlation.

Results: The prediction rule was developed using a total of 48,269 patients with 16,130 in the derivation cohort and 32,139 in the validation cohort. Variables included in the prediction rule, and assigned an integer score were chronic obstructive pulmonary disease (1 point), renal disease (1 point), dyslipidemia (1 point), white blood cell count ≥ 15,000 cells/ml (2 points), prior antibiotics (3 points), white race (3 points), principal CDI (5 points), and community-onset, healthcare facility-associated CDI (7 points), for a total of 23 possible points. The recurrence risk for each score ranged from 13% (0 points) to 52% (23 points). The risk score was strongly correlated with recurrence (R2=0.93). Patients were split into low (scores 0-7), medium (8-15), and high (16-23) risk groups. Overall recurrence rates in each group were as follows: low risk (17%), medium risk (26%), and high risk (36%). Rates of recurrence were similar between derivation, validation, and overall cohorts.

Conclusion: Increasing risk score was strongly correlated with CDI recurrence. This clinical prediction rule may be utilized by providers in choosing appropriate preventive therapies in CDI patients based on recurrence risk.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 2-367

Poster Title: Assessment of discharge antimicrobial selection for patients presenting with urinary tract infection symptoms in two pediatric emergency departments

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Purpose: Antimicrobial selection and prescribing in pediatric patients presenting to emergency departments with a concern for a urinary tract infection is often a challenge. Most patients are treated empirically based on local susceptibilities, but good antimicrobial stewardship practice should be utilized to maximize patient outcomes. At the Children's Hospital of San Antonio, isolate results were compared with discharge medication to analyze appropriateness of the antibiotic selected empirically, as well as determine if narrower-spectrum antibiotics could have been used.

Methods: This was an institutional review board exempt, retrospective study assessing urine isolates and susceptibilities that were obtained from the Emergency Department in the Children's Hospital of San Antonio and the Children's Emergency Department at Westover Hills during the month of June 2016. Unique isolates from urine cultures were included for all patients seen at either emergency department in outpatient visits who were up to 18 years of age at the time of presentation. Additionally, all negative urine cultures were included to more accurately assess prescribing practices. Discharge prescription information (drug, dose, dosing interval and duration), patient weight, isolate susceptibilities and patient allergies were also collected. Only isolates with 30,000 or more colony forming units were considered appropriate to treat. Negative cultures that were treated were considered inappropriate. Appropriateness of drug selection was defined as the most narrow spectrum agent available to treat the subsequently isolated bug.

Results: A total of 113 unique isolates were identified. Of the isolates, 24 percent (n equals 27) were treated with the appropriate drug, dose and duration, or antimicrobials were appropriately withheld. Of those patients discharged with an antimicrobial, the appropriate drug, dose, and duration were prescribed 1.35 percent of the time (1 time out of 74). The appropriate antimicrobial was prescribed or appropriately withheld 30 percent of the time. Of those who were discharged with an antimicrobial, appropriate dose or duration were seen 74 percent and 32 percent of the time, respectively. The most common drug prescribed was cefdinir (48 percent, n equals 54), followed by trimethoprim-sulfamethoxazole (n equals 7) and cephalexin (n equals 5). No drug was prescribed for 39 patients (34.5 percent). Of the isolates, 63.7 percent were cefazolin sensitive and 31.9 percent were ampicillin sensitive. Additionally, of the patients treated with cefdinir, isolates were susceptible to a first generation cephalosporin 77.8 percent of the time (n equals 42). The most common urine isolate was Escherichia coli (n equals 67), with Staphylococcus sp. being the second most common (n equals 13), which was likely a contaminant. The average duration of therapy was 9.6 days.

Conclusion: A small portion of our patient population was discharged on appropriate therapy. In most instances, patients were prescribed antimicrobials that were too broad. In the age of antimicrobial stewardship, it is imperative to define local resistance patterns and develop a protocol-driven consensus on how to best empirically treat pediatric patients for urinary tract infections.

Submission Category: Pediatrics

Submission Type: Descriptive Report

Session-Board Number: 2-368

Poster Title: Transitions of care medication trends in pediatric patients at a Central Texas children's hospital

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Purpose: Patients are often discharged with prescriptions for medications that are integral to continuity of care. Transitions of care services provided by pharmacists may improve patient safety and health literacy through medication reconciliation and education. There is limited data on the role of pharmacy services during transitions of care in the pediatric setting. The objective of this study is to determine whether any notable trends exist in patients' prescribed medications during transitions of care at Dell Children's Medical Center of Central Texas (DCMCCT). This study may help to identify opportunities for pharmacist-led medication reconciliation and discharge counseling in the pediatric population.

Methods: A retrospective chart review was conducted of patients discharged from DCMCCT between January 1 – 31, 2016 and June 24 – July 27, 2016. Patients were identified via a query in Cerner PowerChart. Clinical information related to the patient's discharge was collected by reviewing the patient's electronic medical record in PowerChart. Patient characteristics that were analyzed included the number of patients who were discharged with prescriptions, how many prescriptions they received, nursing units from which they were discharged, date and time of discharges, and whether or not the patient was readmitted within 30 days. Discharge medication characteristics that were analyzed included the number of prescriptions written, classes of medications prescribed, and whether or not the medications were antimicrobials or over-the-counter. All patients who were discharged from DCMCCT during the specified time periods were included in the study. Data were analyzed in Microsoft Excel using descriptive statistics.

Results: In January 2016, 1193 patients were discharged, 471 (39.5 pct.) of whom were discharged with prescriptions. In July 2016, 899 patients were discharged, 393 (43.7 pct.) with prescriptions. In both cohorts, most patients with prescriptions were discharged between 8:00 am and 5:00 pm (Jan: 75.6 pct.; Jul: 74.8 pct.). The greatest numbers of patients with prescriptions were discharged from the respiratory care unit in January (24.0 pct.) and the neurology/epilepsy monitoring unit in July (25.7 pct.). Both units also care for internal medicine patients. A total of 876 discharge prescriptions were written in January and 802 in July. Most patients being discharged with prescriptions received one to three prescriptions (Jan: 90.4 pct.; Jul: 87.3 pct.). The most commonly prescribed medications in January were albuterol (11.9 pct.), ibuprofen (11.1 pct.), and ondansetron (6.7 pct.), while those most commonly prescribed in July were ibuprofen (7.9 pct.), hydrocodone/acetaminophen (7.7 pct.), and diazepam (6.0 pct.). Similar numbers of prescriptions for over-the-counter medications (Jan: 34.5 pct.; Jul: 35.4 pct.) and antimicrobials (Jan: 7.4 pct.; Jul: 7.2 pct.) were written for both cohorts. There were 65 readmissions in January and 61 in July. Data for readmitted patients were similar to those from their respective cohorts.

Conclusion: By identifying the time of day and units from which patients are most often discharged with prescriptions, pediatric institutional pharmacies may be better able to repurpose pharmacy staff for medication reconciliation and discharge counseling efforts. Additionally, identifying medications most likely to be prescribed at discharge may facilitate the development of institution-specific patient education materials. It is recommended that pediatric institutional pharmacies wishing to develop transitions of care services collect and evaluate data on medication trends in order to optimize resources and more effectively care for patients at the point of discharge.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 2-369

Poster Title: Assessing the impact of familialism on immunization practices in predominately Spanish-speaking Hispanic community health centers along the US-Mexico border

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Purpose: People in the United States continue to get diseases that are vaccine preventable. A portion of these cases can be attributed to people not getting immunized against vaccine preventable diseases in the first place. The purpose of this study was to determine the impact of familial influence on vaccination practices in respondents as they transition from childhood into adulthood, to explore cultural beliefs that would adversely affect the probability of receiving recommended vaccines, and to determine if a Hispanic community primarily looks to family members instead of healthcare professionals when it comes to making decisions on vaccinations.

Methods: This is an ongoing prospective observational study of patients who receive care at local community health centers. Inclusion criteria included men and women at least 18 years of age who were present at the community health centers. Participants were randomly selected and asked to complete a two-part survey electronically. The first survey was a 10-question demographic survey used to determine several characteristics such as education, age, race/ethnicity, and socioeconomic status. A second survey composed of 46 questions assessed a respondent's early childhood experience with the flu vaccine while growing up with his/her family as well as the respondent's current views and practices concerning the flu vaccine. In addition, the second survey included a validated familialism scale. Upon consultation with a psychometric specialist, the survey tools were adapted to meet the appropriate literacy level of no more than 9th grade level. Likewise, the surveys were created to be culturally and linguistically appropriate for the US-Mexico border. Participants had the option of completing the survey in either English or Spanish. Trained personnel were present to administer the survey and assist participants if they did not understand any of the questions. This ongoing study was exempt by the University of Texas at El Paso institutional review board.

Results: A total of thirty-one participants have completed the two-part survey (English n = 16, Spanish n = 15). The majority of respondents were women (22/31 = 71 percent), had an average age of 51, identified as Hispanic/Latino (29/31 = 94 percent), and lived in a home in which the primary language spoken is Spanish (22/31 = 71 percent).
The preliminary results have identified that a majority of respondents have received the flu vaccine in the past 12 months (18/31 = 58 percent). One observed correlation surfaced during this early stage of data analysis. Respondents who answered that their family had negative feelings towards vaccines as they were growing up also happened to attest that they prefer to ask family members, instead of healthcare professionals, for medical advice. These results suggest that a number of participants place a high priority on the family unit. Although more completed surveys are necessary to adequately power the results of this study, the preliminary findings point to opportunity for education and interventions geared towards the family unit in order to reach individual patients in this particular community.

Conclusion: Preliminary results suggest that familial influence impacts vaccination practices of respondents as they transition from childhood into adulthood. Interestingly, it appears that this predominantly Hispanic community primarily looks to family members instead of healthcare professionals when it comes to making vaccine decisions. Additionally, the participants who grew up with family members who had negative feelings towards vaccines appear to be the ones who depend on the family unit when making immunization decisions. These preliminary results highlight an opportunity for healthcare providers to focus on educating families to improve patient immunization outcomes.

Submission Category: Clinical Services Management

Submission Type: Evaluative Study

Session-Board Number: 2-370

Poster Title: Assessing the current status of pharmacy involvement in transition of care programs within hospital institutions in the Rio Grande Valley

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Purpose: Transitions of care (TOC) refers to the movement of patients between health care practitioners, settings, and home as their care needs change. These transitions increase the risk for medication-related adverse events and higher hospital readmission rates. Consequently, hospital institutions have begun to instate pharmacist-led TOC programs that can include medication reconciliations, medication counseling, and follow-up phone calls. Pharmacists utilize a patient-centered approach to review therapy and assess medication issues. This study evaluates the current status of pharmacist involvement in TOC programs in the Rio Grande Valley (RGV) in order to establish a need to develop pharmacist-led TOC programs within hospitals.

Methods: With approval from the institutional review board, the Director of Pharmacy from nine acute care institutions in the RGV were contacted via telephone and informed about the study by members of the research team. The phone numbers were obtained through the acute care facility websites, which is public information. If the subjects agreed to participate, their email addresses were obtained, and a link to the survey was sent electronically. The online Qualtrics survey included the recruitment email and consent. Survey data was collected through Qualtrics at the end of the survey period. The survey provided both quantitative and qualitative data.

Results: There was a 78 percent response rate of participants in the study (n equals 7). All of the institutions surveyed had some form of a TOC model; however, the pharmacy department plays an active role in less than 50 percent of these institutions. Of the institutions where the

pharmacy department does not have an active role in the TOC program, only 25 percent had future plans to incorporate the pharmacy department. Some of the common perceived advantages of pharmacy involvement include decreased rates of readmission due to medication errors or incomplete pharmacotherapy information and decreased risk of confusion and error regarding home medications during both admission and discharge. The perceived barriers to incorporating the pharmacy department in transitions of care include lack of resources, time, and administrative support.

Conclusion: Statistics show that there is a disparity of education, income, and health in the RGV when compared to the state and national averages. By attaining a definitive look at whether institutions in the RGV have recognized the benefits of having a TOC program, are in the progress of developing one, and the challenges they encountered or anticipate facing, this study lays the groundwork for enhancing existing TOC programs and developing new pharmacist-led TOC programs in the future.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 2-371

Poster Title: Medication non-adherence predictors in bipolar patients

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Purpose: Medication non-adherence is a barrier to successful treatment in bipolar patients that can be modifiable through use of behavioral training and motivational techniques. Before implementing an intervention, it is important to identify factors that contribute to non-adherence. Pharmacists, having frequent contact with patients, can take an active role in addressing non-adherence through focused medication counseling. This project was initiated to determine factors related to medication non-adherence that will assist pharmacists when counseling patients with bipolar disorder.

Methods: A Medline search (1946 to present) was performed using the exploded MeSH terms "bipolar disorder" and "medication adherence." Results were initially limited to randomized controlled trials. Due to a low yield, this restriction was removed to allow a broader selection of studies including observational and cross-sectional. Additional articles were identified after review of the reference lists of selected studies. Reported data for demographic and clinical predictors and patient perceptions were considered for this report. Subjects of the selected studies had been diagnosed with either bipolar disorder type I or II and treated with various medications.

Results: A total of 14 studies were identified that met the selection criteria. Patient-related factors associated with non-adherence included: marital status, being a minority, presence of co-morbid substance abuse disorder, earlier onset of illness, suicide attempts, and others. Psychological factors relevant to non-adherence can be explained by patient perceptions and attitudes. Lack of insight and denial of bipolar disorder diagnosis were found to be associated with increased rates of non-adherence. Treatment-related barriers to medication adherence expressed by patients included fear of adverse effects, addiction to the medication, doubts about medication efficacy, and an overall negative attitude towards treatment. Other reasons

considered to be contributory towards non-adherence included: forgetfulness, unfavorable social environment, and inadequate understanding of bipolar disorder. Limitation to this evaluation is the variation in methodologies across the different studies. Results can be strengthened by developing a standard study design using defined measurement tools to assess non-adherence.

Conclusion: Using the results of clinical and demographic features associated with non-adherence, pharmacists can better identify bipolar patients that are likely to be non-adherent to treatment. Subsequently, they can address the individual factors that most likely contribute to non-adherence such as illness insight, denial of diagnosis, and fear of side effects during medication counseling sessions. Pharmacist interventions using motivational interviewing and educational techniques should positively impact long-term patient outcomes through relapse prevention and decreased hospitalizations of bipolar patients.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 2-372

Poster Title: Identifying types of pharmacy student interventions made during an interprofessional six-week adult internal medicine rotation

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Purpose: The practice of pharmacy is progressing and requires pharmacists who are integral members of a healthcare team and share in therapeutic decision-making. The new standards for pharmacy education require that pharmacy students are involved in direct and interprofessional team-based care in multiple practice settings, which include real-time interactions with prescribers and student prescribers. The objective of this study is to identify the type and number of interventions, clinician acceptance, clinical importance of pharmacy student interventions, and time to complete interventions that were performed during in an interprofessional internal medicine team.

Methods: From April 2014 to December 2015, fourth-year Doctor of Pharmacy (PharmD) students at University Medical Center in El Paso, Texas, recorded their interventions into a Microsoft Access ® database. The database includes five major types of interventions such as Adverse Drug Reaction (ADR), Interactions, Drug Therapy, Dosing, and Patient/Provider. These five intervention types are further subdivided into specific intervention categories. For all the interventions performed, the outcomes were recorded as physician accepted, not accepted, or continued to monitor. The students rated their interventions in categories of minor, moderate, or severe clinical importance Time per intervention was reported in categories of ≤ 15 minutes, ≤ 30 minutes, and one hour or greater. Descriptive statistics were performed on the collected data. The study was exempt by the University of Texas at El Paso Institutional Review Board.

Results: A total of 531 interventions were documented, resulting in an average of 44 interventions per student (n=12). Physicians accepted 462 of the student interventions, which provided an overall acceptance rate of 87%. The most frequent types of interventions performed by PharmD students were under the categories of Therapy Needed (29.8%), Too Low Dose/Frequency (21.1%), Too High Dose/Frequency (8.3%), Therapeutic Level Monitoring (6.8%), and IV to PO Conversion (4.9%). A majority of interventions was of moderate clinical importance (56.1%) and took approximately 15 minutes to complete (92.5%).

Conclusion: The results of this study illustrate the potential value of these interventions in improving patient care and support the idea that PharmD students offer appropriate recommendations to help improve patient care. This study shows that PharmD students are beneficial additions to interprofessional teams. The high physician acceptance rate may indicate that interprofessional team-based care may promote greater acceptance of PharmD student interventions, which could lead to better interprofessional collaboration. PharmD students under supervision of clinical faculty on an interprofessional internal medicine team are valuable collaborators and contributors in decreasing the number of drug-related problems that can negatively impact patient care..

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 2-373

Poster Title: Moxifloxacin as definitive therapy for Streptococcus anginosus infections

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Purpose: Streptococcus anginosus, a subset of viridans streptococci with variable hemolysis patterns, makes up part of the normal oral and gastrointestinal flora in humans. S. anginosus infections can range from relatively simple to life-threatening, and the incidence has been increasing at our institution. Beta-lactams have been the traditional treatment of choice for these infections, while fluoroquinolone use has historically been discouraged. The purpose of this study was to evaluate the use of moxifloxacin, a newer fluoroquinolone with more potent gram-positive activity and convenient once daily oral dosing, for the treatment of S. anginosus infections.

Methods: An institutional review board approved retrospective chart review of all patients with at least one positive culture for S.anginosus between January 1, 2011 and December 31, 2015 was conducted. Patients were identified through a query of the microbiology laboratory database and then subsequently cross-referenced with pharmacy billing records to identify patients with a charge for moxifloxacin. Patients who were pregnant, incarcerated, did not receive systemic antimicrobials, or who died within 48 hours of admission were excluded. Demographic data including age, gender, weight, comorbidities, race, and ethnicity code were collected. All culture data available during the index admission were collected in addition to any systemic antimicrobials received. Antibiotic susceptibilities and moxifloxacin minimum inhibitory concentrations (MICs) were recorded when available. Outcomes included hospital length of stay (LOS), re-isolation of S. anginosus within 30 days of treatment, 30-day hospital readmission for an infectious complication, and in-hospital mortality.

Results: We identified 29 patients with a S. anginosus infection treated with moxifloxacin. The mean patient age was 51 years (range: 26-77), with the majority being female (16/29, 55%). Patients were predominantly white (93%) and Hispanic (48%). Hypertension and diabetes mellitus represented the most common patient comorbidities. Four patients were admitted directly to the intensive care unit. The most common isolation sites included oral/maxillofacial (n=9) and wound/abscess (n=8). Ten patients had positive bone cultures or osteomyelitis. Other sites included respiratory (n=5), intra-abdominal (n=6), blood (n=3), and central nervous system (n=1). Most infections were polymicrobial (19/29, 66%), with anaerobes as the most common co-pathogen. Moxifloxacin MIC testing was performed for three patients and ranged from 0.25-0.5 mcg/mL. Vancomycin and piperacillin/tazobactam were the most common empiric therapies. The majority of patients were discharged with moxifloxacin as their definitive outpatient antibiotic for the treatment of S. anginosus (21/29, 72%). The average duration of total antibiotic therapy was 34 days (range: 3-65) and average duration of moxifloxacin therapy was 24 days (range: 1-63). The average hospital LOS was 10 days (range: 3-35). Only one patient required readmission within 30 days due to suspected infectious complications, no patients had S. anginosus re-isolated, and no patients died.

Conclusion: S.anginosus infections have increased at our institution over the last decade. Moxifloxacin is an attractive therapy option for treating these infections due to its once daily dosing, high bioavailability, and potent in vitro activity against this pathogen. Minimal clinical data, however, exists to support its use. In this preliminary evaluation of the utility of moxifloxacin for S. anginosus infections, only one patient was readmitted within 30 days, and no patients had documentation of intolerance to the medication. This initial investigation supports the further evaluation of moxifloxacin for treatment of S. anginosus infections, particularly in comparison to traditional beta-lactam therapy.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 2-374

Poster Title: Barriers and biases towards the human papilloma virus (HPV) vaccination in the Hispanic culture

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Purpose: The Centers for Disease Control reports fifty-six percent of girls and thirty-four percent of boys have been immunized with the first dose of the Human Papilloma Virus (HPV) vaccine in Texas. The Healthy People 2020 Initiative has set a goal of eighty percent vaccination rates by the year 2020. This research project aims to gauge bias and ascertain barriers relating to the HPV vaccine in a largely Hispanic population to determine how to best address them in an educational intervention to encourage vaccination and cancer prevention in a vulnerable population.

Methods: Recruitment occurred at Dr. Juan Aguilera's Pediatric Clinic in Pharr, TX. The research team surveyed 134 patients in the triage station of the clinic. Patients were asked if they were interested in completing a survey regarding the HPV vaccine for research purposes. Of the 134 patients, 112 met the inclusion criteria (18 years or older and accompanying a minor younger than 18 years of age). The survey was provided on an iPad via Qualtrics in both English and Spanish. It contained an initial consent followed by the fifteen-question survey. Baseline characteristics collected included zip code, sex, ethnicity, age, relationship to minor, and level of education of the guardian. Upon completion, each participant was provided an educational pamphlet containing basic information pertaining to the vaccine and the importance of immunization.

Results: A total of 112 participants completed the survey. The baseline characteristics gathered match statistics reported for the South Texas region along the United States- Mexico border. Among the participants, 99 percent were confident that vaccinations against Meningitis, Polio, Tetanus, Pneumonia, Cancer, Hepatitis A and B and Mumps were extremely important or very important. Additionally, 74 percent felt that vaccines would not have long-term effects. Participants stated they heard of the vaccine from a medical provider (54 percent), on television (41 percent), or had never heard of the vaccine (14 percent). Of the participants surveyed, 34 percent had a child who had been vaccinated with the HPV vaccine, 42 percent had a child who had not been vaccinated, and 25 percent were not sure. Of those with a child who had not been vaccinated, 65 percent were interested in vaccinating their child after the survey. Twenty- five percent of participants stated they were not interested in having their child vaccinated with the HPV vaccine in the future. Of this population, the barriers and biases identified include: vaccine would encourage child to have sex, harmful side effects, belief that the vaccine is only for females, or thought their child was too young.

Conclusion: The HPV vaccine can prevent and decrease mortality rate from cancer. Therefore, this is a valuable and worthy endeavor that deserves increased research efforts. From this sample, we determined that 50% of people had heard of the vaccine on television or from a healthcare provider. These two sources have been identified as preferred channels for education to increase vaccination coverage along the US- Mexico border. Funding to promote the vaccine through television ad campaigns and an in office video presentation are potential beneficial approaches to increase education and awareness for HPV vaccination.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 2-375

Poster Title: National epidemiology of cystic fibrosis hospitalizations in the United States between 2001 and 2010

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Purpose: While cystic fibrosis (CF) has traditionally been considered a high mortality childhood disease, recent advancements in its treatment have extended the median age of survival to over 40 years in developed countries. Rates of CF and associated patient characteristics, however, have not been described in a national cohort of patients in recent years. The purpose of this study was to investigate the national epidemiology of CF hospitalizations longitudinally and overall in the United States over a 10-year period, including patient age, prevalence, regional and seasonal variation, and hospital length of stay (LOS).

Methods: We performed a retrospective analysis of the United States National Hospital Discharge Survey (NHDS), which provides a nationally representative sample of inpatient discharges from non-federal, acute care hospitals. Individuals with a principal or secondary ICD-9-CM diagnosis code for CF (277.XX) between 2001 to 2010 were included. Frequency weights were used to derive national case estimates. Prevalence per 10,000 discharges and median hospital LOS were presented overall and annually. Additionally, we evaluated prevalence by geographic region and season. Geographic regions were defined per the United States Census Bureau. Seasons were defined as follows: winter (Dec-Feb), spring (Mar-May), summer (Jun-Aug), and fall (Sep-Nov).

Results: The data represent 246,181 hospitalizations for CF during the study period. The majority of patients visited a nonprofit hospital (80%), had admissions classified as urgent (43%) or emergent (31%), and were admitted via referral (57%). The median (IQR) patient age was 17 (10-25) years. Overall, an increase in median age was observed from 16 years in 2001 to 22

years in 2010. The prevalence of CF hospitalizations was highest in 2004 (7.9/10,000 discharges) and lowest in 2009 (4.8/10,000 discharges). Prevalence generally decreased during the study period. The South and West had a much lower cumulative prevalence, 4.9/10,000 and 3.9/10,000 discharges, respectively, than the Northeast (9.5/10,000 discharges) and Midwest (8.2/10,000 discharges). The cumulative 10-year prevalence remained generally consistent over the four seasons, with the highest prevalence in winter (6.5/10,000 discharges) and the lowest prevalence in fall (6.3/10,000 discharges). The overall median hospital length of stay (IQR) was 7 days (3-13).

Conclusion: Overall, there was an increase in the median annual age of patients hospitalized for CF and a decrease in yearly prevalence. Analysis of prevalence by geographic region revealed considerable variation. No prominent seasonal variations were identified. With revolutionary treatments approved after 2010, a follow-up epidemiological investigation of the subsequent 10 years may reveal drastic advances in CF patient outcomes.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 2-376

Poster Title: Exploring Healthy Food Choices in a US-Mexico Border

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Purpose: Healthier weights can be achieved by changing dietary habits. Calorie counting is one way to identify areas of improvement. A community agency serving a rural US- Mexico border offered nutrition education classes and recipes modification tips to participating community members. The agency worked in collaboration with a regional pharmacy school to explore healthy food choices. The purpose of this project was to work with the community agency to evaluate caloric breakdown of traditional Mexican recipes developed from the nutrition classes and to provide healthier versions.

Methods: A pharmacy student calculated content of traditional Mexican dishes prepared during the class and provided healthier caloric alternatives for those same Mexican dishes. The student used an online nutritional calculator for each recipe item based on measurements provided by the participants. Description of the highlights and challenges in this process were documented to provide feedback for the agency to improve their nutrition education services. To help the agency learn about the surrounding community, several pharmacy students administered a questionnaire on an electronic tablet (English/Spanish) between the Summer of 2015 and Fall of 2016. Data was gathered in a non-randomized convenience sample. The survey was based on questions developed from published literature and was focused on personal and family health and willingness to change eating habits

Results: The pharmacy student calculated caloric content when evaluating 10 traditional and 10 improved recipes for traditional Mexican dishes. Some individuals created new recipes that they thought were healthier alternatives, but in fact provided little improvement. The pharmacy student observed that individuals did not always decrease carbohydrates or fats for better nutritional balance. Challenges occurred when finding caloric content for certain food

items of traditional Mexican dishes. Further, the pharmacy student observed that selection of healthier recipe alternatives may have been limited by lack of understanding of portion control, not including affordable fresh vegetables, and using higher-sodium canned items. Sixty-five (n 65) surveys were collected (80 percent female, 38 percent Spanish speakers) in this rural community. Fifty-seven percent of participants try to eat healthy foods every day, 43 percent want to lose weight, and 39 percent were ready to improve their family's health but indicated that it was difficult to change. Thirty-one percent of participants wanted to improve their family's health by eating more fruits and vegetables and 18 percent wanted to eat smaller portions.

Conclusion: This project revealed gaps in patient's knowledge about healthy alternatives in traditional Mexican recipes. The application of nutritional knowledge does not always get translated into practice when community members are preparing meals for themselves or their family. Through the survey, participants were open to learning health tips and understood that dietary changes needed to be made. This information can be used to incorporate new methods of educating the community in portion control and healthier alternatives to Mexican dishes. Pharmacists' increasing involvement in health and wellness requires additional investments to be made to learn about the community in which they serve.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 2-377

Poster Title: Utility and correlation of lactic acid (LA) and procalcitonin (PCT) for diagnosis and prognosis of patients presenting with sepsis or septic shock.

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Purpose: Sepsis is characterized by devastating consequences as the syndrome progresses into septic-shock and multi-organ failure. Mortality rates are estimated to be over 10% for sepsis and 40% in septic shock. Currently, lactic acid is the established biomarker assessed for diagnosis of sepsis, as well as an indicator of prognosis and perfusion. Whereas procalcitonin has been used to evaluate the likelihood of having a systemic bacterial infection antibiotic treatment requirement, and duration. This study was designed to evaluate and compare the utility of lactic acid and procalcitonin as biomarkers in the diagnosis of septic shock and the prediction of hospital mortality.

Methods: This was a retrospective study of patients admitted to Methodist Charlton Medical Center for the treatment of sepsis or septic shock . The study was conducted as part of a routine quality review process. Patients admitted with sepsis or septic shock from September 1, 2015 to July 31, 2016 were reviewed to determine whether lactic acid and procalcitonin levels were reported. Patients were included if they were 18 years of age or older, diagnosed with septic shock with a lactic acid greater than or equal to 2 mg/dL, and had a procalcitonin level drawn within the first 24 hours of sepsis diagnosis. Subjects meeting inclusion criteria were then further reviewed for serial lactic acid and procalcitonin values, demographic data, microbiological/serological data (positive vs negative cultures and bacterial vs fungal/viral) and additional laboratory values. The primary outcome was to assess whether any correlation between lactic acid and procalcitonin values exists in the diagnosis of septic shock, including if LA or PCT was more closely associated with other infectious indicators (WBC, etc). The secondary outcome was to assess the correlation of lactic acid and procalcitonin values to hospital mortality and positive cultures growing bacterial or fungal organisms.

Results: The preliminary cohort screened a total of 80 patients for the inclusion criteria. Forty-five patients met the inclusion criteria. The majority of the patient population was African-American (26 patients), followed by Caucasian (17 patients) and Hispanic (1 patient). There was no correlation between LA and PCT for the initial value and diagnostic utility of sepsis ($p = 0.97$). PCT ranged from < 0.05 to 29.42 mg/L despite elevated LA levels greater than 2 mg/dL (range 2.1-18.4 mg/dL). Fifty-three percent of patients had a positive bacterial culture with PCT being significantly correlated ($p=0.05$) but there was no correlation noted for having a positive culture ($p=0.44$). LA had no correlations with bacterial infections ($p=0.94$) or positive cultures ($p=0.84$). When analyzing other infection indicators, there was a weak correlation for PCT to WBCs and neutrophils and LA to WBCs and interestingly it was noted that increases in LA was associated with a decreases in neutrophils. Although the mortality rate was high at 71%, there was no association for PCT ($p=0.43$) or LA ($p=0.8$) for all-cause mortality.

Conclusion: Among our preliminary cohort, there was no correlation identified for procalcitonin and lactic acid values being utilized as biomarkers for the initial diagnosis or as prognostic indicators. Regardless of LA or PCT levels, mortality was high. While PCT was associated with positive bacterial cultures, there was no overall association in predicting an infectious process. Similarly, LA was not associated with any infectious processes despite down trending in serial levels. Future evaluations need to include patients with LA levels less than 2mg/dL and serial levels to better understand potential utility.

Submission Category: Critical Care

Submission Type: Descriptive Report

Session-Board Number: 2-378

Poster Title: Assessing the compliance to a glycemic control protocol in the intensive care unit setting

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Purpose: Hyperglycemia is common in the intensive care unit (ICU), and if not properly controlled, has been associated with worse clinical outcomes. A glycemic control protocol was implemented in the ICU of a community hospital for hyperglycemia management. In order to assess if further education was needed for nurses, an investigation was conducted to identify how many nurses were following the protocol when treating patients.

Methods: This study was carried out by two pharmacy interns (fourth year pharmacy students) and one pharmacist with advanced training (residency). Patients in the study were identified using the Cerner electronic medical record. Inclusion criteria were patients in the ICU during April 2016. Patients were excluded if they had DKA or did not have a blood glucose level greater than 150. The insulin drip infusion protocol was based on the Atlanta Protocol and the sliding scales used were developed by a group of pharmacists and physicians within the hospital system. Data was collected from the electronic medical record to see if each step of the glycemic control protocol was followed. A “yes” was recorded if all steps of the protocol were followed. A “no” was recorded if at least one step of the protocol was not followed and the steps not followed were also recorded. The “yes” and “no” responses were counted and a percentage was calculated for each response over the total number of patients. For the patients who had a “no” recorded, the specific steps not followed were also totaled.

Results: A total of 44 patients were examined to see if they were treated according to protocol. 6 of the patients (13.6 percent) received treatment that followed protocol, while 38 patients (86.4 percent) did not. Of these 38 treatments that did not follow protocol, 22 patients had no A1C taken and 16 patients received the wrong insulin dose.

Conclusion: Although protocols have been put in place to help improve patient outcomes in the ICU, this study showed that not all nurses treated patients according to the established protocols. Further education would be beneficial to ensure all patients with hyperglycemia in the ICU are treated in a uniform manner.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Evaluative Study

Session-Board Number: 2-379

Poster Title: Metoprolol in atrial flutter or atrial fibrillation with rapid ventricular response in the emergency center

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Purpose: Management of acute atrial fibrillation (AF) or atrial flutter (AFL) with rapid ventricular response (RVR) requires prompt ventricular rate or rhythm control. Atrial fibrillation is the most common arrhythmia presenting to the emergency center (EC); however, both AF and AFL are managed similarly. Current guidelines recommend intravenous (IV) administration of a beta-blocker or nondihydropyridine calcium channel antagonist to slow ventricular heart rate. Metoprolol is a commonly used IV rate-controlling agent in the EC. This study aims to evaluate the efficacy and safety of IV metoprolol in the EC for controlling rapid ventricular rate in patients presenting with AF or AFL.

Methods: The institutional review board approved this single center, retrospective observational study. Adult patients aged 18 years and older who presented to the EC at Memorial Hermann – Texas Medical Center with a primary or secondary diagnosis of AF or AFL with RVR, defined as a heart rate greater than 110 beats per minute (bpm), and who received IV metoprolol as a first-line agent were included in the study. Pregnant women, prisoners, and patients transferred from another institution were excluded. A total of 297 patients were considered for inclusion from February 6, 2015 to May 31, 2016. Thirty patients met the inclusion criteria. The primary outcome measure was a target heart rate of less than 110 bpm within 30 minutes from administration of the first dose of IV metoprolol. Secondary endpoints included adverse effects such as bradycardia (heart rate < 60 bpm) and hypotension (systolic blood pressure < 90 mmHg), the need for a second rate or rhythm-control agent, maintenance of rate control, time to initiation of oral rate-control medications, length of stay (LOS) in the EC, and final disposition. Data was analyzed using SPSS version 22 for Windows.

Results: Twenty-eight patients seen in the EC were diagnosed with primary or secondary AF with RVR; 2 were diagnosed with AFL with RVR. Males and females were evenly distributed. The average age was 67.7 plus or minus 13.9 years. Metoprolol achieved a target heart rate less than 110 bpm within 30 minutes in 17 (56.7 percent) patients. Twelve (40 percent) patients required a second rate or rhythm control agent including either IV diltiazem or amiodarone. One (3.3 percent) patient required electrical cardioversion in the EC. Nine (30 percent) patients received oral medications, with an average time to administration of 60.08 plus or minus 42.12 minutes from initial bolus dose. Seven (23.3 percent) patients were discharged from the EC and 23 (76.7 percent) were admitted to the hospital, including the intensive care unit [7(23.3 percent)], intermediate care unit [9 (30 percent)], or general floor [7(23.3 percent)]. The average LOS in the EC was 6.2 plus or minus 2.7 hours. Bradycardia and hypotension occurred in 2 (6.7 percent) and 4 (13.3 percent) patients, respectively.

Conclusion: The use of metoprolol as an initial agent in the management of AF or AFL to control rapid ventricular heart rate was successful in 17 (56.7 percent) patients in the EC compared with 12 (40 percent) patients who required a second rate-control agent. Metoprolol was shown to be effective in achieving rapid rate control without notable adverse effects in 24 (80 percent) patients. Expanding the present study to include a greater number of patients over a longer period of time is required to further study the safety and efficacy of metoprolol in patients presenting with AF or AFL with RVR.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Evaluative Study

Session-Board Number: 2-380

Poster Title: Diltiazem in atrial fibrillation and/or atrial flutter with rapid ventricular response in the emergency center

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Purpose: Atrial fibrillation (AF) and atrial flutter (AFL) are the most common arrhythmias that present to emergency centers (EC). One of the therapeutic goals in management of these arrhythmias presenting with rapid ventricular response (RVR) is ventricular rate control. According to current guidelines, intravenous (IV) administration of a beta blocker or non-dihydropyridine calcium channel antagonist is recommended to slow the ventricular heart rate. Diltiazem or metoprolol are commonly used in emergency centers for this purpose, with no conclusive evidential difference between them. This study aims to evaluate the use and describe the safety and efficacy of diltiazem in the emergency center.

Methods: This single center, retrospective cohort, observational study has been approved by the Institutional Review Board. Data was collected through review of electronic medical records. Patients 18 years or older who received IV diltiazem in the EC for ventricular rate control in AF and/or AFL were evaluated. Approximately 100 patients admitted to the EC at Memorial Hermann – Texas Medical Center from June 1, 2015 through June 15, 2016 were considered for inclusion. Exclusion criteria include pregnant patients, prisoners, and patients transferred from another institution. The primary endpoint is to determine percentage of patients who achieved rate control, defined by a heart rate less than 110 beats per minute within 30 minutes of administration of first dose of diltiazem. Secondary endpoints include adverse effects following administration of diltiazem, need for second rate control medication, need for cardioversion, maintenance of rate control from EC admission to hospital admission or discharge from EC, time to initiation of oral rate control medications, length of stay in EC, and patient disposition. Possible adverse effects included bradycardia, defined as heart rate less

than 60 beats per minute and hypotension, defined as systolic blood pressure less than 90 mmHg. Data was analyzed using SPSS Version 22.0 for Windows.

Results: There were 30 patients who met inclusion criteria, with an average age of 60.7 (26-89) years and average weight of 88.2 (46.8-136.8) kilograms. Males comprised 16 (53.3 percent) patients and 14 (46.7 percent) were females, while 17 (56.7 percent) presented with new onset AF and/or AFL. Length of stay in the EC was an average of 7.3 (2.5-20.1) hours. For the primary endpoint, diltiazem achieved rate control within 30 minutes of the first dose in 19 (63 percent) patients. A total of 5 (16.7 percent) patients experienced adverse effects after diltiazem administration, 3 (10 percent) with hypotension and 2 (6.7 percent) with bradycardia. The need for administration of another rate control medication occurred in 11 (36.7 percent) patients. Maintenance of rate control was achieved for an average of 27 (plus or minus 29) percent of the total time patients were in the EC. Additionally, cardioversion was not required for any patients. The average time to initiation of oral rate control medication in these patients was 149 (20-365) minutes. After treatment, 5 (16.7 percent) patients were discharged from the EC, 10 (33.3 percent) were admitted to general floors, 13 (43.3) to intermediate care floors, and 2 (6.7%) to critical care units.

Conclusion: Diltiazem was effective in achieving rate control of AF or AFL with RVR in 63 percent of patients. Adverse effects occurred in less than twenty percent of patients who received diltiazem. Diltiazem appears to be safe and effective in the management of AF or AFL with RVR in the EC. Expansion of this study to include more patients over a longer period of time would provide more insight into these results.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-381

Poster Title: Evaluation of sodium bicarbonate and mannitol combination infusion for the management of acute kidney injury

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Purpose: Sodium bicarbonate is commonly administered for the prevention of acute kidney injury (AKI), as studies show protective effects in preventing and reducing the severity of AKI through attenuation of oxidative stress on renal cells. While literature supporting mannitol administration as a renally protective agent is available, there is a broad array of mixed evidence. There are no current studies on the concomitant administration of sodium bicarbonate and mannitol in AKI. The purpose of this study is to evaluate the efficacy, safety and outcomes of sodium bicarbonate and mannitol combination infusion for the management of acute kidney injury.

Methods: This institutional review board approved single-center, retrospective, observational, descriptive study evaluated the combination infusion of 75 mEq sodium bicarbonate and 12.5 g mannitol in one liter of half- normal saline at varying rates for a minimum of 24 hours in patients with renal dysfunction admitted to Memorial Hermann – Texas Medical Center from July 2013 – February 2016. Patients were included if they were 18 years or older and received the combination product. Exclusion criteria included pregnant patients, patients with chronic renal failure requiring renal replacement therapy before admission, and the need for dialysis this admission prior to initiation of the combination infusion. The primary endpoint was to describe the change in serum creatinine in patients receiving sodium bicarbonate and mannitol combination infusion. The secondary endpoint was to describe the relationship of urine output (UO) to the volume of combination infusion therapy received.

Results: Thirty patients were included. Twenty patients reported a past medical history (PMH) of chronic kidney disease (66.7 percent), 2 were stage 2 (10 percent), 13 were stage 3 (65 percent), and 5 were stage 4 (25 percent) not requiring dialysis. Additional PMH included hypertension in 29 patients (96.7 percent), diabetes in 18 (60 percent), heart failure in 15 (50 percent), cardiac arrest in 10 (33.3 percent), and previous AKI in 8 (26.7 percent). The mean [standard deviation (SD)] serum creatinine in patients who received the combination infusion for the 24 hours prior to initiation was 2.36 mg/dL (1.08) and 1.94 mg/dL (1.01) after discontinuation of the combination infusion. The average duration of infusion of the combination infusion was 2.7 (1.7) days. Twenty-two (73.3 percent) patients received concomitant n-acetylcysteine, and 23 received IV contrast (76.7 percent). Average UO in the 24 hours prior to infusion was 597 mL/patient/day and patients averaged 1581 mL/patient over the two days after infusion initiation. The combination infusion dose averaged 1002 mL over the two days after infusion initiation. The most frequent adverse event reported was hypotension, occurring in 7 (23.3 percent) patients, followed by anemia and bradycardia each in 4 (13.3 percent) patients.

Conclusion: Recipients of this therapy were patients at high risk of AKI, as past medical history of chronic kidney disease, hypertension, diabetes, heart failure, and cardiac arrest were common. Improvement was seen in serum creatinine after use of the combination product and may support the utilization of this therapy. Urine output was very closely reflective of the volume of fluid received with the combination product. Therefore, whether this infusion therapy is preferential to other forms of fluid as treatment for acute kidney injury is unclear. However, the improvement in serum creatinine observed in this study warrants further large scale investigation.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 2-382

Poster Title: Evaluation of blood pressure management and outcomes in ischemic stroke patients with or without a prior history of hypertension

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Purpose: Approximately one-half of patients presenting with an acute ischemic stroke (AIS) take scheduled antihypertensive medications. Currently, the risk-benefit ratio for lowering or raising the blood pressure during the initial 24 hours of acute ischemic stroke is unknown. The reinitiation of antihypertensive agents and the timing of such should be individualized to the patient based on current hemodynamic status, stroke subtype, and patient specific comorbidities. The purpose of this study is to evaluate blood pressure management and outcomes in ischemic stroke patients with a prior history of hypertension compared to patients without a history of hypertension.

Methods: This single center, retrospective, cohort study evaluated patients admitted with an ischemic stroke from July 2015 to July 2016 to a comprehensive stroke center. Patients 18 years or older with a primary diagnosis of acute ischemic stroke were included in the analysis. Pregnant women or those who received blood pressure management greater than 24 hours at an outside hospital were excluded. Data collection included patient demographics, National Institute of Health Stroke Scale (NIHSS), Glasgow Coma Scale (GCS), stroke types, blood pressure goals, blood pressure values and antihypertensive regimens during the hospitalization, length of stay (LOS), disposition, modified rankin scale (mRS) and outcomes.

Results: A total of 32 patients were included; 9 did not have a history of hypertension and 23 had a history of hypertension. The median [interquartile range (IQR)] NIHSS was 3 (1-9) in those with history of hypertension and 3 (1-8) in those without history of hypertension. Patients with history of hypertension had a mean [standard deviation (SD)] age of 70.4 (16.2) years compared

to 59.7 (16.6) years in those without history of hypertension. Mean (SD) admission systolic blood pressure (SBP) was 158.7 (33.1) mmHg in the history of hypertension group compared to 137.9 (22.8) mmHg for those without history of hypertension. Patients with a history of hypertension received an average of 2.9 antihypertensive medications, while those without hypertension received an average of 1 antihypertensive medication. The mean (SD) discharge SBP for those with history of hypertension was 126.0 (21.4) mmHg compared to 116.8 (15.7) mmHg in patients without history of hypertension. Median (IQR) LOS was 5.2 (4.1-6.3) days in patients with a history of hypertension and 4.7 (3.3-6.9) days in patients without history of hypertension. The median (IQR) discharge mRS was 3 (1-4) in patients with history of hypertension compared to 2 (0.5-3.5) in those without history of hypertension.

Conclusion: We observed that patients with a history of hypertension presented with higher blood pressures at admission and required more antihypertensive agents to manage blood pressure during the hospital stay. Additionally, the LOS was longer in patients with a history of hypertension compared to those without a history. Currently, the sample size is too small to make any conclusions. The plan is to expand this to a larger sample size and conduct a more robust analysis of the blood pressure values and antihypertensive medication regimens.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-383

Poster Title: Evaluation of single administration of intravenous acetaminophen for pain control in postpartum patients

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Purpose: Intravenous (IV) acetaminophen (APAP) has been used as an adjunct analgesic agent for pain management in perioperative surgeries. Oral and IV acetaminophen have similar effects but differ slightly in the onset of action. However, the cost of IV APAP is significantly higher than oral formulation, 42 dollars per a 1-gram vial versus 2.61 dollars for 100 tablets of 500-milligram APAP. Therefore, in September 2015, Memorial Hermann The Woodlands Hospital implemented an automatic one-dose stop of IV APAP. The aim of this study is to evaluate the effectiveness of one dose of IV APAP for pain control in postpartum patients.

Methods: This study was a retrospective case-control study that evaluated the use of single dose of IV APAP for pain management in postpartum patients. The study included all patients who received at least one dose of IV APAP for pain control during a 72-hour postpartum period from August 15 – September 14, 2015 as the pre-protocol group and November 1-30, 2015 as the post-protocol group. Patients under 18 years of age were excluded from the study. The electronic medical record was utilized to provide a comprehensive profile of patients, pain medication consumptions, naloxone administered, and other safety concerns. The data was then analyzed to evaluate the primary and secondary outcomes. The primary outcomes were the effectiveness of the one dose IV APAP protocol, which was evaluated based on opioid analgesic consumption in IV morphine equivalents (ME) and changes in pain scores using average of highest pain scores. Opioid consumption and pain scores were evaluated during 0-24-hour, 24-48-hour, and 48-72-hour postpartum periods. Secondary outcomes included hospital length of stay (LOS), administration of more than 4 grams APAP in 24 hours, changes in hepatic functions (liver function tests (LFTs) greater than 3 times upper limit of normal (ULN)), and naloxone use as a reversal agent for opioid overdose.

Results: A total of 164 patients were included in the study (pre-protocol, n equals 113; post-protocol, n equals 51); baseline characteristics were similar in both groups. Most patients underwent cesarean section (pre-protocol, 98.2 percent; post-protocol, 92.3 percent). Compared to the pre-protocol group, opioid consumption was 13.2 percent higher in the post-protocol group during 0-24-hour period but 10.4 percent and 9.6 percent lower during 24-48-hour and 48-72-hour periods, respectively. Pain scores were lower in the post-protocol group for all three periods (0-24-hour, 17.8 percent lower; 24-48-hour, 8.1 percent lower; 48-72-hour, 8.1 percent lower). LOS was comparable in both groups (pre-protocol, 3.2 days; post-protocol, 3.3 days). No patient in the post-protocol group exceeded 4 grams APAP in 24 hours while 13.3 percent of patients in pre-protocol group exceeded the maximum. Of the 31 patients whose LFTs were documented, no patient had LFTs greater than 3 times the ULN at admission and discharge. Lastly, total of 9 patients received naloxone (pre-protocol, n equals 7; post-protocol, n equals 2), but only one patient, in the post-protocol group, received it for respiratory depression reversal; others received it for itching.

Conclusion: A one-dose IV APAP stop protocol was found to lower pain scores and resulted in less incidents of administration of more than 4 grams of APAP in 24 hours with similar safety concern profile compared to multiple-dose IV APAP for postpartum patients. Although opioid consumption was higher during the first 24-hour period in post-protocol patients, it was lower during the second and third 24-hour periods.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-384

Poster Title: Liposomal bupivacaine in the cardiac population

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Purpose: Recently, the use of liposomal bupivacaine has increased in the cardiac population despite the lack of evidence and approval for this use. As administration increases, it becomes important to describe this off-label utilization and identify its impact on patient safety and efficacy. The purpose of this study is to assess the utilization for indication, dosing, and impact of efficacy and safety.

Methods: This single center, retrospective descriptive cohort study approved by the institutional review board evaluates the utilization of liposomal bupivacaine in adult patients in the Heart and Vascular Institute at Memorial Hermann – Texas Medical Center from July 1, 2014 through June 30, 2016. Patients were excluded from the study if they were under the age of 18, pregnant, or had fewer than three documented pain score measurements after administration of liposomal bupivacaine. The primary objective was to determine the procedures where liposomal bupivacaine was used and the doses utilized. The secondary objectives included assessment of pre-procedural pain scores versus post-procedural pain scores.

Results: Of the 30 patients evaluated, the majority of liposomal bupivacaine use was for a thoracotomy (35 percent) and device manipulation (35 percent); the remainder of utilization varied among an assortment of procedures including transcatheter aortic valve replacement and coronary artery bypass grafting. All documented utilization was for a total of 20 mL of undiluted 1.3 percent liposomal bupivacaine. The median pain scale documented for the 24 hours prior to administration of liposomal bupivacaine was 0 (interquartile range: 0, 0). For the 24 hour period following administration the median pain score was 0 (interquartile range: 0, 3). On average three different medications were administered concurrently with liposomal bupivacaine, with the most common medications being acetaminophen (75 percent) and

acetaminophen-hydrocodone (45 percent). No significant rates of adverse effects were observed in this patient population.

Conclusion: Off-label administration of liposomal bupivacaine in the cardiac population was used status post a variety of cardiovascular procedures. The standardized dosing of liposomal bupivacaine used in these procedures was 266 mg (20 mL), and though the median pain score 24 hours post-administration elevated, noted by the interquartile range, the patients within this population still remained well managed with a minimal amount of opioid usage. The clinical significance of these effects must be determined in a larger long-term prospective trial.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 2-385

Poster Title: Evaluation of blood pressure management in ischemic stroke patients admitted with a blood pressure less than or greater than 180mmHg

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Purpose: The majority of patients with an acute ischemic stroke (AIS) present with a systolic blood pressure (SBP) greater than 140 mmHg. Extreme low and high elevations of SBP have been associated with poor outcomes. Blood pressure management in AIS patients is a major component of inpatient treatment and may impact disposition. Current guidelines do not state a definitive blood pressure goal to adhere to for secondary prevention. The purpose of the study was to investigate the outcomes of ischemic stroke patients admitted with either a SBP less than 180 mmHg or a SBP greater than or equal to 180 mmHg.

Methods: This institutional review board approved retrospective, single center, cohort study evaluated blood pressure management in patients with acute ischemic stroke (AIS) from June 2015 to July 2016 at a comprehensive stroke center. Patients 18 years or older with an acute ischemic stroke were included. Pregnant patients or patients transferred from an outside hospital greater than 24 hours after the initial onset of symptoms were excluded. Data collection included patient demographics, past medical history, stroke type, daily blood pressure goals, blood pressure values, antihypertensive regimens during hospitalization, length of stay (LOS), Glasgow Coma Scale (GCS) scores, and outcomes.

Results: Thirty-two patients were included; 27 patients presented with a SBP less than 180 mmHg (less than) and 5 patients presented with a SBP greater than or equal to 180 mmHg (greater than). All patients in the greater than group had a history of hypertension. The less than group had a mean [standard deviation(SD)] age of 67.9 years (17.2) and 59 percent were female compared to a mean (SD) age of 64.4 years (14.9) and 60 percent female in the greater

than group. Median (range) admission GCS scores in the less than group was 15 (7-15) and 15 (3-15) in the greater than group. Mean (SD) admission SBP in the less than group was 143.0 (21.6) mmHg compared to 205.8 (24.5) mmHg in the greater than group. Patients in the less than group received an average of 2 medications throughout hospitalization compared to 4 in the greater than group. Seventy-five percent of the less than group required at least one medication upon discharge whereas 80 percent of the greater than group required at least 2 medications. The median [interquartile range (IQR)] LOS in the less than group was 5.6 (4.2-6.3) days compared to 5.2 (3.9-6.1) days in the greater than group.

Conclusion: We observed that patients admitted with a SBP greater than or equal to 180 mmHg required more medications throughout their stay and were also discharged on more medications compared to those with an admission SBP less than 180 mmHg. Currently, our sample size is too small to make conclusions. Plans are underway to expand this project to a larger sample size and a more robust analysis of blood pressure values and antihypertensive medications used.

Submission Category: Pain Management

Submission Type: Evaluative Study

Session-Board Number: 2-386

Poster Title: Evaluation of pain management regimens in post-operative spinal surgery patients

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Purpose: According to the American Pain Society Guidelines on the Management of Postoperative Pain Control, a reported eighty percent of all surgical patients will experience pain post-operation, with less than half having sufficient pain control. Pain management and associated adverse events are ongoing concerns for clinicians. Pain is best addressed from a multi-modal approach, which can be individualized based upon the procedure. This study aimed to evaluate pain management regimens as well as serious adverse events occurring in patients who underwent spine surgery.

Methods: This Institutional Review Board approved, single center, retrospective observational study evaluated patients admitted July 1, 2014 to June 20, 2016. Patients were greater than or equal to 18 years, underwent spine surgery, and required pain management. Pregnant patients were excluded. The primary outcome was assessed using patient reported pain scale scores, review of pain medications received, and incidence of adverse events post-operatively. Excess sedation was defined as a Richmond Agitation and Sedation Scale (RASS) score of minus 5 (unarousable), indicating no response to physical or verbal stimulation, over two consecutive checks. Uncontrolled pain was defined as a pain score of greater than or equal to 6 over two consecutive checks. Hypotension was defined as systolic blood pressure less than 90 mmHg or a decrease by 40 mmHg from the previous two readings. Data collection included: patient demographics, past medical history, surgery information (type, indication, length of surgery), post-operative care unit (PACU) length of stay (LOS), all pain and sedation medications the patient received from admission to 48 hours post surgery, adverse events, hospital LOS, and disposition.

Results: A total of 30 patients were included: The mean [standard deviation (SD)] age was 59.2 (13.3) years and 20 (66.7 percent) patients were male. Twenty-one patients (70 percent) were white/Caucasian. The most common surgery location was cervical (70 percent), and the most common indication was stenosis (60 percent). Twenty-three percent of patients received posterior laminectomy, which was the most common procedure. Seventeen significant adverse events occurred; 13 (43.3 percent) had uncontrolled pain, 2 (6.7 percent) experienced excess sedation, and 2 (6.7 percent) experienced hypotension. Additionally, fourteen patients (46.7 percent) experience nausea and vomiting requiring an anti-emetic post-operatively. No patient experienced respiratory depression or cardiac arrest. The overall median [interquartile range (IQR)] pain score was 3 (0-6). Of the 294 pain scores recorded, 37 percent were 0, 17 percent were 1 to 3, 28 percent were 4 to 6, and 18 percent were 7 to 10. In patients experiencing uncontrolled pain, on average, 1 episode occurred. Patients received a median (IQR) of 4 (2-4) pain medications post-operatively, with the majority receiving opioids, primarily hydromorphone and the combination product acetaminophen-hydrocodone. Mean (SD) hospital LOS was 1.2 (0.5) days. All patients were discharged home alive.

Conclusion: Post-operatively, 43.3 percent of our spinal surgery patients experienced a significant adverse event including excess sedation, hypotension, uncontrolled pain. Additionally, 46.7 percent experienced nausea and vomiting. Currently, our sample size is too small to draw any conclusions. We plan to expand this project to a larger sample size and conduct a more robust analysis of adverse events.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 2-387

Poster Title: Prevalence of medication orders recommended for central line administration in hospitalized patients at Houston Methodist Hospital

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Purpose: The placement of central lines is common for medication administration. However, the presence of a central line is associated with several complications. Evaluating medication orders that recommend central line administration can provide insight into the usage and risks of these agents at an institution. This study was conducted to identify the prevalence and describe the usage of medication orders that are recommended for administration through a central line at Houston Methodist Hospital.

Methods: This is a single center, retrospective cohort, observational study. Data was collected through a review of electronic medical records. Patients who received intravenous medications at Houston Methodist Hospital in the Texas Medical Center from July 1, 2016 through August 31, 2016 were analyzed. Recommendations for central line administration was defined using a comprehensive database review from Trissel's Handbook of Injectable Drugs. Medications were determined to be recommended for central line administration if their properties included a mean pH of less than 5 or greater than 9, osmolarity greater than 600 milliosmoles per liter and/or vesicant characteristics. Medications that differed in pH and osmolarity based on strength or diluent were not included in the comprehensive list. The primary outcome was to determine the proportion of central line recommended medications administered to hospitalized patients. Secondary outcomes included proportion of central line recommended medications given based on medication class, floor setting, and the property designating central line administration.

Results: There were a total of 190,459 intravenous medication orders that qualified during the specified time range. Of these orders, 62,057 (32.6 percent) met central line administration requirements defined in this study. The majority of these orders consisted of 27,101 (43.7 percent) electrolytes, 16,157 (26 percent) antiemetics, and 7,800 (12.6 percent) antimicrobials. The most common electrolyte was potassium chloride, equaling 16,506 (26.6 percent) orders, while the most common antiemetic and antimicrobial were ondansetron and vancomycin, equaling 15,991 (25.8 percent) and 5,108 (8.2 percent) orders, respectively. Additionally, out of 18,270 intravenous medication orders in the ICU, 6,708 (36.7 percent) of these medications qualified for central line administration. The majority of orders recommending central line administration qualified based on pH, with 33,175 (53.5 percent) having a pH less than 5 and 539 (0.9 percent) having a pH greater than 9.

Conclusion: About one-third of intravenous medications ordered during the time frame of this study were classified as central line recommended per the requirements defined in this study. Almost half of these medications were electrolytes. Out of the intravenous medications administered in the ICU, about one third of medications recommended central line administration as well. Results of this study may yield positive implications for practice in health-systems. Monitoring of medications that recommend central line administration may help to decrease the need for this type of line access in hospitalized patients.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 2-388

Poster Title: Validation of ICD-9-CM/ICD-10-CM codes for automated electronic scoring of APACHE II, APACHE III, and SAPS II

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Purpose: Retrospective cohort studies involving intensive care unit (ICU) patients frequently describe acuity of patient illness with severity classification scores. Most risk scores use a combination of physiologic variables and comorbidities to calculate the score. While physiologic variables can often be extracted from electronic medical records (EMR), identifying comorbidities has traditionally relied on manual review of clinical documentation. This process is time-consuming and tedious with larger sample sizes, thus an automated electronic scoring tool using diagnostic coding would facilitate the process. Our study objective is to validate the use of diagnosis codes in the calculation of severity scores.

Methods: Patients admitted to an ICU between 07/01/14 and 06/30/16 were screened for the study. Patients were excluded if they were pregnant, a prisoner, or were missing data necessary to calculate a risk score. Sixty patients were then randomly selected for inclusion. Physiological and comorbidity data was extracted and manually collected for all patients in this IRB-approved, retrospective, observational study. Three severity scores were calculated: the Acute Physiology and Chronic Health Evaluation (APACHE) II, the APACHE III, and the Simplified Acute Physiology Score II (SAPS II). Each score was calculated using eight different comorbidity definitions utilizing International Statistical Classification of Diseases and Related Health Problems (ICD) codes, which were evaluated for accuracy and reliability against manual review of clinical documentation. Comorbidity sets used included a set generated by the authors through validated literature and manual collection, Agency for Healthcare Research and Quality (AHRQ), Elixhauser Comorbidity Index, and Quan's comorbidity set. Each data set included a version with and without the use of Diagnosis-Related Group (DRG) codes to exclude comorbidities related to the admitting diagnosis. The primary outcome was to determine the difference in score between electronic and manual methods amongst data sets. Secondary

outcomes include difference in predicted mortality and proportion with different comorbidities from the manual set. Comparison of severity scores was performed using paired t-test and Wilcoxon signed rank test.

Results: There was no difference in APACHE II and SAPS II severity scores for each of the eight comorbidity sets when compared with the manual set. A statistically significant difference was found in the APACHE III score for all eight comorbidity sets compared with the manual set (p-value equals 0.02 for each set). In all cases with a difference, the score using diagnostic coding was higher than the score for the manual set. Among patients with a different score from manual, the median (interquartile range [IQR]) difference for all sets was 5 (2-5) for APACHE II, 11 (7-13.5) for APACHE III, and 9 (9-9.5) for SAPS II. Predicted hospital mortality calculated using the SAPS II regression model equation was not significantly different for each set compared with manual. The proportion of patients with different comorbidities identified from manual was highest using APACHE II criteria (28.3-31.7 percent among the eight comorbidity sets), followed by APACHE III (16.7 percent differed from manual for all sets), and SAPS II (5 percent differed for all sets). There was no intra-set difference in comorbidities identified using APACHE III or SAPS II criteria.

Conclusion: These results show that diagnostic coding can reliably be used to identify patient comorbidities for the calculation of severity classification scores. Despite some variation in identification of comorbidities, there was no difference in APACHE II and SAPS II scores. Although a significant difference in APACHE III score was found, this difference was driven by comorbidity variation in a small number of patients and may not be clinically significant. The use of an electronic scoring tool based on physiologic and diagnostic data extracted from the EMR can be an efficient way to calculate severity classification scores in larger retrospective studies.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 2-389

Poster Title: Effect of body mass index (BMI) on norepinephrine dosing requirements in patients with septic shock

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Purpose: According to the Surviving Sepsis guidelines, norepinephrine (NE) is the recommended first line option for patients in septic shock requiring vasopressors for hemodynamic support. However, guidelines do not provide recommendations on whether NE dosing should be weight or non-weight-based. Recent literature suggests obese patients require less NE than non-obese patients, thus dosing should be non-weight-based. However, the study population did not encompass extreme ranges of BMI. Our facility utilizes weight-based dosing of NE with observational success. Therefore, the purpose of this study is to evaluate the outcomes of NE dosing between non-obese and obese patients with septic shock.

Methods: This was a retrospective study of patients from Methodist Charlton Medical Center, a community hospital, who were admitted with septic shock requiring NE for hemodynamic support. The study was conducted as part of a routine quality review process. Patients who were prescribed NE from September, 1 2015 to July 31, 2016 were reviewed for dosing indications. Patients were included if they were 18 years of age or older, diagnosed with septic shock with a lactic acid greater than two mmol/L, and survived at least 24 hours after sepsis diagnosis. Patients were then divided into two groups, obese (body mass index greater than or equal to 30 kg/m2) and non-obese group (body mass index less than 30 kg/m2). The following data was collected on all included patients: demographic data, pertinent laboratory values, and medication data (specifically maximum dose of NE, addition of vasopressin and/or hydrocortisone, and volume of fluids). The primary outcome was to compare between groups the maximum dosing requirements of NE during the first 24 hours of the infusion. The secondary outcomes were the requirement for the addition of vasopressin and/or

hydrocortisone, initial fluid resuscitation volume administered within the first six hours of sepsis diagnosis, and hospital mortality.

Results: The preliminary cohort consisted of 21 obese and 24 non-obese patients. There was no difference between the two groups in regards to age, gender, and race. There was a statistical difference in total body weight of 102.4 +/- 19.3 kg in the obese group and 68.3 +/- 17.6 kg in the non-obese group ($p < 0.01$). The maximum NE dose was 64.3 +/- 45.8 mcg/minute in the obese group and 32.5 +/- 25.5 mcg/minute in the non-obese group, ($p=0.025$). The initial fluid resuscitation volume administered within 6 hours was 12.7+/- 20.5 mL/kg and 29.0 +/- 25.3 mL/kg ($p=0.005$). The total fluid resuscitation volume at 24 hours was 20.0 +/- 23.5 mL/kg and 46.7 +/- 35.0 mL/kg ($p=0.005$), for obese and non-obese, respectively. Despite this difference in fluid resuscitation, no difference in mortality was correlated to fluids within 6 hours ($p = 0.16$) or over the first 24 hours ($p = 0.25$). There was no difference in the requirement for the addition of vasopressin or hydrocortisone. However, those patients that did require the addition of either agent had significantly higher hospital mortality ($p < 0.05$).

Conclusion: Among our preliminary cohort, obese patients with septic shock required higher maximum norepinephrine doses during first 24-hours versus non-obese patients to maintain mean arterial pressure above 65 mmHg. This data was not consistent with previously published literature. Our patients had more variation in weight, were an older population, and majority African-American. However, no difference was noted in mortality regardless of NE dose. The Surviving Sepsis guidelines does not specify NE dosing recommendations, more data is required to identify a clear consensus for broader populations and reduction of morality. Further data will continue to be gathered and analyzed at this institution.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 2-390

Poster Title: Descriptive analysis of patients in a Medicare advantage plan approved for anti-diabetic patient assistance programs (PAPs)

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Purpose: Diabetes treatment can include regimens that consist of two or more medications. Generic medications are available, but some options that patients benefit from are brand name, which can be expensive. Most manufacturers have patient assistance programs, which would provide their brand name medications at no cost if patients meet eligibility requirements. Evaluating the characteristics of patients accepted into these programs could provide managed care organizations valuable information regarding attributes of patients likely to be accepted, and disparities in program acceptance requiring further evaluation. This can help determine more patients that may qualify, and in turn improve patient outcomes.

Methods: A cross-sectional study was conducted among patients accepted into the various anti-diabetic patient assistance programs. The patient population was located in Houston, TX, where data was compiled using Cigna Healthspring's LivingWell clinic database. Patients were included if they were enrolled with the health plan from January 1, 2015 to December 31, 2015, and were accepted into any anti-diabetic patient assistance program. Patients were excluded if they discontinued enrollment in the health plan during the period of interest. Patient characteristics including age, gender, race, low income subsidy (LIS) status, medication class, and comorbidities were examined. Group differences were evaluated using a chi square test.

Results: In total, 175 patients with a mean age of 70 were accepted into anti-diabetic patient assistance programs. Within these 175 patients, 45.71 percent of them were male and no significant difference was documented with gender. Statistically significant differences were observed with race, where there were significantly more whites than other races (n equals 126, 72 percent, p less than 0.0001). With regards to low income subsidy status, there was a significantly lower proportion of patients with LIS (n equals 32, 18.29 percent, p less than 0.0001). Additionally, the majority of patients (n equals 119, 68 percent) were approved for the insulin class compared to the other classes of anti-diabetic medications (p less than 0.0001), and had 3 comorbidities (diabetes, hypertension and hyperlipidemia) compared to having one or two of these aforementioned comorbidities (n equals 151, 87.28 percent, p less than 0.0001).

Conclusion: Observed differences in LIS status and comorbidities can potentially be explained by the increased financial burden among patients who do not qualify for LIS and who have more comorbidities as they may be using a larger number of medications. The documented racial differences need further investigation in future research to ensure all racial groups have access to PAPs.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 2-391

Poster Title: Improvement in hemoglobin A1c among patients approved for an anti-diabetic patient assistance program in a Medicare advantage plan

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Purpose: Diabetes is one of the leading causes of morbidity and mortality in the United States today. Patients' diabetes can often be controlled through a clinically prescribed regimen of medications. One barrier that commonly hinders patient's adherence to anti-diabetic medications is the cost of the medication. For this reason, drug manufacturers provide assistance to patients that meet certain criteria. This assistance provides the medication to the patient free of charge. The objective of this study was to evaluate clinical benefits gained by the patients who received patient assistance programs.

Methods: A retrospective study was conducted using de-identified data provided from Cigna-Healthspring's Living Well Clinic. Patients included were accepted into anti-diabetic patient assistance programs between January 1, 2015 and December 31, 2015 and had A1c values from before and after their acceptance. A paired t-test was conducted to evaluate the difference between pre and post A1c values. Additionally, pre and post A1c values were categorized as achieving target vs. not, using the HEDIS measure target of an A1c below 9. McNemar chi square tests were used to determine if there was a significant difference in target achievement before and after using the assistance program. All statistical analyses were performed using SAS version 9.3 (SAS Institute, Cary, NC) statistical package at a priori significance level of 0.05.

Results: A total of 52 patients with records of both pre and post A1c values were included in the cohort, 34 of them were female and 18 of them were male. The mean value of pre-A1c was 0.6769 higher than the post-A1c value in patients who received free medication through

patient assistance programs, the difference was statistically significant (p=0.0057). Also, a statistical significant difference was found when categorizing pre and post A1c values into achieving target vs not by using HEDIS measure (p=0.0126).

Conclusion: Findings indicate a significant improvement in glycemic control for the patients after qualifying for the patient assistance program which can lead to better health outcomes in this patient population. Future research with a comparative group is warranted.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 2-392

Poster Title: Impact of a Pharmacist-Driven Antimicrobial Stewardship Program on Hospital Outcomes

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Purpose: Antimicrobial stewardship programs (ASP) promote appropriate use of antimicrobial agents to reduce microbial resistance while providing optimal patient-focused clinical care. The potential for spread of resistant organisms means that the misuse of antibiotics can adversely impact the health of patients who are not even exposed to them. With the escalating rate of antimicrobial resistance in hospitals across the United States, it is imperative to promote proper antibiotic use to ensure the continued efficacy of antimicrobial agents available. The implementation of an ASP in a physician-owned hospital is investigated to quantify the effects of the ASP on overall hospital outcomes.

Methods: An ASP committee that included representation from clinical pharmacists, infectious disease (ID) specialists, physicians, informatics personnel, hospital epidemiologists, microbiology personnel, and nursing was created in a community hospital in Edinburg, Texas. This ASP pharmacy-driven committee has been implemented for a total of 15 months and holds monthly meetings in order to discuss new issues concerning antimicrobial agents or updates in infectious disease treatment guidelines in order to find solutions to any issue that may arise. The ASP has also been able to regulate the use of antibiotics by enforcing formulary restrictions to ID specialists, encouraging pharmacy pharmacokinetic consultations, and implementing new protocols when prescribing antibiotic agents for patients. Monitoring of the antibiotic cost, medication use analysis, and the hospital's antibiogram was initiated to assess the benefits of the ASP on hospital outcomes.

Results: The data analyzed demonstrated the hospital's total antibiotic cost decreased by 13% and the total cost per adjusted patient day decreased by 14% compared to the previous year. The total days of therapy (DOT) per adjusted patient days from January to August 2016 was 19% based on the drug classes most commonly used in this hospital. The total yearly antibiotic use for cephalosporins, penicillins, fluoroquinolones, and carbapenems was 28%, 24%, 13%, and 10%, respectively. In addition, the hospital's 2016 antibiogram demonstrated a 42% reduction in the number of isolates with an increased resistance and a 400% increase in bacterial coverage compared to the hospital's 2015 antibiogram.

Conclusion: This ASP is unique in that is it a pharmacy-driven committee that incorporated a multidisciplinary team in order to establish better use of antimicrobial agents. It is also one of the largest and one of few ASPs initiated in the lower Rio Grande Valley. This study demonstrated a reduction of antibiotic cost and reduction in antimicrobial resistance, which had a positive impact on hospital outcomes. This ASP model is effective in optimizing the care of patients who are treated for infections.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-393

Poster Title: Analysis of the appropriate prophylactic use of filgrastim in an ambulatory oncology setting

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Purpose: Filgrastim is a granulocyte colony-stimulating factor that encourages the production of neutrophils. It is primarily used to prevent significant myelosuppression and reduce the incidence of febrile neutropenia. The National Comprehensive Cancer Network (NCCN) currently recommends colony-stimulating factors when the risk of febrile neutropenia is greater than 20 percent. The primary objective of this evaluation was to determine if the prophylactic use of filgrastim was being utilized appropriately in patients receiving antineoplastic therapy in an ambulatory oncology setting.

Methods: The institutional review board determined this was a performance improvement project and that it did not require their approval. Medication order information was compiled for patients who received at least one dose of filgrastim from January 2015 to December 2015. Information obtained for all individuals included chemotherapy regimen, goal of therapy, sex, and weight. Additional information was obtained for individuals who were receiving regimens associated with an intermediate to low risk of febrile neutropenia. This included age, height, creatinine, bilirubin, and surgical/wound history. Using risk factors for febrile neutropenia identified in the NCCN guidelines and literature, the use of filgrastim was classified as either appropriate or not appropriate.

Results: Data was collected from 20 individuals and a total of 110 filgrastim orders. Forty-four percent of patients received antineoplastic treatment regimens with the intention of cure, with the rest being given for palliative care. The majority of treatment regimens prescribed were associated with a low risk of febrile neutropenia, followed by intermediate and high-risk regimens, respectively. Overall, 39 percent of prophylactic filgrastim orders were determined to be inappropriate. The average number of febrile neutropenia risk factors found in patients on

intermediate and low risk regimens was 1.8, with the most common being a prior history of chemotherapy, hemoglobin below 12, and age greater than 65.

Conclusion: A notable number of filgrastim prescriptions were determined to be inappropriate. Our immediate goal is to use this information to aid in the development of a hospital-wide protocol that guides the prescribing practices of filgrastim in patients that are myelosuppressed. We aim to reduce the inappropriate use of filgrastim in order to decrease costs and associated side effects of non-indicated treatment.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 2-394

Poster Title: Utilizing candida score to identify patients at increased risk for candidiasis - a retrospective cohort study

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Purpose: Candida species have been identified as the fourth most common cause of nosocomial bloodstream infections in the country. Mortality rates associated with invasive candidiasis are estimated to be over 40%; the highest pathogen-derived mortality in hospitals. The ability to distinguish clinically relevant invasive candidiasis from colonization can lead to earlier treatment and reduced mortality. The purpose of this retrospective cohort study is to assess the potential risk factors for invasive candidiasis by calculating a Candida Score.

Methods: The study population consists of all non-neutropenic patients admitted to the intensive care unit with positive candida in the blood or urine at University Medical Center in El Paso, Texas. A review of the study population was performed to calculate each patient's Candida Score and ascertain risk factors for invasive candidiasis. Based on clinical data, calculation of the Candida Score was performed at the time of admission, then at each time point the patient presented with a new risk factor. The following information was collected from patients' charts in order to calculate the Candida Score and provide patient demographics: age, gender, surgical date, surgical procedure, positive cultures (from any site), medication history, progress notes (to assess criteria for sepsis and use of total parenteral nutrition), length of stay, and hospital outcomes (discharge or death). Chi-square tests were used to compare categorical risk factor variables between patients with candidemia, based on hospital outcome. Candida scores were calculated for each patient, and comparisons done for previously stated risk factors. Logistic regression was used to assess the association of covariates to death. The primary regression model will assess the relevance of known candidemia risk factors, previously identified in the literature, to Hospital Outcome (1=death, 0=discharge).

Results: A total of 83 patients were included in this study to assess mortality stratified by Candida Score. The frequency of death is increased as the Candida Score increases. A Candida Score of 3 resulted in 33.3% (8/24) mortality; Candida Score of 4 resulted in 15.8% (3/19) mortality; and Candida Score of 5 resulted in 100% (4/4) mortality. A maximum likelihood estimate to assess the relationship between Candida Score and mortality showed a 0.7 decrease in survivability with every unit increase in Candida Score, indicating a positive relationship between Candida Score and mortality (p 0.0042). Analysis of the relationship between Candida Score and mortality using patient age, gender, length of stay, and Candida Score using linear regression revealed that only patient age and Candida Score were significant predictors of death (p 0.0275 and 0.0037, respectively). Additionally, an analysis was performed to examine the relationship between the number of days until treatment occurred and its effect on mortality in those with a Candida Score greater than or equal to 3. A delayed time to treatment was not significantly related to mortality (p 0.5526).

Conclusion: This retrospective cohort study was performed to assess potential risk factors resulting in invasive candidiasis by using a Candida Score that would be predictive of mortality risk. Our study determined that a Candida Score greater than or equal to 3 was associated with increased risk of mortality. The use of a bedside tool such as the Candida Score can be used to identify patients at increased risk of invasive candidiasis resulting in mortality in an acute hospital setting.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 2-395

Poster Title: Association of ceftaroline with mortality and re-hospitalization among patients with pneumonia admitted to the United States veterans health care system

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Purpose: Pneumonia is the leading cause of death due to infectious disease and the eighth leading cause of death overall in the United States. Underlying patient comorbidities and advanced age complicate treatment, leading to increased morbidity and mortality. Evidence exists to support specific older drugs for treatment, yet there is not ample evidence on new agents, particularly ceftaroline. Ceftaroline demonstrates activity against common pneumonia pathogens; however, there is not much data supporting its utility in pneumonia. This study describes mortality and hospital readmission for patients with pneumonia who received ceftaroline as first--line therapy.

Methods: This was a retrospective, cohort, descriptive study of adults (age 18+ years), admitted to hospitals in the United States Veterans Affairs (VA) Health Care System, with pneumonia, between 10/1/10 -and 9/30/14, and who received ceftaroline as first-line therapy within 14 days of hospital admission. Descriptive statistics (means, medians, counts, and percentages) were used to characterize the experience of VA patients treated for pneumonia with first-line ceftaroline therapy.

Results: A total of 48 patients were included. Ceftaroline patients were primarily white (75%), with a median (interquartile range [IQR]) Charlson comorbidity score of 6 (3-10) and were more likely to be diagnosed with COPD (56%), dyslipidemia (69%), and hypertension (75%). Average patient age was 65 (59-73) years. For patients treated with ceftaroline, median time from hospital admission to study drug initiation was 1 (0-2) days and median hospital length of stay

was 8 (3-18) days. Crude mortality rates for ceftaroline were: 30-day (4%), 60-day (13%), and 90-day (15%). Hospital readmission rates were: 30--day (23%), 60--day (27%), and 90--day (27%).

Conclusion: This study provides real-world effectiveness data for first-line ceftaroline in pneumonia among elderly, predominantly white male patients with multiple underlying comorbidities. Prospective investigations in larger, more generalized cohorts are needed to confirm or refute these findings.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 2-396

Poster Title: Abuse and misuse of pregabalin and gabapentin: a systematic review

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Purpose: Gabapentinoid (pregabalin and gabapentin) abuse is increasingly being reported. This study was conducted to assess the extent of gabapentinoid abuse, characteristics of typical abusers, patterns of abuse, and potential harms in order to bring this trend to providers' attention.

Methods: A systematic review of MEDLINE, Cochrane Library, ClinicalTrials.gov and FDA data, indexed through 7/28/2016, utilizing the following searches: pregabalin OR gabapentin OR gabapentinoid AND one of the following: abuse, misuse, overdose, or substance-related disorders[MESH], was conducted according to PRISMA guidelines. Additional studies were identified through review of references. All English-language epidemiologic studies, clinical studies, and case reports/series of gabapentinoid abuse/misuse/overdose (defined by ACTTION classification) were included. Animal studies were excluded. Two authors reached consensus regarding study inclusion after full-text review. The body of literature was assessed for bias qualitatively.

Results: Fifty-nine studies were included in this systematic review (24 epidemiologic, 3 clinical abuse liability, and 32 case reports/series), indicating increasing numbers of patients are self-administering, both orally and by alternate routes, higher-than-recommended doses to achieve euphoric highs. In the general population, a 1.6% prevalence of gabapentinoid abuse was observed, whereas prevalence ranged from 3-68% among opioid abusers. An international adverse event database identified 11,940 reports of gabapentinoid abuse from 2004-2015, with >75% reported since 2012. Risk factors include a history of substance abuse, particularly

opioids, and psychiatric comorbidities. While effects of excessively high doses are generally non-lethal, gabapentinoids are increasingly being identified in post-mortem toxicology analyses.

Conclusion: Possible sources of bias include: heterogeneous study designs; risk of bias in studies due to small size, retrospective nature, and single-country-origin; and assumption of class effect among gabapentinoids.
Evidence suggests gabapentinoids possess potential for abuse, particularly in individuals with a history of opioid abuse, and reports of such abuse are increasingly being documented. Prescribers should be aware of high-risk populations and monitor for signs of abuse.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 2-397

Poster Title: Application of an algorithm to estimate effectiveness of biologics for rheumatoid arthritis in a large insurance database

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Purpose: Claims data collected by third-party payers contain information on medications, diagnoses, and procedure codes, but generally lack information on clinical outcomes for complicated disease states such as rheumatoid arthritis. However, a validated, claims-based algorithm for estimating effectiveness of biologic agents in treating RA has recently been developed. This algorithm has been applied to various databases in order to compare the effectiveness of biologics in treating RA. The objective of our study was to implement the claims-based algorithm in a large insurance database to estimate the effectiveness of biologics in treating RA.

Methods: The cohort included patients with rheumatoid arthritis who were enrolled in a Commercial (non-exchange) or a Medicare Advantage Prescription Drug plan in the Humana database and who initiated biologic treatment between June 2007 and December 2009. Patients were required to be continuously enrolled 6 months before through 12 months after the first claim for the biologic (the index date). The four biologics examined in this study included abatacept, infliximab, adalimumab, and etanercept. Sample sizes for certolizumab, golimumab, and rituximab were too small to be included. Patients were categorized as effectively treated by the claims-based algorithm if they met all of the following 6 criteria in the 12-month post-index period: (1) a medication possession ratio greater than or equal to 80 percent for subcutaneous biologics, or at least as many infusions as specified in U.S. labeling for intravenous biologics; (2) no increase in biologic dose; (3) no switch in biologics; (4) no new non-biologic disease-modifying antirheumatic drug; (5) no new or increased oral glucocorticoid treatment; and (6) no more than 1 glucocorticoid injection. Sensitivity analysis was performed by removing the dosage increase criterion (criteria number 2), which was thought to negatively

impact the efficacy rate for infliximab due to the allowance of dosage increase in the package insert dosage criteria.

Results: A total of 1,196 individuals were included in the analysis. The index biologic was categorized as effective using the algorithm for 25.4 percent of patients overall, including 28.9 percent for subcutaneous biologics and 20.3 percent for intravenous biologics. The index biologic was categorized as effective in the first year for 30.3 percent of etanercept (102/337), 27.6 percent of adalimumab (104/377), 32.7 percent of abatacept (37/113), and 16.5 percent of infliximab (61/369) patients. Sensitivity analysis showed that there was no significant difference in the effectiveness of the biologic agents after removing the dose increase criterion.

Conclusion: Using a claims-based algorithm in a large Commercial and Medicare claims database, it was shown that infliximab was significantly less effective than either etanercept, adalimumab, or abatacept. However, when a sensitivity analysis was performed by removing the dose increase criteria, the effectiveness of the biologic agents became comparable and no significant difference was observed between infliximab and the other agents.

Submission Category: Infectious Diseases

Submission Type: Case Report

Session-Board Number: 2-398

Poster Title: Acute brucellosis infection complicated by concurrent tuberculosis and syphilis infection treated with streamlined triple antibiotic therapy.

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Purpose: This case report details a case of acute brucellosis treated with rifampin-containing triple antibiotic therapy to also treat latent tuberculosis. A 51-year-old male presented to the emergency department with a 4-week history of fevers associated with chills, sweating, fatigue, diarrhea, mild-to-moderate abdominal pain, and 1-2 episodes of vomiting each day. The patient noted a weight loss of approximately 25 pounds and was previously treated for suspected Helicobacter pylori and Clostridium difficile infections at two different hospitals. Social history was significant for contact with pigs and cattle through his profession as a livestock inspector. He was subsequently admitted to the hospital for fever of unknown origin. During the patient's hospital stay, mild splenomegaly, elevated LFTs, and thrombocytopenia was noted, yet his comprehensive metabolic panel and complete blood count remained both within normal limits. On the 2nd day of the patient's admission, a positive fecal PCR showed presence of C. difficile, Enterotoxigenic E. coli, Shiga toxin-producing E. coli, and Norovirus. Following this test result, the patient was started on vancomycin 125 mg by mouth every 6 hours. On day 4, a positive syphilis screen was noted with an RPR titer result of 1:2, considered latent syphilis, and penicillin G benzathine 2.4 million units IM was initiated. On day 5, a positive Quantiferon Gold result was found in the presence of negative sputum AFBs, PPD, and MTB/RIF PCR which was considered a latent tuberculosis infection. On the same day, the patient's blood cultures revealed Brucella species and he was started on doxycycline 100 mg PO every 12 hours, rifampin 300 mg every 8 hours, and gentamycin 400 mg IV every 24 hours. The patient was discharged after a 10-day hospital stay with antibiotic therapy for 3 concurrent infections. The patient was continued on triple antibiotic therapy for his brucellosis which consisted of doxycycline 100 mg PO every 12 hours for 6 weeks, rifampin 300 mg every 8 hours for 6 weeks, and gentamycin 400 mg IV every 24 hours for 7 days. The latent tuberculosis treatment consisted of 4 months of rifampin 600 mg every 24 hours which included the 6-week rifampin

therapy for brucellosis. The patient's treatment of latent syphilis comprised of penicillin G benzathine 2.4 million units IM every 7 days for a total of 3 doses. The oral vancomycin regimen for suspected C. difficile infection was discontinued 5 days into therapy due to an alternative diagnosis and resolution of diarrhea. Currently, there is conflicting evidence demonstrating superior benefit of triple therapy with doxycycline, rifampin, and an aminoglycoside compared to dual therapy in the treatment of brucellosis. We describe the co-treatment of latent tuberculosis and acute brucellosis with rifampin-containing triple therapy.

Methods:

Results:

Conclusion:

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 2-399

Poster Title: Medication reconciliation completion rate and documentation accuracy comparison of a forensic psychiatric unit and an acute adult psychiatric admissions unit at a state hospital.

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Purpose: A 2006 Joint Commission study found that out of the 350 medication errors in their database, 63 percent were due to a breakdown of communication, half of which could have been avoided by accurate medication reconciliation. The state hospital has several types of units including acute adult admissions and adult forensic units. All of the patients suffer from serious and persistent mental illness, commonly with poor medication adherence and frequent admissions. This study compares the completion rate and documentation accuracy of medication reconciliation between these units.

Methods: This is a retrospective cohort study of all patients admitted to one forensic unit and one acute adult admission unit performed as a program review between 04-01-2016 and 08-15-2016. Data collected included patient demographic and medication information: age upon admission, gender, admission type (internal transfer or outside admission), unit, admitting physician, psychiatrist, when and if reconciliation was documented, diagnoses, medications before and upon admission. Facility policy specifies that the admitting physician or unit psychiatrist should perform the medication reconciliation within 24 hours. Pharmacists are not formally involved in the medication reconciliation process due to funding shortages. The hospital has a Medication Reconciliation Worksheet, but this is not a formal part of the medical record. Additional sources of documentation included notes and history. The medications recorded prior to admission were compared to the medications ordered by the unit physician during the first two days of the patient's admission. Immediate use or one-time use only medications were excluded, but as-needed medications from either lists were included. Unjustified discrepancies were categorized as: omitted, duplicated, contraindicated, changed,

or unclear information. The primary hypothesis is that there is no difference in 24 hour documentation rate. Secondary hypotheses are no difference due to admission type or between units in: completion rate at any time, accuracy; and no difference between clinicians performing medication reconciliation. Statistical analysis was Chi-square. P less than 0.05.

Results: A total of 53 patients were captured in the sample, acute equals 20 (40 percent), forensic equals 33 (62 percent), female equals 21 (40 percent), male equals 32 (60 percent), mean age (standard deviation) equals 41 plus-or-minus 13 years. Medication reconciliation was documented in 40 (75 percent) of the 53 patients and was documented 8.6 plus-or-minus 18 hours after admission, but 13 of the 40 (32 percent) patients had their medication reconciliation documented prior to being admitted. Medication reconciliation was documented within 24 hours in 35 (66 percent) of the records. The acute unit had 16 (80 percent) medication reconciliations completed within 24 hours compared to 19 (58 percent) on the forensic unit (P equals 0.095). Completion rate at any time were similar for acute and forensic: 16 (80 percent) versus 24 (73 percent) (P equals 0.55). Individual admitting physician completion rates within 24 hours ranged from 33 percent to 100 percent (P equals 0.59). However, internal unit transfer completions within 24 hours were: transfers between units were 30 percent versus 74 percent for new admissions (P equals 0.0075. Completions at any time were similarly fraught: 40 percent versus 84 percent (P equals 0.0038).

Conclusion: Medication reconciliation did not differ significantly between units or prescribers within 24 hours or on an absolute basis overall. However, we identified a specific problem area: transfers between units were accomplished only 30% of the time within 24 hours of the transfer. This suggests that there is an opportunity to improve the care of patients by a targeted pharmacy-based medication reconciliation program.

Submission Category: Pediatrics

Submission Type: Case Report

Session-Board Number: 2-400

Poster Title: Rituximab for treatment of refractory anti-NMDA receptor encephalitis in a pediatric patient

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Purpose: Anti-N-methyl D-aspartate receptor (anti-NMDAR) encephalitis is a devastating disease that is increasingly being identified in both children and adults with psychosis, language disturbances, behavioral changes, and motor deficits. Up to one quarter of patients with this disease will experience severe long-term neurologic sequelae or expire. Currently no consensus guidelines exist on the optimal management of patients with anti-NMDAR, though intravenous immune globulin (IVIG) is often considered first-line pharmacotherapy though up to 50% of patients may have incomplete response with this agent. Limited data exist on how patients who fail IVIG or are intolerant to this agent should be managed.
We present a case of an otherwise healthy 4 year-old child who was transferred to our facility after experiencing focal seizures and dysarthria. She exhibited loss of age-appropriate language skills to that of a 1-2 year old in addition to behavioral changes and right-sided weakness. The patient was initially placed on levetiracetam for seizure prophylaxis and underwent various diagnostic tests including electroencephalogram (EEG) monitoring and a lumbar puncture to test for cerebrospinal fluid abnormalities. During her admission she had no recurrence of seizures, but her language skills and ability to follow commands continued to decline. Similarly, her right-sided weakness was largely unchanged. The neurology team was consulted regarding the cause of the patient's symptoms and recommended administration of intravenous methylprednisolone 250 mg twice a day for five days to treat for autoimmune encephalitis. The patient had minimal resolution of symptoms with this therapy and instead experienced significant episodic irritability that was accredited to the corticosteroids. Eighteen days after her initial episode, the results of our institution's serum anti-NMDAR antibody test came back as highly elevated and the patient was subsequently diagnosed with anti-NMDAR encephalitis.

The patient was then initiated on a four-day regimen of IVIG 2 g/kg/day, which resulted in partial but still incomplete, response. She was less irritable than previously reported but her communication skills remained below baseline. After her intolerability to corticosteroid therapy and inadequate clinical response to IVIG, immunotherapy with rituximab was initiated at 375 mg/m2 per dose. The patient's speech significantly improved two days after her first infusion of rituximab. Only her fine motor movement had not yet returned to baseline.

During the patient's second follow-up visit approximately one and a half months after discharge, both her mother and the neurologist reported that she had nearly complete symptom resolution. Her speech had returned to baseline, she had no evidence of hemiparesis, and she was attending kindergarten. It was determined at that time that there was no need for continued immunosuppression.

Anti-NMDAR is an often poorly recognized cause of neurologic and psychiatric symptoms in pediatric patients that is associated with significant morbidity. Although IVIG has historically been considered first-line therapy, overall response rates remain fairly low, as was seen with our patient. Early intervention in patients with anti-NMDAR encephalitis is of paramount importance for successful outcomes and baseline recovery. Our patient experienced intolerability to corticosteroids, minimal response to IVIG, and then subsequent complete resolution of symptoms with rituximab. Further studies should be conducted to elucidate whether rituximab should be considered as part of the initial therapy of anti-NMDAR.

Methods: N/A

Results: N/A

Conclusions: N/A

Methods:

Results:

Conclusion:

Submission Category: General Clinical Practice

Submission Type: Case Report

Session-Board Number: 2-401

Poster Title: Progressive Multifocal Leukoencephalopathy and Posterior Reversible Encephalopathy Syndrome in a Bilateral Lung Transplant Recipient

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Purpose: This case report describes a patient with posterior reversible encephalopathy syndrome (PRES) followed by reactivated John Cunningham Virus (JCV) manifesting as progressive multifocal leukoencephalopathy (PML) during immunosuppressive therapy for a bilateral lung transplant. A 61-year-old woman was hospitalized four months post-transplant for progressively worsening headache, altered mental status, aphasia, seizure activity, lower left extremity monoplegia, and lower left extremity paresthesia. A brain MRI at admission revealed findings suggestive of laminar necrosis in the right parietal lobe and early Wallerian degeneration in the right corticospinal tract. An EEG provided evidence of right tempo-parietal periodic lateralized epileptiform discharges. The constellation of symptoms, MRI and EEG findings were attributed to PRES. Development of PRES was thought to be secondary to tacrolimus toxicity, so the patient's immunosuppressive therapy was switched to cyclosporine. Following initiation of cyclosporine, the patient experienced increased headache which was concerning for worsening PRES, which was confirmed by a follow-up MRI. The patient was transitioned from cyclosporine to sirolimus and mycophenolate mofetil. After attaining a therapeutic sirolimus trough, the patient was discharged to a rehabilitation center for therapy due to lower extremity weakness.
While admitted to the rehabilitation center, the patient developed fevers and mild leukocytosis. She was treated with vancomycin and piperacillin/tazobactam for potential pneumonia. After 10 days of antibiotic therapy, there was little improvement in pulmonary symptoms, so the patient was readmitted to the hospital. At admission, the chest x-ray demonstrated right upper lobe (RUL) nodular thickening with a new RUL consolidation

consistent with unresolved pneumonia. A subsequent bronchoscopy and lung tissue biopsy indicated A2 acute cellular rejection. Intravenous methylprednisolone 500 mg daily was administered for three days then tapered to 20 mg oral prednisone over the course of 12 days. A repeat MRI performed during this admission showed progressive white matter changes in multiple regions of the brain. These findings, combined with positive JCV serology in the cerebrospinal fluid from a previous admission, are pathognomonic for PML.
The patient's new diagnosis combined with concerns for acute organ rejection was discussed with the patient and family. One of the primary strategies for treating PML is to restore a patient's immune system, but the team was unable to further decrease immunosuppressive agents in this patient due to acute cellular rejection. Mirtazapine 15 mg daily was initiated in an attempt to slow disease progression and to ease her increasing anxiety following this new diagnosis. Mirtazapine was chosen due to in vitro studies showing that the JCV may infect cells using the 5HT2A receptor, which is inhibited by mirtazapine. Unfortunately, her neurologic status continued to decline, as she developed slurred speech and mild right-sided weakness. She was discharged to a skilled nursing facility with eventual plans to transition to hospice care. More study into the treatment of PML is needed, particularly in solid organ transplant patients who require immunosuppression.

Methods:

Results:

Conclusion:

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 2-402

Poster Title: Long-acting injectable antipsychotics: Do they prevent or delay hospital readmissions?

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Purpose: One of the most common reasons for rehospitalization and relapse in patients diagnosed with bipolar disorder, schizophrenia, and schizoaffective disorder is medication non-adherence. Long-acting injectable (LAI) antipsychotics were developed as a way to decrease pill burden in this patient population and to simplify medication regimens by allowing less frequent administration. The purpose of this study was to determine whether long-acting injectable antipsychotics prevent or delay hospital readmission in patients with a known history of medication non-adherence.

Methods: The institutional review board approved this retrospective, matched evaluation study. Men and women aged 18-65 who were diagnosed with bipolar disorder, schizophrenia, or schizoaffective disorder and were discharged between November 30, 2011 to November 30, 2013 from Austin State Hospital, an inpatient state hospital were included in the study. These patients had to have documented medication non-adherence, either during the current admission or previous reports, and be prescribed a first generation LAI antipsychotic (fluphenazine decanoate or haloperidol decanoate) or second generation LAI antipsychotic (paliperidone LAI or risperidone LAI) or a corresponding scheduled dose of oral “equivalent” first or second generation antipsychotic. Patients were matched based on psychiatric diagnosis, “equivalent” oral dose, number of prior admissions, and length of stay. Patients were excluded if they had a length of stay greater than one year or less than two days. The definition of oral “equivalent” doses were fluphenazine LAI dose divided by 1.25, haloperidol LAI dose divided by 10, paliperidone LAI dose divided by 20, and risperidone LAI dose divided by 10, with each calculation rounded to the closest available oral dose. The primary objective was to determine

whether LAI antipsychotic use was associated with an increased time to readmission in patients diagnosed with bipolar disorder, schizophrenia, or schizoaffective disorder with a known history of non-adherence and whether one-year readmission rates were decreased.

Results: Those who received a LAI (N=120, MeanSE: 278+/-11.5 days) had a significantly longer (Chi-square = 3.9054, df=1, p=0.0481) survival time without readmission compared to those who did not (N=120; MeanSE: 243.6+/-12.8 days). There was no statistically significant difference in the frequency of one-year readmission between those who did receive a LAI (43.1%) and those who did not (56.9%)(Chi-square= 3.3419, df=1, p=0.0675). At the $p < 0.10$ level, differences were significant, with higher proportion of subjects who did not receive LAI (13.8%) being readmitted. Those who received a LAI with administration frequency of a month or longer (MeanSE: 307.9+/-13.1 days) had a significantly (Chi-square=6.5180, df=1, p=0.0107) longer survival time without readmission when compared to those who did not receive a longer administration LAI (MeanSE: 245.0+/-18.5 days). No statistically significant difference was revealed in mean length of stay on readmission between those who did receive a LAI (44.3+/-47.3) and those who did not (50.1+/-75.6)(t-value=0.47, df=1, p=0.6384). There were no statistically significant differences in survival time without readmission (Chi-square=2.3543, df=1, p=0.1249) between those who received an second generation LAI (MeanSE: 268.6+/-15.9 days) and those who received a first generation LAI (MeanSE: 199+/-10.5 days).

Conclusion: This study revealed the use of LAI antipsychotics, particularly those with longer administration frequency, to have potentially promising outcomes in those patients with a history of non-adherence. Further studies should be conducted in order to confirm these results on a larger scale.

Submission Category: General Clinical Practice

Submission Type: Case Report

Session-Board Number: 2-403

Poster Title: Benefit of liver-kidney transplant for renal graft function in a highly-sensitized patient refractory to desensitization with plasma exchange and intravenous immunoglobulin

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Purpose: This case report demonstrates a highly-sensitized patient who underwent a liver-kidney transplant in conjunction with desensitization techniques with plasma exchange (PLEX) and intravenous immunoglobulin (IVIG) as methods to decrease the risk of graft rejection. The patient is a 61 year-old female with a history of end-stage liver disease (ESLD) secondary to hepatitis C virus complicated by hepatocellular carcinoma and end-stage renal disease secondary to type II diabetes mellitus who was on hemodialysis three times a week since April of 2010. She had been on the waitlist for transplant since 2011 partly due to her high calculated panel reactive antibodies (cPRA) of 100%. She was admitted to the hospital for management of her ESLD, and desensitization was initiated with twice-weekly PLEX and IVIG with follow-up HLA antibody testing in anticipation for organ availability in the near future. She remained highly sensitized with cPRA at 100% despite 8 sessions of PLEX and IVIG, in which she maintained strong HLA antibody production against HLA-A2, A26, B13, B35, and Cw6 and several moderate and weak HLA-antibodies. The antibody levels limited the likelihood of finding a suitable donor as it posed a significant risk for antibody-mediated rejection (AMR) post-transplant. Therefore, successful desensitization prior to kidney transplant relied heavily on the transplanted liver's ability to clear circulating antibodies. A suitable donor with HLA that included HLA-A2 and B35 became available on hospital day 27. The liver was transplanted first, in hopes of removing antibodies directed against the kidney graft. For induction, the patient received rabbit anti-thymocyte globulin (rATG) 75 mg (1.5 mg/kg) intra-operatively to the liver and two more doses of rATG on post-operative days (POD) 1 and 4. Donor-specific antibodies (DSA) post-liver transplant were obtained and showed the liver's success in clearing some antibodies, displayed by the removal of a majority of the moderate and weak antibodies and the decrease in HLA-A26 and B13 antibodies to moderate levels. However, antibodies directed at HLA-A2 and B35

remained strong. The following day, the kidney was transplanted, and she was initiated on maintenance immunosuppression with tacrolimus, mycophenolate mofetil (MMF), and methylprednisolone taper. Intermittent PLEX and IVIG were continued post-transplant according to DSA levels that were closely monitored after each session. However, this had minimal effects on decreasing antibody production, and strong HLA-A2 and B35 antibodies remained. Oliguria continued, indicating delayed graft function, and she required hemodialysis on POD 7. A renal biopsy was performed on POD 6 and supported AMR indicated by positive DSA, positive Cd4 staining, and apparent tubular epithelial cell necrosis accompanied by minimal peritubular capillaritis. PLEX and one dose of rituximab 700 mg (375 mg/m2) were initiated followed by PLEX and IVIG for AMR treatment. This treatment yielded hopeful outcomes due to increases in urine output, reaching to greater than 0.6 mL/kg/hr. Unfortunately, acute kidney injury secondary to septic shock complicated her treatment, requiring re-initiation of hemodialysis. This case report suggests that the transplant of a liver graft prior to a kidney graft can help with the desensitization process by removing HLA-antibodies. However, it may not eliminate all of the circulating antibodies that could target the kidney graft. For this patient, AMR prevention with PLEX and IVIG plus preceding the kidney transplant with a liver graft appeared unsuccessful. Future studies can focus on other available agents in preventing AMR when the presence of strong HLA-antibodies is known.

Methods:

Results:

Conclusion:

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 2-404

Poster Title: Gauging uninsured patients' access to prescription medications using coupons from drug discount programs in a primarily Hispanic population

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Purpose: In 2015, 28.6 million people in the United States remained uninsured while prescription sales were 419 billion dollars, an 11.7 percent increase compared to 2014. Uninsured patients utilize discount coupons, engage in medical tourism, purchase medications online, or do not fill their prescriptions when they cannot afford their medications. Financial difficulties increase medication inaccessibility and lead to poor patient health outcomes, particularly in the impoverished South Texas Region that includes a largely Hispanic population. Medication adherence is impossible without medications. The purpose of this project is to assess uninsured patients' access to prescription medications in a predominantly Hispanic region.

Methods: The institutional review board approved this research project. Pharmacist managers of retail chain and locally-owned independent pharmacies (n equals 21) were contacted at their place of business and recruited to voluntarily participate in a four question survey about drug discount programs. Subjects who chose to participate were verbally consented and assured all information would be kept strictly confidential. Pharmacists were queried regarding acceptance of prescription coupons. If they did not accept coupons, then follow-up questions sought to determine the reasons for not honoring coupons in their pharmacies. They were also asked to comment on negative and positive experiences with prescription drug coupons. The final question in the survey included a request for permission of two follow-up phone calls in English and Spanish by an unidentified researcher to any member of the pharmacy staff regarding honoring prescription coupons at that particular pharmacy for a second phase of the study.

Results: The response rate was 81 percent. Seventeen subjects consented, 2 declined, and 2 could not be reached. Forty-one percent (n equals 7) of participants stated they do accept coupons from discount drug programs versus 59 percent (n equals 10) of participants who stated they do not accept coupons from discount drug programs. Of the subjects who do accept discount drug coupons, 43 percent (n equals 3) cited overall positive experiences because they play a role in helping patients with their medication expenses. 43 percent (n equals 3) of subjects who do accept drug discount coupons also cited overall negative experiences due to cost issues, and 14 percent (n equals 1) cited positive and negative experiences. Of the subjects who do not accept discount drug coupons, 40 percent (n equals 4) had in-house programs that were preferable, 50 percent (n equals 5) had specific policies against accepting them, and 10 percent (n equals 1) reported poor reimbursements. Out of all the participants, 71 percent (n equals 12) have experienced cost issues, such as hidden transaction fees. Less than one percent (n equals 1) stated that the process is simple, while 12 percent (n equals 2) stated that the process is complicated.

Conclusion: The majority of the participants stated their pharmacy does not accept coupons from discount drug programs. Medical providers need to be made aware of the situation surrounding prescription coupons. Clearly, if they are making assumptions regarding procurement of medications via prescription discount coupons, they are in for a surprise tantamount to that of the researchers in this study. A second phase of this approved study will involve follow-up phone calls by unidentified researchers posing as patients inquiring about the acceptance of discount coupons to determine if a disparity exists for Spanish or English callers in a predominantly Hispanic population.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 2-405

Poster Title: To Screen or Not to Screen? Utilization of a Scoring System for the Transition of Care Program at a Comprehensive Cancer Center.

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Purpose: Medication reconciliation has been shown to improve patient outcomes. The Pharmacy Transitions of Care (TOC) team at the University of Texas MD Anderson Cancer Center explored methods to best maximize efficiency by optimizing a new electronic health record (EHR), the 2015 version of Epic® . The team created a TOC dashboard with a scoring system feature to prioritize admitted patients based on likelihood of medication intervention being needed. The objective was to determine the effectiveness of the dashboard scoring system to identify patients with higher need for interventions to review.

Methods: This was a retrospective review of all patients assessed by the TOC team from October 2015 to July 2016. Patients were excluded during May 2016 as the transition to Epic® took place and TOC activities were inconsistent during the month. Patients prior to May were reviewed in a sequential fashion. Outcomes from these patients were compared to those reviewed after Epic® implementation. Review in Epic® utilized a score ranking system aimed to review patients at highest risk for medication related discrepancies. The scoring system is comprised of weighted scores related to factors such as age, poly-pharmacy, high risk medication classes, and allergies. Primary outcomes assessed were types of intervention and time spent reviewing each patient. Intervention types included pharmacist actions such as adding or removing medications or updating details of the medication order. Additional outcomes included length of stay and time to medication history. Descriptive statistics were utilized to analyze factors that may indicate the effectiveness of the dashboard to screen patients with higher acuity level. Continuous variables were compared with Student's T-test,

and categorical variables have been compared by chi-square test or Fisher's exact test, as appropriate.

Results: The post-implementation group included 54 patients. The pre-implementation group included 290 patients. Mean time spent on TOC activity increased from 12 to 15.9 minutes per patient. Patients in the intervention group had a length of stay approximately 0.8 days longer. Patients in the post-implementation group were also receiving more medications with a mean of 2 more medications per patient. The mean time to medication history from admission was reduced by approximately 4.8 hours. The number of medication history actions decreased from an average of 2.2 actions to 1.3 actions.

Conclusion: The implemented scoring system appeared to be identifying more acutely ill patients, as indicated by the increased length of stay, number of medications per patient, and time to complete medication histories. The use of EPIC® also decreased response time for medication history. However, the hypothesis was rejected based on the fewer medication history actions documented in the post-implementation period in comparison with the pre-implementation group. A number of confounders may be influencing results. Further data collection is warranted before making recommendations. The future direction is to further assess the quality of the dynamic scoring system.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 2-406

Poster Title: Oral chemotherapy adherence rates among patients treated with everolimus calculated using proportion of days covered (PDC)

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Purpose: Purpose: Everolimus is a common chemotherapy treatment for several different malignancies. Adherence of chemotherapy medication is paramount to treatment success. Oral chemotherapy drugs allow for more convenient administration of chemotherapy medication. However, the success of these treatments are dependent on patient compliance. Proportion of days covered (PDC) is a calculation used to measure a patient's medication adherence rate. PDC is a more accurate measurement of adherence than medication possession rate (MPR), because it prevents the over estimation of adherence caused by early refills.

Methods: Methods: This study was a retrospective chart review of patients who filled their everolimus prescriptions at a Texas Oncology pharmacy from January 1st of 2013 to December 31st of 2015. 381 patients were reviewed for this study. Patients were excluded if they only filled one prescription of everolimus. Patients were also excluded if there is a gap in fills > 30 days past the date the patient would have used the full days' supply of the most recent prescription fill, and the chart did not clearly cite noncompliance, or list an excusable reason for this gap. 94 patients were excluded from the study due to these exclusion criteria. Adherence rates were calculated using Proportion Days Covered (PDC). Days covered was determined by the date the patient picked up their prescription, and the days supply of that prescription. This was compared to the total number of days the patient should have been on therapy. If the patient refilled their prescription before the previous refill's days supplied had been completed. Then the newest refill would not be started until the previous fill's days supplied had been completed. The definition of compliance was set as a PDC greater than or equal to 90%. Patients charts were reviewed to determine the reason for noncompliance if documented.

Results: Results: The mean PDC for patients receiving everolimus was 92%. The majority of patients had a compliance rate higher than 90%. There was no reason given for the patient's noncompliance in a majority of the patient charts. The most common documented reason for noncompliance was toxicity, of which the most common toxicity was mucositis. Other toxicities included infection, rash, back pain, and anemia. Patients were often excluded from the study because of disease progression causing large gaps in therapy.

Conclusion: Conclusion: The majority of patient were highly compliant on their chemotherapy regimen. The reasons for patient noncompliance are not well documented. More information is required to determine the reasons for patient noncompliance. This is an important area for future research as oral chemotherapy regimen become more prevalent.

Submission Category: Critical Care

Submission Type: Case Report

Session-Board Number: 2-407

Poster Title: Risk of acute liver failure from bodybuilding herbal and dietary supplements.

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Purpose: This case report highlights the potential risk of the unregulated market of bodybuilding herbal and dietary supplements that have been implicated in acute hepatic failure. A 34-year-old Hispanic male was transferred from an outside hospital to a transplant facility after three weeks of progressive jaundice, mid-epigastric abdominal discomfort, nausea, and mild forgetfulness. Labs upon admission included total bilirubin: 22.9 mg/dL, alkaline phosphatase: 128 U/L, AST/ALT: 4542/3742 U/L, INR: 2.1, ammonia: 57 micromol/L, lactate: 732 mmol/L, and MELD score: 29 points. The patient was diagnosed with acute liver failure with grade I hepatic encephalopathy and placed on the transplant list. While providing supportive care, the team began trying to determine the cause of the liver failure and evaluate him for liver transplant. His past medical history included treatment for bronchitis over one month prior to the start of symptoms that was treated with ciprofloxacin and methylprednisolone dose pack. No symptoms were reported after completing the treatment. He had a tattoo three months prior to admission. The patient took no routine prescription medications or over-the-counter products, including acetaminophen. He denied illicit drug use. A toxicology screen was performed which returned with negative results, including acetaminophen. This eliminated prescription medications and acetaminophen toxicity as a possible cause. He reported taking bodybuilding nutritional supplements for over a year, which included branched chain amino acids (BPI Sports Best BCAA), creatine, whey, and casein (Optimum Nutrition). The patient had currently been working to become a personal trainer and motivational coach. While the exact mechanism of hepatotoxicity is not fully known, herbal and nutritional supplements have previously been implicated in acute liver failure. The patient reported increased alcohol consumption starting three months prior that included drinking an average of 10 beers per week. No known drug allergies were reported or any other medical conditions. The patient also denied any recent travel outside of the United States. Tests were performed to assess for autoimmune and viral hepatitis and all were negative. Tests for genetic liver disease were

negative. An abdominal sonogram was performed showing a “starry sky” appearance suggesting acute hepatitis with no evidence of venous thrombosis, hepatic mass, or infiltrative process. Additionally a liver biopsy was performed showing cholestasis with minimal necrosis, nothing to suggest autoimmune hepatitis, supporting the possibility for acute liver failure due to drug induced liver injury. Supportive and pharmacologic care was provided to manage the complications of his acute liver failure. The patient’s AST/ALT peaked on hospital day 2 at 4565/4573 U/L, and total bilirubin peaked on hospital day 15 at 26.4 mg/dL. With continued clinical improvement, the patient’s transplant was placed on hold with the hopes that the patient’s own liver would recover. He continued to show signs of hepatic improvement over the course of the hospital stay. Upon hospital discharge, his AST/ALT remained elevated but had decreased to 183/282 U/L, alkaline phosphatase was elevated at 173 U/L, total bilirubin was elevated but decreased to 3.4 mg/dL and his INR was normal. This case brings attention to the risk of acute liver failure from unregulated bodybuilding supplements in an otherwise healthy adult patient population.

Methods:

Results:

Conclusion:

Submission Category: Infectious Diseases

Submission Type: Case Report

Session-Board Number: 2-408

Poster Title: Candida glabrata peritonitis: Questions about fluconazole dosing and duration of treatment

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Purpose: This case highlights the uncertainty in how to appropriately treat intra-abdominal infections caused by Candida glabrata, susceptible to fluconazole, with respect to dosing and duration of treatment. Our patient was admitted to the medical intensive care unit for gastric ulcer perforation. He required intubation, and a laparotomy was performed. Shortly afterwards, he developed septic shock and required norepinephrine. He also progressed into atrial fibrillation but was cardioverted into normal sinus rhythm with amiodarone. The patient has a past medical history significant for end stage liver disease secondary to alcoholism, ascites, and hepatic encephalopathy as well as a past surgical history of transjugular intrahepatic portosystemic shunt. Baseline liver function tests for the patient include total bilirubin of 7.0 mg/dL, alkaline phosphate of 120 U/L, AST of 21 IU/L, and ALT of 10 IU/L. One week after the laparotomy, purulent discharge from the incision site on the abdomen was noted. A diagnostic paracentesis was performed to rule out peritonitis. The peritoneal fluid returned with a white blood cell count of 88, 13% segmental neutrophils, a glucose of 130 mg/dL, and a total protein of less than 3 g/dL. The culture grew Candida so the patient was empirically initiated on fluconazole 100 mg by mouth daily. Two days later, the organism further speciated as Candida glabrata. After review of the Infectious Diseases Society of America guidelines for the management of candidiasis, the patient was switched to micafungin 100 mg IV daily because echinocandins are recommended as first line therapy. The microbiology lab was called to determine if the Candida glabrata was susceptible to fluconazole in hopes that the patient would have an oral option as he was being prepared for discharge. The Candida glabrata did return as susceptible to fluconazole. After receiving 5 days of micafungin treatment, the patient was switched to fluconazole 400 mg by mouth daily based on these susceptibilities. Additional review of the Infectious Diseases Society of America guidelines found that intra-abdominal infections caused by Candida glabrata are to be treated similarly to candidemia. Candidemia

caused by Candida glabrata that is susceptible to fluconazole should be treated with high dose fluconazole daily. This recommendation was taken into consideration along with the dose response of Candida glabrata to fluconazole. Two days after fluconazole 400 mg was initiated, the dose was increased to 800 mg by mouth daily. There were concerns with using high dose fluconazole in this patient due to his medical history of end stage liver disease. The package insert cautions the use of fluconazole in patients with underlying liver dysfunction and recommends to monitor the AST levels. The patient's AST remained stable while inpatient. The recommended duration of treatment for this patient was unclear. Determining treatment duration is based on adequate source control and clinical response; however, no specific recommendation for the appropriate treatment duration is available. The internal medicine team consulted the infectious disease team who recommended a 14-day course of antifungal therapy. The patient completed the remaining 7 days of therapy on fluconazole 800 mg by mouth daily following discharge.

Methods:

Results:

Conclusion:

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Evaluative Study

Session-Board Number: 2-409

Poster Title: Assessing social media use by U.S. pharmacy schools

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Purpose: Social media has become the latest tool for pharmacy schools to engage applicants, students, alumni, and the broader public. It is an opportunity to share information, advertisements, and news related to pharmacy issues and health matters. Universities may be aware of the capabilities of social media, but these technologies may not be used to their fullest potential. The purpose of this study is to evaluate the patterns of social media use by U.S. pharmacy schools and the size of the following audience.

Methods: All 135 pharmacy schools holding pre-candidate, candidate, accredited with probation, or accredited status with Accreditation Council for Pharmacy Education were included in the study. Each school's social media content was reviewed and recorded by 2 separate reviewers over a 3-week period (May 27 – June 15, 2016) to determine number of sites used as well as number of posts and likes specific to Facebook, followers for Twitter, and Instagram. Each school's number of applications, degrees conferred, and enrollees from 2014-2015 were collected. US News and World Report rank and score were collected and correlated to use of social media. Logistic regression was used to characterize the association of social media presence (had an account or not) while multiple regression was used to identify measures of social media attention (followers and "likes") and activity (posts and tweets).

Results: Twitter and Facebook were the most common social media platforms used. In total, 80% of pharmacy schools had a Facebook page, while 63% had a Twitter account and 27% had an Instagram. Roughly 16% of pharmacy schools had no social media presence whatsoever. Older universities were more likely to have Facebook and Twitter accounts. Facebook, Instagram, and Twitter account status was not correlated with number of applications. US News

and World Report score correlated with Facebook posts, Facebook likes, and Twitter followers. Additionally, Facebook likes had a moderate correlation with the number of applicants. Time from accreditation correlated with an increase in Facebook likes and Twitter followers.

Conclusion: Overall, a majority of pharmacy schools utilize social media in some format. Social media presence was seen in older pharmacy schools but did not show a correlation to the number of applicants. However, the attention (likes and followers) on some social media sites, especially Facebook, did have a moderate relationship to number of applicants and US News and World Report rank. Social media use by pharmacy schools is in its early stages of development and its value to these programs is still uncertain.

Submission Category: General Clinical Practice

Submission Type: Case Report

Session-Board Number: 2-410

Poster Title: Suspected case of rivaroxaban-induced renal tubular acidosis

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Purpose: This case report describes a possible case of rivaroxaban-induced renal tubular acidosis (RTA) in a patient on long-term anticoagulation therapy for recurrent deep vein thrombosis (DVT). This patient began anticoagulation therapy with rivaroxaban 20 mg PO daily in 2013. She presented to the hospital in mid-2016 for left lower leg pain, which she attributed to a blood clot. DVT was ruled out using ultrasound. She was diagnosed with cellulitis and successfully treated with antibiotics. During admission, laboratory abnormalities prompted additional inpatient workup. Initial results from her serum chemistry panel were within normal limits except potassium (1.8 mEq/L) and bicarbonate (13 mEq/L) and her anion gap was normal at 11. The patient's magnesium and phosphate were normal at 2.1 mg/dL and 2.9 mg/dL, respectively. Her serum pH from a venous blood gas was 7.29. On the first three days of her hospital stay, the patient's potassium and bicarbonate remained low despite appropriate potassium replacement, and the etiology of her persistent hypokalemia and low bicarbonate remained unclear. After further chart review, we noted that her persistent hypokalemia and low bicarbonate had been present since 2013. In the setting of normal renal function, in addition to a normal anion gap metabolic acidosis without other apparent etiologies (e.g., diarrhea), these chronic deficiencies were concerning for a possible RTA. Our nephrology service was consulted for further workup. Her urine anion gap was variable, and the patient's urine pH rose from 6 to 7 after potassium citrate supplementation. Laboratory difficulties led to an unsuccessful bicarbonate challenge and the inability to calculate fractional excretion of bicarbonate (FEHCO3). Following potassium citrate replacement, her bicarbonate normalized. For the remainder of the hospital stay, she was supplemented with potassium citrate 20meq PO daily. On the day of discharge, all chemistry labs were within normal limits (potassium: 3.8mEq/L, bicarbonate: 25mEq/L). Because we were able to normalize her bicarbonate with a low dose of potassium citrate, and she persistently had a urine pH >5.3, it was determined she

most likely had a distal (type 2) RTA versus a proximal (type 1) RTA. RTAs are part of the differential diagnosis for patients with non-anion gap metabolic acidosis and are generally classified as inherited or acquired. Given its onset, inherited causes were determined to be unlikely. Acquired RTAs are often drug-related. Classic drug exposures for acquired RTA (acetazolamide, sulfonamides, ifosfamide, outdated tetracyclines, streptozocin, antiretrovirals) were not present, and multiple myeloma was ruled out with the absence of urinary light chains. A renal biopsy was not performed. The only major medical variable related to the onset of her chronic metabolic acidosis was the initiation of rivaroxaban in 2013. The Naranjo Algorithm, used to assess the probability of an adverse drug reaction (ADR) from rivaroxaban, gave a score of 3, indicting a possible ADR. Unfractionated heparin and related anticoagulants have been associated with hyperkalemic (type 4) RTA secondary to hypoaldosteronism; however, we were unable to find reports of heparin-like anticoagulants, or any other anticoagulants, causing hypokalemic (proximal or distal) RTA. While there appears to be a lack of plausibility of rivaroxaban causing RTA, a temporal relationship exists in this patient. When causes for a disease are unclear, clinicians must consider all potential causes for the disorder and proceed with treatment strategies that minimize risk to the patient. In this case, the risks and benefits of discontinuing/modifying anticoagulation versus treating the RTA with potassium citrate and continuing anticoagulation had to be determined. Given her current success with rivaroxaban, it was decided that continuing this agent for life-long anticoagulation outweighed the potential burden of daily potassium citrate supplementation.

Methods:

Results:

Conclusion:

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 2-411

Poster Title: Evaluation of interventions from a pilot antimicrobial stewardship program in a small community hospital

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Purpose: Antimicrobial stewardship is becoming increasingly important due to increased resistance rates and increased risk for hospital acquired infections like Clostridium difficile. Christus Santa Rosa (CSR) Westover Hills is a 150-bed community hospital located in San Antonio, Texas. Due to increased Clostridium difficile rates and Centers for Medicare and Medicaid Services (CMS) requirements for a hospital based antimicrobial stewardship program (ASP), Christus established a collaborative, pharmacist led ASP. Stewardship initiatives included prospective antimicrobial surveillance and feedback, pharmacist decentralization, and hospital wide physician and nursing education. This study will evaluate the interventions recommended and accepted from the pilot ASP.

Methods: Based on prospective data collected from September 2015 to November 2015, a total of 209 interventions were recommended with 153 interventions accepted (73 percent acceptance rate). All interventions were classified according to categories and included: change in dose, change in route, change in interval, therapeutic drug monitoring, change in therapy, therapy de-escalation, and therapy discontinuation.

Results: Intervention categories that were among the most recommended and accepted were change in therapy (54/76 approved, 75 percent acceptance), therapy discontinuation (45/64 approved, 70 percent acceptance) and therapy de-escalation (33/54 approved, 61 percent acceptance). The intervention category least recommended and accepted was change in route (4/11 approved, 36 percent acceptance).

Conclusion: Although physician resistance was a problem, the initial phase of the ASP had an overall high acceptance rate on total recommended interventions. Pharmacist interventions with the highest acceptance rates can significantly impact antimicrobial prescribing through improving and de-escalating antibiotic selection and discontinuing unnecessary antibiotic usage. Christus Santa Rosa will definitely benefit from continued ASP efforts and our institution will pursue computer-based software to streamline workflow and improve efficiency and data collection.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Case Report

Session-Board Number: 2-412

Poster Title: Atrial fibrillation with new onset thromboembolism and previous major bleeds on warfarin and aspirin therapy: a case report

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Purpose: The case report illustrates the misperception of aspirin as a safe and effective antithrombotic therapy for stroke prevention in patients with atrial fibrillation (AF) and a history of major bleeding events. AG is a 63 yo female with a complex medical history of polycystic kidney disease (PCKD), deceased-donor renal transplant (2006), hyperparathyroidism, pulmonary vasculitis/diffuse alveolar hemorrhage (DAH), pulmonary hypertension, stroke (1999), gastroesophageal reflux disease (GERD), valvular, permanent AF (2005), mitral regurgitation (MR) status post mitral valve replacement (MVR), atrial septal defect closure (2007), osteoporosis, and as per patient “heart clot since the ‘90’s” with no intervention. The patient has a history of two major bleeding events on antithrombotic and oral anticoagulant therapy (OAC): hemoptysis associated with warfarin initiation for new onset AF in 2005 and a gastric bleed associated with aspirin therapy initiated status post MVR in 2007. The patient underwent a routine outpatient transthoracic echocardiogram (TTE) on May 5, 2015, which revealed a large atrial mass. The differential included myxoma or thrombus. The patient was admitted on May 27,2015 for a transesophageal echocardiogram (TEE) to differentiate the mass. Appropriate stroke and systemic embolism (S/SE) prophylaxis was discussed on multidisciplinary rounds with consideration given to her CHA2DS2VASc score of 4 (age < 65, female, hypertension, stroke) and HASBLED of 3 (hypertension, stroke, prior major bleed). The pharmacy intern recommended OAC with warfarin, as opposed to aspirin, based on the proven superiority for S/SE prophylaxis and lack of added safety given an equivalent bleeding risk with aspirin (ASA) 325 mg daily. However, the cardiothoracic surgery resident elected to maintain use of the home aspirin 81 mg regimen given the concerns for bleeding. Afternoon report of the TTE revealed two large immobile masses deemed thrombotic in nature, though inoperable when considering safety and patient preference. Thus, OAC therapy discussions were re-visited,

with the pulmonologist weighing in on the risk of bleeding. Given the history of DAH, warfarin was recommended for long term therapy. The primary cardiology team felt most comfortable with a three-day-trial of intravenous heparin drip to allow close observation of potential bleeding. In light of no bleeding, warfarin 2 mg was initiated, for a goal therapeutic INR range of 2-3. Ultimately, the patient received warfarin, though this was a function of the active thrombus.The initial plan to use ASA 81 mg PO daily is not supported in the literature. The BAFTA (Birmingham Atrial Fibrillation Treatment) trial evaluated dose-adjusted warfarin (target INR 2-3) versus aspirin 75 mg/day in patients 75 years-of-age or older with AF or atrial flutter. Mant et al. found that warfarin reduced the risk of stroke (RR 0.46 (CI 0.26-0.79) p= 0.003) without increasing the risk of hemorrhage. Though target-specific oral anticoagulants (TSOACs) are not approved for valvular AF, the AVERROES (Apixaban Versus Acetylsalicylic Acid [ASA] to Prevent Stroke in Atrial Fibrillation Patients Who Have Failed or Are Unsuitable for Vitamin K Antagonist Treatment) 3 trial also demonstrated the considerable bleeding risk associated with aspirin use. In the AVERROES trial, patients with AF who were not candidates for warfarin received either apixiban 5mg BID or aspirin 81-324mg daily. Though terminated early, the study demonstrated lower rates of stroke with apixaban versus aspirin after one year (1.6%/yr vs. 3.7%/yr; 95% CI 0.32-0.62; P < 0.001) without a significant increase of major bleeding (1.4%/yr vs. 1.2%/yr; 95% CI 0.74-1.75; P=0.57). Considerable misunderstanding exists regarding the limited efficacy of and relatively significant bleeding risk of aspirin use, as compared to warfarin and even TSOACs. This case demonstrates the need for clear and accurate education regarding the limited role of ASA in S/SE prophylaxis for AF.

Methods:

Results:

Conclusion:

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Evaluative Study

Session-Board Number: 2-413

Poster Title: Incidence of Bleed in Cancer Patients Utilizing DOACs in an Emergency Center

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Purpose: Cancer patients are at greater risk of developing venous thromboembolism (VTE) due to increased tumor burden, procoagulant production and thrombogenic chemotherapy. They are also at greater risk for bleeding while using anticoagulants due to organ dysfunction/malnutrition. The CLOT trial illustrated the superiority of low molecular weight heparin (LMWH) over warfarin in cancer patients; thus, at our institution, LMWH is the primary treatment of choice. However, direct oral anticoagulants (DOACs) are an attractive alternative because of convenience, decreased monitoring and cost. The purpose of this study is to assess the incidence of bleeding in cancer patients who are on DOAC therapy.

Methods: The institutional review board approved this retrospective, single-center chart review utilizing the EPIC health records system. We randomized 150 patients from a pool of 14,000 patients on anticoagulants who presented to the emergency center (EC) between March and September of 2016. To be included in the study, patients needed to have a cancer diagnosis and be on current anticoagulation upon EC admission. Data was collected on cancer type, chief complaint, diagnosis and site of bleed, need for transfusion, kidney function, liver function, degree of thrombocytopenia and concurrent use of additional anticoagulants. A major bleed diagnosis was classified as a bleed in a critical region (e.g. intracranial, retroperitoneal) or the need for blood transfusion of ≥ 2 units of packed red blood cells. Minor bleeds were defined as anything not fitting the criteria for major bleed. Three groups of anticoagulants were examined: DOACs, LMWH, and warfarin.

Results: We collected data on a total of fifty patients for each group (DOAC, LMWH and warfarin). Within the DOAC group, 33 patients were on dabigatran, 11 patients were on apixaban and 6 patients were on rivaroxaban. Seven patients in the DOAC group (14%) met criteria for major bleed. The incidence of major bleed in the DOAC group broken down by specific drug was as follows: dabigatran, 6.1%; rivaroxaban 50.0%; and apixaban 18.2%. In the LMWH group, two patients (4%) were diagnosed with a major bleed. In the warfarin group, seven patients (14%) were diagnosed with major bleed. Minor bleeding occurred in 2% for DOACs (one patient on dabigatran), 2% for LMWH and 8% for warfarin.

Conclusion: In a retrospective analysis of patients on DOACs, enoxaparin and warfarin, we found that patients on warfarin and DOACs had a similar incidence of major bleed which was higher than LMWH. Based on a small sample, dabigatran seems to have the lowest incidence of bleed at 6.1%. The incidence of bleed between enoxaparin and dabigatran is similar,supporting its use in anticoagulation of cancer patients. Our data supports the results of the CLOT trial in which bleeding rates were higher with warfarin than with LMWH. Further studies are needed to assess the efficacy of DOACs for VTE treatment in cancer patients.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Descriptive Report

Session-Board Number: 2-414

Poster Title: Literature review of available the appropriate treatment options for older women in Australia with atrial fibrillation.

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Purpose: Develop a research background on epidemiology and treatment of atrial fibrillation among older Australian women. These women are at higher risk of stroke than men, and have a lower rate of receiving appropriate care compared with men. This review will combine global and Australian clinical guidelines and research to present current global and Australian treatment plans and identify some existing gaps in literature.

Methods: A database search was done to determine what comparative treatment options for atrial fibrillation, clinical guidelines, epidemiology, and gender comparison research exist. Search engines involved were Pubmed (Included Medline), Proquest, and Embase. Then an introduction, background, and gaps of evidence were developed.

Results: The following search terms were used to identify existing research: Arrhythmia, atrial fibrillation, Australia, women, stroke, and heart failure. Limiting terms involved were: full text, human, English language, year 1990 to current, and age greater than 65 years. From the search, 95 articles matched the search criteria and were analysed for relevance. Of that, 54 articles were referenced for the review.

Conclusion: Older women with atrial fibrillation are at higher risk of death compared to older men with atrial fibrillation. They also have a reduced quality of life when diagnosed compared to men. Gaps in research have been identified, and this will help in developing future studies.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 2-415

Poster Title: Comparative Effectiveness of Agents Used as Monotherapy for the Treatment of Pulmonary Arterial Hypertension: A Systematic Literature Review and Network Meta-Analysis

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Purpose: Network meta-analyses (NMAs) have previously been published to assess the comparative effectiveness of treatments for pulmonary arterial hypertension (PAH). However, not all studies included all marketed treatments for PAH nor did they assess the most common efficacy endpoint used in regulatory submissions – change in 6-minute walk distance (6MWD) from baseline to 12 weeks. 6MWD is a surrogate endpoint that reflects exercise capacity, is simple to measure and perform, and is also widely used in clinical practice to assess patient status. To date, a comprehensive NMA evaluating the comparative effectiveness of the various PAH-specific monotherapy agents has not been conducted.

Methods: We conducted a systematic literature review by searching MEDLINE and Embase for publications on PAH treatments. Abstracts were first reviewed independently by two investigators, with uncertainties or discrepancies resolved by consensus. Articles were then reviewed in full text by two investigators, with uncertainties or discrepancies resolved by consensus. Key inclusion criteria included: randomized, double-blind, controlled; majority of patients with PAH; study length ≥8 weeks; English language; average age ≥18 years; licensed therapy (i.e. Food and Drug Administration (FDA) or European Medicines Agency) for PAH or expected to be licensed shortly for PAH; appropriate dose based on prescribing information approved by the FDA; 6MWD as an outcome; monotherapy evaluated; and treatment-naïve. Key exclusion criteria included: drug withdrawn from market; assessed off-label treatment of PAH; assessed only hemodynamic, pharmacokinetic, or pharmacodynamic outcomes; non-human study; and patients transitioned from another treatment to a study treatment. Following the identification of all articles that met the inclusion criteria, patient demographics, clinical characteristics, and 6MWD at baseline and at 12 weeks were extracted into data tables. For articles in which key outcome data (e.g. mean values, standard deviations, or standard

errors) were not available, data were obtained from FDA medical reviews, a Cochrane review (Chen 2009), p-values, or using the GraphClick digitizer. Afterwards, data were analyzed using a frequentist approach with R version 3.3.1. Graphics were generated using STATA version 14.2.

Results: Eleven studies met all inclusion criteria and were included in the analyses. The PAH-specific treatments evaluated were ambrisentan oral (PO) 5 mg daily, ambrisentan PO 10 mg daily, epoprostenol intravenous (IV), bosentan PO 125 mg twice daily, riociguat PO maximum 2.5 mg three times daily, treprostinil subcutaneous (SC), treprostinil IV, sildenafil PO 20 mg three times daily, iloprost inhaled 2.5 or 5 micrograms 6 or 9 times daily, and placebo. Using a fixed effects model, results revealed a significant increase in 6MWD (meters) between each treatment compared to placebo. Between treatments, ambrisentan PO 10 mg daily and epoprostenol IV demonstrated a statistically significant increase in 6MWD compared to treprostinil SC (34.5 m (95% CI: 6.4 to 62.6 m) and 59.6 m (95% CI: 19.9 to 99.3 m), respectively). The I2 statistic was 35%, suggesting that heterogeneity was not significant. Using a random effects model, all treatments except bosentan PO 125 mg daily and treprostinil SC demonstrated a statistically significant increase in 6MWD (meters) compared to placebo. Between treatments, epoprostenol IV demonstrated a statistically significant increase in 6MWD compared to treprostinil SC (58.4 m (95% CI: 8.6 to 108.2 m)).

Conclusion: This is the first NMA to evaluate the comparative effectiveness of all marketed treatments for PAH as monotherapy and their effects on 6MWD from baseline to 12 weeks. Results from both the fixed effects model and random effects model consistently demonstrated that treatment with epoprostenol IV had a significantly greater increase in 6MWD compared to treprostinil SC. Relative to one another, other treatments were not found to be consistently better or worse in relation to 6MWD.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 2-416

Poster Title: Development of clinical problem solving skills in first and second year student pharmacists: Patient case workshop pilot program

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Purpose: In the first two years of their academic training, pharmacy students at the University of Washington learn predominantly through didactic coursework, and opportunities for application of course material are limited during this time. However, given the challenging realities of practice, pharmacists must effectively apply their knowledge, skills, and prior experiences in a variety of complex situations that may change rapidly and unpredictably over time. The purpose of the Patient Case Workshops was to provide first and second year PharmD students an opportunity to actively engage in the clinical reasoning and decision-making process with guidance and feedback from experienced practitioners.

Methods: The Patient Case Workshop program was organized and piloted by two pharmacy students with the guidance of two University of Washington School of Pharmacy faculty members. Patient Case Workshops consisted of a total of fourteen sessions, supervised by practicing pharmacists or pharmacy residents who assumed the role of workshop facilitators. Workshop facilitators guided students through the thought process behind the assessment and development of a plan for a patient that they helped treat in their practice. Workshop topics included: asthma, cardiology, diabetes, pain, pediatrics, neurology, and oncology.
First, second and third year students were invited to participate, with a focus on second year student pharmacists during both years of the pilot program. Students engaged and actively participated in the discussions to facilitate their learning. Students asked questions to collect information, clarify diagnoses, and increase their baseline knowledge about medication regimens. Students prepared assessments and plans within a small group format to come to potential solutions, and had the opportunity to present them. An inter-professional component

was included in two cases, with students from the schools of Nursing and Social Work taking part in active small-group discussions with pharmacy students.
At the end of the first year of the pilot study, a survey was distributed to participating students to assess the viability of continuation of the project into its second year.

Results: During the first year, 206 participants attended one or more workshop sessions, with an average 25 students per session. In the second year of the project, 256 participants attended, with an average of 32 students per session. Most students participated in more than one session. In addition, during the first year, 70% of participants were PY2s and the remaining 30% were PY1s. During the second year, invitations to participate were also extended to third year students to further integrate the topics learned in therapeutics, although the focus remained on PY2s.
In the survey that was sent to participants at the end of the first year, a total of 18 students responded. 88% of survey respondents answered “yes” when asked if they would register for an elective course that offers workshops once per week. When asked what the sessions helped students improve on the most, top answers included “knowledge of the subject” and “exposure to the role pharmacists play in a healthcare team.”

Conclusion: Patient case workshops allow students to solidify and utilize didactic coursework, provide an opportunity to self-assess abilities to apply knowledge in a practical setting, help students to identify pertinent information necessary to assess a patient, and provide practice opportunities to formally present a plan. Based on the results of the participant survey and general popularity of the sessions, we conclude that by involving practitioners and integrating clinical reasoning/problem-solving opportunities early in the curriculum, opportunities such as patient case workshops help support and deepen student learning.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 2-417

Poster Title: Evaluation of the utilization of ranolazine at an academic hospital system

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Purpose: Ranolazine (Ranexa®) is FDA approved for treatment of chronic angina in patients unresponsive to 1st line agents. It is also used off label for persistent atrial and ventricular arrhythmias in patients unresponsive to 1st line therapies. Inappropriate use of ranolazine can lead to unwanted harm and financial burden for patients. This project evaluated the prescribing practices with ranolazine based on current FDA approved and off-label indications at the University of Washington and Harborview Medical Centers over a 6-month period. This project also characterizes drug interactions with common concomitantly used medications and evaluates if adjustments were made as appropriate.

Methods: Ranolazine use between November 1, 2015 and April 30th, 2016 was identified through pharmacy dispensing records. Inclusion criteria included patients that charted administration of at least one dose in that time period. A retrospective chart review in ORCA PowerChart (Cerner) was then conducted. Dosing, indications for use (FDA approved and off-label) and status of home ranolazine continuation were evaluated for all patients. Continuation of home 1st line agents (beta blockers, calcium channel blockers and nitrates) was also evaluated for patients who received ranolazine as treatment for chronic stable angina. For patients who received concurrent CYP3A inhibitors during their course of treatment with ranolazine, charts were further reviewed to identify any efforts to mitigate, minimize or monitor potential complications as recommended by the manufacturer.

Results: 65 patients received ranolazine at the University of Washington and Harborview Medical Centers during the study period. There were 104 hospital admissions among these 65 patients. Ranolazine was appropriately prescribed for FDA approved and common-practice off-label indications for all admissions. Ranolazine was used for chronic stable angina in 67

admissions, and for ventricular tachycardia in 37 admissions. Of the chronic stable angina encounters, 66 showed continuation of home 1st line agents. Only one patient during one admission received an inappropriate dose of ranolazine without adequate documentation of intervention or monitoring regarding the high dose dispensed. The other 64 patients received appropriate dosing during 103 hospitalizations as recommended by the manufacturer for chronic stable angina and according to conducted clinical trials for ventricular tachycardia. Ranolazine was a prior-to-admission medication continuation in 78 of 104 admissions. During 35 admissions, ranolazine was concomitantly administered with moderate CYP3A inhibitors often prescribed in these disease states. Dose adjustments occurred in 11 of these instances; clinical monitoring was not noted in provider documentation when no dose adjustments were made.

Conclusion: The University of Washington and Harborview Medical Centers appropriately prescribed ranolazine for FDA approved and off-label indications. In most cases, inpatient use was a continuation of home ranolazine. Lack of dose adjustment with concomitant use of CYP3A inhibitors may suggest the need for an automated alert or pharmacist intervention when prescribers are not aware of drug interactions.

Submission Category: Pain Management

Submission Type: Evaluative Study

Session-Board Number: 2-418

Poster Title: Evaluation of topical lidocaine patch use in an academic medical center

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Purpose: Lidocaine 5% patches (Lidoderm®) are FDA approved for pain associated with post-herpetic neuralgia (PHN). However, at Harborview Medical Center (HMC), they are often prescribed for various off-label acute and chronic conditions. This off-label use can become problematic for patients post-discharge, as many insurance companies do not pay for lidocaine patches for off-label indications. This study compared the cost-effectiveness of lidocaine patches to established, first-line pain medications for most commonly used indications within our institution. This study also characterized the prescribing of lidocaine patches based on indication and which medical services had the highest rates of prescribing.

Methods: Pharmacy dispensing records from April 1, 2016 to April 30, 2016 were used to identify patients initiated on lidocaine 5% patches at Harborview Medical Center. All patients that were admitted during this time period and received at least one lidocaine 5% topical patch during their stay were included in this study. Patients excluded during this time frame included those admitted to the Emergency Department, those that were discharged prior to being admitted to the floor, and those that were discharged outside of the above time frame. Of the 116 patients meeting the inclusion criteria, 30 patients were chosen by a random number generator and these charts were retrospectively reviewed. Data collection included the hospital service that prescribed the lidocaine patch, total number of days in the hospital, total number of doses or lidocaine patches received, cost of lidocaine patch therapy, and prior and/or concurrent use of other pain modalities.

Results: The patients in this study consisted of 13 females (43.3%) and 17 males (56.7%), with an average age of 56.5 years (range 21-104 years) and an average length of stay of 12.2 days (range 3-43 days). Within this patient selection, there were a total of 241 patches dispensed and administered, resulting in a total cost of $6,230. The average cost of lidocaine patches per patient per admission was $208 and the average cost per day per patient was $17. The Medicine service prescribed patches for 13 patients (43.3%), General Surgery Trauma prescribed for 6 patients (20%), Neurosurgery prescribed for 4 patients (13.3%), Medicine Cardiac Care Unit (CCU) prescribed for 3 patients (10%), and Acute Pain Service(APS), Trauma Surgery ICU, Orthopedics, Rehab Medicine prescribed for 1 patient each (3.3% each). Two patients (6.7%) were prescribed lidocaine patches prior to admission and nine patients (30%) were discharged with the patch. All patients were found to be using other pain modalities prior to initiation of the patch. Indications included back (33.3%), rib (16.7%), neck (14.3%), and chest pain (14.3%), pain at multiple sites (14.3%), and other pain (10%). None of the patients were prescribed lidocaine patches for PHN.

Conclusion: This retrospective study showed that the Medicine service is largely responsible for prescribing most of the lidocaine patches within this institution. The most common indication for prescribing was back pain and none of the patients were prescribed lidocaine patches for the FDA approved indication of PHN. Although the cost of lidocaine patches is more expensive than oral and intravenous pain modalities, it is difficult to determine if this correlates with better outcomes and patient satisfaction as other pain modalities are used concurrently with administration of the patch. This data provides a benchmark for future quality improvement studies and comparisons.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 2-419

Poster Title: Impact of pharmacy-driven patient education on heart failure hospitalizations

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Purpose: Clinical pharmacists improve disease state management for a variety of conditions, including hypertension, diabetes, and congestive heart failure (CHF). Despite these clear benefits, direct pharmacy involvement remains inconsistent throughout healthcare systems and has yet to evolve as the standard of care for heart failure patients. While multidisciplinary practice is advocated by heart failure treatment guidelines, there remains a paucity of literature endorsing the pharmacist's role in transitional care. The primary objective of this study is to evaluate the significance of a pharmacist or graduate pharmacy student reviewing medications and providing counseling at discharge with subsequent effect on readmission rates.

Methods: The pharmacist and pharmacy student provided interventions such as patient education, prescribing heart failure medications using a collaborative practice with providers, monitoring drug concentrations, medication reconciliation, and ensuring treatment adherence. The pharmacy student performed a retrospective cohort study of patients seen by Swedish Advanced Cardiac Support. Data was collected in two sets, one year before and nine months after a pharmacist joined the CHF clinic team in September 2015. The primary endpoint studied was the 30-day readmission rates. Inclusion criteria comprised of adult patients greater than or equal to 18 years of age, patients with a diagnosis of ICD 10 code I50, or patients who were admitted to or consulted by Swedish Advanced Cardiac Support Program. Exclusion criteria included pediatric patients less than 18 years of age and prisoners. Subjects were stratified into two groups, those who received pharmacy-led counseling at discharge versus standard of care, largely nurse or provider-led counseling.

Results: From September 2014 to September 2015, there were 420 CHF cases. Of these cases, 39 patients were readmitted within 30 days. The readmission rate at Swedish Medical Center during this time period was 9.29 percent. A pharmacist was present to provide the appropriate

interventions between October 2015 and June 2016. During this time, there were 324 CHF cases with 27 patients who were readmitted within 30 days. The readmission rate at this time was 8.3 percent. Although the readmission rate dropped by 1.01 percent, the chi-square test did not prove to be statistically significant with a p value of 0.65. Several limitations were identified in this process, including a small sample size, short time period, and restricted roles of the pharmacist, as it was a brand new position. These limitations have lead to various improvements in the patients' transition of care, such as identifying potential barriers to treatment success and resolving them by providing full medication reviews, completing physical exams, smoking cessation counseling, managing hypertension and hyperlipidemia as well as obtaining medication insurance approvals.

Conclusion: Utilizing the pharmacist's skills to provide patients with a better understanding of their disease and medications could prevent medication error and increase treatment adherence throughout transitions of care and reduce the need for hospitalization. However, the involvement of the multidisciplinary team is integral to a patient's improvement in disease management. Further steps to improve this process are to obtain data from a longer period of time, establish the pharmacist's roles and responsibilities, promote interdisciplinary collaboration, and integrate site visits to patient's homes.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 2-420

Poster Title: Aspirin resistance in pediatric patients after cardiac surgery

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Purpose: Pediatric patients undergoing cardiac surgery are at high risk for thrombosis, especially neonates, those with single ventricular anatomy, and prolonged insertion of central venous catheters. Aspirin is commonly used as antiplatelet therapy to prevent thrombosis after high risk cardiac procedures. Aspirin resistance has been reported in pediatric patients with cardiovascular defects undergoing surgical procedures. The goals of this quality improvement study are to elucidate the characteristics of aspirin resistance in pediatric patients undergoing cardiac surgery and to determine if a dose-response relationship exists between aspirin and aspirin reaction units.

Methods: This was a prospective study using the VerifyNow Platelet Inhibition Assay to assess platelet function in patients receiving aspirin for thrombosis prevention. Inclusion criteria were: (1) patients requiring post-surgical anticoagulation with aspirin after cardiac surgery and (2) age less than 18 years. Results were based on aspirin reaction unit (ARU) values. ARU values less than 550 indicate aspirin-induced platelet inhibition. ARU values greater than 550 indicate lack of aspirin-induced platelet inhibition. The starting dose of aspirin was 5 milligrams per kilogram per day (mg/kg/day). If a patient's ARU remained greater than 550, indicating inadequate response, the dose was incrementally increased up to 13 mg/kg/day (maximum 325 milligrams per day). Baseline hematocrit and platelet count were obtained and repeat platelet counts were assessed 3 to 10 days post initiation of aspirin. Exclusion criteria were: (1) platelets less than 50,000 per microliter, (2) hematocrit less than 20 percent, (3) administration of additional antiplatelet agents, or (4) documented thrombosis before administration of aspirin therapy.

Results: This is a preliminary study to detect the presence of aspirin resistance in pediatric patients undergoing cardiac surgery. There were 7 pediatric cardiac surgery patients included in this study. The age range was 2 weeks to 6 months, with the median age being one month. The

dose range was 3.10 to 12.85 mg/kg/day (mean 7.52). Five of seven patients (72 percent) responded to standard aspirin therapy, while two of seven patients (28 percent) required higher aspirin doses due to ARU levels greater than 550. Of those requiring dose increase, one patient had an ARU less than 550 after dose increase to approximately 13 mg/kg/day. The other had a persistent ARU level greater than 550 even after dose increase and developed a lower extremity thrombosis requiring anticoagulation with low molecular weight heparin. One patient was excluded from the study due to the development of necrotizing enterocolitis during therapy, necessitating discontinuation of the aspirin.

Conclusion: Aspirin resistance exists in pediatric patients undergoing cardiac surgery. In some patients, aspirin resistance can be overcome by dose escalation. Thrombosis was seen in one patient who demonstrated aspirin resistance despite receiving a higher dose of aspirin.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 2-421

Poster Title: Influence of Age on Patient Education of Anticoagulation Therapy using Warfarin

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Purpose: Warfarin is a widely used anticoagulant medication with significant therapeutic benefits. Anticoagulation is also one of the medication classes with the highest risks profile. Managing warfarin to achieve the maximum therapeutic benefit can be challenging for both provider and patient. This 3-week retrospective observational study was used acquire a baseline evaluation of whether a patient's age has any impact on their understanding of warfarin therapy. The information gathered will be used to develop effective education plans and target age group that struggle most with understanding the use and risks of their warfarin therapy.

Methods: The study enrolled new patients from one anticoagulation clinic: Memorial Cornerstone Anticoagulation Clinic,in Yakima, WA, over a 3-week period between June 6- June 24, 2016. Patients at their first visit were given a 30 minute educational appointment performed by varying pharmacists. This clinic followed its own protocol for dosing and education adapted from the 2012 CHEST guidelines.
New patients are defined as having visited the anticoagulation clinic more than 1 visit but no more than 5 visits or have been at the anticoagulation clinic within a 2 week period, whichever is greater. These patients were given a questionnaire adapted from the Managing Oral Anticoagulation Therapy: Clinical and Operational Guidelines and their results were recorded. The questionnaire was written in layman's term with the exception of using the term INR. The primary objective was to determine if at least one age group would perform better or worse than the other age groups in the study. The secondary objective was to determine which concept and question patients had the greatest difficulty understanding.

Results: Patients who met the criteria were enrolled, 32 patients qualified with 4 (13%) patient were restarting. Patients restarting therapy moved away and recently returned or were at this clinic but started being managed elsewhere and returned. Patients who are classified as restart had not been to the clinic greater than one year. The clinic was opened Monday-Friday 8:30-5pm with a 24 hour on call pharmacist. Patients were placed into one of five age groups "Under 50", "50-59", "60-69", "70-79", "Over 80". An anova test was performed yielding a p-value 0.19. The null hypothesis states that at least one of the means is different and the alternative hypothesis states that all groups would yield the same score. We fail to reject the null hypothesis. For the secondary endpoint, all groups struggled with, "What will happen to my INR if I eat too many Vitamin K rich foods?" 56% of patients answered the question incorrectly. There are several limitations to this study. The time frame was narrow causing a small sample size to participate in this study. The questionnaire included only English speaking patients. The data gathered was limited to one clinic.

Conclusion: Clinicians should be aware that many patients receiving oral anticoagulation therapy have significant gaps in their warfarin-related knowledge, even after receiving initial education and frequent monitoring through an anticoagulation clinic. It is advisable to assess patients' knowledge, beliefs and practices. Frequent reinforcement of key information and "refresher" educational materials should be offered periodically throughout therapy.
Future studies may include a longer time frame to increase the sample size, performing further observational studies to find a correlation between better patient education and better control with anticoagulation therapy, and or if better patient education relates with less adverse effects.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 2-422

Poster Title: Evaluation of highly active antiretroviral therapy (HAART) adherence in an independent pharmacy

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Purpose: Adherence to highly active antiretroviral therapy (HAART) is extremely important when treating human immunodeficiency virus (HIV), as replication of the virus must be suppressed to prevent opportunistic infections and progression to AIDS. This virus is known to have a high mutation rate, particularly when medications aren't taken appropriately, which can result in resistance to medications. The objective of this project was to assess adherence rates to HAART medications and the impact of home medication delivery at an independent community pharmacy in Washington.

Methods: The WSU Office of Research Assurances has found that the project is exempt from the need for IRB review. All patient profiles were de-identified and a review was conducted for HAART medications from January through June of 2016. All prescriptions were for a 30 days supply. Adherence was determined by reviewing pick-up dates for each medication and calculating the excess or deficit at the time of the next fill. For the purpose of this study, it was assumed patients had no medication on hand as of the first pick-up date, day 1. Each patient was also assumed to take the first dose of medication on day 1, and the last dose on day 30. Adherence rates for the course of therapy were calculated using two methods: total months supply of medication from the month of first pick-up through June, and total days covered from first pick-up to day 30 from the final June prescription. Days supply for subsequent fills was counted from the day after day 30. Deficit from late pick-up was calculated by counting from the day after day 30 to the day before the next fill. Early pick-up, resulting in medication surplus, was accounted for by counting from the early pick-up date through day 30 of the current fill. Delivery method was also compared to adherence rates to determine effects on adherence.

Results: Nineteen patients' HAART therapy was reviewed for adherence to prescribed regimens. The patient population included 15 males and 4 females, ages 21-60. The average adherence rate based on months supply was 120.2 percent, while the adherence rate for total days covered was an average of 115.7 percent. Patients with medication deficit had an average adherence rate of 86.4 percent in months supply, and 87.8 percent total days supply. The average adherence rate for patients with medication surplus was 129.2 percent from months supply, and 123.2 percent total days supply. The recommended HAART adherence rate of 95 percent was met by 84.2 percent (16/19) of patients. Method of delivery was analyzed along with adherence rates. Of the study population, 10 received their prescriptions by mail, and 9 picked up their medications from the pharmacy. Upon analysis, 90 percent (9/10) of mail delivery patients received all prescriptions on time, with an average months adherence of 139.9 percent, and average total days supply adherence of 131 percent. Only 22.2 percent (2/9) of patients picking up from the pharmacy received all prescriptions on time, with a months adherence average of 98.2 percent, and an average total days supply adherence rate of 98.8 percent.

Conclusion: Overall medication adherence in this project was very good. Methods of delivery influenced the adherence rates of the individuals in this pharmacy. Options for mail delivery provided by this independent pharmacy is helping to ensuring their HIV patients receive their medication on time each month.

Submission Category: Clinical Services Management

Submission Type: Descriptive Report

Session-Board Number: 2-423

Poster Title: Incorporating patient education guides to improve thirty day readmission rates for patients with chronic obstructive pulmonary disease

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Purpose: Chronic obstructive pulmonary disease (COPD) is a complicated disease state that is often poorly controlled due to lack of patient understanding. According to the United States government site for Medicare, the national rate of readmission for COPD patients is twenty percent. This institution is no different than the national average readmission. The purpose of this study is to improve patient compliance with COPD disease state management through identification of knowledge deficits and implementation of patient specific education at the bedside.

Methods: Prior to the study, COPD readmission data was obtained from the data and informatics manager of the institution. A committee was established with respiratory therapists and pharmacists to approach a consensus on what needed to be accomplished to improve outcomes. Four main educational objectives were established: understanding the pathophysiology of COPD, knowing proper inhaler technique including the difference between rescue and maintenance medications, identifying how triggers and allergens play a role in COPD, lastly, recognizing when to seek urgent medical attention. To understand what educational needs a patient requires, a patient assessment was developed based on the four patient objectives. The answers were then used as a guide for discussion that both pharmacy and respiratory therapy could use at the bedside. Additionally, a student pharmacist developed a medication educational tool that personalized regimens by indicating exactly what medications the patient is discharging on, whether that medication is intended for rescue or maintenance and why that medication is important. The educational insert includes a calendar that can be used for an oral steroid taper and a green, yellow, red zone table that identifies an appropriate action plan for the patient based on current symptoms.

Results: From January of 2012 to August of 2016 there have been 1707 primary diagnosis of a COPD exacerbation. In this time frame, 40 of our patients were readmitted in less than thirty days. Eight respiratory therapists, five pharmacists and twenty pharmacy students have successfully passed the initial assessment that would be given to patients to fill out. The pharmacy director and clinical managers believe the COPD patient assessment is a useful tool to identify possible disparities in knowledge, guide patient specific education and improve readmission rates.

Conclusion: Thirty day readmission with complicated disease states is something that several institutions are trying to improve nationwide. The COPD patient assessment will help identify disease state knowledge deficits, which will in turn guide patient specific educational needs. Implementation of this educational tool and process will help standardize our institutional approach to COPD patient education in addition to improving patient compliance and successful disease state management outside of the hospital.

Submission Category: Small and Rural Pharmacy Practice

Submission Type: Descriptive Report

Session-Board Number: 2-424

Poster Title: International advanced pharmacy practice experience (APPE) in Ecuador: prevalence of arthritis in Ecuadorian Andes mountains

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Purpose: Arthritis has been one of the most common diagnoses in the villages of the Ecuadorian Andes mountains based on the previous medical mission data. The aim of this study was to determine the prevalence of arthritis in patients that were seen at the free clinic in the villages of Basan Grande, Cebadas, and Panchancho, Ecuador. Furthermore, to help future medical mission trips determine the amount of medications will be needed to provide effective treatment for arthritis and medical services.

Methods: Every year the fourth year pharmacy students travel to Ecuador with the Ecuador Medical Mission Team/One Heart Global Ministries to set up free medical clinics in different villages as part of fourth year APPE rotations. Patients were seen by healthcare providers; physicians, surgeon, medical students, pharmacist, and nurses based on first come, first-served basis. The study was conducted between the months of July-August 2016 in three villages of Ecuador: Basan Grande (n equals 210), Cebadas (n equals 388), and Panchancho (n equals 132). Patients were diagnosed with arthritis based on physical exam and symptoms of arthritis. Patients with arthritis were identified and analyzed to estimate overall arthritis prevalence by village and gender groups.

Results: A total of 731 patients were evaluated and 108 of these patients were diagnosed with arthritis. The overall prevalence of arthritis in the three villages was 15 percent, 61 percent of women, and 39 percent of men. In Basan Grande the prevalence of arthritis was 18 percent, 65 percent of women and 35 percent of men. The prevalence of arthritis in Cebadas was 17 percent, 72 percent of women, and 28 percent of men. In Panchancho the prevalence of arthritis was 3 percent, 100 percent of them were women.

Conclusion: The study showed 15 percent of the populations that were seen at the remote clinic were diagnosed with arthritis. The prevalence of arthritis was significantly higher in women compared with men. This finding shows arthritis as one of the highest diagnoses. Future healthcare providers should provide education on osteoporosis and dispense more calcium and vitamin D. Additionally, focus on patient education on prevention of arthritis such as exercising and eating a healthy diet.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-425

Poster Title: Evaluation of sugammadex use compared to neostigmine in a community hospital

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Purpose: Within a few months prior to this study, sugammadex was added to the hospital's formulary and carried in all operating rooms' medication dispensing apparatuses. The purpose of this study was to evaluate sugammadex use and subsequent cost compared to neostigmine, which was previously the medication of choice, for the reversal of neuromuscular blockade during surgeries.

Methods: This was an evaluative retrospective study of all patients treated with sugammadex in a community hospital from July 15, 2016 to August 17, 2016. The list of patients was provided by the pharmacy department. Patients' computerized medical records were reviewed and the data collected included: age, gender, weight, sugammadex package size used and quantity administered, and severity of kidney disease if applicable. From this data, an equivalent neostigmine dose (based on recommended dosing of 0.03 mg/kg) and administration quantity was calculated. Sugammadex administration doses were calculated from patient weight and administration quantity for analysis of proper dosing based on recommendations per sugammadex prescribing information. Pharmacy purchasing prices for the 2 mL and 5 mL vials of sugammadex (100 mg/mL) and 10 mL vials of neostigmine (1 mg/mL) were obtained, costing $88.84, $162.73, and $58.69, respectively, and used to extrapolate cost differences between the two medications for each patient encounter. It was determined that 1 vial of neostigmine would have been used for each patient encounter, the remainder would then be wasted; it is important to note that sugammadex is only available in single-use vials.

Results: A total of 36 patients were evaluated, with 23 being under the age of 65. There were 20 women (ages 17-90) with an average weight of 87.28 kg and 16 men (ages 23-90) with an average weight of 95.11 kg. There were no patients with severe kidney disease and only 1 patient with moderate disease. It was determined that the cost difference between a 2 mL and

5 mL vial of sugammadex, when compared to a 10 mL neostigmine vial, was $30.15 and $104.04, respectively, resulting in a total loss of $1528.74 during this time period, or $42.47 per patient encounter. According to the dosing recommendations of the sugammadex prescribing information of 2 mg/kg or 4 mg/kg, there were 8 instances where these recommendations were not followed; the majority (7 out of 8 patients) resulted in under-dosing.

Conclusion: Only direct drug acquisition costs for the pharmacy were evaluated, in which case, neostigmine was more costs-saving than sugammadex at approximately $42.27 per patient encounter. In addition, this analysis found that some patients did not receive appropriate doses of sugammadex. This analysis did not look into extraneous costs such as those associated with recovery time, operating room costs, or insurance reimbursement. Further study must be completed to fully grasp the extent of costs associated with the use of sugammadex compared to neostigmine and to assess the effects of under-dosing patients receiving sugammadex for neuromuscular blockade reversal.

Submission Category: Preceptor Skills

Submission Type: Descriptive Report

Session-Board Number: 2-426

Poster Title: Regionalization of pharmacy student programs at Southwest Washington Region Providence facilities with utilization of the layered learning practice model: a process improvement project

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Purpose: In 2011, the American Journal of Health-Systems Pharmacy published The consensus of the Pharmacy Practice Model Summit which emphasized the importance of a patient's right to pharmacists' care. In 2015, a publication discussing the issues pharmacy leaders faced included practice model growth and the role of students among the top concerns. The layered learning practice model (LLPM) assists in fulfilling the clinical and educational needs in hospital pharmacy. Our goal as a region is to increase direct patient interaction by clinical pharmacists while providing a remarkable learning experience for students and residents with the implementation of this model.

Methods: The Southwest Washington Providence pharmacy team has been working to rapidly grow our clinical services, student rotations, and residency program over the past 4 years. As of 2016, we employ 45 full-time pharmacists, offer 127 student rotations, and accept 10 PGY1 residents, making us exceptional candidates for the implementation of the LLPM. This project was designed to assess the perceived current performance of our LLPM. A 10 question survey comprised of a Likert scale was prepared and arranged from 0 to 5, with 0=not applicable, 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, and 5=strongly agree. Pharmacists with an active preceptor license who had experienced the LLPM were provided the anonymous survey via email and were given 14 days for completion. This survey assessed: preparedness to participate in the LLPM, appropriate allocation of tasks to both residents and students, adequate time to complete clinical tasks while precepting, removal of order verification from clinical service lines, amount of direct patient care achieved with the LLPM, satisfaction with

amount of direct patient care time achieved, and the satisfactory education of students on medication safety and transitions of care. The pharmacists also had the opportunity to leave additional comments along with their scoring. The results were then collected and tallied.

Results: A total of 26 pharmacists completed the survey within the 14-day period. All responses ranking from 1-5 were included in the analysis. Preparation for the implementation of the LLPM was felt to be adequate by 38% pharmacists while the remainder did not feel there was enough training. 26% of pharmacists surveyed agreed that more direct patient care is accomplished with the use of students and residents, while 74% did not agree with this statement. Currently, 54% of the pharmacists are satisfied with the amount of direct patient care they are achieving. While 32% of pharmacists agreed that they have enough time for educating students and residents while completing their clinical tasks, the remainder did not agree. There were 9 comments similarly describing the relationship between amount of direct patient care/clinical services achieved and the amount of time a student or resident had spent at that rotation. The beginning of each rotation requires more commitment to orientation and education at the potential expense of clinical services. This is in contrast to the end of each rotation which often culminates in more provision of patient care from the pharmacist, resident, and student team.

Conclusion: Based on these results, the execution of the LLPM at Southwest Washington Region Providence facilities has room for growth and improvement. More than half of the pharmacists surveyed did not feel adequately prepared to execute the LLPM, which suggests more time must be invested in preceptor development to achieve optimal utilization of students and residents. Unfortunately, the majority of pharmacists surveyed do not feel this model has improved time for clinical services or direct patient care. Although our goal has not yet been reached, these results expose the opportunities for future development and refinement of the LLPM at our facilities.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 2-427

Poster Title: Evaluation of occurrences and causes of hypoglycemia to identify ways pharmacists may intervene to decrease incidences of hypoglycemic events associated with antihyperglycemic agents

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Purpose: Hypoglycemia in the hospital is associated with increased mortality and increased length of stay. The American Diabetes Association recommends a target glucose range of 140 to 180 mg/dL for the majority of critically ill and noncritically ill patients, a less stringent goal than at home. Patients often get restarted on their home regimen of insulin and/or oral antihyperglycemic agents without maintaining the diet they had outside of the hospital. Coupled with acute sickness, patients are at higher risk for hypoglycemia. This project aims to evaluate hypoglycemic events to identify ways for pharmacists to intervene in decreasing the number of events.

Methods: An electronic screening tool was used to identify patients who had hypoglycemia, defined in this project as a blood glucose less than or equal to 60 mg/dL. An event was defined as low blood glucose of 60 mg/dL or less including all the lows afterwards that are related to the same cause. Data was collected over a period of 4 weeks. Information that was looked at included: antihyperglycemic regimen, steroid use, causes of each event, changes made to insulin regimen after a hypoglycemic event and prevalence of hypoglycemia in each medical service. After meeting with the head physician of the diabetes team at Providence Sacred Heart Medical Center, insight was given on how pharmacists may intervene. This project is Institutional Review Board exempt because it is performance improvement.

Results: In a 4 week time period, 84 patients experienced at least 1 hypoglycemic event; 26 patients' hypoglycemia was not associated with antihyperglycemic agents, while 58 patients were diabetic and/or had at least 1 antihyperglycemic agent. These 58 patients accounted for 86 total events in the 4 week time period. Long acting insulin was identified as the causative factor in 39 of the 86 events (45 percent). In only 55 out of the 86 events (64 percent) was a change made to the antihyperglycemic regimen after a low blood glucose was recorded; the median basal insulin reduction was 25 percent in patients that had a change made. There were 2 hypoglycemia events related to discontinuation or dosing frequency of steroids. Of the 58 patients who had at least 1 hypoglycemic event associated with an antihyperglycemic agent, 12 patients were on the cardiac medical floor, which is consistent with previous reports of hypoglycemia at this institution.

Conclusion: Pharmacists have a role in inpatient hypoglycemia by being medication experts as well as through daily conduction of thorough medication profile reviews. Pharmacists may aid physicians and hospitalists by identifying patients at high risk for a hypoglycemic event and making recommendations to an antihyperglycemic regimen. Through this initial evaluation, a follow-up pilot project will be implemented on the cardiac medical floor in which pharmacists will make recommendations regarding restarting home antihyperglycemic regimens, adjusting a regimen based on steroids and antihyperglycemic dose/regimen change after a low blood sugar has been recorded to prevent a recurrence.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 2-428

Poster Title: A survey of physicians, physician assistants and student pharmacists satisfaction: Utilizing student pharmacists to identify medication prior authorizations

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Purpose: The purpose of conducting this satisfaction survey was to assess the implementation of a pilot prior authorization service led by student pharmacists. Our primary objective by initiating this new service at St Luke's Rehabilitation Institute in Spokane, WA was to identify patients preparing for discharge and ensuring medications requiring insurance prior authorization were identified. Processing these requests require hours to weeks worth of communication and documentation between physicians, physician assistants, and insurance companies. By utilizing Advanced Pharmacy Practice Experience (APPE) student pharmacists, we hoped to improve continuity of care, medication adherence and communication to ensure collaborative care at discharge.

Methods: Student pharmacists were introduced to the process of receiving prior authorization needs of medications from insurance companies during the first week of their institutional or acute rotations at St. Luke's Rehabilitation Institute. They had access to patient profiles including insurance information, medication administration records, and plans for discharge. This service was provided to physicians and physician assistants for 8 weeks. At the conclusion of this pilot service, brief, confidential surveys were given to in-patient physicians, physician assistants and student pharmacists at St Luke's. These surveys consisted of 7 questions for physicians/ physicians assistants and 5 questions for student pharmacists to assess satisfaction with this prior authorization service. Paper surveys were distributed to all eligible respondents. Reminder emails to return surveys were sent to eligible respondents. Completed surveys were anonymously collected from respondents via pharmacy inboxes throughout the facility. Average satisfaction scores, times and responses were aggregated to provide a basis of improvement by the primary investigator and authors.

Results: Overall, response rate from physicians and physician assistants was 25 percent and 66 percent from student pharmacists. Physicians and physician assistants were satisfied with pilot service, rating it 5 on a 1-to-5 point scale. They spent, on average, 25 percent of their shift on prior authorizations before implementation of student-led prior authorization service. After initiation of pilot service, they spent on average 5 percent of their shift. Positive feedback included having more time with patients and increased collaboration on patient care with student pharmacists. Improvement feedback to this service showed that the student pharmacists should be able to obtain and complete prior authorization forms and be prepared to make medication suggestions upon meeting with patient's physician or physician assistant. Student pharmacists, on average, were moderately satisfied with piloting this prior authorization service (3.67 out of 5). Mean prior authorization need was 1 medication authorization per patient. Information review from insurance companies took on average 12.5 minutes to determine prior authorization need. Student pharmacists were satisfied with obtaining new information about the prior authorization process and providing continuity of care for patients. Suggested improvements included a desire for additional insurance resources and knowledge of which medications would be continued at discharge.

Conclusion: A student pharmacist-led prior authorization identification service increased healthcare collaboration in an in-patient rehabilitation setting. Identifying prior authorization needs prior to discharge would allow physicians and physician assistants to more efficiently plan discharge orders. The positive addition of student pharmacists as part of the healthcare team facilitated active learning by navigating insurance medication coverage. One limitation was using the same anonymous survey for physicians and physician assistants; therefore, not being able to identify the provider who benefited most from this service. Opportunities to expand this service include utilizing student pharmacists knowledge of medications to offer therapeutic alternatives to healthcare providers.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 2-429

Poster Title: Public health impact of pharmacist intervention within an interprofessional clinic setting in Iquitos, Peru

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Purpose: From a public health perspective, counseling on lifestyle modifications is an integral part of patient care. As student pharmacists in an interprofessional healthcare team, we were in a position to provide valuable education and impact public health outcomes in Iquitos, Peru. The most common diagnoses in our clinic experiences were infections, chronic back pain, and malnutrition. Through literature review, all have been identified to be within the top 25 leading causes of global disability-adjusted life years (DALY). In providing education to patients with these diagnoses, pharmacists will be able to make a lasting impact on community, regional, and global health.

Methods: A total of 5 minor acute care clinics were held by an interprofessional team of pharmacy and nursing faculty and students within low income communities of Iquitos, Peru. The clinics were organized through an academic institution and arranged by a medically-driven non-profit community organization based locally in the host country. Patient specific information such as age, height, weight, blood pressure, and temperature were collected. Diagnoses, medications dispensed and the counseling provided were collected on intake forms for all clinics as part of a pharmacy APPE rotation. Patient demographic information, along with individual diagnoses, were entered into an excel spreadsheet and all patient information was de-identified. The data was analyzed for most common diagnoses, most dispensed medications, and the type of counseling provided. Our findings were then compared with similar data found upon literature review, focused on public health and global health trends.

Results: Data from a total of 284 patients were collected and analyzed. The mean patient age was 26.5 years, with females making up 62 percent of the patient population. Infections of various etiologies were the most common diagnoses, with a total of 42.6 percent. Student pharmacists were able to intervene in these patients and provide education on lifestyle modifications such as hygiene to prevent the spread of disease. Chronic back pain was the second highest percentage of diagnoses at 18.9 percent. Student pharmacists took part in counselling not only on proper use of analgesic medications, but also in demonstrating proper body mechanics. Third, malnutrition was diagnosed in 11.6 percent of patients and student pharmacists were able to provide education to this population about proper hydration and the importance of nutritious foods and a balanced diet. Of the 284 patients that were seen in clinic, 57 percent were seen for at least one of the above conditions, and each of these patients received extensive education regarding their diagnoses. Through education, we were able to increase health literacy and understanding in communities in Iquitos, which in turn can lead to a more lasting public health impact than simply dispensing medications.

Conclusion: Infections, chronic back pain, and malnutrition are identified as leading causes of global disability, and thus the importance of addressing these public health concerns is imperative. In an interprofessional clinic setting, pharmacists can aid in identifying these conditions and providing counseling on lifestyle modifications to prevent the spread of disease, strategies to alleviate chronic pain, and improve nutrition. This type of education can enhance the care of chronic conditions not only in Peruvian communities, but in the United States as well in an effort to improve global trends in disease.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 2-430

Poster Title: Evaluating causes of hospital acquired Clostridium difficile infections and implementing a strategy to tailor appropriate antibiotic use

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Purpose: As a preventable negative outcome, hospital acquired Clostridium difficile infections have been an important quality measure at healthcare institutions. Thus, efforts have constantly been made to decrease Clostridium difficile infection rates among hospitalized patients in an effort to improve patient experience. Evaluating the causes behind hospital acquired Clostridium difficile associated diarrhea and implementing changes to address these causes have been key elements in reducing hospital acquired Clostridium difficile infection rates.

Methods: Retrospective chart review was performed for all hospital acquired Clostridium difficile cases encountered within eight months at Providence Sacred Heart Medical Center and Providence Holy Family Hospital. Several factors were found to be associated with Clostridium difficile infections including inappropriate antibiotic use, overuse of proton pump inhibitors and inappropriate testing for Clostridium difficile toxin. This project will further focus on tailoring antibiotic use. Also the 25 most recent Clostridium difficile cases were evaluated for the following aspects related to antibiotic use: need for antibiotics, selection of appropriate agent, and appropriate duration of therapy as established by treatment guidelines by the Infectious Diseases Society of America. This is a performance improvement project and is IRB exempt.

Results: 85 Clostridium difficile cases were analyzed. Trends noted were antibiotic use within the past three months, use of proton pump inhibitors and inappropriate testing. The most commonly used antibiotics at both institutions were cephalosporins, broad spectrum penicillins and fluoroquinolones. Among cephalosporins, first generation agents constituted 33 percent of total cephalosporin use at Holy Family Hospital and 46 percent of total use at Sacred Heart

Medical Center. Use of third generation cephalosporin agents was 41 percent and 30 percent at Holy Family and Sacred Heart respectively. Additionally, the 25 most recent cases were evaluated in depth in relation to antibiotic use. Of the 25 cases, 5 had inappropriate initiation of antibiotics, 1 had inappropriate choice of antimicrobial agent, 6 had inappropriate duration of therapy.

Conclusion: Clostridium difficile infections present an extreme burden for the healthcare system, and strategies to reduce infection rates are exceptionally valuable. A correlation between inappropriate antibiotic use and Clostridium difficile infections was observed in this analysis. Thus, it is crucial to ensure that antibiotic use is tailored in relation to appropriate initiation, choice of agent and duration of therapy. A crucial next step is evaluation of antibiotic use for disease states with specific therapy recommendations and provider education to hone in on proper antibiotic use. The hope is that a decrease in inappropriate antibiotic use will decrease Clostridium difficile infection rates.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 2-431

Poster Title: Evaluation of the naloxone protocol: working to improve current opioid administration practices, patient monitoring, and documentation for patient safety.

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Purpose: Naloxone is a highly effective reversal agent for opiates; however, inappropriate use subjects patients to unnecessary side effects and inadequate pain control. The naloxone protocol at two acute care hospitals validates the need for naloxone administration in adults meeting one of two criteria: respiratory rate less than 8 breaths per minute and minimal response to verbal or tactile stimulation. This project aims to evaluate the current naloxone protocol and events that led up to the use of naloxone in each patient case to support the implementation of more stringent pain medication protocol use, standardized sedation assessments, documentation practices, and monitoring.

Methods: A medication use evaluation was completed for inpatient naloxone use at Providence Sacred Heart Medical Center and Holy Family Hospital. The project included patients 18 years and older who received at least one dose of naloxone as an inpatient from June 2016 to September 2016. Patients who received naloxone in the emergency department, operating room, or as a continuous infusion were excluded. An evaluation of the patient's charts was completed to determine the reasons for the naloxone administration and protocol adherence. Data collected included laboratory values, respiratory monitoring, opioid administration, patient controlled analgesia use, sleep apnea, concomitant benzodiazepine use, and as needed and range dose opioid use. Correlations between naloxone use and contributing factors will then assessed. This is a performance improvement project and is IRB exempt.

Results: Over the 11 week time period, 41 patients received naloxone as an inpatient. Of these 41 patients, 36 (88 percent) received naloxone appropriately according to the naloxone protocol, whereas 5 patients (12 percent) received it inappropriately. Interestingly, 12 patients

(29 percent) had no or minimal response to naloxone. If the Pasero Opioid-Induced Sedation Scale was utilized to help assess severity of sedation within the protocol, only 7 patients (17 percent) received naloxone appropriately. None of the patients had thorough documentation of the naloxone administration event. Respiratory monitoring was done using pulse oximetry for all 41 patients, whereas capnography, a better indicator for early hypoventilation, was not used at all. Patient controlled analgesia was used in 13 out of the 41 patients, and out of the 13 patients, only 7 patients (54 percent) followed the protocol for dose limitations. Risk for sleep apnea was assessed in only 16 patients (39 percent). Concomitant benzodiazepine use was found in 8 patients (20 percent) increasing their risk for respiratory depression and sedation. There were 30 patients (73 percent) who had as needed or range dose orders of pain medications, and only 15 patients (50 percent) followed the range dose opioid administration protocol appropriately.

Conclusion: More stringent pain medication protocol use shall be enforced while incorporating patient risk factors to help prevent the need for naloxone rescue. Also, the Pasero Opioid-Induced Sedation Scale should be incorporated into the current naloxone protocol to provide a less subjective assessment for patient sedation. Standardized documentation and monitoring while an opioid is used also needs to be established to provide appropriate validation for naloxone use. Future goals of this project are to assess the most common precipitating factors that lead to the use of naloxone and if certain comorbidities place patients at a higher risk for respiratory depression.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-432

Poster Title: Role of Cholesterol Lowering Protein (PCSK9) in Rheumatoid Arthritis

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Purpose: Atherosclerosis is highly prevalent in patients with Rheumatoid Arthritis (RA) since inflammation can attack non-joint structures such as blood vessels, where arteries become hardened and blocked. Both diseases involve similar cells and pro-inflammatory cytokines in its pathogenesis. The purpose of our study was to evaluate the effects of PCSK9 (proprotein convertase subtilisin kexin 9), which lowers LDL cholesterol, on inflammatory cytokines and signaling pathways in cytokine-stimulated Rheumatoid Arthritis synovial fibroblast cells. If PCSK9 does play a role in inflammation, PCSK9 inhibitors could potentially be used for Rheumatoid Arthritis patients with Atherosclerosis.

Methods: RA synovial fibroblast cells from different patients were obtained from NDRI (National Disease Research Interchange) and CHTN (Co-operative Human Tissue Network), grown in media until they were confluent, and seeded onto a 6-well plate for treatment. Then the cells were starved in serum free media for 16-18 hours. The next day, fresh serum free media was added and each 6 well plate was pretreated with different PCSK9 concentrations for 30 minutes. The cells were then stimulated with the inflammatory cytokine IL-1β for 24 hours for ELISA (enzyme-linked Immunosorbent assay) or 30 minutes for Western Blotting. For the ELISA process, IL-6 and IL-8 (inflammatory mediators) levels were measured in culture supernatants in response to varying PCSK9 treatments using ELISA kits (from R&D Systems®). For Western immunoblotting, total protein was estimated using BCA (bicinchoninic acid) method. In this process, 25 µg of total protein was loaded onto polyacrylamide gels and transferred onto PVDF (polyvinylidene difluoride) membranes by wet blotting. The membranes were probed for primary antibodies p-P38 and p-JNK (Cell Signaling Technologies®), which are part of the MAP kinase signaling pathway, in 1:1000 concentration overnight at 4°C and

subsequently developed using the substrate. Membranes were stripped and re-probed for β-actin (from Santa Cruz Biotechnology Inc.®) as a loading control.

Results: PCSK9 was discovered to reduce the expression levels of both pro-inflammatory cytokines IL-6 and IL-8 in Rheumatoid Arthritis synovial fibroblasts, with higher concentrations of PCSK9 reducing these pro-inflammatory cytokines the most. PCSK9 was also found to partly activate the MAP kinase signaling pathway in Rheumatoid Arthritis synovial fibroblasts through analyzing the effects of PCSK9 on the primary antibodies p-P38 and p-pJNK.

Conclusion: In Rheumatoid Arthritis synovial fibroblasts, PCSK9, in a dose-dependent manner, reduced the expression levels of pro-inflammatory cytokines and had a partial effect on reducing signaling pathways. However, further studies should be performed to determine the exact underlying relationship and mechanism. To validate our preliminary data, future studies in animal models of Rheumatoid Arthritis will be performed. However, our data has offered initial results that suggest the effect PCSK9 inhibitors have on inflammation in patients with Rheumatoid Arthritis, allowing the potential for PSCK9 inhibitors to be used for Rheumatoid Arthritis patients with Atherosclerosis.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 2-433

Poster Title: Non-Cardiac Drug Induced QT/QTc Prolongation: A Retrospective Chart Review

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Purpose: Assessment of the effect of non-cardiac medications has not been well characterized for non-specific conduction disorders, specifically QT Prolongation in a predominately urban, African American population. Prolonged QTc (QT interval corrected for heart rate) is clinically associated with the dangerous ventricular arrhythmia, Torsades de Pointes (TdP) which can lead to sudden cardiac arrest. Currently, data on the prevalence of QTc prolongation in these minorities is limited. This study evaluated the effect of non-cardiac drugs on the QT Interval in a large public university associated teaching hospital serving an urban, predominately minority population.

Methods: Electronic medical records were utilized to conduct a retrospective chart analysis for patients admitted to Howard University Hospital (HUH) from January 2013 to December 2015. Patients were selected for inclusion if they had an electrocardiogram (EKG) during their inpatient stay, and were diagnosed with a non-specific conduction disorder (ICD-9 code 794.31). Exclusion criteria included age < 18, prior history of NYHA Stage II/IV heart failure, pregnancy and no EKG upon admission. Data extracted were patient demographics, laboratory data, comorbidities, and administered medications. PR, QT and QRS intervals were measured from the EKG and the corrected QT (QTc) interval was calculated using Bazett's formula considering < 450 ms as normal and adjusting for heart rate. The thresholds used to define an elevated QTc interval were > 450 ms and 500 ms. Patients were categorized into three groups on the basis of how many non-cardiac QTc prolonging drugs they were taking: either zero, one or multiple non-cardiac QTc prolonging drugs. The groups were compared at baseline using chi-square statistics for categorical variables and ANOVA for continuous variables. Bivariate logistic regression was utilized to determine which of the independent variables were associated with an elevated QTc interval and multivariate logistic regression models were developed to

ascertain whether utilization of non-cardiac QTc prolonging drugs was independently associated with a prolonged QTc interval after adjusting for confounders.

Results: Altogether, 121 patients met inclusion criteria, and 71 (59%) were taking at least one non-cardiac QTc prolonging medication. Patients taking multiple non-cardiac QTc prolonging medications had a higher mean QTc interval (503+64.6 ms) than those taking only one of these medications (484.2+42.0 ms) or none at all (467.4+53.5 ms). In bivariate logistic regression analysis, factors associated with a QTc interval > 450ms included multiple non-cardiac QTc prolonging medications (OR=4.36, p=0.02) and presence of an endocrine disorder (OR=3.28, p=0.02). Factors associated with a QTc interval > 500 ms in bivariate analysis included multiple non-cardiac QTc prolonging medications (OR=2.66, p=0.04) and hypokalemia (OR=2.73, p=0.04). After adjusting for confounders using multivariate logistic regression, the odds of a QTc interval > 450 ms were 4 times higher in patients taking multiple non-cardiac QTc prolonging medications (p=0.04) when compared to patients taking no non-cardiac QTc prolonging medications. Although the likelihood of a QTc interval > 500 ms was higher when taking multiple QTc prolonging medications (OR=2.77, p=0.06), the association was no longer statistically significant after adjusting for confounders in a multivariate logistic regression. The most common class of offenders was antipsychotics medications, with Seroquel (N=12), Advair (N=11) and Abilify (N=6) being the most frequent.

Conclusion: In this underserved population, over half of the patients studied received at least one medication known to prolong to QT interval, and many of these patients had elevated QTc intervals. The patients with QTc prolongation have higher odds of developing adverse outcomes. While none of the patients in this study presented with TdP, further studies are warranted to determine the clinical implications of the alarming presence of elevated QTc intervals, including surveillance and characterization of the degree of TdP.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 2-434

Poster Title: School of pharmacy faculty members' perceptions of students' knowledge of medical terminology

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Purpose: Medical Terminology is not a required standalone course within the University of Wyoming School of Pharmacy (UW SOP) curriculum. With the implementation of inter-professional education experiences, mandated by the 2016 ACPE standards, common medical terminology language is needed for communication among health professional students. This study was designed to gauge school of pharmacy faculty members' perceptions of current student's knowledge in medical terminology. Areas of focused questions included: are students weak in medical terminology; is medical terminology offered in coursework throughout the SOP; and should this be a mandated course.

Methods: This research was given exempt status through the institutional review board. A survey was conducted and all faculty members in the University of Wyoming School of Pharmacy were given a survey at the beginning of the 2015 Fall Academic Year. Faculty used Likert-type scales to rate their responses regarding their perceptions of student ability levels, preparation, and readiness to utilize medical terminology while in pharmacy school. We also collected qualitative data about faculty members' personal utilization of medical terminology in their courses.

Results: Eighty-six percent of the faculty completed the survey. Fifty-eight percent of the faculty believed that medical terminology should be a required course in Pharmacy School and sixty-four percent currently included medical terminology into lectures. Only thirty-eight percent of faculty agreed or strongly agreed that students were prepared to use medical terminology on rotations.

Conclusion: The results have been shared with the School of Pharmacy curriculum committee. In the short term, faculty will look for additional opportunities to implement medical terminology into existing courses. Courses such as Physical Assessment, Pharmacy Practice Lab, and Pathophysiology were identified as key places for enhancing the curriculum with medical terminology. Future implications include surveying fourth year pharmacy students both pre- and post-rotations to gauge their confidence in using medical terminology and the impact of this on inter-professional interactions.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 2-435

Poster Title: Pharmacist involvement in Accountable Care Units on general medicine floors at a community hospital

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Purpose: In 2001, the Institute of Health came out with a report titled Crossing the Quality Chasm: A New Health System for the 21st Century. The report stated that, "the delivery of care often is overly complex and uncoordinated, requiring steps and patient 'handoffs' that slow down care and decrease, rather that improve safety." A community hospital attempted to coordinate and target patient care through the creation of Accountable Care Units (ACU) to care for patients admitted to the internal medicine service.

Methods: An Accountable Care Unit (ACU) is a geographic care area responsible and accountable for the clinical, service, and cost outcomes it produces. The 4 features of a ACU are 1) unit based teams 2) patient centered workflow 3) unit level performance data and 4) unit management partners. The physicians and nurses are geographically on the same floor and only follow patient on that floor. There is also a staff pharmacist and case manager that follow only patients on that floor. By sharing space, time, and process, teamwork is an inevitable outcome. To increase patient centered workflow, the ACU implemented Structured-Interdisciplinary-Bedside-Rounds (SIBR). These daily rounds standardize communication between the team and include the patient in the team's cross checks each to improve the quality and safety of care. By creating unit based data, the ACU can identify areas of strength and areas that need improvement. Having duel leadership between a Medical Director and Nurse ensures consistency of the ACU's policy through both disciplines and making sure the staff feel connected to the goals of the unit.

Results: Since the implementation of the ACU on the ward, there have been a decrease in 30 day readmissions, decreased medical costs, and decreased length of stay. The doctors were also able to interact with the patient more. They did not have to go all the way across the hospital to find their patients because of the geographical set up of the ACU. During SIBR, we were able to

make an interdisciplinary patient care plan centered around the patient's needs. By including the patient, we are making them more responsible for their personal health care. In addition, implementing SIBR rounds made sure that the entire medical team was on the same page about the plan for the day.

Conclusion: There are multiple problems in the United States health care system that lead to patient safety issues including the structure of the system. By restructuring our hospital wards, we can enhance communication between providers and build engagement to improve the quality of care a patient receives. Comradery is built between the team because they are constantly around each other, caring for the same patients. Being an active part of the delivery of care makes providers more invested in the care of their patient's, as well as their patient's final outcomes, thus improving patient safety.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 2-436

Poster Title: Assessment of testosterone replacement therapy monitoring within the Cheyenne veterans affairs medical center

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Purpose: Testosterone replacement therapy is a restricted treatment prescribed in the veteran's affairs setting that requires monitoring to assess safety and efficacy of its use. The purpose of this medication utilization evaluation (MUE) is to determine if testosterone is monitored appropriately in the VA population of Cheyenne, WY. Per VA criteria for use, morning testosterone levels between 7:30 and 10:00am, hematocrit and hemoglobin, prostate specific antigen, liver function tests and lipid profiles should be monitored annually. A hematocrit level greater than 54% warrants a discontinuation of therapy due to increased risk of venous thromboembolism.

Methods: This MUE initially reviewed 154 patients at the Cheyenne VA medical center that were currently taking testosterone. This data was obtained using a database through the computerized patient record system (CPRS). Patients were identified that had an active prescription for testosterone replacement therapy within the 15 month period of March 2015-June 2016. This medication utilization evaluation did not assess whether or not these patients met inclusion or exclusion criteria when they were originally initiated on testosterone. Once the patient list was established, the date of the initial consult was used to determine if the patient had a renewal consult within 15 months from that consult. If the patient met these two previous criteria, labs were reviewed within that same 15 months to determine if the patient had appropriate lab monitoring. Labs included: testosterone, hematocrit and hemoglobin, PSA, liver function tests, and a lipid profile. If the patient did not have any one of these labs monitored within the 15 month period, it was considered as inappropriate monitoring. The timing of testosterone levels was also evaluated. If levels were drawn at 10:00am or earlier, it was considered an appropriate sample, and levels drawn at 10:01am and later were considered inappropriate.

Results: Of the 154 patients that were currently taking testosterone replacement therapy, 34 patients were excluded for this report because they had not been on testosterone therapy for 15 months. Out of the 119 eligible patients, 95 patients had a renewal ordered within 15 months of initiating treatment or within 15 months of other renewals. A majority of the patients had a testosterone level (76.5 percent), hematocrit/hemoglobin level (88.2 percent), CBC panel (85.7 percent), PSA levels (75.6 percent), AST/ALT levels (80.6 percent), and a lipid panel (81.5 percent) within the 15 month period. A total of 15.1 percent of patients had a hematocrit above 54 percent during treatment and 65.5 percent of patients had testosterone levels drawn after 10:00am. During March 2015-June 2016, providers at the Cheyenne VA healthcare system completed approximately 80 percent appropriate renewals for patients taking testosterone replacement therapy. Patient's labs were being appropriately monitored every 15 months and a majority of patients did not have a hematocrit above 54 percent. However, 65.5 percent of testosterone levels were drawn after 10:00am.

Conclusion: The monitoring of testosterone replacement therapy is not being completed appropriately at the Cheyenne VA medical center. Areas of improvement for the future include: provider education on the appropriate timing of drawing testosterone levels, obtaining all necessary follow-up labs and assessment, and follow-up of those patients still taking testosterone replacement therapy when HCT levels are greater than 54 percent.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 2-437

Poster Title: Effect of twice-daily vs. once-daily dosing on hemoglobin A1c with long-acting basal insulin glargine U100

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Purpose: Insulin glargine U100 is a long-acting basal insulin approved by the Unites States Food and Drug Administration (FDA) to be administered once daily for the treatment of Diabetes Mellitus. The estimated duration of action is between 10 to greater than 24 hours. As such, it is thought to be more effective at lowering hemoglobin A1c (A1c) when giving this insulin twice daily compared to once daily in certain cases. Literatures on glargine U100 twice daily and HgA1c reduction are lacking. This retrospective chart review aims at assessing whether or not twice daily dosing has an advantage over once daily dosing.

Methods: This cross-sectional analysis is pending approval from the institutional review board. Patients of the University of Wyoming Family Medicine clinic in Cheyenne, WY who had a prescription for insulin glargine U100 (Lantus) on their profile between June 1, 2015 and May 31, 2016 were identified. A chart review was then performed to collect total daily insulin dose, most recent A1c value, dosing frequency, type of diabetes mellitus, the date started on their current dose of insulin, and the date of their last A1c. The average A1c was then compared between those taking insulin glargine U100 daily and those taking it twice daily using an unpaired Student's t-test.

Results: Twenty-four patients were identified with a prescription for insulin glargine U100 on their profile and an A1c value that had been measured after their insulin dose or schedule had changed. Of these, five were taking insulin glargine U100 on a twice-daily schedule and nineteen were taking it on a once-daily schedule. The average A1c in the group that administered insulin glargine twice daily was 9.14%, and the average when administered once daily was 8.7%. This data was then analyzed, and our results showed that using twice-daily

versus once-daily yielded no significant difference on the A1c value (95% CI: -1.05 to 1.93, p=0.53).

Conclusion: Our results showed that there is no statistically significant difference between using insulin glargine U100 twice daily versus once daily in lowering the A1c level. Given the small sample size and many potentially confounding factors, such as the initial control that subjects had when each regimen was initiated, the time since the regimens were initiated, and potentially variable adherence to the regimen among the subjects, a Type II error should be ruled out with further studies.

Submission Category: Oncology

Submission Type: Descriptive Report

Session-Board Number: 2-438

Poster Title: Accuracy of documentation and monitoring of oral chemotherapy in a small community cancer center

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Purpose: Advancements in oncologic research has led to the approval of new oral chemotherapy agents including endocrine therapy and cytotoxic agents. These self-administered agents provide patients with a convenient option with perceived benefits of less clinic visits and less complications. However, oral chemotherapy is only effective when patients adhere to the prescribed administration schedule. The potential for drug-drug interactions and unwanted toxicity can lead to non-adherent patients. While chemotherapy education can help identify potential problems in the beginning, continued monitoring and assessing patient adherence when patients are seen in clinic can lead to better efficacy, patient outcomes and overall survival.

Methods: Retrospective chart reviews were completed and de-identified prior to analysis by the primary author. A two-month time period from May to June of 2016 of a small community oncology clinic schedule was reviewed. All patients identified to be on oral chemotherapy were evaluated for this study. Adherence documentation, chemotherapy education documentation, monitoring documentation per package insert from manufacturers, documentation within the electronic medication record (EMR) on the medication home list, and documentation of drug interactions were reviewed and assessed for each individual patient that was identified.

Results: In the two-month time frame, there were 48 patients identified to be on oral chemotherapy or endocrine therapy, of these patients 20 were on oral chemotherapy. Adherence with oral chemotherapy or endocrine therapy was not documented within provider notes specifically in any of these patients. Chemotherapy education was not always documented within the EMR and monitoring parameters were not discussed within provider

notes in the EMR . Over half of the patients did not have these medications added to their home medication lists that were accessible by other departments utilizing the EMR. Drug-drug interactions were not documented in most cases and upon review many patients had drug interactions that were a category D. Most documentation within the medication list was incorrect in the EMR.

Conclusion: This study illustrates the difficulty encountered with new oral chemotherapy agents especially with regard to documentation and assessment of adherence and toxicity. Currently, there is no mechanism within the EMR to trigger providers to ask specific questions or to document on oral chemotherapy. Electronic medical record support will be developed to assist with the documentation of therapy within this population of patients. This study also supports the need for a clinical oncology pharmacist to assist with the management, monitoring and documentation of appropriate therapy in oral chemotherapy and endocrine therapy patients.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-001

Poster Title: Retrospective data analysis on the benefits of having a standing order for emergency contraceptives and the proper medication administration

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Purpose: In the United States there are only 9 states that allow pharmacists to dispense emergency contraception (EC) under a collaborative practice agreement or a state-wide standing order. In Massachusetts two EC products are available through standing order, levonorgestrel and ulipristal acetate. Patients often use over-the-counter (OTC) levonorgestrel due to ease of access, however prescription only ulipristal acetate may be more clinically appropriate for certain patients. The purpose of this study was to investigate the benefits of an EC standing order in a federally qualified health center (FQHC) pharmacy.

Methods: This was a retrospective review of pharmacy data approved by an institutional review board. Patient records were eligible for inclusion in this study if the patient received an EC product via standing order between August 2015 and August 2016. Patient records were excluded if the intake form was missing information/not complete. The pharmacy's emergency contraception intake form was analyzed retrospectively. The primary objective of the study was to investigate how many patients who received EC were indicated to receive ulipristal acetate. Secondary objectives for the study were to determine the reason why a patient was indicated for one product over the other, evaluate the costs for patients who received EC through standing order and assess whether a referral was needed for patients. Pertinent data included: the date the patient received the EC, the reason for EC, number of days since last intercourse, date of last menstrual cycle, height, weight and body mass index of the patient, any current medications the patient is taking, whether or not anti-nausea medication (meclizine) was recommended, whether ulipristal acetate or levonorgestrel was dispensed, and whether there was a referral and decision made.

Results: Thirty EC intake forms were reviewed. Two were excluded due to incompleteness of the intake form. Out of the 28 records meeting inclusion/exclusion criteria, 5 patients received levonorgestrel and 23 received ulipristal acetate. Two of the five levonorgestrel recipients had a body mass index that would categorize them for ulipristal acetate; however, ulipristal acetate was on backorder at the time. All 23 patients that received ulipristal acetate had patient characteristics that would make levonorgestrel a non-preferred agent. Two patients received ulipristal acetate due to seeking EC more than 72 hours since last intercourse. Twenty-one patients received ulipristal acetate due to a BMI over 25kg/m2. In studies, levonorgestrel has shown to have lower efficacy for overweight patients compared to ulipristal acetate. One patient was counseled on the benefit of an intrauterine device instead of oral EC due to a body mass index of 38kg/m2. The patient declined and chose to use ulipristal acetate instead. All patients received instructions for use of each EC product and standardized counseling from a pharmacist . Six patients accepted the suggestion to be referred to a provider. All patients who received EC from the clinic were able to receive EC with $0 co pay.

Conclusion: Prescription only ulipristal acetate was indicated in 77% of patients that would not have had access to it without a standing order. Patients receiving EC via a standing order were able receive information on EC and obtain referrals to providers. These benefits are unlikely to occur when purchasing EC over the counter. Additionally, OTC EC typically costs patients between 40 and 50 dollars. Patients in the study received the medication at no out-of-pocket cost through insurance. Utilizing a standing order greatly benefited patients seeking EC and should be expanded throughout the country.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 3-002

Poster Title: Real-world diabetes outcomes after a Medicaid formulary change in long-acting insulin analogue from insulin glargine to insulin detemir

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Purpose: Long-acting insulin analogues have varying pharmacokinetic profiles that may influence their relative effect on hemoglobin A1c (HbA1c), hypoglycemic episodes, weight, and total daily insulin dose in patients with diabetes mellitus. Existing studies on the effects of switching basal insulin formulations have had conflicting results and often examine a population who is dissatisfied with or not controlled on the current insulin. The purpose of this study is to retrospectively examine the clinical efficacy and safety outcomes of a formulary-mandated switch from insulin glargine to insulin detemir in patients receiving their diabetes care at a Federally Qualified Health Center (FQHC).

Methods: The institutional review board for Regis University approved this retrospective chart review. Patients who were 18 years and older with type 1 or type 2 diabetes were included if they received care at Clinica Family Health (CFH), had Colorado Medicaid as their primary insurance, had been on insulin glargine for at least 6 months, and had their insulin switched from insulin glargine to insulin detemir between April 1, 2014 and April 1, 2015 as a result of the mandated formulary conversion. Patients who left care at CFH less than 6 months after switching basal insulin, had a diagnosis of gestational diabetes, lacked a HbA1c at baseline or 6-months (plus or minus 30 days) post-switch were excluded. The primary outcome was change in HbA1c at 6 months. It was estimated that 88 patient charts would need to be reviewed to detect a change of 0.54 percent in HbA1c, using a two-sided alpha of 0.05 and 95 percent power. Secondary outcomes included HbA1c at 1 year, total daily basal insulin dose, use of bolus insulin, total daily bolus insulin dose, weight, twice daily basal insulin regimen, use of oral antidiabetic agents (OADs), number of patients converted back to insulin glargine, diabetes-related hospitalizations, and severe hypoglycemia. All outcomes were assessed at 6 months and 1 year (OADs only at 6 months).

Results: A report has been generated that identifies all Medicaid patients who were receiving care at CFH and who were on insulin glargine at the time of the shift in preferred insulin. This report has identified 235 potential candidates for inclusion. Data collection is ongoing, and results are anticipated to be complete in December 2016.

Conclusion: This study fills a gap in the existing literature on the effects of switching from insulin glargine to insulin detemir. It describes the real-world clinical effects of a mandated (rather than elective) change in basal insulin in a medically underserved population.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 3-003

Poster Title: Implementation of education with ongoing feedback for the appropriate treatment and diagnosis of urinary tract infections: Antimicrobial stewardship collaborative with Colorado Hospital Association

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Purpose: Urinary tract infections (UTIs) continue to be one of the most common indications for antibiotics among hospitalized patients, yet the diagnosis and treatment varies among providers. Increasing resistance of urinary pathogens, increased risk of collateral damage, and the inappropriate treatment of asymptomatic bacteriuria has led to the creation of antimicrobial stewardship programs within Colorado institutions. The goals of this collaborative include the following: decrease the rate of Clostridium difficile infection (CDI), reduce fluoroquinolone use, limit duration of treatment, reduce readmission rates for UTIs, and improve the accurate diagnosis of UTIs according to the Infectious Diseases Society of America (IDSA) guidelines.

Methods: This collaborative encompasses both a retrospective chart review for baseline data collection and an ongoing interventional phase in conjunction with the Colorado Hospital Association. Baseline data was collected for 80 randomly selected patients with a UTI diagnosis during the year 2014 using the electronic medical record system. The interventional phase includes daily prospective review with feedback and education from Infectious Diseases (ID) specialists (e.g. ID pharmacist, ID attending physician), bimonthly education sessions to hospitalists and Emergency Department providers, creation of flowcharts for the diagnosis and treatment of UTIs, and daily reports to identify patients on fluoroquinolones and treatment of asymptomatic bacteriuria. Quarterly review of 20 randomly selected patients with UTI diagnoses is completed for post-implementation data collection.

Results: Baseline data collection revealed that 48 percent of patients met IDSA guideline definition of UTI. Of these, only 69 percent of patients had localizing urinary symptoms present and 30 percent of patients did not have a urine culture performed. At baseline, 56 percent of patients were treated with fluoroquinolones and the median total duration of therapy was eight days. There were 5 percent of patients readmitted within 30 days for a UTI. Preliminary post-implementation phase data reveals an average of 43 percent of patients meeting IDSA guideline definition of UTI. Fluoroquinolone prescribing has decreased to an average of 43 percent during the post-implementation phase. Further, the median total duration of therapy during this period is eight days. There has been a decrease in patients readmitted within 30 days for UTI to 2 percent in the post-implementation phase. Quarterly results are ongoing and continue to be collected.

Conclusion: Based on preliminary post-implementation data, fluoroquinolone prescribing and readmissions for UTIs have decreased. The main area for continued improvement is the appropriate diagnosis of an UTI and decreased treatment of asymptomatic bacteriuria. Continued efforts at educating providers with daily reminders and the creation of flowcharts to help streamline the proper approach to diagnosing and treating UTIs will continue to improve antimicrobial stewardship practices in this area.

Submission Category: Clinical Services Management

Submission Type: Evaluative Study

Session-Board Number: 3-004

Poster Title: Effect of the implementation of a pharmacist-directed, nurse-run antiarrhythmic drug monitoring program

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Purpose: Antiarrhythmic medications carry risk of toxicity and adverse drug events, yet safety monitoring guidelines are not well-established for many of them. In collaboration with Kaiser Permanente Department of Cardiology, including electrophysiologists and nurses, clinical pharmacy specialists developed monitoring guidelines for these medications. Additionally, a multidisciplinary antiarrhythmic drug monitoring program was implemented; it utilized a refill protocol which made refills contingent upon compliance with monitoring. The purpose of this study was to determine the impact of the monitoring program on compliance with the recommended safety monitoring parameters.

Methods: This institutional review board-approved, retrospective cohort study evaluated patients who received antiarrhythmic drug therapy before (control group) and after (intervention group) the implementation of an antiarrhythmic monitoring program which occurred on 10/1/2011. Patients were included if they were aged 18 years and older and had filled a prescription for an antiarrhythmic drug prescribed by a cardiologist during the study period. Monitoring in the control group consisted of standard care by the managing cardiologist and encompassed the study period 7/1/2011 to 10/1/2011. Monitoring in the intervention group was done through a pharmacist-directed, nurse-run prescription refill protocol which prompted patients to complete recommended safety monitoring prior to receiving antiarrhythmic drug refills with a study period of 4/1/2016 to 7/1/2016. The drugs included were disopyramide, dofetilide, dronedarone, flecainide, mexiletine, procainamide, propafenone, quinidine, and sotalol. Amiodarone was excluded because it was monitored by a separate, pre-existing monitoring service. Specific monitoring parameters, including labs and

electrocardiograms, and their recommended frequency varied by drug. Chart review of the electronic medical record was performed to determine whether each monitoring test was complete or incomplete. The primary outcome measure was the total percent compliance with recommended safety monitoring parameters for all antiarrhythmic drugs in each group. Secondary outcomes included the percent compliance for individual antiarrhythmic drugs. Statistical comparison for differences between groups was performed using chi-square test.

Results: A total of 349 patients comprising 807 recommended monitoring tests were identified as the control group. The intervention group consisted of 531 patients comprising 1158 recommended monitoring tests. For the primary outcome, the intervention group completed 971 out of 1158 (83.9 percent) recommended monitoring tests versus 586 out of 807 (72.6 percent) in the control group representing a statistically significant difference (p less than 0.0001). Within the secondary outcomes, compliance with monitoring increased significantly for dofetilide (80.3 vs 57.7 percent) and sotalol (83.1 vs 54.9 percent).

Conclusion: Implementation of a pharmacist-directed, nurse-run antiarrhythmic drug monitoring program significantly improved compliance with overall safety monitoring. The majority of this improvement was driven by significantly increased compliance with dofetilide and sotalol monitoring. The impact of improved safety monitoring on clinical outcomes was beyond the scope of this study and is yet to be determined.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 3-005

Poster Title: Characterization of the T cell response induced by an experimentally isolated antigen to evaluate its potential role in the immune-mediated pathology of Multiple Sclerosis

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Purpose: Multiple Sclerosis (MS) is a demyelinating disease affecting approximately 2.3 million people worldwide. While suspected to be an autoimmune disease, the exact cause of MS remains unknown. Current treatment options are only moderately effective, due in large part to this lack of pathophysiological understanding. Immunoglobulins are found to be elevated in the cerebrospinal fluid (CSF) of MS patients, but not healthy controls, suggesting the involvement of B cells in MS patient CSF. This study investigated the ability of an antigen, isolated from MS CSF antibodies, to initiate T cell activation in vitro to evaluate its potential role in MS pathology.

Methods: The institutional review board approved this case-control study. Peripheral blood mononuclear cells (PBMCs) were obtained from the Rocky Mountain MS BioBank as well as from healthy volunteers to serve as controls. Samples were coded to blind the researchers throughout conduction of T cell specificity assays using a mixed lymphocyte assay and analysis via flow cytometry. Both MS (n = 16) and control (n = 12) PBMC samples were incubated for 6 hours at 37 degrees Celsius, 5.5 percent CO2 in the presence of a positive control, negative control, or the experimental antigen to allow for T cell activation and proliferation. The samples were then stained with antibodies against CD3, CD4, CD8, CD45RA, CD45RO, CD40, Th17, IFN-gamma, and Ki-67 to allow for discernment by flow cytometry. IFN-gamma served as a marker for T cell activation, Ki-67 as a marker for T cell proliferation, and the other stained proteins permitted evaluation of specific T cell subpopulations (e.g. memory vs. naïve, helper vs. cytotoxic, etc.). The samples were unblinded after flow cytometry analysis and the data

evaluated, comparing MS and control groups using a Student's t-test to determine significance of any observed differences.

Results: Interestingly, there was a significant increase in average T cell activation, as measured by IFN-gamma production, for both CD4+ and CD8+ T cells in the control samples compared to the MS patient samples (CD4+: 6.63 percent vs. 1.64 percent; CD8+: 6.4 percent vs. 0.55 percent; P less than or equal to 0.05). Control samples also demonstrated a higher level of T cell proliferation, as measured by Ki-67, versus the MS samples (CD4+: 13.63 percent vs. 2.58 percent; CD8+: 9.85 percent vs. 1.79 percent; P less than or equal to 0.05). However, this did not correlate with an increase in CD40 expression, indicative of antigen-presenting cells, in the control samples (24.76 percent controls vs. 47.83 percent MS; P equals 0.13). When comparing memory vs. naïve T cell responses, the MS samples showed a stronger naïve response (CD4+: 65.27 percent vs. 44.71 percent, P equals 0.07; CD8+: 82.47 percent vs. 67.01 percent, P equals 0.04) and a similar memory response (CD4+: 36.52 percent vs. 38.02 percent, P equals 0.9; CD8+: 9.76 percent vs. 14.75 percent, P equals 0.38) compared to the control samples.

Conclusion: Theoretically, MS patient PBMCs should recognize an antigen targeted by antibodies in the CSF of MS patients while the PBMCs from healthy volunteers should not. Subsequently, a stronger memory T cell response in the MS patient samples would be expected; however, that was not observed in this study. The explanation for these results is unclear. The antigen might be presented differently in vitro vs. in vivo. The B/T cell interactions of interest could be CSF specific and absent in the periphery. Validation and elucidation of these results will require further investigation of a larger number of samples.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 3-006

Poster Title: Synthesis and biological evaluation of anti-tumor agents inspired by marine sponges

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Purpose: The medicinal chemistry of benzimidazole based alkaloids with extended amidine functionality were investigated for their anti-tumor potential. Preliminary data show these agents target the N-terminal ATP binding sites of Topoisomerase two alpha, resulting in potent anti-tumor activity. Various derivatives were synthesized and tested in order to further investigate their bioactivity, anti-tumor effects and their ability to inhibit or reverse epithelial-mesenchymal transition (EMT) in metastatic SW620 colon cancer cell lines.

Methods: The synthesis of various extended amidine benzimidazoles was performed starting with commercially available starting material. 4-methyl-2-nitroaniline was acetylated to form N-(4-methyl-2-nitrophenyl) acetamide with acetic anhydride and sulfuric acid. Methylation of N-(4-methyl-2-nitrophenyl) acetamide was performed using dimethyl sulfate in potassium hydroxide solution to form N-methyl-N-(4-methyl-2-nitrophenyl) acetamide. Reduction of the dinitro group of N-methyl-N-(4-methyl-2-nitrophenyl) acetamide generates the N-(2-amino-4-methylphenyl)-N-methylacetamide followed by subsequent Phillips condensation in refluxing sulfuric acid to form the 1,2,5-trimethyl-1H-benzimidazole. 4,6-dinitro-1,2,5-trimethyl-1H-benzimidazole was generated via dinitration of 1,2,5-trimethyl-1H-benzimidazole with sulfuric and nitric acid. Catalytic reduction of 4,6-dinitro-1,2,5-trimethyl-1H-benzimidazole was performed using palladium on carbon in methanol to generate the 4,6-diamino-1,2,5-trimethyl-1H-benzimidazole. Fremy's oxidation of 4,6-diamino-1,2,5-trimethyl-1H-benzimidazole generated the phosphate salt of 6-amino-4-imino-1,2,5-trimethyl-1H-benzimidazole-7-one, which was then transaminated using primary amines in methanol at 30-40 degrees centigrade

to form various extended amidine benzimidazole alkaloids (BH-12-198, BH-12-203, BH-12-205, BH-12-206, BH-12-207, BH-12-209, BH-12-210, BH-12-212, BH-12-213, BH-12-214). Compounds were purified by reverse phase chromatography and biological analysis was assessed using the sulforhodamine B (SRB) cytotoxicity assay, measured effects on EMT via reporter and Western blot analysis, and a modified Boyden invasion assay were used to evaluate the anti-tumor activity of these molecules.

Results: The anti-tumor potential of the various extended amidine benzimidazoles was investigated in the SW620 colon cancer cell line through inhibition concentration fifty-percent (IC) cytotoxicity determination. The inhibition concentration fifty-percent per agent were as follows: BH-12-198 (0.910 micromolar), BH-12-203 (0.059 micromolar), BH-12-205 (0.490 micromolar), BH-12-206 (0.840 micromolar), BH-12-207 (0.460 micromolar), BH-12-209 (1.1 micromolar), BH-12-210 (0.757 micromolar), BH-12-213 (0.382 micromolar), BH-12-214 (0.509 micromolar). Furthermore, the effect of these agents on biomarkers for EMT were investigated, showing down-regulation of vimentin, and N-cadherin and subsequent upregulation of E-cadherin and providing evidence to support reversion of the EMT and the malignant phenotype in colon cancer.

Conclusion: Benzimidazoles with extended amidine functionality were determined to be potent anti-tumor agents exhibiting cytotoxicity ranging from nanomolar to low micromolar range inhibition concentration fifty-percent and displayed impressive reversion of the EMT in metastatic SW620 colon cancer cells making these agents potential pharmaceutical agents for the treatment and prevention of metastatic colon cancer, and potentially many other types of human cancer.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-007

Poster Title: Oral fluoroquinolone administration in respect to interacting substances: The pediatric diet dilemma

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Purpose: Oral fluoroquinolones (FQs) remain as options for treatment of pediatric patients in certain circumstances (i.e. infections with multidrug-resistant organisms or as oral treatment when the only other option is a parenteral antibiotic). FQ administration should be separated from substances that contain divalent or trivalent cations to optimize bioavailability. Pediatric patients oftentimes receive concomitant interacting substances (feeds/multivitams), which impairs the absorption of the FQ and can put patients at risk for development of resistance. The purpose of this study was to describe the appropriate and inappropriate administration of oral FQs in relation to feeds and other substances in pediatric patients.

Methods: The Organizational Research Risk & Quality Improvement Review Panel at Children's Hospital Colorado approved this retrospective review. All pediatric patients less than 18 years of age who received oral ciprofloxacin or oral levofloxacin between January 1, 2016 and July 31, 2016 were included. Each FQ administration was evaluated regarding appropriateness. Ciprofloxaicn and levofloxacin administration data (including timing, formulation, and route), feeding data (including timing in relation to FQ administration), and oral medication data for medications with divalent or trivalent cations (including timing in relation to FQ administration) was collected to assess appropriateness of FQ administration. Interacting substances included those containing calcium, magnesium, zinc, and iron. Appropriate administration of levofloxacin and ciprofloxacin was defined based on the administration recommendations for each drug respectively from Micromedex®.

Results: There were a total of 539 administrations evaluated during the study period (ciprofloxacin, n=134 and levofloxacin, n=405) in 124 patients. Of the 539 administrations, 78% had an order for an interacting substance. A total of 330 administrations were considered inappropriate (61%). Of the 330 inappropriate administrations 259 (78%) were due to concomitant feeds, 43 (13%) were due to concomitant oral substances, and the remaining 28 (8%) were due to both concomitant feeds and oral substances. When evaluating levofloxacin versus ciprofloxacin administration, both had similar rates of inappropriate administration (248/405, 61% versus 82/134, 61%, respectively).

Conclusion: Concomitant administration of substances that impair FQ absorption is common in the pediatric population. Providers should take compliance with administration instructions into consideration when choosing a FQ for treatment of infections in the pediatric patient population, as receipt of interacting substances is common. Potential quality improvement measures identified include more descriptive administration comments within the electronic medical record and education of the pharmacy and nursing staff to insure appropriate timing of FQs.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 3-008

Poster Title: Analysis of antibiotic selection and duration of therapy for the treatment of aspiration pneumonia at an academic medical center

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Purpose: Aspiration pneumonia is an infection that is frequently treated in hospitalized patients; however, data on optimal treatment and duration of therapy for aspiration pneumonia is limited. The lack of data leads to ambiguity about the need to cover certain organisms including anaerobes, Pseudomonas aeruginosa, and methicillin-resistant Staphylococcus aureus (MRSA). This project was designed to describe the current practices in treating aspiration pneumonia at Denver Health Medical Center, compare current practices with treatment guidelines, and identify potential areas for antibiotic stewardship interventions.

Methods: This is a retrospective cohort study analyzing the treatment of adults with aspiration pneumonia. One hundred twenty-four patients with an ICD-9 code for aspiration pneumonia admitted between January 2015 and June 2015 were electronically identified. Of these, 99 patients who had aspiration and treated with antibiotics were randomly selected for review. Patient demographics, pertinent past medical history, microbiological culture data, and antibiotic treatment were reviewed. Pneumonia was classified as hospital-acquired aspiration pneumonia (HAAP) if onset of symptoms occurred 48 hours after hospital admission or community-acquired aspiration pneumonia (CAAP) if the patient presented with or developed symptoms of pneumonia less than 48 hours from admission. Antibiotics received by intensive care (ICU) patients were compared to those received by floor patients. Additionally, antibiotics used for patients with CAAP were compared to those with HAAP. Antibiotics use was evaluated individually and grouped as anti-pseudomonal beta-lactams, anti-MRSA, and anaerobic agents. Antibiotics and duration were compared to Denver Health's recommended agent of ceftriaxone for 5-7 days to determine how often internal guidelines were followed.

Results: Of patients reviewed, 72 percent were male and 43 percent had alcohol abuse. Fifty-four percent had CAAP; 46 percent HAAP. Respiratory cultures were obtained in 46 percent of patients. The majority of cultures was negative or grew mixed flora. Pseudomonas aeruginosa was cultured in 3 patients, and Staphylococcus aureus was cultured in 10 patients (susceptibilities not reported). Median treatment duration was 8 days (IQR 6, 13). Patients were treated with the follow frequency: anti-pseudomonal beta-lactam 47 percent, levofloxacin 28 percent, anti-MRSA 48 percent, anaerobice agent 54 percent, and ceftriaxone 33 percent. Fifty percent of ICU patients had CAAP versus 50 percent HAAP, whereas 58 percent of floor patients had CAAP versus 42 percent HAAP. Antibiotic selection among ICU patients is as follows: anti-pseudomonal beta-lactam 59 percent, levofloxacin 28 percent, anti-MRSA 61 percent, anaerobice agent 52 percent, and ceftriaxone 35 percent. Antibiotic selection among floor patients is as follows: anti-pseudomonal beta-lactam 33 percent, levofloxacin 29 percent, anti-MRSA 33 percent, anaerobice agent 56 percent, and ceftriaxone 31 percent. Treatment of HAAP versus CAAP is as follows: 63 versus 34 percent anti-pseudomonal beta-lactam, 39 versus 19 percent levofloxacin, 67 versus 32 percent anti-MRSA, and 54 versus 53 percent anaerobice agent.

Conclusion: About half of the patients received treatment against anaerobes which speaks to the uncertain need to cover these organisms. Anti-pseudomonal and anti-MRSA agents were used more frequently in ICU patients or patients with HAAP which was expected. Given the infrequency of these organisms cultured, using narrower spectrum agents could be an opportunity for antimicrobial stewardship. One way to do this would be to promote the use of ceftriaxone which is the recommended agent, but just 33 percent of patients received ceftriaxone. Lastly, patients were treated for longer than the recommended duration which provides another opportunity for antimicrobial stewardship.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-009

Poster Title: Comparison of usability, accuracy, preference, and satisfaction between three once weekly GLP-1 receptor agonist pen devices

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Purpose: Glucagon-like-peptide-1 receptor agonists (GLP-1 RAs) are subcutaneous injection medications used to treat type 2 diabetes. Three GLP-1 RAs are available as once-weekly injections using prefilled, single-use, pen devices; each with different preparation and administration requirements. Complexity of medication administration requirements has been linked to poor adherence and inaccurate dosing. The purpose of this study was to compare the usability, accuracy, preference, and satisfaction between albiglutide (Tanzeum), dulaglutide (Trulicity), and exenatide XR (Bydureon).

Methods: This was an open-label, task and interview based study comparing three GLP-1 RA pen devices. Assessments were conducted with 30 health care professional participants at one major university medical campus. The study was approved by the investigational review board and informed consent was obtained from each participant. During a 45-minute session in a private room with a computer, each participant watched the products' instructional videos in a randomized order. Subsequently, each participant demonstrated and verbalized how to use the pen devices. Accuracy and usability were assessed by one evaluator. Usability and accuracy performance outcomes were time taken to complete the administration demonstration and percent of required administration steps demonstrated correctly. Participants completed a 6-item usability survey for each device using a 5-point Likert scale where 5 was "very easy" and 1 was "very difficult" and then completed a 5-item preference survey using a ranking scale where 1 was "most preferred" and 3 was "least preferred." Continuous and categorical variables were compared using the one-way analysis of variance (ANOVA) and Fisher's Exact Test, respectively. User satisfaction ratings were compared using the Mann-Whitney test. Statistical significance was set at p less than or equal to 0.05.

Results: Average demonstration time was shorter with dulaglutide compared to exenatide XR and albiglutide (1.37, 2.30, 3.53 minutes, respectively; p less than 0.0001 for both). Based on manufacturers' instructions, the number of required administration steps for dulaglutide, exenatide XR, and albiglutide was 6, 16, and 23 respectively. Accuracy in demonstrating these steps was 84.4% with dulaglutide, 83.8% with exenatide XR, and 75.9% with albiglutide (p less than 0.05 for dulaglutide vs. albiglutide). Dulaglutide was easier to prepare for injecting than exenatide XR and albiglutide (average Likert scale scores 4.70, 3.47, 2.87 respectively; p less than 0.001 for both). Dulaglutide was easier to hold stable when injecting compared to exenatide XR or albiglutide (average Likert scale scores 4.83, 4.47, 4.30 respectively; p less than 0.05 for both). Participants found it easier to recall administration steps for dulaglutide compared to exenatide XR and albiglutide (average Likert scale scores 4.40, 3.17, 2.27 respectively; p less than 0.001 for both) and easier for exenatide XR compared to albiglutide (p less than 0.05). Twenty-eight participants (93 percent) preferred dulaglutide in overall preference, ease of use and demonstration, confidence in full dose delivery, and likelihood of recommending to other healthcare professionals (p less than 0.0001 for all).

Conclusion: Out of the three once weekly GLP-1 RAs studied, dulaglutide was associated with the highest user satisfaction, fastest demonstration with the fewest errors compared to exenatide XR and albiglutide. Most participants preferred dulaglutide overall.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 3-010

Poster Title: Evaluation of the use of systemic corticosteroids in patients with an acute exacerbation of COPD (AECOPD) and a diagnosis of pneumonia

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Purpose: COPD is a leading cause of morbidity and mortality worldwide, and pneumonia is a leading cause of death from infectious disease in the US.
Studies of systemic corticosteroids in patients with pneumonia have shown conflicting benefits and potential harms, whereas studies in patients with an AECOPD have shown significant benefits. Although these conditions are often comorbid, studies of systemic corticosteroid use in patients with both an AECOPD and pneumonia are lacking.
This study aimed to gain a better understanding of the risks and benefits of the use of systemic corticosteroids in patients with an AECOPD and pneumonia.

Methods: The institutional review board approved this retrospective chart review. We collected data on patients 40-89 years of age admitted to the University of Colorado Hospital between 7/1/12 and 5/20/16.
Patients with a hospital diagnosis of either COPD or obstructive chronic bronchitis with exacerbation and pneumonia, based on ICD-9 and ICD-10 codes, were examined for inclusion. Exclusion criteria were hospital-acquired pneumonia, no radiographic evidence of pneumonia, immunocompromised status, asthma or other lung disease, death during hospital stay, septic shock with the need for pressors, and systemic corticosteroid use within 30 days of admission. It was determined that with a population mean length of stay of 8 days and standard deviation of 4 days, to detect a 2 day length of stay difference, which we believed to be clinically significant, with 80-percent power and an alpha level of 0.05, we needed 64 patients in each group.
We compared patients who received systemic corticosteroids to those who did not. Patients who were administered systemic corticosteroids for more than one dose, or for one dose with a

discharge course of systemic corticosteroids immediately thereafter qualified for the steroid group.
The primary outcome assessed was length of hospital stay (LOHS) using a 2-tailed t-test. Secondary outcome was treatment failure, a composite of ICU admission, ventilation, escalation of steroid therapy, and 30-day AECOPD or pneumonia readmission using 2-tailed Fisher's exact test.

Results: There were 138 patients included in this study. The average age was 67.2 years, 57-percent were male and 74-percent were white. There were 89 patients in the steroid group and 49 patients in the non-steroid group. There were no statistically significant differences in the background characteristics between groups.
There was no statistically significant difference in LOHS between patients in the steroid group and the non-steroid group, with a mean LOHS of 4.7 plus/minus 3.2 vs. 4.2 plus/minus 2.1 days, respectively (p=0.273).
There was no statistically significant difference in treatment failure between the steroid and non-steroid groups (12-percent in the steroid group and 8-percent in the non-steroid group, p=0.5733). None of the components of treatment failure were significantly different between the two groups.
There was no statistically significant difference between the two groups for any of the adverse events examined (hyperglycemia, psychiatric side effects, and edema).
There was no difference in mean LOHS for patients who went to the ICU between the two groups (p=0.090). The mean LOHS for patients with severe pneumonia was longer in the steroid group compared to the non-steroid group (6.0 plus/minus 4.0 vs. 4.3 plus/minus 1.8 days, p=0.025).

Conclusion: In patients with an AECOPD and pneumonia, there was no statistically significant difference in LOHS between patients that received a course of systemic corticosteroids and those that did not. The use of systemic corticosteroids in this population also did not reduce the frequency of treatment failure or any of its components.
This study suggests that the use of systemic corticosteroids in patients with an AECOPD and pneumonia does not provide a clinical benefit, especially in the case of severe pneumonia. More research must be done before systemic corticosteroids are used routinely in this patient population with both AECOPD and pneumonia.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 3-011

Poster Title: Retrospective review of the use of as needed hydralazine and labetalol for the treatment of acute hypertension in hospitalized medicine patients

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Purpose: Prevalence of hypertension in hospitalized patients is greater than 50 percent. Treatment of chronic hypertension is based on evidence-based guidelines. No guidelines exist on the management of hypertensive urgency/severe asymptomatic hypertension in the hospitalized patient, nor have studies demonstrated benefits from BP lowering in these patients. Studies have shown the unnecessary use of PRN IV hydralazine and labetalol for management of severe asymptomatic hypertension in hospitalized patients. The purpose of our study was to evaluate the use of PRN labetalol and hydralazine (oral or IV) in hospitalized medical patients and to examine the potential negative outcomes associated with their use.

Methods: The Colorado Multiple Institutional Review Board approved this retrospective chart review. Data was collected on 250 patients admitted to the University of Colorado Hospital (UCH), an urban academic medical center, between November 2014 and April 2016. Patients were enrolled if they were 18-89 years of age, admitted to a UCH internal medicine team, and received at least one dose of as needed oral or IV hydralazine and/or labetalol regardless of previous antihypertensive treatment or hypertension diagnosis. Exclusion criteria included ICU admission, pregnancy, and recent CVA (prior to admission) in the last six months, or patients admitted for hypertensive emergency, cerebral hemorrhage, hypertensive encephalopathy, aortic dissection or aneurysm. The primary outcome was to describe the use of as needed antihypertensive medications in hospitalized medicine patients. Secondary outcomes included assessment of potential harm associated with acute treatment of severe asymptomatic hypertension, and description of changes made to patient's antihypertensive medication regimens during hospital stay and on discharge.

Results: A total of 573 doses of PRN oral or IV hydralazine or labetalol were administered to 250 patients. Oral hydralazine was the most commonly administered PRN antihypertensive (521 doses, 90.9 percent), with 25mg or 50mg being the most commonly administered doses (384, 73.7 percent). Mean BP before administration of PRN antihypertensive medication was 183/93 plus or minus 14/13 mmHg. Forty-one percent of PRN administrations were given for a SBP less than 180mmHg or DBP less than 110mmHg (threshold for hypertensive crisis definition). The BP reductions within 6 hours of PRN antihypertensive administration was less than 10 percent in 13 percent of administrations, 10-25 percent in 50 percent of administrations, and greater than 25 percent in 22 percent of administrations. Fifteen percent of administrations resulted in no BP improvement. No patients were assessed for the presence of end-organ damage prior to administration of PRN antihypertensive medication. There were no serious adverse events related to the PRN antihypertensive administration. Despite receiving at least one PRN antihypertensive medication during their hospital stay, 41 percent of patients were not continued on their home antihypertensive medication(s) while hospitalized, and 62 percent of patients did not have their home antihypertensive regimens intensified at discharge.

Conclusion: Oral hydralazine is commonly used for acute BP lowering in hospitalized internal medicine patients. Administration BP thresholds for PRN antihypertensive medication are often less than what is used to define hypertensive crisis. Many patients are prescribed PRN antihypertensive medications instead of being continued on their home antihypertensive regimens. Despite receiving PRN antihypertensive medication while hospitalized, many patients did not have the intensity of their home antihypertensive regimens increased. Internal medicine providers should be educated about the use of as needed antihypertensive medication for the management of severe asymptomatic hypertension in the hospital setting.

Submission Category: Pediatrics

Submission Type: Case Report

Session-Board Number: 3-012

Poster Title: Ofatumumab as an alternative to rituximab in pediatric patients who require anti-CD20 monoclonal antibody therapy: A case series at Children's Hospital Colorado

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Purpose: Ofatumumab is a fully human monoclonal antibody that induces B cell lysis by binding to the small and large loops of the CD20 molecule on the surface of the B cell. Currently ofatumumab is only FDA approved for the treatment of chronic lymphocytic leukemia in adults, but could be a beneficial therapy in patients with various B-cell mediated diseases who cannot receive chimeric rituximab due to hypersensitivity, intolerance, or refractory disease. This case series illustrates the off-label use of ofatumumab in two patients at Children's Hospital Colorado. Patient 1 is a 9-year-old male who received an allogeneic hematopoietic stem cell transplant at age 7 in attempt to cure his congenital dyserythropoietic anemia after two prior stem cell transplant failures. He has a history of severe intolerance/allergy to rituximab exhibited by multiple instances of secretory diarrhea, vomiting, and hives which recurred after a desensitization trial of escalating doses of rituximab. As a component of the preparative regimen for the third engraftment attempt, the health care team chose to initiate ofatumumab in order to deplete B cells and reduce potential confounding alloantibodies while minimizing the risk of intolerance or hypersensitivity to treatment. The regimen included four doses of ofatumumab: 175 mg/m2 once, followed by 580 mg/m2 every 7 days for three doses. The infusions were well tolerated with the exception of one instance of agitation, during which the infusion was paused and subsequently resumed without incident. The patient did not experience any complications related to ofatumumab therapy. He received the remainder of his preparative regimen followed by successful engraftment of the third stem cell transplant. Patient 2 is an 8-year-old male who received an allogeneic stem cell transplant in attempt to cure his X-linked adrenoleukodystrophy. As a complication of stem cell transplantation, he developed autoimmune hemolytic anemia and was readmitted with a hemoglobin of 4.5 g/dL. Upon admission, he received red blood cell transfusions and was treated with methylprednisolone and rituximab in addition to cyclosporine therapy. The patient responded

to treatment and was subsequently tapered off of the methylprednisolone while still receiving rituximab and cyclosporine. During the attempt to taper methylprednisolone, his hemolytic anemia flared and he was re-treated with methylprednisolone, rituximab, and mycophenolate mofetil. After responding to treatment and a second attempt to taper methylprednisolone, he experienced another flare of hemolytic anemia despite continuation of rituximab and mycophenolate. Due to the suspicion that the patient was no longer responding to rituximab as a result of potential anti-murine immunoglobulin antibody production, he was started on ofatumumab for alternative immunosuppressive therapy. The patient received an initial ofatumumab dose of 175 mg/m2, which was followed by 580 mg/m2 weekly for three weeks, then every other week for four weeks, and then once a month. After changing therapy from rituximab to ofatumumab, signs and symptoms of the hemolytic anemia flare resolved without complications or adverse effects of treatment. Although further experience is necessary in order to determine the safety and efficacy of ofatumumab in pediatric patients with various B-cell mediated conditions, it may play an important role as salvage therapy in patients who cannot receive rituximab due to hypersensitivity or refractory disease.

Methods:

Results:

Conclusion:

Submission Category: I.V. Therapy/ Infusion Devices/ Home Care

Submission Type: Descriptive Report

Session-Board Number: 3-013

Poster Title: Pharmacy intern hospital rounding, performance of random audits, and compilation of survey feedback improves IV smart pump compliance in a community hospital

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Purpose: Intravenous smart pumps are designed to deliver medications to patients at precise rates and volumes. Pumps include programmable parameters that allow for development of drug libraries and provide medication dosing guidelines in terms of concentrations, dose limits, and patient populations. These parameters are necessary for safe medication administration but may become a nuisance. This can lead to alert fatigue, override of program limits, and decreased utilization of smart pump technology. The purpose of this project was to improve smart pump compliance, medication administration processes, and patient safety in accordance with ISMP guidelines through behavioral change and reduction of alert fatigue.

Methods: Pharmacy intern involvement consisted of unit rounding and random IV pump audits, which are easy metrics for nurse managers to use as improvement opportunities. Surveys were disseminated to nursing staff to identify issues that hindered compliance. A safety newsletter highlighted the prominence of smart pump use. Participation in REMEDI collaborative enabled pharmacy interns to analyze data regarding IV smart pump utilization. Additionally, other hospital sites were contacted about smart pump practice recommendations. This allowed students to compare drug libraries from multiple institutions in order to reduce alert fatigue, refine and augment drug libraries, and provided a benchmark of compliance rates. Data was further evaluated for areas to provide targeted nurse education on proper medication administration. Information gathered was compiled to make changes to the drug library in order to increase compliance and reduce alerts. Medication entries were expanded and enhanced in existing libraries based on feedback from nursing staff and opportunities identified

through REMEDI. Pharmacy students answered questions that came up during rounding, encouraged communication, educated on the importance of smart pump utilization, and clarified misconceptions. In addition to student efforts, compliance rates were distributed monthly to nursing unit managers and discussed at task force meetings, quality steering committees, leadership huddles, patient safety council, pharmacy and therapeutics committees, and medication use safety team meetings.

Results: Through the efforts of pharmacy students, compliance rates regarding the use of IV smart pumps increased. Over the project time period, pharmacy students built a drug library for the pediatric unit of the hospital, which directly correlated with increased nurse compliance of that unit. The percentage of alerts per infusion that used the drug library and the percentage of soft limit overrides decreased. Barriers to using IV smart pumps also decreased. Compared to the number of times that nurses used the drug library, soft limit edits and hard limit frequencies were greater, meaning that a positive change was observed. Pharmacy interns spent approximately 65 hours engaging with nursing staff, which resulted in adding 25 new drug entries to the libraries of various clinical care areas and updating five soft and hard limits in order to decrease the number of alerts. Drug editions and edits were all presented at medication use safety team meetings held quarterly. There was a significant decrease in the frequency of alerts and the percentage of alert overrides, as well as an increase in smart pump compliance rates.

Conclusion: This project provided insight into the impact of pharmacy student involvement of IV smart pump operations in a community hospital. Student efforts included nurse education, additions to the drug library, and updates of soft and hard limits. Pharmacy intern participation in IV smart pump quality improvement initiatives leads to a positive impact of smart pump utilization, which simultaneously results in enhancement of patient safety.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Evaluative Study

Session-Board Number: 3-014

Poster Title: Evaluation of Epinephrine Administration in the Emergency Department

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Purpose: Severe allergic reactions present to the emergency department with varied symptom severity; therefore it is imperative to provide adequate care quickly to prevent negative outcomes. International guidelines recommend epinephrine be administered intramuscularly as first line treatment for adults with such reactions. Studies serving as the basis for the recommendation demonstrate superior absorption when administered in the lateral thigh versus the deltoid. Despite epinephrine being first line, errors surrounding administration are common. The objective was to assess the use of epinephrine during allergic reactions to determine appropriateness of dose, route, and location based on current practice at twelve regional emergency departments.

Methods: This analysis was a multi-center, retrospective, observational cohort study conducted in twelve regional emergency departments. Data was collected from August 1, 2013 to December 31, 2015. Patients were identified through automated dispensing machine reports for epinephrine 1mg/ml ampule from emergency department machines. Data from the reports were used to query electronic medical records to obtain predefined variables. Defined variables included gender, age, route, specific site of administration, and epinephrine dose charted. Data was then compiled to identify the appropriateness of administration site, route, and dose as a health-system wide process improvement project.

Results: From August 1, 2013 to December 31, 2015, epinephrine was administered 911 times to 869 patients who presented to one of the twelve emergency departments analyzed. Of those 911 administrations, 756 (83%) were administered into areas other than the lateral thigh. The

deltoid was the most frequent administration site as 664 (72.9%) injections were given in that location, while only 155 (17%) injections were given into the preferred location of the lateral thigh. There were 58 (6.4%) injections given into other locations that included the gluteus and abdomen, while 34 (3.7%) injections were administered intravenously. The most common administration route was intramuscular (659 injections, 72.3%), followed by subcutaneous (218 injections, 23.9%), then intravenous (34 injections, 3.7%). Doses of 0.3 – 0.5 mg of epinephrine were given 761 (83.5%) times, however 90 (9.9%) injections were given that were less than 0.3mg while 60 (6.6%) injections were given at doses greater than 0.5mg.

Conclusion: International guidelines recommend injecting epinephrine 0.3-0.5mg intramuscularly into the lateral thigh for allergic reactions. Based on pharmacokinetic properties, superior absorption is achieved with epinephrine administration into the lateral thigh. Data collected supports the need for additional education to ensure proper administration as 756 (83%) epinephrine administrations evaluated were not administered into the correct location and 150 (16.5%) incorrect doses were given. While patient outcomes were not evaluated, choosing the optimal injection site might be clinically relevant during emergency situations. This analysis is likely representative of other emergency departments, thus indicating a need for increased awareness of proper epinephrine administration.

Submission Category: Pharmacy Law/ Regulatory/ Accreditation

Submission Type: Descriptive Report

Session-Board Number: 3-015

Poster Title: Regulating human kindness: The call for safe and accessible donor human milk

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Purpose: In both hospital and outpatient settings, donor human milk (DHM) is prescribed or purchased over the counter for term infants and promoted for nourishment and immune support. Additionally, neonatal intensive care units promote and utilize DHM with nutrient fortification for use as prophylaxis against necrotizing enterocolitis in very low birth weight pre-term infants. This research examines how healthcare systems are incentivized to provide DHM, explores the public health benefits and concerns, and reviews the current regulatory status of DHM with a focus on the jurisdiction of the Federal Food and Drug Administration (FDA).

Methods: Public health benefits and concerns were evaluated through a search of evidence and clinical practice guidelines for DHM by the American Academy of Pediatrics, the American Society of Parenteral and Enteral Nutrition, the World Health Organization, and the US Breastfeeding Committee. Popular media and literature searches were evaluated in the following areas: current market share of human milk exchange held by commercial vs non-profit milk banks, current processing and shipping policies of milk banks, human milk banking history, and peer-to peer milk sharing practices. Regulatory practices were reviewed by examining the Federal Food, Drug, and Cosmetics Act; Public Health Service Act; Code of Federal Regulations; US Surgeon General's position statements; Human Milk Banking Association of America's guidelines for establishing a human milk bank; Joint Commission (JCAHO) National Quality Core Measures; and FDA safety alerts.

Results: JCAHO has included DHM as an option to satisfy the exclusive breast milk feeding performance measure, which Centers for Medicare and Medicaid Services use in calculating a hospital's total performance score. Thus, hospitals are incentivized to provide DHM to increase reimbursement. DHM is a public health resource in the prevention of necrotizing enterocolitis and the resultant costs and complications of short bowel syndrome in adults. The non-profit Human Milk Banking Association of America has guidelines based on federal regulations for plasma donation, and most commercial milk banks publish their manufacturing process.

Currently, only those establishments located in states with banked milk regulations are inspected by outside agencies to ensure that the product is safe for infant consumption. Federal regulations are needed to protect the public from medication or viral and bacteriological pathogen exposure should the milk banks fail to adhere to current good manufacturing processes. There are no mandatory reporting requirements for infants who experience illness or death from infectious disease after consumption of DHM. Per the Federal Food, Drug, and Cosmetics Act, DHM is both a food and a drug prescribed for the prevention of a human disease. Current regulations either fail to appropriately address or specifically exclude DHM.

Conclusion: As a food product for nourishment and immune support and as a human tissue product used for the prevention of a human disease, DHM is under the FDA's jurisdiction. However current regulations fail to provide adequate guidance and new regulations are needed to support the public health benefit and reduce the public health risk of DHM.

Submission Category: Pharmacokinetics

Submission Type: Evaluative Study

Session-Board Number: 3-016

Poster Title: Treating epistaxis in patients with hemophilia using a novel compounded drug formulation: a stability study

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Purpose: Epistaxis is common in patients with hemophilia. It is typically treated using nasal packing and oral antifibrolytic medications (i.e. aminocaproic acid and tranexamic acid), which are often not sufficient to resolve a bleed. Some hemophilia treatment centers have used compounded aminocaproic acid nasal spray to improve epistaxis resolution times; however, there have been a lack of data to support the stability of this product once it has been compounded, preventing treatment centers from dispensing it. The purpose of this study is to analyze the stability of compounded aminocaproic acid nasal spray to accurately assign a beyond use date (BUD).

Methods: Aminocaproic acid nasal spray 100 mg/mL was compounded in a non-sterile setting according to pharmacy protocol. The compounded product was then sent to a local analytical laboratory and stored at either room temperature or 2 degrees Celsius. Samples were taken from each temperature setting weekly and assessed using liquid chromatography-mass spectrometry (LCMS). 5 µL injections were made on an Agilent 1260 HPLC with tandem 6120 single quad mass spectrometer. Fragmentation was used to assess the presence of degradation products in each sample, so as to ensure consistency of active pharmaceutical ingredient over time. First, total ion count was monitored and quantified with the fragmentor voltage set to 0 V. Fragmentation was then monitored with the fragmentor voltage set to 70 V. The total ion count and fragmentation pattern were consistent in each sample and indicate no appreciable appearance of degradation products. Data collected over 25 weeks were then reported, analyzed, and graphed over time using Microsoft Excel.

Results: After 25 weeks of testing, aminocaproic acid nasal spray 100 mg/mL retains potency and is stable at both room temperature and 2 degrees Celsius.

Conclusion: Aminocaproic acid nasal spray 100 mg/mL can be appropriately dispensed with a BUD of 6 months and stored at either room temperature or in the refrigerator, as it has shown to be chemically stable after this time in these temperature settings.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 3-017

Poster Title: Impact of pharmacy workup program on guideline-driven recommendations for aspirin, angiotensin converting enzyme inhibitors/angiotensin II receptor blockers, and statin therapies

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Purpose: Pharmacist collaboration with providers has a positive impact on patient outcomes including decreasing cardiovascular risk through reaching blood pressure and cholesterol goals following standards of care based on guidelines. At a federally qualified health center (FQHC) in Colorado, a pharmacy pre-visit program was implemented to increase the number of patients meeting standards of care. The objective of reviewing this quality improvement initiative was to evaluate the impact of the pharmacy pre-visit program related to increasing appropriate utilization of guideline-driven standards of care for aspirin, angiotensin converting enzyme inhibitors (ACEi)/angiotensin II receptor blockers (ARB), and statin therapies.

Methods: To establish baseline utilization rates, a retrospective chart review was performed to identify patients at risk for cardiovascular disease. Charts eligible for review were identified using the electronic medical health record (Greenway Success EHS) from a FQHC in the Denver area. Patients included in the review were between the ages of 40 and 79 years old and seen in the clinic in the past 12 months (November 2014 to November 2015). The program was implemented in June 2016 utilizing a workup tool for pharmacy services to review the chart of each patient scheduled the following day. Charts were evaluated to verify the patient was receiving treatment per the standards of care. Notes were placed in patient charts with recommendations to the providers to better align treatments with guideline-based standards. The statin therapy recommendations were made based on 2013 American College of Cardiology/American Heart Association (ACC/AHA) guidelines. The ACEi or ARB therapy recommendations were made based on the 2014 American Society of Hypertension-

International Society of Hypertension (ASH-ISH) guidelines and 2016 American Diabetes Association (ADA) guidelines if the patient had diabetes. The aspirin therapy recommendations for primary prevention were made based on the 2016 U.S. Preventive Services Task Force (USPSTF) guidelines and ADA guidelines for diabetic patients. These notes placed over a 10-week period were reviewed to determine the percent increase of patients meeting standards of care.

Results: The baseline utilization review identified 406 patients in total. Of this population, 187 (46.1 percent) were eligible for statin therapy, but only 70 patients (37.4 percent) were being appropriately treated. Amongst the 406 total patients, 71 patients were eligible to receive aspirin, however 46 patients (64.8 percent) were not on aspirin. Amongst 406 patients, 100 patients had diabetes, 34 of which were eligible for an ACEi or ARB therapy. However, 6 patients (17.6 percent) were not being treated with an ACEi or ARB therapy.
After the pharmacy pre-visit program implementation, 349 total patients were seen over a 10-week period by the providers and 124 patients met the inclusion criteria for review of the pharmacy pre-visit workup recommendations. Before pre-workups, 58 percent of patients who qualified for statin therapy were on appropriate therapy, 32 percent of patients qualified for aspirin therapy were on appropriate therapy, and 94 percent of patients qualified for ACEi/ARB therapy were on appropriate therapy. After pre-workups, 65 percent of patients who qualified for statin therapy were on appropriate therapy, 48 percent of patients who qualified for aspirin therapy were on appropriate therapy, and 94 percent of patients who qualified for ACEi/ARB therapy were on appropriate therapy.

Conclusion: The daily pharmacy pre-visit program was a quality improvement initiative that had a positive impact on guideline-recommended standards of care within the FQHC and will continue to be utilized in the future. Before pharmacist intervention, the clinic was already exceeding national averages of standards of care for aspirin, ACEi/ARB, and statin therapy. The daily pharmacy pre-visit program was associated with an increase in prescriber adherence to guideline recommendations for aspirin (16 percent increase) and statin (7 percent increase) therapies. Guideline recommended usage of ACEi/ARB therapy remained the same, just 6 percent below every patient who qualified.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 3-018

Poster Title: Disease modifying therapies and other potentially teratogenic medications and concurrent contraceptive use in women with multiple sclerosis

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Purpose: Multiple sclerosis is a chronic inflammatory disease that affects twice as many women than men and usually manifests in women of childbearing age. Because of the chronic nature of this disease, it is not uncommon for women to be prescribed potentially teratogenic disease modifying therapies as well as other symptomatic medications. The aim of the study was to determine the rate these medications were prescribed and the concurrent use of contraceptive methods and/or documentation of contraceptive counseling or pregnancy planning. When prescribed, the appropriateness of the contraception method was assessed.

Methods: This was a retrospective, observational study of women ages 15-44 with multiple sclerosis of childbearing ability who were prescribed at least one potentially teratogenic disease modifying therapy or supporting therapy from October 1, 2014 to September 30, 2015 at the Rocky Mountain MS Center and outpatient neurology clinic at the University of Colorado Anschutz Medical Campus. The Colorado Multiple Institutional Review Board approved this study. Patients that met our inclusion criteria were identified using ICD-10-CM codes in the EPIC™ electronic health record database and were included in the study if they were a woman between the ages 15-44 years of age with childbearing ability who were diagnosed with multiple sclerosis and given at least one prescription for a potentially teratogenic medication (previous FDA category D or X) during the study time frame. Exclusion criteria included women less than 15 years of age or older than 44 years of age with multiple sclerosis, women who had surgical sterilization, women with partners who were documented to be surgically sterile (e.g. vasectomy), women who had a hysterectomy, acute use of medication (e.g. 14 days or less), women without multiple sclerosis, and men.

Results: A total of 399 patient charts were screened. One hundred twelve women with multiple sclerosis and a mean age of 35 years were included in the study. Of these women, 81% were prescribed one potentially teratogenic medication and 19% were prescribed two of these medications. Only 31% (35) of the women in this study had a documented contraception method. Of these 35 patients, 74% (26) were on an oral combined hormonal contraceptive, 11% (4) had an intrauterine device (levonorgestrel or copper), 9% (3) had a progesterone-only implant, 6% (2) used a combined hormonal contraceptive vaginal ring, 11% (4) used male condoms, and 3% (1) used spermicide. Of the patients on an oral combined hormonal contraception, 31% (8) were also on a disease modifying therapy or other medication that lowers the efficacy of the contraception. Furthermore, only 5% (6) of patients in the study population received contraception counseling and/or pregnancy planning. The remaining 95% of the study population did not have any documentation of contraception counseling and/or pregnancy planning. Of the 21% of patients on two potentially teratogenic medications during the study period, only 5% (1) had documented pregnancy planning.

Conclusion: There was minimal documentation regarding contraception use in women with multiple sclerosis of childbearing ability and many were not using any contraception method while on a potentially teratogenic medication. Of the patients on a contraception method, 31% were on a disease modifying or symptomatic therapy that lowers the efficacy of said method. This study demonstrates the need for providers to discuss with these women the risks and benefits of both disease modifying and symptomatic therapies for multiple sclerosis, the importance of contraceptive counseling and/or pregnancy planning, and the need to select an appropriate contraception method when pregnancy is not desired.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-019

Poster Title: Multicenter restrospective observational study to examine the efficacy and thrombotic events in patients receiving Idarucizumab (PRAXBIND®).

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Purpose: Idarucizumab, (Praxbind®), is a monoclonal antibody approved for the reversal of anticoagulant effects related to dabigatran in the event of an emergent surgery/procedure or life threatening bleeds. In the initial FDA approval, only 3 trials with healthy volunteers, a total of 224 subjects were treated. Similarly, in the RE-VERSE AD trial only 123 dabigatran-treated patients were administered idarucizumab and 5 of those patients (0.04%) reported thrombotic events. This project was designed to characterize the current utilization of idarucizumab to assess safety and efficacy.

Methods: A retrospective analysis was performed starting when idarucizumab was added to Centura Health formulary. Starting January 2016, a system wide database search of all Colorado Centura Health hospitals for documented idarucizumab administration was performed. Inclusion criteria was any patient whom received idarucizumab. Patient charts were reviewed to gather data for idarucizumab indication and dosing regimen, thrombotic events and patient outcomes were recorded. A subgroup analysis of thrombotic events was performed in patients with renal disease as it has been reported that this patient population experiences higher blood concentration levels.

Results: Review of 14 patient charts, from 6 Colorado Hospitals, indicating administration of idarucizumab, occurred between January 2016 and September 2016. Patient population consisted of 12 males (85.71%) and 2 females (14.29%) with an average age range of all patients of 76.5 SD+/-9.58. 5 (35.7%) patients were in need of reversal due to clinically relevant bleeding and 9 (64.25%) patients were in need of urgent surgery. A one-time dose of 5 grams

was administered to 12 patients (85.71%) and 2 patients received 2 doses of 2.5 grams (14.29%). The patient population also included 4 patients (28.5%) with renal dysfunction. Data obtained revealed no thrombotic events occurring from idarucizumab administration through discharge. 2 patients expired during the observation period, but were unrelated to idarucizumab administration. No difference was seen in regards to patient outcomes or thrombotic events when looking at the different dosing regimens. Since no thrombotic events were reported, we can conclude that renal dysfunction did not put patients at an increased risk of thrombotic events despite previous trial reports of this patient population having higher drug levels in the blood.

Conclusion: Our observations indicate no episodes of thrombotic events during the hospitalization including those with renal dysfunction and also when using different dosing regimens. Based upon these data we can conclude that the standard dosing of 5 gm once can safely be used in patients with renal dysfunction with no increased risk of thrombotic events. When looking at the different dosing regimens, we also see no difference in outcomes or adverse events therefore using the manufacturer recommendation of a one-time dose of 5 grams should be used in patients requiring urgent reversal from bleeding related to dabigatran.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 3-020

Poster Title: Evaluation of a smart labeling system and its impact on charge capture and medication errors

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Purpose: Patient safety challenges unique to the perioperative setting can potentially increase the risk of medication errors (MEs). Perioperative ME rates have been reported as high as 1 per 20 cases and have been attributed to the medication management system and safety checks used in each hospital. The purpose of this collaborative project between the Department of Anesthesia and Department of Pharmacy was to evaluate the impact of the Codonics Safe Label System (SLS) on MEs and charge capture. Secondary objectives included identifying factors related to charge capture associated with MEs and adverse drug events.

Methods: The Children's Hospital Colorado Quality Improvement Review Panel approved this retrospective chart review. An EPIC report identified all perioperative patients from November 2015 to July 2016. Patients of all ages were included if they received at least one medication from the Omnicell Anesthesia Workstation (AWS) in the main operating rooms (ORs) or procedure center. Cardiac OR, maternal-fetal OR, and off-site encounters were excluded. Codonics SLS machines were installed in four ORs in February 2016. Data were not collected for 2 months after installation to allow for staff training. Data collection post implementation was restricted to the four rooms that housed a Codonics SLS machine. Data collected included date and time of procedure, patient medical record number, procedure location, staffing anesthesiologist, medications with charge capture discrepancy, and medication cost. Medication costs were updated before and after implementation to represent actual cost. The primary outcome measure was the frequency and cost associated with discrepancies between the documented medication administration report in EPIC and the medications charged to the

patient. Secondary outcome measures included medication name and route of administration. It was determined that a minimum sample size of 1,354 patients would yield an 80% power to detect a difference between groups. A one-tailed z-score test was used to analyze the difference between two population proportions. All analysis was performed with PRISM GraphPad, version 6.

Results: There were 1,014 patients in the pre-Codonics group and 958 patients in the post-Codonics group. Implementation of Codonics SLS improved charge capture by 3.62%. This improvement is statistically significant (z-score 6.66, p-value < 0.05). A charge capture improvement of $26,774 and revenue realization of $9,639 were observed. These values were extrapolated to a potential annual savings of $384,172 per 30,000 patients. Medications most frequently associated with discrepancies were topical lidocaine (n=100, 12%), cefazolin (n=99, 12%), ketorolac (n=99, 12%), and dexamethasone (n=94, 11%). Route of administration most frequently associated with discrepancies were intravenous (n=681, 83%) and topical (n=144, 17%).

Conclusion: Medication management systems with built-in safety checks can improve charge capture and have the potential to decrease ME. Investigators expect to see an increase in revenue after large-scale implementation of Codonics SLS at Children's Hospital Colorado. More research is needed to evaluate the clinical impact of Codonics SLS in reducing ME.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Case Report

Session-Board Number: 3-021

Poster Title: Risk of thrombocytopenia in patients on telavancin

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Purpose: Telavancin is a glycopeptide antimicrobial indicated for patients with complicated SSTI and hospital acquired or ventilator acquired bacterial pneumonia. Thrombocytopenia is a very rare adverse effect of telavancin and few studies have evaluated its significance. This report presents such a case associated with telavancin use from the clinical practice of authors.
A 68-year-old female was admitted to hospital due to shortness of breath. She was found to have bilateral pulmonary infiltrate with questionable CHF and pneumonia/pneumonitis and consequent acute hypoxemic respiratory failure. She was hypoxic, requiring 100 percent non-rebreather mask, and had a history of heavy tobacco abuse of smoking about 60 packs a year. Her past medical history was significant for chronic heart failure, type 2 diabetes, hypertension, chronic lymphedema in left lower limb, and breathing disorder. The patient presented with a severe thrombocytopenia of unknown etiology. On admission, the platelet count was 49,000/mm3. The patient had been on telavancin at an outpatient clinic for the past 21 days through her right chest wall tunneled PICC line for a left lower extremity cellulitis. After admission, telavancin was discontinued and replaced by Zosyn in order to empirically treat for pneumonia.
On June 21st, 2016, the patient's platelet count was 49,000/mm3 without signs of bleeding. On June 22nd, 2016, , the platelet count decreased even further to 40,000/mm3.Two days after discontinuing telavancin on June 23rd,the patient's platelet counts improved to 79,000/mm3, and restored to normal levels by the 25th. The improvement in the patient's platelet counts was observed after telavancin was discontinued, and this was seen while the patient remained in critical condition secondary to hypoxemic respiratory failure through the 27th. After resolution of thrombocytopenia, the patient's oxygen needs gradually decreased and the renal function was restored with the serum creatinine of 2.0 mg/dL as her new baseline. After getting transferred to general ward for recovery, she was discharged on July 3rd.

This case report highlights the potential for incidence of thrombocytopenia to occur with prolonged use of telavancin. Although thrombocytopenia is a rare complication of telavancin, it can still occur at an alarming severity, requiring clinical management. Due to its significance, it should be carefully monitored in patients on the drug.

Methods:

Results:

Conclusion:

Submission Category: Cardiology/ Anticoagulation

Submission Type: Case Report

Session-Board Number: 3-022

Poster Title: Therapeutic Management of Lower Extremity Arterial Bypass Graft Occlusion: Case Report

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Purpose: Lower extremity peripheral arterial disease is primarily caused by atherosclerosis and thromboembolic processes that alter the normal functions of the arteries of lower extremities. Surgical revascularization is indicated in patients with limb ischemia without adequate improvement by exercise rehabilitation and pharmacologic therapy and significant limitations of daily activities. Bypass graft occlusion may result due to various reasons such as: technical complication of the graft, thrombosis due to inadequate outflow of blood, myointimal hyperplasia, or progression of atherosclerosis. Intra-arterial thrombolysis is a common method of treatment in lower extremity bypass graft occlusions. Results of a prospective, randomized trial demonstrated that thrombolysis in acutely ischemic (< 14 days) improved limb salvage and reduced the magnitude of the surgical procedure. Studies demonstrated 57% success rate with streptokinase, whereas almost 90% of grafts have been successfully opened with alteplase in other studies. Therapeutic heparin is useful as an adjunct but may increase hemorrhagic complications. If patency of the occlusion is not restored, patient will have to be reassessed for surgical revascularization and possible amputation.
The patient is a 58 year-old male with a history of peripheral vascular disease requiring right popliteal-to-posterior tibial artery bypass two weeks prior to his admission. He presented to an outpatient clinic for evaluation due to complaints of severe right leg pain unable to be controlled by his pain medications. This is an acute change from his previous post-operative state. Patient also complains of tingling in his right foot, in which the duplex ultrasound demonstrated (acute) occlusion of the new right lower extremity (RLE) bypass graft. He was subsequently admitted to a general medical and surgical hospital with 250 beds for repair of the bypass graft. The incision on his right thigh was intact and dry; however, the incision on his calf had mild separation with some sero-sanguineous drainage. Patient was admitted to intensive care unit and initiated on both therapeutic alteplase and heparin infusions.

After two days of continuous therapeutic alteplase and heparin infusions, angiogram was performed and revealed restored patency of patient's bypass graft. The alteplase and heparin infusions were subsequently discontinued. However, following the discontinuation of the alteplase and heparin infusions, the patient developed re-occlusion of his arterial bypass graft. At the same time, the patient became hypotensive with a blood pressure of 78/45 mmHg and was noted to have a myocardial infarction. Electrocardiogram confirmed the presence of ST-segment elevation myocardial infarction which lead to coronary bypass graft (CABG) surgery of four vessels. Due to his overall clinical condition and the risk of bleeding vs. thrombosis following CABG, no further interventions were initiated for the re-occlusion.

About one month following his presentation and management for RLE graft occlusion with alteplase and heparin infusions, the patient developed gangrenes on right toes as well as discharge from some of his leg wounds. The Orthopedics service was consulted for assessment. Based upon the findings of his angiogram, surgery is planned for trans-metatarsal amputation of all five toes on his right foot.

Although there are guidelines available for pharmacologic management peripheral arterial diseases, there is not specific management of peripheral arterial bypass graft occlusion. Current treatments are based on the management of native arteries and regimens used in case reports and small studies. More studies are needed to improve prevention of bypass graft occlusions and management and monitoring after revascularization.

Methods:

Results:

Conclusion:

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Case Report

Session-Board Number: 3-023

Poster Title: Management of a patient receiving concomitant meropenem and valproic acid therapy

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Purpose: The purpose of this patient case is to describe the management of a patient receiving concomitant therapy with meropenem and valproic acid in a setting of sepsis secondary to a urinary source. The patient was identified on interdisciplinary rounds and the patient information was gathered from the electronic medical record. The patient is a 69 year-old female with a past medical history significant for seizures on anti-epileptic therapy including valproic acid (VPA) and phenytoin, who was admitted to the hospital with new diagnosis of hemolytic-uremic syndrome and who experienced a prolonged complicated hospitalization including acute kidney injury, hospital-acquired pneumonia, Clostridium difficile colitis, and meningoencephalitis. During her hospitalization, the patient also developed severe sepsis secondary to cystitis. To manage the patient's infection, the patient was empirically initiated on meropenem to cover extended-spectrum beta-lactamases and on vancomycin for methicillin-resistant Staphylococcus aureus coverage. Antibiotics were selected based on the patient's complicated hospital course, previous infectious history, previous antibiotic use, and severity of infection. The pharmacist for the service was consulted to assist with antibiotic selection and dosing.

Prior to initiation of meropenem, the patient's VPA level was sub-therapeutic at 32 mcg/mL. The patient's last seizure had been several weeks prior when the VPA had been discontinued, as the patient's seizure history was questionable at the time. The medication had been reinitiated but had not been titrated to therapeutic levels, as the patient had not experienced any additional seizures. The initiation of meropenem resulted in a drop in the VPA level to 11 mcg/mL in 24 hours, however, the patient did not experience any seizures. Subsequently, the VPA dose was titrated from 750 mg orally every 8 hours to 1,250 mg orally every 8 hours. After dose titration, the VPA level was 13 mcg/mL. The patient's VPA level was drawn daily while on therapy and signs and symptoms of seizures were monitored frequently. Meropenem was

continued for 4 days and was eventually discontinued because the cultures grew meropenem-resistant Citrobacter freundii. The patient was started on ceftazidime/avibactam based on culture susceptibilities. After the discontinuation of meropenem, VPA was titrated back down to 750 mg orally every 8 hours and the VPA level increased to 39 mcg/mL.

Literature provides strong evidence for a drug-interaction between VPA and meropenem. Carbapenems may reduce serum VPA to subtherapeutic levels, resulting in loss of seizure control. The onset of this interaction is within 24 hours and the effect can last up to 8 days after discontinuation of the carbapenem. Several studies have evaluated the mechanism of interaction between VPA and carbapenems. Systematically absorbed VPA is glucuronidated by the liver to become valproate glucoronide (VPA-GLU), which is excreted by the kidneys. Researchers have proposed that carbapenems may enhance the rate of glucuronidation of VPA by the liver, hasten the renal clearance of VPA-GLU, or inhibit the bacterial beta-glucoronidase enzyme that hydrolyzes VPA-GLU to valproic acid.

While on concurrent therapy, the serum VPA concentrations should be monitored frequently. Alternative antibacterial therapy may be considered if serum VPA concentrations drop significantly or seizure control deteriorates. However, because of increasingly resistant organisms and the need for broad-spectrum empiric coverage, prescribers often turn to carbapenems. Oftentimes, alternative antibiotic choices are limited, but it is important for the patients to be monitored more frequently. It is also not known whether increasing the VPA dose can overcome this drug interaction. It may be appropriate to use additional anti-epileptic medications while completing carbapenem therapy in patients receiving valproic acid. Thus, it is the role of the pharmacist to monitor for clinically significant drug interactions, including anti-epileptic medications such as VPA, and to make dose adjustments as clinically indicated.

Methods:

Results:

Conclusion:

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 3-024

Poster Title: Management of cellulitis utilizing oritavancin to avoid hospital admission

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Purpose: Oritavancin is a semi-synthetic, lipoglycopeptide antibiotic indicated for treatment of acute bacterial skin and skin structure infections (ABSSSI) caused by gram-positive microorganisms. A one-time dose of oritavancin 1,200 mg over a three hour infusion time, shows comparable efficacy and safety to seven days of vancomycin when treating ABSSSIs. The purpose of this study is to describe the use of oritavancin in our health system following implementation of a cellulitis pathway utilizing oritavancin in emergency department (ED) and observation status patients to avoid inpatient hospital admission. An evaluation of efficacy, safety, and cost impact of oritavancin use are included.

Methods: This study was approved by the Institutional Review Board (IRB). A retrospective chart review was conducted on patients 18 years and older who presented to a WellStar Health System facility between March 2015 and July 2016 and received oritavancin in the ED, clinical decision unit (CDU), or other units of the hospital using an established pathway designed to avoid inpatient admission. Patients who received oritavancin only in an outpatient infusion center were not included in the study. The primary endpoint was to assess the budget impact of a one-time dose of oritavancin in ABSSSI patients compared to historical data on inpatient hospital admissions for ABSSSI. Secondary endpoints include: admission rate within 30 days of oritavancin administration, adverse events, and clinical cure rate.

Results: Fifty six patients were included in the study. Financial data was included for the initial visit wherein oritavancin was administered, as well as infection-related return visits. Nine patients returned for infection-related reasons within 30 days of oritavancin administration. No significant adverse events were reported. Compared to historical data on inpatient hospital

admissions for cellulitis in patients with minor or moderate diagnosis-related group (DRG) severity, use of oritavancin was associated with a cost savings of $1181.29 per case.

Conclusion: Oritavancin use was found to be safe, effective, and cost saving when used in a clinical pathway to avoid inpatient admission for cellulitis.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 3-025

Poster Title: Evaluation of the use of IV builder technology in the ordering of intravenous medications for the treatment of hospitalized patients

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Purpose: The use of computerized physician order entry (CPOE) and electronic medical records (EMR) have provided both benefits and challenges with regards to medication order entry. The EMR used at Grady Health System (GHS) allows providers and pharmacists to create patient-specific custom intravenous (IV) medication orders using a tool called the "IV builder". This tool is used to order an IV admixture of a non-formulary medication or a custom admixture that is not pre-built in the EMR system. This study was conducted to determine the appropriateness of orders entered using this tool.

Methods: This was a retrospective chart review of 90 patients with at least one medication order placed using the IV builder tool between April 1, 2015 and March 31, 2016. Additionally, a voluntary, anonymous eight question survey was administered to pharmacists, attending physicians, advanced practice providers, and intern/resident physicians to gauge comfort level and knowledge of the IV builder tool. The primary objective of the study was to determine the prevalence of orders using the IV builder tool which were deemed appropriate. Appropriateness was defined as orders including a non-formulary medication and/or an admixture not available as a pre-built order, in addition to medication doses meeting GHS dosing guidelines (when applicable) and admixtures without drug-drug or drug-diluent incompatibilities. Secondary objectives included determining the prevalence of IV builder tool use by various services of the hospital, determining which disciplines use the IV builder tool most often, and evaluating provider and pharmacist comfort and knowledge when using the IV builder tool.

Results: Of the 90 orders that were reviewed, 27 percent (n=25) of the orders were deemed appropriate based on the pre-defined criteria. The top three services utilizing the IV builder tool were internal medicine (62 percent), neurology (15 percent), and surgery (9 percent). The disciplines that used the IV builder tool the most were resident/intern physicians (70 percent) and advanced practice providers (11 percent). The survey was completed by 57 providers and pharmacists. Approximately 35 percent (n=20) of the respondents reported that they had never used the IV builder tool. Of the respondents who reported using the tool (n=37), 35 percent reported using it on a weekly basis and 54 percent reported using it on a monthly basis. When asked about their level of interest in additional training on the IV builder tool, 25 percent of respondents reported not being interested, 56 percent were moderately interested, and 19 percent were extremely interested. When asked how well respondents thought order entry errors, including improper doses and incompatibilities, are caught and prevented by the IV builder tool, only 16 percent of respondents were aware that the IV builder tool does not catch these errors.

Conclusion: A substantial percentage of orders entered using the IV builder tool were not deemed appropriate based the criteria applied. More education for practitioners on appropriate use of the IV builder tool and availability of pre-built orders may be beneficial. Educational efforts may initially be focused on the service that was found to use the tool most often, which was the internal medicine service. The majority of survey respondents indicated that they were open to additional education.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 3-026

Poster Title: Characterization of copper deficiency in adult patients with a history of major gastrointestinal surgery

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Purpose: Copper is an essential trace element that plays an important role in many human body functions, including mitochondrial respiratory chain, iron absorption, collagen synthesis, neuropeptide and neurotransmitter synthesis, protection from oxidative stress, as well as immune function. Copper is primarily absorbed in the duodenum, thus copper deficiency has been reported in patients with a history of bariatric surgery which copper absorption site is bypassed. The purpose of this study is to further evaluate potential risk factors, signs and symptoms associated with copper deficiency in patients with a history of major gastrointestinal surgery such as gastric bypass, gastrectomy, or Whipple procedure.

Methods: Retrospective chart review was performed for patients who had at least one low serum copper level (men less than 70 mcg/dL; women less than 80 mcg/dL) during the period of January 1, 2004 through June 30, 2016. Enrolled patients were at least 18 years old and had one or more of the following procedures: gastric bypass, partial or total gastrectomy, or Whipple. Patients with a history of Wilson's disease were excluded from the study. Data collection included demographics, past medical and surgical histories, physical findings, and hematological laboratory tests. Descriptive statistics were used to describe the patient population with copper deficiency within the Emory healthcare system. Multivariable analysis was used to characterize risk factors for copper deficiency.

Results: Sixty-nine patients were included in the data analysis, of which 91 percent were female. The average age and body mass index were 50 years and 26.8 kg/m2, respectively. Majority of the patients (90 percent) were on oral diet, nine percent were on home parenteral nutrition, and four percent were on enteral nutrition prior to admission. Forty-six percent of patients had a history of Roux-en-Y gastric bypass, other bariatric surgery (30 percent),

gastrectomy (19 percent), and Whipple (3 percent). The most common co-morbidities were history of anemia (86 percent), gastrointestinal diseases (62 percent), neurological problems (54 percent), hypertension (46 percent), and history of malnutrition (41 percent). Seventy percent of patients were taking an acid reducing medication within a year prior to the low copper level. Most commonly reported manifestations included hypothermia (temperature less than 36 degrees Celsius, 86 percent), weakness or fatigue (86 percent), tachycardia (heart rate greater than 100 beats per minute, 64 percent), hypotension (blood pressure less than 90/60 mmHg, 51 percent), unequal extremity movements (41 percent), and history of falls (29 percent). Notable hematological abnormalities included anemia (30 percent macrocytic, 67 percent normocytic, and 3 percent microcytic), thrombocytopenia, and leukopenia (83 percent, 33 percent, and 14 percent, respectively).

Conclusion: Knowing the signs and symptoms associated with copper deficiency in adult patients with a history of major gastrointestinal surgery can be helpful in the differential diagnosis and allows for faster recognition and treatment. In our study, patients with copper deficiency and a history of gastrointestinal surgery commonly present with hypothermia, weakness or fatigue, tachycardia, anemia, and thrombocytopenia. All these signs and symptoms associated with copper deficiency are not specific; therefore, a greater effort for screening this patient population is warranted.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-027

Poster Title: Evaluation of the utilization and discontinuation of stress ulcer prophylaxis with proton pump inhibitors in critically ill patients at a community teaching hospital

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Purpose: Proton-pump inhibitors are widely used in the inpatient setting to decrease the risk of stress-related mucosal disease in critically ill patients. These agents often fail to be discontinued once patients no longer meet criteria for utilization of stress ulcer prophylaxis. Use of proton pump inhibitors is associated with significant adverse effects including Clostridium difficile infection and pneumonia, highlighting the importance of ensuring appropriate prescribing of these agents. The purpose of this study was to assess appropriateness of inpatient prescribing and discontinuation of proton pump inhibitors in critically ill patients at an academic medical center.

Methods: This study involved a retrospective medication use evaluation of one hundred critically ill patients receiving pantoprazole or esomeprazole between January 2014 and June 2014. Drug codes assigned by the institution were used to identify patients receiving a proton pump inhibitor in an intensive care unit during the study period. Patients were evaluated for drug indications, dosing and frequency of adverse events.

Results: Of one hundred intensive care unit patients receiving a proton pump inhibitor for stress ulcer prophylaxis, eighty-two had an appropriate indication. All patients were initiated on the appropriate dose upon initiation of acid suppression therapy. Upon transfer from the intensive care unit to a floor unit, fifty-five patients received continued stress ulcer prophylaxis without a documented approved indication. Thirty-six patients were discharged on acid suppression therapy without an appropriate indication. Five patients experienced adverse events during therapy (Clostridium difficile).

Conclusion: The results of this study demonstrate inappropriate utilization of stress ulcer prophylaxis in critically ill patients at our facility. As a result of these findings, the clinical pharmacy staff now provides periodic physician education on appropriate use and discontinuation of stress ulcer prophylaxis. The existing intensive care unit transfer order set was amended to include discontinuation of stress ulcer prophylaxis where indicated. These results have also led to development of a hospital policy allowing discontinuation of stress ulcer prophylaxis by a clinical pharmacist for patients who do not meet approved criteria for use.

Submission Category: Pediatrics

Submission Type: Case Report

Session-Board Number: 3-028

Poster Title: Efficacy of amlodipine in the treatment of infantile pulmonary hypertension.

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Purpose: Patient AB is a Caucasian, former 25 week male with a birth weight of 1.025kg, who presented at 3.5 months of age with hypertension (blood pressures in 130s/60s). Past medical history is significant for prematurity, extremely low birth weight, significant chronic lung disease, hypothyroidism, cholestasis, feeding intolerance (status post gastrostomy tube fundoplication), and multiple episodes of pneumonia. At the time of presentation, patient AB was requiring a 7 liter cannula with an increasing oxygen requirement of 29%. Pulmonary hypertension was suspected and confirmed by echocardiogram. Pharmacy was consulted to dose amlodipine. Amlodipine is currently not approved by the Food and Drug Administration for the treatment of hypertension in patients less than six years of age and there is little primary literature data for dosing in patients less than one year of age. After review of the limited primary literature data, a dose of 0.1 mg/kg by mouth daily of amlodipine was chosen. Cardiology was consulted and agreed with medication selection and dose. We expected a significant decrease in systolic blood pressure would be observed in 6-14 days which was calculated using a half-life of 30-60 hours. The patient was monitored daily for adverse effects which included flushing, hypotension, edema, and increased fatigue. Within 48 hours of administration, the patient's blood pressure decreased from 139/66 to 103/62. The patient displayed no adverse effects at that time. By day six on amlodipine, the patient's blood pressure was 93/46. The patient's breathing improved as well which allowed the weaning of supplemental oxygen to a 0.5 liter nasal cannula. The patient continued to exhibit no signs of adverse effects. An increase in blood pressure to 128/68 was noted on day ten. As a result, the patient's dose was increased from 0.1 mg/kg to 0.15 mg/kg by mouth daily and adjusted to account for weight gain. The patient's blood pressure decreased to 90/68 with the new dose. Similar blood pressures were observed over the next three days with no signs of adverse effects. By day 14, the patient again experienced a gradual increase of blood pressure potentially due to weight gain and a relative decreased dose per weight. As a result, amlodipine

was increased to 0.2 mg/kg by mouth daily and spironolactone/hydrochlorothiazide 1 mg/kg by mouth twice a day was added to manage chronic lung disease and hypertension. Soon following the amlodipine dose change and the addition of a second medication, the patient was discharged home on amlodipine 0.2 mg/kg by mouth once daily and spironolactone/hydrochlorothiazide 1 mg/kg by mouth twice a day with a follow-up scheduled with outpatient cardiology. As this report suggests, amlodipine appears to be effective in the treatment of pulmonary hypertension in infants under the age of one with little to no adverse effects. More studies will need to be performed to validate this single case, but it is important to note an experience of safety and efficacy in this understudied population.

Methods:

Results:

Conclusion:

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 3-029

Poster Title: Use of an acetaminophen maximum daily dose calculator to prevent unintended acetaminophen overdose in hospitalized patients

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Purpose: Acetaminophen is a common ingredient in combination pain medications administered to hospitalized patients. To prevent liver toxicity, the FDA recommends no more than 4 grams of acetaminophen be taken in a 24 hour period. Manufacturers of acetaminophen recommend no more than 3 grams within 24 hours. With the abundance of acetaminophen containing products, it is easy to unintentionally administer too much acetaminophen. In response to this risk, Emory Healthcare developed an alert which can notify a nurse when a dose of acetaminophen would exceed 3 grams per day. This project was designed to assess the effectiveness of this alert.

Methods: A computerized rule was developed which allows for the addition of a rolling 24 hour acetaminophen dose across multiple acetaminophen-containing products and routes of administration. As a test of change, the alert was activated in the "background" at Emory University Hospital and data collected over a 48 hour period to capture any patient who would have had the nursing alert fire. A retrospective chart review was performed on these patients to determine the maximum acetaminophen dose administered in the previous 24 hours, the specific acetaminophen products orders, timing of the doses in relation to the alert firing, whether or not the orders were placed as part of a power plan, and whether or not the patient had any liver dysfunction during their stay. Based on the results, changes to standing power plans were implemented and the report was repeated to determine effectiveness of the changes.

Results: A total of 48 patients had the alert fire during the initial 48-hour study window. Forty-seven of the patients on the report had received more than 3 grams of acetaminophen in the previous 24 hours. Twenty-eight patients' acetaminophen orders originated outside of a power

plan and nineteen were ordered as part of a power plan. The average acetaminophen dose for orders outside of power plans was 3.5 grams (highest dose = 4.5 grams). The average acetaminophen dose given within a power plan was 3.9 (highest dose = 7.1 grams). One patient was found to have mild liver dysfunction. Seventy-two percent of patients who received > 3 grams of acetaminophen received it from a single around-the-clock acetaminophen dosage form. The majority of patients would not have exceeded the 3 gram maximum dose if the nurse would have waited an additional 15-20 minutes before giving the dose. The most common power plans containing acetaminophen orders which put patients at risk for > 3 grams in 24 hours were related to Neurology. When the alert was re-run after changes were made to the power plans, only one patient was identified on the report as exceeding the 3 grams daily dose.

Conclusion: The alert, in combination with changes made to power plans and the alert cutoff, proved to be an effective method of identifying patients who would be at the highest risk for receiving more than 3 grams of acetaminophen within a 24 hour period. This alert will result in improved patient safety within our healthcare system.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-030

Poster Title: Face the factors: Evaluating clinical use of coagulation factor VIIa (recombinant) in a pediatric hospital

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Purpose: Children's Healthcare of Atlanta (CHOA) pharmacy department took over dispensing of factors in November 2015. Currently, coagulation factor VIIa (recombinant) is FDA approved for the following indications: Hemophilia A or B, congenital factor VII deficiency, and Glanzmann's thromboasthenia. There has also been literature to support the use of coagulation factor VIIa (recombinant) in treatment of excessive bleeding after cardiac surgery and prophylactically if bleeding was a risk for complication of a cardiac surgery. The objective of this MUE is to assess the usage of coagulation factor VIIa (recombinant).

Methods: A retrospective chart review of patients receiving coagulation factor VIIa (recombinant) at CHOA was conducted from December 2015 to May 2016. Data collection included patient demographics, admission date and diagnosis, physician service, prescribing physician, indication for use, side effects, labs, and use of concurrent blood products. The dose and date of administration was recorded and dosing was assessed for appropriateness based on FDA recommendations and previous clinical trials.

Results: A total of 40 patients received coagulation factor VIIa (recombinant) during the time period of December 2015 to May 2016 and all patients were evaluated. Eighty-five percent of patients were at the Egleston campus and 15% of patients were at the Scottish Rite campus. This is most likely because cardiac procedures take place only at Egleston. Forty-five percent of all patients received coagulation factor VIIa (recombinant) for post-operative bleeding after cardiac surgery. Coagulation factor VIIa (recombinant) was given to 10% of all patients as a rescue intervention, which was defined as any patient that received multiple blood products (platelet concentrate, pRBC, fresh frozen plasma, and/or cryoprecipitate) prior to receiving

coagulation factor VIIa (recombinant). Most of these rescue interventions were cardiac related surgeries and the coagulation factor VIIa (recombinant) was given in the OR. The most common FDA approved uses of coagulation factor VIIa (recombinant) were Factor VII deficiency (12.5% of all patients) and Glanzmann's thromboasthenia (10% of all patients).

Conclusion: The majority of coagulation factor VIIa (recombinant) was used in cardiothoracic surgery. Education and procedure changes will be implemented through collaboration between the cardiothoracic surgeons and the pharmacy department. Protocols will be developed for use of coagulation factor VIIa (recombinant). Some examples of future protocols include coagulation factor VIIa (recombinant) use in cardiac procedures, rescue interventions and post-operative bleeds. A flowchart will be created to assist healthcare professionals in appropriately dosing coagulation factor VIIa (recombinant).

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Evaluative Study

Session-Board Number: 3-031

Poster Title: Incidence of hypoglycemia among emergency department patients treated with regular insulin from a hyperkalemia protocol

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Purpose: Hyperkalemia is a common condition found among patients seen in emergency departments and can be fatal if left untreated. The purpose of this study is to determine the incidence of hypoglycemia among patients treated with regular insulin as part of an emergency department hyperkalemia protocol at a large community hospital. Findings from the study will be used to evaluate the emergency department hyperkalemia protocol.

Methods: This was retrospective, observational, pilot study involving electronic medical chart review. Adult patients seen in the emergency department from January 2016 through March 2016 who received treatment with regular insulin from the hyperkalemia protocol were eligible for inclusion in the study. Patients were identified by running a report from the pharmacy system of all patients during this time period who received regular insulin resulting from an emergency physician order from the hyperkalemia protocol order set. The primary endpoint of this study was incidence of hypoglycemia, which was defined as blood glucose less than 70 mg/dL. In addition, severe hypoglycemia was defined as blood glucose less than 40 mg/dL. Additional data collection parameters included demographics, past medical history, admission laboratories, hyperkalemia treatments, post-treatment laboratories, hospital admission, and re-admission. Specific laboratories that were evaluated included including serum blood glucose, point of care blood glucose, serum creatinine, creatinine clearance, potassium, and magnesium. Descriptive statistics were used to summarize the data.

Results: A total of 103 patients were included in the analysis. The average age of patients in the study was 62.9 years with 53 percent being male. Twenty-nine percent of the patients had a previous admission for hyperkalemia and 10 percent of the patients had been admitted previously for hypoglycemia. Additionally, 49 percent of patients had a past medical history of diabetes and 53 percent had end-stage-renal-disease with hemodialysis. The average admission serum blood glucose was 146 mg/dL and the average admission serum potassium was 6.25 mEq/L. Approximately 70 percent of patients received the recommended dose of 10 units regular insulin for treatment of hyperkalemia. A total of 94 number of patients were admitted to the hospital (91.3 percent). The incidence of hypoglycemia among patients treated with regular insulin from the hyperkalemia treatment protocol was 15 percent (n equals 15). In addition, the incidence of severe hypoglycemia was 6 percent (n equals 6).

Conclusion: Findings from this pilot study demonstrate a clinically significant incidence of hyperkalemia in this community hospital setting. This study adds to the limited published literature on this topic. This data warrants extension of the study duration to confirm the incidence of hypoglycemia associated with regular insulin treatment. Furthermore, it is warranted to evaluate the association between risk of hypoglycemia and admission weight, glycemic control, and renal function.

Submission Category: Infectious Diseases

Submission Type: Case Report

Session-Board Number: 3-032

Poster Title: Management of a patient with daptomycin and statin induced rhabdomyolysis

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Purpose: Rhabdomyolysis is a rapid breakdown of muscle tissue that leads to a release of muscle fiber contents into the bloodstream. The condition is characterized by mild to severe pain typically presenting in the large muscle areas of the lower extremities and is an adverse event associated with daptomycin and statin therapy. Complications of rhabdomyolysis include fluid and electrolyte abnormalities, acute kidney injury, compartment syndrome, and disseminated intravascular coagulation. While rhabdomyolysis is a documented rare side effect of daptomycin therapy, the continuation of concurrent statin therapy is controversial as there are limited case reports documenting the increased risks of rhabdomyolysis with combination therapy. This case report focuses on the treatment of a patient diagnosed with rhabdomyolysis following therapy with daptomycin and a high intensity statin.

A 74 year old African American female with a past medical history significant for dyslipidemia, stroke, and Enterococcus faecalis infective endocarditis presented to the emergency department with increased weakness, fatigue, and dark urine. Laboratory results revealed a serum creatinine (SCr) of 2.11 mg/dL, which was elevated from the patient's baseline of 1.05 mg/dL, abnormal liver function tests, and a significant creatine phosphokinase (CPK) level of greater than 41,000 units/L. Three weeks prior to the presentation to the emergency department, the patient was initiated on atorvastatin 40mg orally daily for secondary stroke prevention and intravenous vancomycin and gentamicin therapy for endocarditis. The choice of antibiotics for the infective endocarditis was based on the patient's history of a true penicillin allergy, despite pansensitive cultures. Within two weeks of initiation of vancomycin and gentamicin therapy, the patient developed acute kidney injury as evidenced by an elevated SCr of 2.60 mg/dL and a calculated creatinine clearance (CrCl) of 21.9 mL/min. The patient was then transitioned to intravenous daptomycin 10 mg/kg/day. The change in antibiotics occurred at her rehabilitation center without a pharmacy consult and no dose adjustments were made to account for her renal impairment. Based on the severity of the patient's renal injury, the most

appropriate daptomycin dosing interval would have been every 48 hours. Statin therapy was also continued based on her recent stroke history despite cautionary labeling in the antibiotic's package insert to consider the suspension of statin therapy. Ten days after daptomycin initiation, the patient presented with rhabdomyolysis.

The patient was admitted to the hospital and was treated with aggressive fluid resuscitation and a change in antibiotic therapy. Daptomycin and atorvastatin therapy were discontinued immediately as this was determined to be the etiology of the patient's rhabdomyolysis. The patient was maintained on 3-6 liters of intravenous normal saline per day for the treatment of rhabdomyolysis and was initiated on an intermittent dosing regimen of vancomycin for completion of her endocarditis treatment. Monitoring parameters included daily renal and liver function tests, urine output, electrolytes, fluid status, and morning vancomycin levels with a goal to re-dose the patient if the level was less than 20 mg/L. Overall, the treatment of this patient with aggressive fluid resuscitation was successful. The goal urine output was achieved within the first two days of treatment, renal and liver function tests improved, CPK levels decreased dramatically to 735 units/L by the day of discharge, and there were no complications associated with fluid overload or electrolyte imbalances.

This case study emphasizes the importance of proper dosing of daptomycin in renal impairment, the risks associated with the co-administration of statin therapy and daptomycin, and the treatment of rhabdomyolysis. Pharmacists can play an integral role in patient care by assisting in the appropriate selection and dosing of antimicrobials, especially in complicated patient cases and by evaluating the safe use of concurrent medications.

Methods:

Results:

Conclusion:

Submission Category: Critical Care

Submission Type: Descriptive Report

Session-Board Number: 3-033

Poster Title: Evaluation of Respiratory Therapist Treatment Protocol (RTTP) in Critically Ill Patients on Mechanical Ventilation at a Large Academic institution

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Purpose: Bronchodilators are used in mechanically ventilated (MV) patients with asthma and chronic obstructive pulmonary disease (COPD). At Grady Health System, orders for bronchodilators are written based on the respiratory therapy treatment protocol (RTTP). In the respiratory therapist (RT)-driven RTTP, the RT initiates treatments based on an acuity score, ranging from 0 to 4, using patient characteristics such as pulmonary history and chest x-rays. The American Association for Respiratory Care (AARC) estimated about 30-60% of inpatient respiratory care is inappropriate. Previous studies have evaluated the benefits of RT-driven protocols in non-ICU patients, however, data for critically ill ICU patients are lacking.

Methods: The primary objective was to evaluate adherence to RTTP and bronchodilator therapy with albuterol and ipratropium in MV patients admitted to SICU and MICU at Grady Health Systems. Secondary objectives included the assessment of bronchodilator therapy before and after RTTP, duration of drug therapy and mechanical ventilation, and the incidence of hypokalemia and ventilator-associated pneumonia (VAP) associated with the use of nebulized bronchodilator therapy. Adherence is defined as an order submitted by an RT, acuity score documented on the medical record, and metered dose inhaler (MDI) use for MV patients. Non-adherence to the RTTP was defined as lack of acuity score documentation, wrong frequency, or given nebulizers during ventilation. IRB-approved, retrospective electronic medical record review of a target sample size of 200 patients, 30 adult patients thus far, who received bronchodilator therapy while on mechanical ventilation for >24 hours between January 2011 and December 2015. The pre-protocol phase included patients from January 2011 to December 2012 and the post-protocol phase included patients from January 2013 to December 2015. Inclusion criteria were critically ill patients in the medicine (MICU) or surgical (SICU) intensive care units on mechanical ventilation >24 hours and on bronchodilator therapy

with albuterol and/or ipratropium nebulizer and/ or MDI. Exclusion criteria included non-ICU patients, < 24hrs of ventilation, pediatric, pregnant women, prisoners, intellectually or emotionally impaired, institutionalized, or physically handicapped patients.

Results: 30 randomly selected patients were evaluated thus far, before (n=11) and after (n=19) RTTP. The sample consisted of 50% male, median age 59 years, and 90% in MICU. The most common admission diagnoses were pulmonary, mainly due to COPD, (40%) and cardiac (23%). Before RTTP, 91% of orders were entered by a physician and 63% of MV patients received MDI bronchodilators. Post-RTTP, adherence to the protocol occurred in 53% (n=19) of all patients with 79% orders entered by an RT, documented an acuity score, and received MDI bronchodilators during MV. Non-adherence to the RTTP was due to failure of acuity score documentation (33%), wrong frequency of bronchodilators (33%), or given nebulizers during ventilation (22%). Median duration of mechanical ventilation was 7 days and 10 days, before and after protocol, respectively. Median duration of bronchodilator therapy was 3 days and 6 days, before and after protocol, respectively. Patients without obstructive lung disease who received bronchodilator therapy reduced from 72.7% before protocol implementation to 63.2% after protocol. Incidence of hypokalemia and VAP were 10% and 7%, respectively.

Conclusion: The RTTP allows for standardization of therapy in MV patients based on a set of criteria, leading to a streamlined therapy. Prior to RTTP, orders were entered by physicians and more MV patients received nebulized therapy. However, after RTTP, orders were entered by RTs and the use of nebulizer use was diminished. Two VAP events occurred (one before and one after RTTP) in patients who received nebulized bronchodilator therapy. Protocol driven therapy is an innovative approach that hospitals can take to address the inadequacies, inefficiencies, and wastefulness.

Submission Category: Infectious Diseases

Submission Type: Case Report

Session-Board Number: 3-034

Poster Title: Management of invasive Scopulariopsis infection in an immunocompetent patient with a bio-prosthetic aortic valve

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Purpose: Scopulariopsis is a common mold found in many indoor environments. It rarely infects people beyond simple onychomycosis and is not known to be a highly invasive organism. Scopulariopsis typically does not have the ability to invade tissues or cause bacteremia. In the few cases of invasive deep tissue infections reported in the literature, the mold was found to be highly resistant to anti-fungal therapies such as amphotericin B, posaconazole, voriconazole, and micafungin which are all common agents used in the treatment of serious fungal infections. There is limited information available regarding the treatment of invasive infections caused by this organism in immunocompetent individuals and no evidence in using isavuconazole in the treatment of Scopulariopsis infections in any patient. The purpose of this case study is to describe the use of isavuconazole in the treatment of an aortic root infection caused by Scopulariopsis.

The patient is a 69-year-old female with a bio-prosthetic aortic valve that was admitted to the emergency department following three days of left hand weakness, left leg claudication, and persistent headache. Magnetic resonance imaging of the head revealed multiple embolic events in bilateral hemispheres of the brain. She was also found to have a thrombus in the brachiocephalic artery and right internal carotid artery stenosis. Transesophageal echocardiogram of the chest revealed a mobile mass on the aortic root. As a result, the patient continued to have new embolic infarcts in the right hemisphere during the early part of her hospital stay which was attributed to the mass. The mass was excised and tissue cultures resulted with preliminary fungal growth while blood cultures remained negative for any growth. Apparent risk factors leading to the infection could not be established and the infectious disease team was consulted for treatment recommendations. The patient was initiated on empiric therapy with intravenous micafungin and intravenous isavuconazole to broadly cover infection while awaiting fungal identification. Antibiotics were then de-escalated to oral

isavuconazole 372 mg daily as monotherapy after microbiology lab results isolated Scopulariopsis. Scopulariopsis was not identified to the species level due to difficulty in differentiating between the 30 species of the organism. Such determination requires a laborious biochemical process and specific morphological criteria which was deemed not beneficial by the lab. The patient's stay was complicated by thrombocytopenia following initiation of heparin. After ruling out heparin induced thrombocytopenia, the pharmacy team immediately managed anticoagulation for optimal treatment and continued to follow. The infectious disease team recommended monitoring liver enzymes while on long-term triazole therapy. At discharge the patient did not display any further signs of infection and was to complete 6 months of therapy with oral isavuconazole 372 mg daily. The patient was discharged to a rehabilitation center due to left body weakness resulting from the multiple emboli. At the patient's 4 week post-discharge infectious disease appointment, the patient continued to improve on drug therapy with no additional complications.

The use of anti-fungal agents for the treatment of rare and highly resistant infections require great vigilance in monitoring for side effects and appropriate response. The treatment plan for this patient was complicated and involved the off-label use of a new medication emphasizing the role of careful monitoring in rare disease state management. Monitoring the effectiveness and safety of drugs not proven to have treatment effectiveness or safety data beyond what is indicated is important to manage patients adequately. If proven safe and effective, isavuconazole could represent a potential treatment option for infections secondary to Scopulariopsis species.

Methods:

Results:

Conclusion:

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Evaluative Study

Session-Board Number: 3-035

Poster Title: Outcomes in patients with acute ischemic stroke presenting with low National Institute of Health Stroke Scale (NIHSS) scores or rapidly improving symptoms

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Purpose: Alteplase has traditionally not been offered to patients with acute ischemic stroke presenting with low National Institute of Health Stroke Scale (NIHSS) scores or rapidly improving symptoms due to the perception that the risk of treatment may outweigh the potential benefits. The purpose of this study was to determine the rate of favorable outcomes upon discharge for patients presenting with low NIHSS scores or rapid clinical improvement who did not receive alteplase treatment as compare with those who did.

Methods: We conducted an institutional review board approved single-center, retrospective electronic chart review of all patients presenting to the emergency department with an acute ischemic stroke between July 2014 to September 2016. Patients were included if they were at least 18 years old, presented to the emergency department within 4.5 hours of symptom onset, and had an initial NIHSS score of less than 4 or demonstrated rapid improvement of their stroke symptoms prior to the administration of alteplase. Patients were identified by accessing the American Heart Association's "Get with the Guidelines – Stroke Database" for all patients presenting to Midtown Medical Center with acute ischemic stroke during this timeframe. Data collected for both groups included patient demographics, past medical history, hospital length of stay, neuroimaging including non-contrast head CT, head CT-angiogram, brain magnetic resonance imaging, and brain magnetic resonance angiogram; and the modified Rankin Score upon discharge. The primary outcome was the percentage of patients with favorable outcome (modified Rankin score 0 to 1, favorable, or 2 to 6, unfavorable) of those patients who received alteplase and those who did not. Secondary outcomes included disability and final discharge disposition (discharged to home, long-term care facility, etc.) of patients.

Results: A total of 51 patients were included, 24 received alteplase and 27 did not receive alteplase. Two patients demonstrated rapid clinical improvement in the alteplase group and 24 in the non-alteplase group. Upon discharge, 62.5 percent of alteplase patients and 44.4 percent of non-alteplase patients had favorable modified Rankin Scale scores of 1 or less, P 0.197. There were no deaths reported. A total of 41.7 percent of alteplase patients and 55.6 percent of non-alteplase patients were discharged with disabilities requiring the use of assistive devices. Of these patients, 8.3 percent of the alteplase group required placement in an acute rehabilitation facility and 18.5 percent of the non-alteplase group required placement in either an acute rehabilitation facility or in a skilled nursing facility, P 0.425.

Conclusion: The results of this study did not demonstrate a significant difference in the level of disability upon discharge of patients presenting with low NIHSS scores or rapid improvement who did not receive alteplase treatment as compared to those who did. A higher percentage of patients who received alteplase were discharged with a more favorable modified Rankin Score than those who did not receive alteplase; however, these results were not statistically significant. There was no significant difference in disability or discharge disposition between the two groups upon discharge. Larger studies are needed to confirm these results.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 3-036

Poster Title: Evaluation of Time to Antibiotic Administration for Patients presenting with Febrile Neutropenia

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Purpose: Febrile neutropenia (FN) is an oncologic emergency associated with significant morbidity and mortality. Although the Infectious Disease Society of America guidelines recommend antibiotic initiation within 2 hours of presentation, there is a paucity of data supporting antibiotic timing and the impact on patient outcomes. Data supporting the impact of empiric antibiotic timing, causative organisms and adherence to guidelines may lead to improvement in the management of this oncologic emergency. The purpose of this study was to determine the impact of empiric antibiotic initiation within 2 hours of presentation on adverse outcomes in patients presenting with FN at Grady Health System.

Methods: An IRB-approved retrospective chart review analyzed patients diagnosed with FN in the inpatient setting and emergency department (ED) between May 2013 and May 2016. Patients were included in the study if a febrile episode (temperature greater or equal to 38.0 degrees Celsius) occurred concurrently with an absolute neutrophil count (ANC) less than 500 cell/mm3. Subsequent FN episodes during the same admission or patients on therapeutic antibiotics at time of fever onset were excluded. Times of fever onset, admission, and first empiric antibiotic dose were collected. Additionally, empiric antibiotics, antibiotic doses, and resulted bacterial cultures were collected. The primary objective of this study was to determine the impact of empiric antibiotic initiation within 2 hours of presentation of FN on adverse outcome, defined as a hospital stay of greater than 2 weeks after the start of the episode, admission to a step-down unit or an ICU, or death during hospitalization. Secondary objectives

included evaluating time to first dose of empiric antibiotics and compliance with the health system's FN protocol.

Results: A total of 1474 incidences of ANC less than 500 cells/mm3 were identified. A random sample of 277 were evaluated, representing 76 patients, and 19 patients with 20 FN episodes met inclusion criteria. Ninety percent of episodes (n=18) had a cancer diagnosis and 10 percent were positive with HIV (n=2). Overall, 70% of episodes included an adverse outcome (n=14). The hospital stay was greater than or equal to 2 weeks for 55 percent of episodes (n=11), 25 percent were admitted to a step-down unit or ICU (n=5), and 5 percent died during hospitalization (n=1). Of the 20 episodes, 5 received empiric antibiotics within 2 hours of presentation of FN. The median time to first dose of empiric antibiotics was 13 hours (range 1.7-53.9). All patients received an anti-pseudomonal beta-lactam empiric antibiotic, consistent with the health system's protocol. An adverse outcome was experienced by 4 of the 5 patients that received antibiotics within 2 hours and by 10 of the 14 patients that received antibiotics after 2 hours. A cultured organism was identified in either blood or urine cultures of 7 patients including Escherichia coli (2), Klebsiella pneumoniae (1) , Enterobacter cloacae (1), Group A streptococcus (1), and Enterococcus faecium (2).

Conclusion: Overall, adverse outcomes in patients receiving antibiotics within 2 hours and after 2 hours of documented fever were comparable, 80 percent and 67 percent, respectively. A larger sample size may help to highlight the difference in adverse outcome rates among patients based on time to empiric antibiotic administration. Compared to other retrospective chart reviews, the patients identified in this study were more likely to have solid tumor malignancies rather than hematologic. Enterobacter cloacae bacteremia and sepsis were the cause of death for the single patient that died. The cultured organisms were consistent with previously reported studies in patients with FN.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 3-037

Poster Title: Evaluation of empiric urinary tract infection (UTI) guidelines based on a stratified antibiogram in a tertiary community teaching hospital

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Purpose: Escherichia coli (E. coli) is the most prominent urinary isolate found in urinary tract infection. There are established guidelines for the proposed empiric treatment of uncomplicated and complicated urinary tract infections that cover E. coli. However, E. coli resistance is on the rise. The purpose of this study is to determine if Midtown Medical Center's (MMC) UTI empiric antimicrobial guidelines are appropriate based on a stratified antibiogram of urinary isolates.

Methods: This retrospective study of susceptibility data for urinary isolates was approved by the Institutional Review Board at Mercer University College of Pharmacy. Urinary isolates were collected from June 2015 through July 2016 at Midtown Medical Center. Organisms for inclusion consist of positive urinary cultures with an identified pathogen in inpatients and patients reporting to the Emergency Trauma Center. Duplicate isolates found in a patient in a calendar year were excluded. A stratified antibiogram was developed using susceptibility data from the urinary isolates identified. A comprehensive literature review was performed to define uncomplicated and complicated urinary tract infection and identify updated UTI evidenced based recommendations for antibiotic selection. The institution's empiric guideline for urinary tract infection was assessed based on current literature and the generated antibiogram.

Results: A total of 1653 urinary isolates were evaluated for percent susceptibility to various antibiotics. The most prevalent isolate was E. coli (49.5 percent), followed by Klebsiella pneumoniae (13.2 percent), Enterococcus faecalis (9.7 percent), Proteus mirabilis (6.4 percent), and Pseudomonas aeruginosa (4.8 percent). Oral antibiotics endorsed by IDSA for community acquired UTI include nitrofurantoin, trimethoprim/sulfamethoxazole, and alternatively

fluoroquinolones and beta lactams. Intravenous agents include fluoroquinolones, aztreonam, and ceftriaxone. For complicated UTI with multi-drug resistant (MDR) risk factors, coverage includes intravenous antibiotics with pseudomonal activity. MMC's empiric guidelines for antibiotic selection are consistent with the national guidelines. Primary literature recommends avoiding empiric use of an agent with a resistance rate exceeding 21 percent. E. coli isolates at MMC currently show 31 percent resistance to trimethoprim/ sulfamethoxazole and 28 percent resistance to levofloxacin. However, 97 percent of E. coli strains were susceptible to nitrofurantoin, 89 percent to cefuroxime and 93 percent to ceftriaxone. For Pseudomonal coverage, susceptibility to ceftazidime and piperacillin/tazobactam was 85 percent and 88 percent respectively. In the case of a penicillin or cephalosporin allergy, pseudomonal susceptibility to tobramycin and aztreonam was 89 percent and 59 percent respectively.

Conclusion: After review of the stratified urinary antibiogram and MMC's empiric guidelines, the following recommendations for change were made: add durations of therapy for uncomplicated and complicated UTI, change ceftazidime to piperacillin/tazobactam and delete adjunctive tobramycin for complicated UTI with MDR risk factors, and remove antibiotic selection based on age stratification.

Submission Category: General Clinical Practice

Submission Type: Case Report

Session-Board Number: 3-038

Poster Title: Management of tuberculosis meningoencephalitis in an immunocompetent adult patient

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Purpose: Infection with tuberculosis is a prevalent global health concern associated with high rates of morbidity and mortality. Tuberculosis infections are more common in developing countries and often present in immunocompromised patients, such as those infected with Human Immunodeficiency Virus (HIV). On occasion, Mycobacterium tuberculosis (MTB) infection involves extra-pulmonary manifestations including infection of the central nervous system (CNS), however, such manifestations are most common in pediatric populations. This case report is an example of an immunocompetent, adult patient with no recent travel history who presents with disseminated tuberculosis meningoencephalitis. A 71 year old female presented to the neurocritical care unit as a transfer from a neighboring hospital where she had presented with altered mental status and recent weight loss. After transfer, she was treated empirically for bacterial, fungal, and viral meningitis. The infectious disease team recommended a polymerase chain reaction (PCR) panel to screen for the presence of multiple bacterial, fungal, and viral pathogens in the cerebrospinal fluid (CSF). The results of the test suggested the presence of Listeria monocytogenes. Consequently, antibiotic therapy was narrowed to monotherapy with intravenous ampicillin, however, the patient's clinical status did not improve on ampicillin therapy and CSF cultures failed to result positive Listeria growth. The patient subsequently developed obstructive hydrocephalus which required the placement of a ventriculoperitoneal shunt. Two weeks after admission, sputum and CSF cultures resulted positive for acid fast bacilli, eventually confirmed through PCR analysis as disseminated tuberculosis with CNS and genitourinary manifestations. Ampicillin therapy was discontinued and the patient was initiated on rifampin, isoniazid, pyrazinamide, and ethambutol (RIPE) therapy along with a 6 week corticosteroid taper which has demonstrated a mortality benefit in MTB CNS infections. Following 2 months of RIPE therapy, the patient is expected to complete 7-

10 months of isoniazid and rifampin therapy. The patient's clinical status improved on RIPE therapy.

There is an important role for pharmacists in assisting with the management and monitoring of patients receiving RIPE and corticosteroid therapy. RIPE and steroid therapy individually, and especially concomitantly, are known to cause lab abnormalities and serious toxicities. In addition to assisting with dose selection, extensive monitoring of organ function and lab values, as well as implementation of supportive therapies for prevention of adverse effects, all require vigilant work from the clinical pharmacy team and provide multiple opportunities for intervention. Rifampin and isoniazid are involved in many drug interactions through induction of hepatic enzymes. This property has the potential to affect serum levels of other medications important for management of this patient including corticosteroids, thyroid supplementation, and anti-emetics. Additionally, prolonged therapy of these medications, for 1 year or more, requires thorough patient education about the importance of medication compliance and associated adverse effects. Adherence to MTB treatment is essential to patient and public health and pharmacists play a key role in ensuring medication acquisition and proper administration. Prolonged therapy means increased likelihood of adverse events and it is the responsibility of the pharmacist to educate the patient on what to expect and how to identify toxicities. This case is an example of the role of a clinical pharmacist in managing seriously ill patients receiving complicated drug therapies that include potentially toxic and highly interactive medications.

Methods:

Results:

Conclusion:

Submission Category: Ambulatory Care

Submission Type: Case Report

Session-Board Number: 3-039

Poster Title: Bone fractures with minimal trauma in two patients receiving adalimumab therapy

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Purpose: Adalimumab is a recombinant monoclonal antibody that binds specifically to tumor necrosis factor-alpha (TNF-alpha) and modulates cytokine-mediated inflammatory processes. Adalimumab is currently approved by the Food and Drug Administration for the treatment of multiple disease states including Crohn's disease, ulcerative colitis, rheumatoid arthritis, and psoriatic arthritis. Bone health is a concern for patients diagnosed with many of these disease states due to frequent use of steroid-based therapy and other concomitant risk factors that may predispose the patient to osteopenia or osteoporosis. TNF-alpha itself affects bone turnover by activating osteoclasts and inhibiting osteoblast differentiation, thus increasing bone resorption and decreasing bone formation. Thus, adalimumab therapy may positively impact bone health in patients with underlying inflammatory-mediated disease states. The studies done to examine the impact of TNF-alpha inhibitors on bone health are limited. The purpose of this case report is to present two patients who developed stress fractures with limited trauma while receiving adalimumab therapy. Patient 1 is a 56 year old female with a past medical history of rheumatoid arthritis, type 1 diabetes, hypothyroidism, hypertension, and hyperlipidemia. The patient is receiving adalimumab 40 mg subcutaneously every other week and leflunomide 20 mg by mouth daily for the treatment of rheumatoid arthritis with past therapies including remote glucocorticoid pulse treatment, methotrexate, hydroxychloroquine, and etanercept. The patient tripped off a curb while walking resulting in right proximal leg pain. Magnetic resonance imaging revealed an atypical right femoral stress fracture suggestive of bisphosphonate exposure. However, current bone mineral density findings were within normal limits and the patient denied previous bisphosphonate use. Due to delayed fracture healing with physical therapy and limitation of weight-bearing activity, the patient was instructed to discontinue adalimumab and was prescribed teriparatide 20 mcg subcutaneously daily with improvement in pain and fracture

healing on imaging. Patient 2 is a 68 year old male with past medical history of psoriatic arthritis, psoriasis, osteoarthritis, gout, benign prostatic hyperplasia, and exercise-induced asthma. The patient is receiving adalimumab 40 mg subcutaneously every other week for psoriatic arthritis with previous therapies including azulfidine, sulfasalazine, oxaprozin, and remote glucocorticoid use. The patient sustained an oblique fracture in the distal tibial shaft while he was running as a part of regular exercise. Bone mineral density studies revealed osteopenia with t-scores of -0.9 in left total hip and 1.6 in the lumbar spine; however, post hoc calculation of the 10-year risk of major osteoporotic or hip fracture did not meet thresholds for pharmacotherapy prior to the patient's fracture. This patient was also prescribed teriparatide 20 mcg subcutaneously daily for delayed fracture healing, but continued concomitant adalimumab therapy with subsequent fracture healing after a prolonged treatment course. These two cases of atypical fractures occurring with minimal trauma raise questions about the pathologic impact of adalimumab on bone health and indicate the need for further investigation. The pharmacy team in the internal medicine clinic was consulted by the patients' primary care physician to discuss the potential relationship of adalimumab therapy and fracture occurrence and healing. The pharmacy team played an integral role in providing drug information and clinical research to the multidisciplinary team and patients in addition to providing support for the documentation of these adverse events. As the use of adalimumab and other biologic products will likely expand in the future due to numerous indications and the approval of biosimilar products, pharmacists are primed to promote safe and effective use of these medications by providing current drug information to healthcare providers and patients, appropriately reporting adverse events, and contributing to the medical literature regarding experience with these agents.

Methods:

Results:

Conclusion:

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 3-040

Poster Title: Chronic stress increases urinary bilirubin in adolescent rats

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Purpose: Chronic stress is believed to contribute to the progression of type 2 diabetes mellitus (T2DM), non-alcoholic fatty liver disease (NAFLD), and depression. Depressed patients often display elevated cortisol. Chronically elevated cortisol can cause insulin resistance, a characteristic pathology of T2DM, and compensatory generation of free fatty acids and ketones. Fatty acids are converted to triglycerides and LDL in hepatocytes, a characteristic of NAFLD. Urine can contain biomarkers characteristic of these diseases. The purpose of this study is to evaluate urine samples from a putative depression model for biomarkers associated with type T2DM and NAFLD using urinary dipsticks for rapid screening.

Methods: Urine samples were obtained from two previous studies using adolescent chronic restraint stress (aCRS) to model depression in adult female Sprague-Dawley (SD) rats. Urine samples were obtained from acRS rats without treatment, acRS rats that received desipramine as treatment, and non-restrained control rats. Urine was passively collected between 8am to 10 am at the beginning and end of the restraint and treatment periods. Urine samples were transferred from the floor of the chamber by pipet and stored at -80 degrees celsius. Samples were thawed and briefly vortexed to resuspend sediments. 15 microliters of urine was pipetted onto select sections of the Accutest Urine reagent strips (JANT pharmaceutical Corporation, Encino, CA). At 30, 30, 40, and 60 seconds, sections for glucose, bilirubin, ketones, and protein were visually compared to the standards diagram on the test strip package and the associated values were recorded. Data was analyzed using excel to perform t-tests and expressed as the mean plus or minus standard error of the mean (SEM), significance set a priori at P less than 0.05.

Results: aCRS rats displayed significantly greater change in urinary bilirubin vs non-restrained rats after the restraint period (P equals 0.029). aCRS rats that were given desipramine, displayed a downward trend change in urinary bilirubin after the treatment period. No differences were found in protein, ketone, or glucose between treatment groups.

Conclusion: aCRS does not elicit urinary glucose detectable by this rapid screening method, but aCRS rats may be vulnerable to NAFLD. There is evidence of impaired liver function or liver damage in aCRS rats. This data can pose promising preliminary data that can be used to justify looking for NAFLD in depressed patients. This disease state modeled in rats can be useful to evaluate these conditions in humans. Clinical relevance is due to the fact that chronic stress may precipitate metabolic disorders and alter patient outcomes. These results may justify screening depressed patients for liver dysfunction with a convenient urine screening.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 3-041

Poster Title: Impact of an analgosedation protocol in elderly critically ill trauma patients

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Purpose: Accurate pain and sedation assessments, with appropriate selection and management of analgesic and sedative agents are associated with improved clinical outcomes for mechanically ventilated patients in the intensive care unit (ICU). The purpose of the study is to evaluate a pain, agitation, and delirium (PAD) protocol before and after implementation on the duration of mechanical ventilation in critically ill trauma patients with a focus on patients older than 65 years.

Methods: The study is designed as a pre- and post-, cohort, observational study that assesses outcomes before and after implementation of the PAD protocol. Patients greater than 18 years old requiring mechanical ventilation within 72 hours of ICU admission are included in the study. Additional inclusion criteria include an ICU admission with a diagnosis related to trauma during the pre-protocol implementation period (October 2013 – September 2014) and the post-protocol implementation period (October 2014 – September 2016). Patients will be excluded for the following reasons: concurrently receiving neuromuscular blocking agents, requiring greater than 60% FiO2 on mechanical ventilation, receiving atypical or typical antipsychotic medications prior to hospitalization, recent ICU admission in the previous 2 months, initial Glasgow Coma Scale score less than 12, pregnancy, and documented conditions such as alcohol withdrawal, myocardial infarction, and psychiatry history. The primary objective is to assess the impact of the analgosedation protocol on clinical outcomes in mechanically ventilated ICU patients. The primary outcome is to compare the difference in time on mechanical ventilation pre- and post-protocol implementation among participants and a subgroup analysis comparing the difference between patients 65 years and above and patients below 65 years.

Results: Out of a total of 93 patients, only 17 patients were above 65 years old. The difference in time on mechanical ventilation in pre- and post-protocol implementation groups was 1 day ($p = 0.96$). The lengths of stay in the hospital and ICU were similar before and after protocol implementation. No difference in mortality was observed. The use of morphine was significantly different after the implementation of the analgosedation protocol ($p = 0.0002$), but propofol and midazolam use remained similar before and after protocol implementation.

Conclusion: The time on mechanical ventilation, ICU, and hospital length of stay was similar in the pre- and post-protocol implementation groups. Utilization of opioids was higher in the post-implementation group.

Submission Category: Critical Care

Submission Type: Case Report

Session-Board Number: 3-042

Poster Title: Case report of de novo atypical hemolytic uremic syndrome post heart transplant

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Purpose: This case presents the development of atypical Hemolytic Uremic Syndrome (aHUS) in 27-year old patient post heart transplantation. Atypical hemolytic uremic syndrome is a rare, life-threatening genetic disease that can affect vital organs in the body, such as kidneys, heart, or the brain. It is caused by chronic, uncontrolled activation of the complement pathway, leading to the formation of blood clots in small vessels all throughout the body, called systemic thrombotic microangiopathy. Progression to renal failure and end-stage renal disease is also common in patients with untreated aHUS. It is often challenging to diagnose without a family history of the disorder because of very general symptoms often associated with other diseases. In this report, we highlight the case of a deceased, 27-year-old male patient, who presented to Piedmont Atlanta Hospital on May 31st, 2016, with chief complaint of nausea and vomiting for one week. Additionally, he was experiencing fatigue for two weeks prior to hospitalization. The patient has a past medical history of congestive heart failure, atrial fibrillation, and ventricular tachycardia. He was admitted to the Intensive Care Unit (ICU) in Piedmont Atlanta for inotropic support and diuresis. The patient was classified as NYHA Class IV, stage C heart failure with an ejection fraction of 25%, and was listed as status 1A for heart transplant. One month later, he underwent heart transplantation and was placed on Prograf, Cellcept, and Prednisone for immunosuppression therapy. Post-op, the patient developed acute kidney injury, anemia, thrombocytopenia, and neutropenia. As a result, Prograf was held. Additionally, Cellcept and prednisone doses were tapered down, however the patient's condition was deteriorating despite all efforts taken to prevent his worsening condition. The oncology team initially ruled out acute hemolytic uremic syndrome due to the lack of associated clinical or hematologic clues to this etiology. However, when the results of genetic testing were positive for heterozygous mutation and when increased LDH with rare schistocytes was seen on peripheral blood smear, the patient was diagnosed with aHUS. After diagnosis, he received seven days of plasmapheresis and three doses of Soliris. Prior to the initiation of Soliris therapy, the patient

received the meningococcal vaccine and was also given penicillin as prophylaxis during Soliris therapy due to the high risk of meningococcal infections. The patient received Solaris IV 900 mg once a week. The patient's condition appeared to be improved based on impressive progress of CBC and clinical improvement of acute kidney injury. Furthermore, he tolerated being off inotropic support well. However, on the morning of August 31st, 2016, he had a cardiac arrest and developed a profound coagulopathy that was unresponsive to more than 100 units of blood. He received a continuous infusion of blood but still remained severely coagulopathic, anemic, and asystolic on the monitor. A combined decision was made to decelerate care by the primary treatment team and the patient's family. As this case series illustrates, the classic hematologic findings of aHUS appeared late in this case. De novo aHUS is uncommon after transplantation. Due to limited knowledge of the genetics and the etiology of the disease combined with overlapping clinical features associated with other disease states, there is often a delay in the diagnosis and initiation of appropriate treatment of this rare disease.

Methods:

Results:

Conclusion:

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-043

Poster Title: Evaluation of therapeutic enoxaparin dosing in the obese population

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Purpose: Enoxaparin is a low molecular weight heparin used for acute coronary syndrome, to bridge to a vitamin K antagonist, and to prevent and treat blood clots. Patients at Midtown Medical Center, regardless of body mass index, receive a standard 1 mg per kg treatment dose with frequency adjusted for creatinine clearance. Analyzing anti-Xa values in regard to dose received allows for evaluation of the drug's theoretical effectiveness and if there is potential concern for accumulation. This project was designed to assess dosing strategies of treatment enoxaparin in obese patients (BMI greater than or equal to 30) at Midtown Medical Center.

Methods: The institutional review board approved this retrospective study. A report of all anti-Xa levels ordered and obtained between June 2014 and July 2016 at Midtown Medical Center was generated and reviewed. Patients were randomly assigned a patient identification number. Data was collected and reviewed on a patient data log spreadsheet; this log was only assessable to the primary investigator and primary research associate at the study site. Data collected included enoxaparin dose and frequency, anti-Xa levels, indication for enoxaparin, if anti-Xa levels were correctly collected, bleeding occurrences, creatinine clearance, serum creatinine and patient demographics including age, gender, height and weight. Target anti-Xa levels of 0.6 to 1 units per mL and 1 to 2 units per mL for twice and once daily dosing, respectively, were used to assess for theoretical effectiveness. Patients were excluded if they were under the age of 18, pregnant, not obese (BMI less than 30), if their levels were obtained at a site other than Midtown Medical Center, or received prophylactic enoxaparin dosing (less than 0.5 mg per kg).

Results: A total of 106 patients were reviewed. Ninety-one patients were excluded. Fifteen patients were analyzed: nine male and six female with a mean BMI of 50.8 (range 32-113). Indications included: rule out venous thromboembolism (VTE), history of VTE, treatment of VTE, atrial fibrillation, and bridge therapy for surgery. Twenty-three levels were drawn for

patients receiving twice-daily dosing. Twelve levels (52.17 percent) were within therapeutic range, one (4.35 percent) subtherapeutic and ten (43.47 percent) supratherapeutic . One level was drawn for a patient on once daily enoxaparin; this level was subtherapeutic. The average initial dose was 0.8 mg per kg (range 0.5 to 1.21 mg per kg); average dose associated with therapeutic levels was 0.81 mg per kg. Dose adjustments included one instance of a decrease from 0.89 to 0.71 mg per kg that resulted in a subtherapeutic level (0.34 units per mL), one instance of a decrease from 0.63 to 0.5 mg per kg that resulted in a supratherapeutic anti-Xa level (1.19 units per mL) and two instances of a decrease from 0.97 to 0.47 mg per kg and 0.95 to 0.68 mg per kg that resulted in therapeutic levels (0.66 units per mL and 0.86 units per mL).

Conclusion: Supratherapeutic and therapeutic anti-Xa levels were observed in 43.47 and 52.17 percent of patients respectively, suggesting an initial dose of 1 mg per kg of enoxaparin may be too high of an initial dose in an obese population. Accumulation, indicated by supratherapeutic levels, increases the possibility of adverse events. Patients with a BMI greater than 30 may benefit from routine anti-Xa monitoring if the duration of treatment enoxaparin is expected to exceed several days. Further studies with a larger sample population for a longer study period may be warranted to best determine an ideal initial dose in this population.

Student Poster Abstracts

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 3-044

Poster Title: Impact of clinical pharmacy interventions in hypertensive population at an academic medical center: a two-year retrospective review

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Purpose: Current literature demonstrates that clinical pharmacist involvement in direct patient care of chronic conditions results in better outcomes and decreased heath care costs. The purpose of this study was to assess whether pharmacy interventions and the collaborative model used within an academic outpatient internal medicine clinic are effective when examining blood pressure reduction.

Methods: The institutional review boards of Atlanta Medical Center and Mercer University approved this single-centered, retrospective analysis. The intervention group enrollment occurred between April 2013 and March 2015. Inclusion criteria comprised of age greater than 18 years, a past medical history of hypertension and/or uncontrolled blood pressure as defined by reports of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7, JNC 8), naïve to clinical pharmacy interventions, and who received at least one pharmacist intervention for hypertension during the study period with a baseline blood pressure recorded. Patients enrolled in the control group abided same criteria but lack pharmacy intervention. Patients were excluded if no follow-up visit was recorded or if blood pressure measurements were not documented. The primary outcome measure was absolute change in systolic and diastolic blood pressure between study arms and was analyzed utilizing independent samples t-test. Secondary outcome measures were percentage of patients at hypertension goal per JNC guidelines and quantities and percentages of clinical pharmacy interventions performed.

Results: Mean change in systolic blood pressure measured in mmHg for the intervention (N equals 201) and control groups (N equals 314) were -0.69 and -2.04 respectively with no clinically significant difference (95 percent CI, -5.622 to 2.935, P equals 0.538). Mean change in diastolic blood pressure measured in mmHg for the intervention and control groups were -1.8 and -2.61 respectively with no clinically significant difference (95 percent CI, -3.481 to 1.85, P equals 0.547). Percent at goal in intervention arm was 37.8 percent at study initiation and 43.8 percent at final follow up. Percent at goal in control arm was 21.3 percent at study initiation and 41.4 percent at final follow up. Subsequent analyses of specific interventions lacked statistical and clinical significance.

Conclusion: Although the control arm demonstrated greater blood pressure reduction than the intervention arm, the change was neither statistically or clinically significant. Pharmacy intervention at the site is reserved for more complex patients which may be contributory to lack of blood pressure reduction in said population. A broad range of pharmacy interventions was utilized, many of which are unrelated to hypertension management, and may have diluted intervention arm data resulting in lessened effects of those interventions which contribute to desired outcome.

Submission Category: Critical Care

Submission Type: Case Report

Session-Board Number: 3-045

Poster Title: Treatment of lupus nephritis in an African American patient using cyclophosphamide for induction therapy

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Purpose: This case report follows the treatment of a female African American patient who was diagnosed with lupus nephritis. Lupus nephritis is an inflammation of the kidney that is caused by Systemic Lupus Erythematosus (SLE), which is an autoimmune disorder where the body's immune system attacks its own organs and cells. An estimated 40-60% of patients who suffer from SLE are diagnosed with lupus nephritis, with that number increasing to about 75% in African American patients. The presence of lupus nephritis along with SLE can reduce a patient's 10-year survival from 92% to 88%, with an even lower survival rate if the patient is African American. In this case, the patient has a past medical history significant for Juvenile Rheumatoid Arthritis/ SLE, Raynaud's Syndrome and pleuropericarditis that were diagnosed at the age of ten. She presented to the emergency department with significant chest pain that worsened when lying down, shortness of breath, paroxysmal nocturnal dyspnea, four pillow orthopnea and significant swelling in her legs. Physical examination of the patient revealed that she was tachycardic with a pericardial friction rub and had hypertensive urgency. She was believed to have a flare up of her SLE that led to pleuropericarditis and began treatment with intravenous methylprednisone. She also reported a having dark urine and pain upon urination that began three days prior to her hospital admission. Laboratory results revealed that her serum creatinine was elevated. She was treated empirically with antibiotics for a potential urinary tract infection. Rheumatology and nephrology were consulted and a kidney biopsy was performed. She was diagnosed with lupus nephritis and began treatment with cyclophosphamide, an alkylating agent that is a second line treatment option for African American patients with lupus nephritis per the American College of Rheumatology Guidelines for Screening Treatment, and Management of Lupus Nephritis. The Aspreva Lupus Management Study (ALMS) published in November 2009 demonstrated that significantly more African American patients had a response to induction therapy with mycophenolate mofetil

than with cyclophosphamide and less patients in the mycophenolate mofetil group discontinued the study due to adverse effects. The patient received one dose of cyclophosphamide during her hospital stay. Following cyclophosphamide treatment, we began seeing improvement in her lab results and symptoms. Her serum creatinine started to trend back down to normal, BUN levels improved and proteinuria was decreased. Upon the improvement of her symptoms, this patient was discharged with plans to continue cyclophosphamide treatment outpatient.

Methods:

Results:

Conclusion:

Submission Category: Critical Care

Submission Type: Case Report

Session-Board Number: 3-046

Poster Title: Management for patient with traumatic cervical fracture associated with asymptomatic vertebral artery occlusion

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Purpose: This case report illustrates the management for a patient who has a traumatic cervical fracture associated with asymptomatic vertebral artery injury. Vertebral artery injury is a relatively rare disease which can be induced by trauma or occur spontaneously. The annual combined incidence for vertebral and carotid artery dissection is 2.6 per 100,000 cases. Vertebral artery occlusion can lead to fatal vertebrobasilar ischemia. This patient was a 17-year-old African America male involved in a motor vehicle crash with rollover. He presented to the emergency room with pulmonary contusions, cervical fracture, subluxation and a small right pneumothorax. His past medical history included asthma, which was controlled by an albuterol inhaler. Upon admission, magnetic resonance imaging of the neck showed fourth cervical vertebra fracture and fourth to fifth cervical vertebra subluxation. The computed tomography angiogram (CTA) showed an occlusion of right vertebral artery due to the traumatic injury. He did not present with any symptoms pertinent to the vertebral artery injury. The patient underwent anterior cervical discectomy and cervical fusion surgery upon admission, and remained on post-operative Jackson-Pratt Drains until 6 days after the surgery. For pharmacological intervention, aspirin 81 mg by mouth once daily was initiated as a primary prophylaxis to reduce the chance of stroke on the eighth day after surgery. Patient was instructed to continue the low-dose aspirin regimen upon discharge for at least 6 months. Patient would follow up two months after discharge with a CTA to assess for the resolution and stability of the injury. Currently, clinicians screen cervical spine injured patients based on regional guidelines and established protocols. Screening is generally provided for the symptomatic patients who have unexplained neurological deficit and asymptomatic patients with significant cervical vertebra or neck tissue injury. This case report suggests that a reliable guideline for extracranial artery injury screening is needed, especially for patients admitted with traumatic cervical injury. The 2011 American College of Cardiology Foundation guideline

recommends antithrombotic treatment using either an anticoagulant or a platelet inhibitor for at least 3 to 6 months for patients with vertebral arterial dissection associated with ischemic stroke or transient ischemic attack. It can also be managed by endovascular revascularization. However, this guideline does not have a specific recommendation for asymptomatic vertebral artery injury. Thus, management for asymptomatic patient is controversial; treatment options include antiplatelet therapy, anticoagulation therapy, or observation alone. A large randomized trial is warranted to determine the optimal treatment strategy for asymptomatic vertebral artery occlusion. The dose and duration of therapy will also need to be addressed in future studies.

Methods:

Results:

Conclusion:

Submission Category: Critical Care

Submission Type: Case Report

Session-Board Number: 3-047

Poster Title: Drug-induced Stevens-Johnson syndrome/toxic epidermal necrolysis overlap likely secondary to levetiracetam administration

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Purpose: This case report illustrates an example of drug-induced Stevens-Johnson syndrome/toxic epidermal necrolysis (SJS/TEN) overlap following the initiation of levetiracetam. The patient is a 34-year-old African American female transferred to a large quaternary academic medical center for further work-up after developing multiple organ system failure of unknown etiology. She had a one-month history of fevers, myalgias, and arthralgias. Upon admission, she was found to be febrile with an axillary temperature of 38 degrees Celsius. A bone marrow biopsy revealed mildly hypercellular marrow, with a cellularity of 70% and notable hemophagocytosis. A peripheral blood smear revealed marked neutrophilia, microcytic anemia, and thrombocytopenia. The patient was also found to have severe hypertriglyceridemia, elevated ferritin, and low fibrinogen. Based on this information she was given a diagnosis of hemophagocytic lymphohistiocytosis. On ICU day one, due to worsening altered mental status, an electroencephalogram was performed and revealed focal status epilepticus, which was initially treated with fosphenytoin 2,300 mg IV once, high-dose midazolam continuous infusion weaned over eight days, lacosamide 100 mg IV every 12 hours, and levetiracetam 1,000 mg IV every 12 hours. She began etoposide therapy on ICU day two, of which she received four total doses, given twice weekly. The patient also received a dose of intrathecal methotrexate and IV hydrocortisone on ICU day three due to severe central nervous system involvement. On ICU day six, anticonvulsant dosages were increased to lacosamide 200 mg IV every 12 hours and levetiracetam 1,500 mg IV every 12 hours due to continued seizures. On ICU day ten, the medical team noted a blistering rash had erupted on the patient's feet. By ICU day 17, the blistering rash had extended to approximately 25 percent of her body surface area, with significant skin sloughing of the patient's upper and lower extremities, trunk, back, and oral mucosa. A right thigh biopsy confirmed the suspicion of SJS/TEN. Given that the mucocutaneous reaction had resulted in skin detachment of 10 to 30 percent of the patient's

body surface area, it was classified as SJS/TEN overlap syndrome. Levetiracetam, etoposide, and pantoprazole (initiated on ICU day one for stress ulcer prophylaxis) were potential offending agents in this patient case and all efforts were made to eliminate the cause, including discontinuing levetiracetam, holding the etoposide dose, and changing pantoprazole to famotidine. However, on ICU day 18, the patient decompensated. She went into atrial fibrillation with rapid ventricular rate and became severely hypotensive, refractory to vasopressors. The medical team attributed her shock to a combination of factors, including hypovolemic shock secondary to insensible losses from profound skin sloughing and septic shock secondary to a newly acquired gram negative rod bacteremia. Hours later, she passed away following multiple cardiac arrests.

Levetiracetam, etoposide, and pantoprazole were all suspected culprits in this patient case. However, to date, etoposide and pantoprazole have only been implicated in one mucocutaneous reaction each.1,2 This is in contrast to the seven case reports associated with skin reactions following the administration of levetiracetam. As confirmed by literature review, there have been two case reports documenting the development of SJS3,4 and three case reports of TEN5,6 attributed to the use of levetiracetam. In addition, there have also been two cases detailing other cutaneous lesions associated with levetiracetam use, erythema multiform rash7 and morbilliform eruptions.8 Anticonvulsants are a well-known cause of SJS/TEN and evidence of a rash generally appears within seven to 21 days of drug exposure,9 such as in this patient case. Therefore, it is believed that this case report illustrates the eighth drug-induced skin reaction secondary to the administration of levetiracetam and the first documented incidence of SJS/TEN overlap.

Methods:

Results:

Conclusion:

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 3-048

Poster Title: Safety and efficacy of micafungin used for antifungal prophylaxis in neutropenic patients with acute myeloid leukemia at a community hospital

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Purpose: Patients with acute myeloid leukemia (AML) develop neutropenia over time due to either treatment or due to the illness itself. These patients are more susceptible to fungal microbes, and can develop invasive fungal infections due to persistent neutropenia. Currently the Infectious Diseases Society of America and National Comprehensive Cancer Network guidelines do not recommend one antifungal agent over another for the prevention of invasive fungal infections in these patients. The purpose of this study was to evaluate the effectiveness and safety of an antifungal medication, micafungin, for prevention of fungal infections in neutropenic patients with AML at a community hospital.

Methods: The Institutional Review Board approved this retrospective study. Patients were enrolled if they were 18 years old or older, diagnosed with AML, neutropenic (Absolute Neutrophil Count {ANC} less than 500) and treated with micafungin 50 mg intravenously once daily at the study institution for antifungal prophylaxis. Exclusion criteria included concurrent usage of an alternative antifungal agent, or an active fungal infection. All patients with a diagnosis of AML seen at the study institution between March 31, 2006 until July, 31 2016 were screened for eligibility. The primary efficacy endpoint was the rates of treatment success versus failure. Treatment success was defined as the absence of a breakthrough fungal infection and lack of need for treatment doses of systemic antifungal therapy. Treatment failure was defined as the occurrence of any breakthrough fungal infection or the need to change to treatment doses of any systemic antifungal therapy. Breakthrough fungal infections was defined as one of the following: cultures showing fungal isolates, evidence of lung infiltrates suggestive of an

invasive fungal infection, persistent fever that was unresponsive to broad spectrum antibiotic treatments for 96 hours or greater, and any condition requiring treatment doses of a systemic antifungal. Safety was assessed by evaluating adverse events based on the Common Terminology Criteria for Adverse Events version 4.0. Data was analyzed using descriptive statistics.

Results: A total of 70 patients with AML were screened for this pilot study, and 15 patients were included. There were 7 females and 8 males. The average age (plus and/or minus standard deviation) was 56 years old plus and/or minus 11.94. The average ANC at time of study inclusion was 155 plus and/or minus 133. A total of 9 patients (60 percent) met the criteria for treatment success with micafungin, 5 patients (33.3 percent) experienced a breakthrough fungal infection during micafungin prophylaxis and did not meet the criteria for treatment success and 1 patient (6.67 percent) was found to have inconclusive results due to early discontinuation of micafungin, and acquired a breakthrough fungal infection later on during their extended hospital stay. A total of 38 treatment emergent adverse events (TEAE) were identified. The most common TEAE were grade 1 elevated alanine aminotransferase (18.4 percent), grade 1 elevated aspartate aminotransferase (13.1 percent), grade 1 hypokalemia (15.7 percent) and grade 3 hypokalemia (13.1 percent).

Conclusion: The usage of micafungin in neutropenic patients diagnosed with AML for antifungal prophylaxis at the study institution was effective at preventing breakthrough fungal infections in over half of these patients. However, usage of micafungin was most associated with slight increases in liver enzyme tests and episodes of hypokalemia. The clinical and statistical significance of this study must be determined in a larger population of patients, including neutropenic patients with other types of acute leukemia such as acute lymphocytic leukemia and acute promyelocytic leukemia, for which antifungal prophylaxis is indicated.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Evaluative Study

Session-Board Number: 3-049

Poster Title: Analysis of immunization training on pharmacists' attitudes on the recommendation and administration of meningococcal vaccinations

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Purpose: The relentless discoveries relating to the practice of medicine along with revolutionary advancements in technology pose unique challenges to today's health care professional. These challenges place an increasing importance on the science of training, so the most efficient way to provide the latest evidence based therapy safely to the public can be developed. For this reason, the following study will attempt an analysis of the effects of a meningococcal vaccination training session on a small group of pharmacists. It will analyze the pharmacists' attitude and knowledge before and after the training session concerning recommending and administering meningococcal vaccinations

Methods: The institutional review board of Mercer University approved this prospective pilot questionnaire based study. All pharmacists currently undergoing meningococcal vaccination training as employees of The Kroger Co. Atlanta Division, who provided their informed consent, were administered pre and post training questionnaires. The training was broken into multiple sessions, that were held in geographically convenient locations near the participating pharmacists' home pharmacies. The training sessions are currently ongoing. The questionnaires were divided into three distinct sections. The first section attempted to gather demographic information concerning professional experience levels, age, and gender. The second section attempted to gather information concerning the pharmacists' current attitudes concerning the recommendation and administration of meningococcal vaccinations. The third section of the questionnaire attempted to gather information about the pharmacists' current knowledge concerning the meningococcal vaccinations. The pre training survey served as a control. The pre and post training questionnaires were then analyzed to assess any changes in the attitude or knowledge level of the pharmacists that underwent the training session, any possible

correlation between collected demographic information and their given responses, and to assess the opinions of the pharmacists on the training session.

Results: Preliminary pre and post questionnaire data analysis showed increases in the pharmacists' reported confidence levels concerning their ability to properly recommend and administer the meningococcal vaccinations, and increases in their meningococcal vaccination knowledge scores. A percentage increase of 61.5% was observed in the pharmacists' reported confidence to counsel patients effectively on meningococcal vaccinations, an increase of 46.2% was observed in the pharmacists' reported confidence to identify patients who are indicated to receive meningococcal vaccinations, an increase of 19.7% was observed in reported confidence to administer the meningococcal vaccinations, an increase of 61.5% was observed in reported confidence to recognize common side effects associated with the meningococcal vaccines, and an increase of 53.8% was observed in reported confidence to recognize serious adverse events associated with the meningococcal vaccines. An increase of 13.2% was observed in the pharmacists' meningococcal vaccination knowledge score. Preliminary data analysis also showed slight decreases in some perceived obstacles to recommending and administering the meningococcal vaccinations. A decrease of 23% was observed concerning time limitations being an obstacle in the retail setting and an 8% decrease was observed in the small minority view that pharmacists shouldn't be active in giving vaccinations.

Conclusion: Preliminary data analysis currently indicates that the immunization training did have an impact on the participating pharmacists' knowledge and general attitudes concerning the recommendation and administration of the meningococcal vaccinations. Continued studies with additional refinements to the analysis tool based on these studies, could lead to greater improvements in our current training methods.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Case Report

Session-Board Number: 3-050

Poster Title: Case report of postpartum cardiomyopathy: Rare and complex in nature

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Purpose: About four percent of all pregnancies occurring in western industrialized countries are affected by cardiovascular disease. Of that percentage of the pregnant population, 1 in 2289 to 4000 within the United States will develop into postpartum cardiomyopathy (PPCM). This cardiovascular disease is defined as a non-familial form of idiopathic cardiomyopathy occurring between the last month of pregnancy to five months postpartum. This time limit is extremely important for the purposes of exclusion, which often is the only method of initial diagnosis. Currently there are three diagnostic criteria required for the determination of postpartum cardiomyopathy. These include: timing of incidence, absence of heart failure etiology, and absence of heart disease prior to pregnancy. However, recent evidence suggests that echocardiographic findings of left ventricular dysfunction are also inclusive for diagnosis. Furthermore, PPCM shares many symptoms similar to other cardiovascular etiologies that can present acutely or slowly over time. This makes distinguishing the disease increasingly difficult for health care providers. Many theories about possible disease mechanisms are currently being explored, including low selenium levels, viral infection, stress activated cytokines, autoimmune reactions, hemodynamic stress, and unbalanced oxidative stress. However, these theories have not been accepted by the medical community at this time.
A 35-year-old Hawaiian female was admitted to a general medical and surgical hospital for robotic mitral and tricuspid valve repair due to severe regurgitation. She was 2 months postpartum at admission and had a past medical history for pulmonary edema, thyroid nodule, pre-eclampsia, gestational diabetes, PPCM, and denied substance abuse, including nicotine and alcohol. During surgery, she was discovered to have a patent foramen ovale requiring closure. Post operatively, her condition deteriorated. She developed multiple small infarcts, respiratory failure, acute nephritis, fever with negative cultures, worsening blood glucose control, thrombocytopenia, disseminated intravascular coagulation, and multiple troponin level spikes (highest level was 6.68 nanograms per milliliter).

She was admitted to the cardiovascular intensive care unit and required daily radiology tests, cardiac function tests, intubation, and other critical procedures to stabilize her diminishing state and rising weight status of about 50 pounds from baseline. In addition, she became highly despondent and required evaluation for postpartum depression. The heart failure therapy was specific for symptom management and followed the recommended guidelines. Recent literature suggests the use of bromocriptine can be valuable in this population, but its benefits are limited to the initial stages of presentation of PPCM. Therefore, bromocriptine's use in this patient was not appropriate or needed. Instead, the use of milrinone as a stabilizing agent for vasodilation proved very advantageous. Some caveats for the drug included the concern for potential requirement of long term use and limited rehabilitation facilities capable of managing continuous therapy with milrinone. To offset those concerns, milrinone was tapered after stabilization over 3 to 4 days with success. After 36 days from admission, the management selected proved to be successful and the patient was discharged to a rehab facility with improved functional status from physical therapy and ejection fraction status from 25 to 35 percent. In addition, she was stabilized on guideline-directed medication therapy for heart failure in addition to long-term anticoagulation with warfarin.

As this case suggests, the presentation of a patient with PPCM is complex and contains a higher number of variables then a standard patient with stable or decompensated heart failure. Early recognition and management are of critical importance with a disease state that has a high mortality rate of 28 percent with appropriate therapy. Survivors typically require chronic heart failure management and often require transplantation. More research is still required to further understand the etiology, methods for earlier detection, and further mortality reduction in PPCM.

Methods:

Results:

Conclusion:

Submission Category: Preceptor Skills

Submission Type: Evaluative Study

Session-Board Number: 3-051

Poster Title: Evaluating the effectiveness of pharmacy practice residents in preceptorship and academia through postgraduate year 1 (PGY1) teaching certificate program

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Purpose: The Philadelphia College of Osteopathic Medicine (PCOM) School of Pharmacy developed its first Postgraduate Year 1 (PGY1) pharmacy residency program incorporating a teaching and learning curriculum (TLC). The objective of this study is to evaluate the outcomes of the PCOM PGY1 TLC program.

Methods: The focus of this study is to evaluate the TLC program offered by the PCOM School of Pharmacy PGY1 residency program. This program was launched in 2015 with the purpose of preparing residents to work as clinical pharmacists practicing in various patient care settings, as well as developing skills in preceptorship and academia through a teaching certificate program. The program offers two residency positions.
PCOM pharmacy students evaluated both residents based on didactic skills in the academic setting along with various skills associated with preceptorship through the use of student surveys.
Residents were required to co-precept four fourth year Advanced Pharmacy Practice Experience (APPE) students during their Internal Medicine II block towards the end of the residency year. One survey was sent out to these fourth year APPE students to evaluate the resident's preceptor skills. This survey was IRB approved.
Didactic course evaluations were used to assess the resident's classroom teaching skills. Each resident was required to participate in a 1-2 hour large group lecture, in which they could teach either a didactic or elective course. Out of the 113 pharmacy students taking the surveys, 91 students completed a Dietary Supplements course evaluation for a didactic lecture presented by one resident and 22 students completed a Critical Care course evaluation for an elective lecture presented by the second resident.

Results: Residents were evaluated based on student surveys that rated their teaching techniques and various qualities of preceptorship. The student survey was composed of a questionnaire rating the teaching techniques of their resident preceptors using an effectiveness scale from 0 (Not effective) to 5 (Very effective) for each technique. Residents received an average student rating of greater than 4.25 for each teaching technique. They also received an average rating of greater than 4.75 for various qualities listed in the questionnaire.
Course evaluations were used to evaluate residents on their didactic lecture skills in various courses. Residents were evaluated by students who attended the lecture using specific questions from the course evaluation survey that was taken at the end of the term. Students rated the resident on these questions using an agreement scale of 1 (Strongly Disagree) to 5 (Strongly Agree). One resident was evaluated based on their didactic lecture presented in the Dietary Supplements course. This resident received an average rating of greater than 4.3 for each evaluation question. The second resident was evaluated based on their didactic lecture in the Critical Care course elective and received an average rating of greater than 4.6 for each evaluation question.

Conclusion: PCOM School of Pharmacy provides an opportunity for PGY1 residents to participate in various teaching experiences, both at the School of Pharmacy and in the hospital setting. Upon successful completion of this program, each resident will be awarded a teaching certificate at the end of the residency year. The purpose of this study was to evaluate the outcomes of the PCOM PGY1 TLC program. The results of the study suggests that the PCOM School of Pharmacy PGY1 program provides adequate training in teaching experiences that has effectively developed the skills of the residents in academia and preceptorship.

Submission Category: Leadership

Submission Type: Descriptive Report

Session-Board Number: 3-052

Poster Title: Implementation of residency preparation program to help fourth-year doctor of pharmacy students prepare for postgraduate residency application process

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Purpose: The number of applicants applying to postgraduate year 1 (PGY1) pharmacy programs to positions available is approximately 15:1. This increase in pursuit of residency has led to significant competition among applicants, which many do not seem to be prepared for. Many institutions have begun to develop courses that help prepare students for the process. Similarly, Philadelphia College of Osteopathic Medicine-School of Pharmacy (PCOM-SOP) designed a program that focuses on providing individualized time to fourth-year students to help them prepare for the residency application process. This program will also be assessed for its effectiveness in preparing students for this process.

Methods: This Residency Preparation Program was established from the student consensus through an interest survey, which was sent to all fourth-year pharmacy students. In addition to the survey, ideas from different programs that have already implemented similar programs were used to set the foundation of this program. Based on the results of the survey, a proposal was developed and submitted to this institution's executive committee and the Office of Professional and Student Affairs, which approved the program for students interested in pursuing residency. This program takes place over a course of three months with three sessions, each lasting from two to three hours. Each session is capped at 20 students and includes components that the students are interested in. Session one includes an overview of residencies and American Society of Health-System Pharmacists (ASHP) Online Residency Directory and a workshop for building their Curriculum Vitae (CV) and Letter of Intent. Session two includes a discussion with a panel with residents and residency directors and information about ASHP Midyear Clinical Meeting. Lastly, session three focuses on the development of their interview skills by incorporating different types of mock interviews with faculty members. In

order to further prepare students for the residency process, students are expected to participate in required homework assignments for each session.

Results: The interest survey was sent to the Pharmacy Class of 2017, which comprises of 90 students. Out of 90 students, 39 responded with 36 students showing an interest in attending sessions that will provide students with an overview of residency and the application process and a CV and Letter of Intent workshop that provides them with an individualized feedback from the clinical faculty. Moreover, students demonstrated interest in attending sessions that will help them prepare for the ASHP Midyear Clinical Meeting and residency interviews and provide them with an opportunity to attend a panel discussion with residents and residency directors. These components were incorporated into the program to assist students in different aspects of the residency application process. Furthermore, the number of students that signed up for each session are as follows: 23 for session one, 20 for session two, and 20 for session three.

Conclusion: Responses received from the surveys have demonstrated a positive trend towards implementing this program. The effectiveness of this program is determined via surveys that are being sent to students prior to and after each session to assess how much knowledge and skills they have gained after each session. Based on the positive trend, the goal of this program in the future is to expand it and provide opportunity to all pharmacy students enrolled in the pharmacy program to enhance their skills throughout the pharmacy program. Moreover, the goal is to evaluate the effectiveness of this program through residency match rates.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Descriptive Report

Session-Board Number: 3-053

Poster Title: Transdisciplinary team approach that will utilize nursing satisfaction surveys to innovate pharmacy services in an emergency department

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Purpose: Health-systems across the U.S. use technology such as electronic medical records (EMR), computerized physician order entry (CPOE), automatic dispensing cabinets (ADC), and pharmacy medication carousels to provide timely and efficient pharmacy services. Uncoordinated pharmacy technology can prevent nursing staff from providing optimal patient care due to delays in medication delivery. A transdisciplinary team designed and administered a nursing satisfaction survey to identify gaps in pharmacy services to the emergency department (ED). Utilizing these survey results will aid in innovating pharmacy services to the ED for the future.

Methods: A 17-question survey was administered to nursing staff prior to a pharmacy optimization project. Nursing staff ranked services provided by pharmacy in importance of priority to improve services during the optimization period. These services included timeliness of service, good communication about pharmacy services provided, medication delivery via tube station, and medication stocked in respective ADC machines. Pharmacy Information Technology and EMR Database Administrator provided ADC inventory and medication utilization data. EMR Database Administrators also provided Quick Response (QR) barcode timestamp data for medication orders delivered via pneumatic tube station from the inpatient pharmacy. QR barcode timestamp data will help identify certain “high-alert” medications that need expedited delivery for best patient outcomes (i.e. antimicrobial for a septic patient).

Results: Survey results showed that 72.7% of the respondents take up to 15 trips per day to ADC machines outside of their assigned area. To resolve this, trends in inventory usage were established by comparing ADC inventory reports to CPOE medication orders per ED location respective of department ADC. Trends of usage will be used to optimize ADC medication stock

selected in this project. Sorting trends of usage data by most frequently dispensed, the team will also identify “fast-movers” and ergonomically arrange ADC machines for ease of use and replenishing. Intradepartmental patient-specific medication placement and pneumatic tube system turn-around time were identified as interconnected problems. Sixty eight percent of survey respondents scored a three or below in satisfaction level indicating they are least satisfied with inpatient pneumatic tube station delivery. The team identified multiple delivery locations for patient-specific medications in each department, which created confusion in communication. There will be in-services performed for the respective staff after streamlining the delivery process. About 50% responded to waiting an hour or more for medications after their initial call. Utilizing QR barcode timestamp data, we will prioritize medications by level of urgency and pilot select medications to have expedited delivery protocols.

Conclusion: Using a transdisciplinary team, pharmacy was able to address service problems with a satisfaction survey. Using nursing responses, the pharmacy was able to quantify their areas of improvement as a department and strive to be better. Using an integrated departmental approach, health-systems can restore a healthy balance to their complex systems.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Case Report

Session-Board Number: 3-054

Poster Title: Management of HIV-positive Patients Undergoing Coronary Artery Bypass Graft Surgery: A Case Series

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Purpose: Advances in antiretroviral therapy and management of opportunistic infections with prophylactic antibiotics have greatly improved the prognosis of patients with human immunodeficiency virus (HIV). A large number of patients with HIV develop premature cardiovascular disease as a side effect of their antiretroviral medications and as a complication of their infection. Studies have shown that cardiovascular surgeries, such as coronary artery bypass graft (CABG), may be performed in HIV-positive patients without accelerating immunodeficiency. Furthermore, these patients have acceptable mortality when compared to non-HIV infected patients undergoing similar surgeries. This case series investigates the medication management of patients with HIV following CABG surgery at a 250 bed general medical and surgical hospital.

Patient 1 is a 57 year old male who is HIV positive. At the time of admission, he had an undetectable viral load. He presented to his primary care physician complaining of chest pain. The patient was found to have an abnormal electrocardiogram and he was referred to a cardiologist at our facility. Cardiac catheterization revealed stenosis in multiple arteries and CABG surgery was performed. His home medication regimen upon admission was lisinopril 20 mg daily, pravastatin 20 mg daily, amlodipine 10 mg daily, and Atripla (efavirenz/emtricitabine/tenofovir) 1 tablet daily. At discharge, his antiretroviral medication was switched to Genvoya (elvitegravir/cobicistat/emtricitabine/tenofovir) 1 tablet daily. In addition, the following medications were added at discharge: clopidogrel 75 mg daily, famotidine 20 mg every 12 hours, metoprolol 12.5 mg every 12 hours, furosemide 40 mg daily for 7 days and potassium chloride 20 mEq daily for 7 days.

Patient 2 is a 64 year old female diagnosed with HIV in 1986. At the time of admission, she had an undetectable viral load. She presented complaining of chest pain radiating from throat to back. Cardiac catheterization revealed chronic total occlusion of the left ascending artery with

severe diffuse distal disease and stenosis of multiple cardiac arteries. She was referred to cardiac surgery for CABG. Home medication regimen on admission was metoprolol tartrate 100 mg twice daily, nifedipine extended release 90 mg daily, Klor-Con 20 mEq twice daily, levothyroxine 125 mcg daily, Humalog mix 75/25 subQ twice daily and Atripla 1 tablet daily. New medications prescribed at discharge included amiodarone 400 mg every 12 hours, clopidogrel 75 mg daily, aspirin 81 mg daily, atorvastatin 20 mg every night at bedtime, famotidine 20 mg daily, and cefuroxime 500 mg twice daily. There was no change made to her antiretroviral regimen.

Patient 3 is 59 year old male who presented to with syncopal episodes and an unknown HIV status. He has a past medical history of coronary artery disease and underwent percutaneous coronary intervention (PCI) on two previous occasions. Cardiac catheterization revealed severe multi-vessel disease. CABG was performed on three vessels. His home medications prior to surgery were atorvastatin 20 mg daily, clopidogrel 75 mg daily, aspirin 81 mg daily, abacavir 300 mg daily, efavirenz 600 mg daily, and lamivudine 150 mg daily. New medications added to his regimen at discharge included amiodarone 200 mg every night at bedtime, famotidine 20 mg every 12 hours, metoprolol 25 mg every 12 hours, tamsulosin 0.4 mg daily, insulin NPH 14 units before breakfast and 18 units every night at bedtime, and insulin Regular before meals. There was no change to his antiretroviral regimen.

There is limited data on the optimal cardiovascular and antiretroviral medication regimen for HIV-positive patients post-CABG surgery. Pharmacists can play an important role in assisting the cardiovascular team with deciding on the most appropriate post-operative medication regimen by utilizing guideline-directed medication therapy for both atherosclerotic cardiovascular disease and HIV.

Methods:

Results:

Conclusion:

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 3-056

Poster Title: Cost-effectiveness comparison of paliperidone palmitate, paliperidone extended release, aripiprazole once-monthly injectable, and oral aripiprazole in the treatment of schizophrenia

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Purpose: The rationale behind long-acting antipsychotics is that they increase adherence thereby decreasing the occurrence of relapse. A reduction in the occurrence of relapse with the use of long-acting injectable antipsychotics should result in a substantial reduction in healthcare costs compared with the use of their oral alternatives. The objective of this research was to construct a decision analysis model to compare the direct medical costs of two once-monthly, long-acting injectable atypical antipsychotics, paliperidone palmitate and aripiprazole once-monthly injectable, and their oral formulations in the treatment of schizophrenia.

Methods: A decision analysis model was created to compare the cost-effectiveness of paliperidone palmitate, paliperidone extended release, aripiprazole once-monthly, and aripiprazole oral. Outcome probabilities for the analysis were obtained from published literature. A search of primary literature was performed. After excluding the majority of trials returned based on relevance and methodology, fourteen trials were used to construct the decision model. The primary outcome for this research was cost per treatment responder. Treatment responder was defined as a patient who experienced a Positive and Negative Syndrome Scale score reduction of ≥ 30%. The secondary outcome was cost per relapse avoided. For each drug, 10,000 patients were simulated through the model for 1 year and total cost and cost effectiveness were calculated. Sensitivity analyses were conducted varying relapse rate for paliperidone palmitate and the responder rate for oral aripiprazole. An incremental cost-effectiveness ratio was calculated for the secondary endpoint to determine the cost per additional relapse avoided when aripiprazole once-monthly is chosen over paliperidone palmitate.

Results: Aripiprazole oral formulation was the dominant strategy for both the primary and secondary outcome with a cost per responder of $22,666.01 and a cost per relapse avoided of $14,473.42. Paliperidone palmitate was found to be marginally dominant over its oral alternative for both the primary and secondary outcomes. Aripiprazole once-monthly injectable was found to be the least cost-effective alternative for the primary outcome. In a sensitivity analysis varying the effectiveness of injectable aripiprazole, it was found that with 5,452 treatment responders (or a responder rate of 54.52%) injectable aripiprazole would reach a level of cost-effectiveness equivalent to extended release paliperidone. In the secondary analysis injectable aripiprazole was found to have a greater number of patients without relapse than paliperidone palmitate but at a higher total cost. The incremental cost-effectiveness ratio of injectable aripiprazole over paliperidone palmitate was $19,917.09 per additional relapse avoided. The studies used to construct the probability of relapse with paliperidone palmitate had a fairly wide variance. A sensitivity analysis varying the range of relapse for paliperidone palmitate showed that if the number of relapses avoided was reduced from 8,429 to 8,403 paliperidone palmitate would be just as expensive per relapse avoided as injectable aripiprazole.

Conclusion: As oral aripiprazole was the dominant strategy in both the primary and secondary outcomes, and oral aripiprazole's dominance was not sensitive to either of the sensitivity analyses, the results of this research do not support the hypothesis that long-acting injectable antipsychotics are cost saving compared to their oral alternatives. However, these results should be interpreted with some caution due to the limitations of the decision model.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 3-057

Poster Title: Medical use evaluation of vancomycin dosing to create hospital-specific vancomycin nomogram

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Purpose: Vancomycin is an important agent for the treatment of gram positive infections. Dosing of vancomycin is influenced by multiple factors, including severity of infection, patient weight, age, and renal function. Published literature describes correlations between dosing nomograms and attaining target trough levels. Various methods have been developed estimating pharmacokinetic parameters of vancomycin to calculate the dose. The study compares four different pharmacokinetic models, including Moellering, Birt, revised Matzke, and Creighton to determine which model best fits the patient population. The primary outcome of this evaluation is to assess the appropriateness of vancomycin dosing and create a hospital-specific vancomycin nomogram.

Methods: This is a single-center retrospective study conducted at a 202 bed community general medical and surgical institution. Data for patients receiving vancomycin from November 1, 2014 through May 1, 2016 were included in the study. All data was de-identified in order to preserve patient confidentiality. Patient data were eligible for inclusion if the patient received vancomycin for greater than 48 hours and had a documented steady state vancomycin level. Data on age, loading dose, maintenance dose, vancomycin indication, duration of therapy, vancomycin trough, co-morbidities, concurrent antibiotics causing nephrotoxicity were collected and analyzed. Patients with end-stage renal failure requiring hemodialysis were excluded from the evaluation. Predicted vancomycin levels were obtained using estimated eliminations rates, dosing intervals and maintenance doses. Once a trough level was calculated it was compared to the observed levels for the patient population achieving therapeutic vancomycin trough levels to validate which pharmacokinetic model was the most precise and least biased using root mean square error (RMSE), mean absolute error (MAE), and mean error

(ME). This pharmacokinetic model was used to develop vancomycin dosing nomograms for two different goal trough ranges: 10-15 mg/L and 15-20 mg/L.

Results: A total of 185 patients were enrolled in the study with 45 achieving targeted trough levels, 124 being subtherapeutic and 16 being supratherapeutic at steady state. Patient characteristics included an average age of 60.78 years old, mean body weight of 81.38 kg, and mean creatinine clearance of 87.59 ml/min. There were more male patients than female (103 patients were male and 82 patients were female). The most common indications for vancomycin use included pneumonia, cellulitis, sepsis, UTI and empiric therapy. 176 patients were noted to be receiving concomitant antibiotics therapy. Furthermore, of the 45 patients who achieved therapeutic vancomycin trough levels, the majority of patients (43 out of 35) were receiving concurrent antibiotic therapy. Predicted vancomycin levels were obtained using estimated eliminations rates, dosing intervals and maintenance doses. Once a trough level was calculated it was compared to the observed levels. Based upon the calculated values, it was determined that the Creighton method had the smallest RMSE and MAE (5.23, 3.25) and was the second least biased among the other four methods. By using the Creighton method, two nomograms were developed, one for a targeted vancomycin trough concentration at 10-15 mg/L and the other for a target of 15-20 mg/L.

Conclusion: A vancomycin nomogram is an alternative and efficient way of dosing compared to conventional methods. Furthermore, implementing an institution specific nomogram can lead to a successful clinical response with decreased adverse effects. Since some of the most common indications for vancomycin use require different goal trough ranges, nomograms specific to the goal trough ranges were created to facilitate achievement of optimal vancomycin trough levels.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-058

Poster Title: Retrospective evaluation of ceftaroline use pre and post antimicrobial stewardship intervention in the emergency department

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Purpose: Ceftaroline is a fifth generation cephalosporin active against methicillin-resistant Staphylococcus aureus (MRSA) with approval for skin and soft tissue infections and community-acquired pneumonia. High usage in the emergency department (ED) prompted the involvement of the Antimicrobial Stewardship Program (ASP). The purpose of this medication use evaluation was to assess the impact of the ASP intervention on prescribing habits of ceftaroline in the ED. Frequent use of ceftaroline coupled with its high cost does not benefit the hospital or the patients prescribed it. It is vital that ceftaroline is used only when required to decrease the potential for resistance.

Methods: The institutional review board approved this randomized, retrospective evaluation of ceftaroline usage in a rural hospital that sees an average of 2,900 patients a month in the ED. In May 2015, the Pharmacy and Therapeutics Committee voted for the removal of ceftaroline from the floor stock in the emergency department and for a memo to be composed by the ASP to provide education on appropriate use. In July 2015, ceftaroline was removed from the Omnicells and the lead ASP pharmacist attended the Department of Emergency Medicine meeting to review the memo and ceftaroline's removal from the floor stock. A pre-intervention report was created for patients who received ceftaroline in February and March of 2015. A post-intervention report was created for patients who received ceftaroline between the months of August 2015 and July 2016. In each report, thirty patients were selected using simple random sampling, every fourth patient profile was chosen for review. The primary outcome measures were total doses per 1000 patient ED visits and indication for use. Additional data collection included: dose of ceftaroline, glomerular filtration rate, allergy to vancomycin, infectious disease consult, and history of MRSA. This information was collected, de-identified, and analyzed using descriptive statistics.

Results: An analysis of ceftaroline usage was performed comparing January and February data from the years of 2015 and 2016. The data in 2015 showed 3.74 doses per 1,000 patient days while data in 2016 revealed 0.76 doses per 1,000 patient days. Of the indications for prescribing ceftaroline, 83 percent in the pre-intervention arm were FDA approved as opposed to the post-intervention arm where 93 percent of indications were FDA approved. The dosing of ceftaroline showed no change in pre and post intervention as both sets of patients had four incorrect doses. There was an increase in a history of MRSA infections, 6 percent versus 23 percent, and an increase in allergies to vancomycin, 10 percent versus 13 percent. Admission rates for patients presenting to the emergency department that were prescribed ceftaroline increased from 37 percent to 70 percent.

Conclusion: The removal of ceftaroline from the emergency department showed an improvement in physicians prescribing habits for the FDA approved indications. There was a five-fold decrease in doses per 1,000 patient day following the ASP intervention. However, there was no change in accuracy of dosing ceftaroline correctly. Clinical pharmacist interventions are essential in improving hospital drug use and should be utilized regularly.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 3-059

Poster Title: Concentrated insulin's impact on hypoglycemia adverse drug reactions

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Purpose: Insulin is a mainstay of treatment for individuals with diabetes. Hypoglycemia is a major adverse drug reaction (ADR) associated with insulin. As insulin resistance increases, larger doses of insulin are required to maintain euglycemia. With larger volumes of insulin injected subcutaneously, absorption can become unpredictable. Concentrated products address high injection volume burden. Until recently, Humulin R U-500 was the only concentrated insulin on the market. Since 2015, degludec U-200 and glargine U-300 have been approved. The goal of this study was to determine if the increase of concentrated insulins on the market has correlated with an increase of hypoglycemia ADRs.

Methods: Data on the concentrated insulins was obtained from the Food and Drug Administration (FDA) Adverse Event Reporting System (FAERS) Latest Quarterly Data Files at FDA.gov. The FAERS data files that were of interest included year 2012 (Quarter 4), year 2013 (Quarters 1-4,) year 2014 (Quarters 1-4), and year 2015 (Quarters 1-4). After downloading and converting the files, each file was searched to see if it contained information pertaining to the three drugs (Humulin R U-500, degludec U-200, and glargine U-300).

Results: In reviewing the files, some of the quarters did not contain information on any of the three insulins. The years with no data included year 2012 (Quarter 4) and year 2013 (Quarters 1-4). This was partly due to the time of approval of the newer concentrated insulins. For example, glargine U-300 was not introduced to the market until February 2015, and degludec U-200 was not introduced to the market until 2015. There were no reported ADRs on Humulin R U-500 in the earlier portion of the data, since its market approval was in 1994. When

analyzing the remaining data, there was a clear trend of increased ADRs of hypoglycemia with the addition of new concentrated insulins entering the market.

Conclusion: With increasing insulin resistance in individuals, concentrated insulins can decrease the burden of injecting large volumes of insulin therapy. With the introduction of new concentrated insulins to the market, there was an observed increase in hypoglycemia ADRs. This finding brings attention to the need for greater patient and provider education regarding concentrated insulin. Understanding the properties of this new formulation of insulins is critical for safe dosing and administration.

Submission Category: Pharmacy Law/ Regulatory/ Accreditation

Submission Type: Descriptive Report

Session-Board Number: 3-060

Poster Title: Evaluation of naloxone accessibility state legislature and trends of drug overdose-related deaths

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Purpose: Drug abuse is a national epidemic impacting America. Additionally, drug-related overdoses especially those resulting in death have reach proportions that state legislatures are attempting to curb the trend. Most notably, states are addressing opioid-related overdoses by increasing naloxone accessibility to populations at risk of an acute opioid overdose. The prescription drug naloxone is an effective reversal agent for acute opioid overdose. However, it is unknown whether legislative action to prevent drug overdose-related deaths is effective. Therefore, the purpose of this project is to determine if deaths associated with drug overdoses have changed following state naloxone accessibility legislation being enacted.

Methods: Data from the Morbidity and Mortality Weekly Report (MMWR) National Vital Statistics System on deaths related to drug overdoses was gathered for 2013 and 2014. A review of state naloxone accessibility legislature was performed and dichotomized between states that had a change in legislation versus those states that did not have changes in legislation between 2013 and 2014. A Wilcoxon signed rank test was used to compare deaths among states with changes in legislation and a Mann-Whitney U test was used to compare deaths between states who enacted changes in legislation versus those states with no change. Alpha error was set apriori at 0.05. This investigation utilized secondary public data sources and was exempt of IRB approval.

Results: Deaths for drug overdose from 50 states plus the District of Columbia for 2013 and 2014 were analyzed (n=51). Eight states (Kentucky, Maryland, New Jersey, North Carolina, Oklahoma, Oregon, Vermont, and Virginia) executed a change in legislative action during 2013; in these 8 states, there was no significant difference in deaths between 2013 and 2014, p=0.093. No statistically significant difference in deaths was found between states with changes in legislation versus those without changes in legislation in 2013 (p=0.516) and 2014 (p=0.437).

Conclusion: Although the enactment of naloxone accessibility legislature has led to increased availability of naloxone to the public, the total number of fatal drug overdose has continued to rise. No significant difference in deaths was found among states that had a change in naloxone legislation nor between states with a change in legislation versus without a change in legislation. Further assessment of the impact of naloxone accessibility legislature should be investigated as updated data on opioid-related overdose mortality becomes available.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 3-061

Poster Title: Trends of Marijuana Use and Related Indicators in States with Approved and Pending Recreational Marijuana Use

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Purpose: Since 2012, four states and the District of Columbia approved laws permitting the legal sale of recreational marijuana to adults 21 years and older. Five states vote to legalize recreational marijuana this November. With public opinion dramatically rising in favor of marijuana, the purpose of this research was to compare and contrast trends of marijuana use and related indicators in states with approved and pending recreational marijuana use.

Methods: We conducted a literature review of state legislation to identify states with approved and pending recreational marijuana laws. Following identification of the population of approved and pending states, we evaluated annual National Survey on Drug Use and Health (NSDUH) data during the period 2002 to 2014 to identify trends of marijuana use and related indicators among all persons aged 12 years or older. These indicators included percentage of past year marijuana use; percentage of marijuana initiation in the past year; percentage of perceived great and no risk associated with smoking marijuana once or twice a week; percentage of past year marijuana dependence and abuse; and percentage of respondents perceiving that no penalty would result for the first offense possession of an ounce or less of marijuana. Using descriptive data techniques, we depicted the data providing side-by-side comparisons of states with approved and pending recreational marijuana legislation.

Results: The percentage of past year marijuana use among all persons aged 12 years or greater increased from 2002 to 2013. Use ranged from 10.3 to 16.1 and 13.6 to 16.2 percent in 2002, increasing to 12.9 to 20.3 and 19.4 to 21.4 percent in 2013 in states with pending and approved recreational marijuana use, respectively. In contrast, use ranged from 7 to 13 and 8 to 16.9 percent, increasing to 8.4 to 13 and 11.3 to 20.6 percent in states without either medicinal or recreational cannabis use and states with approved medicinal cannabis use only, respectively. The change in percentage of marijuana initiation in the past year was relatively flat in states pending recreational legislation approval, but increased approximately 40 percent in states with approved laws. Compared to states with pending legislation, the perception of great risk

associated with once or twice weekly marijuana use decreased more consistently and strongly in states with approved recreational laws, and approached an equal percentage of respondents who felt that there was no risk. We observed inconsistent data trends between groups regarding marijuana dependence and abuse. Lastly, more individuals perceived no penalty for marijuana possession in states with approved recreational laws.

Conclusion: Trends in marijuana use are increasing regardless of state legislation. Prevalence of use, percentage of new use initiation, percentage of individuals perceiving no risk from using marijuana once or twice a week, and the perception that no penalty would occur if possessing one ounce of marijuana was greater in states with approved recreational marijuana laws. Less the limited marked increase in the perception of no penalty from two states, sufficient data following approval of recreational marijuana use does not exist. Consequently, forecasting the impact of marijuana deregulation in states pending legislation cannot be determined.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 3-062

Poster Title: Lack of reported data concerning the use of dietary supplements and their adverse effects resulting in emergency department visits

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Purpose: After implementation of the Dietary Supplement Health and Education Act of 1994, there has been a relevant amount of hospitalizations, disabilities and deaths regarding dietary supplement use due to exemption of regulation and standardization by the Food and Drug Administration. Dietary supplement suppliers are only required to submit a MedWatch form to the Food and Drug Administration concerning reported cases, deemed “serious adverse events”, potentially leaving consumers vulnerable to ineffective and/or toxic therapies. This study reviews the use of supplements and the deficiency of national data concerning adverse effects, which resulted in admissions to the emergency department.

Methods: Retrospective analysis of articles concerning adverse events caused by dietary supplements amongst adults resulting in visits to the emergency department. Supplement usage data collected from National Health Statistics Reports combining information from 88,962 adults aged 18 and over in 2002, 2007, and 2012. 30-day and 12-month survey recalls were evaluated concerning dietary supplement use. Emergency department visits associated with adverse events precipitated by dietary supplement use was collected from national representative surveillance data. 9 years of data, gathered from January 2004 to December 2013 in 63 hospitals participated in the National Electronic Injury Surveillance System–Cooperative Adverse Drug Event Surveillance project conducted by the Centers for Disease Control, Food and Drug Administration, and Consumer Product Safety Commission, were used to make evaluations. The previously gathered data was compared and assessed. Statistical review in the original assessments included two-sided t-tests and the Statistical Analysis System software (SURVEYMEANS, SURVEYFREQ, SURVEYLOGISTIC, SURVEYREG).

Results: Dietary supplements were the most commonly used complementary health approach amongst adults in all three reporting years (18.1%). Of the dietary supplements analyzed; fish oil, glucosamine, chondroitin, echinacea, flaxseed, and ginseng were the most frequent and consistently used supplements in the study population. Though the prior mentioned supplements were the most used, weight loss supplements were the biggest offenders totaling 25.5% of emergency department visits (95% CI: 23.1-27.9). Emergency department visits stemming from adverse events associated with dietary supplement use was calculated on average to be 23,005 annually (95% CI: 18,611-27,398). These visits culminated to an annual average of 2,154 hospitalizations (95% CI: 1342-2967). A total of 5,943,429 adverse effects were reported to the Food and Drug Administration in a 9 year period, of which only 0.22% (13,144) were caused by dietary supplements.

Conclusion: The health and safety benefits of dietary supplements are still unclear, despite the significant influence they hold as a widely used complementary health approach. Consistent feedback and education on dietary supplements and their adverse effects are necessary to decrease the amount of visits to the emergency department. Although dietary supplement-related adverse events which resulted in emergency department visits comprise a small percentage compared to visits reported for pharmaceuticals; regulating dietary supplements under presumed safety should be a major concern to the Food and Drug Administration.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-063

Poster Title: Evaluation of human 4 factor prothrombin complex concentrate (4FPCC) for anticoagulation reversal at a Level 1 trauma and comprehensive stroke center

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Purpose: Vitamin K antagonist reversal agent, 4FPCC, is approved for the rapid reversal of warfarin. When administered with vitamin K, 4FPCC reduces the international normalized ratio (INR) values to less than 1.3 within thirty minutes in the majority of patients. The severity of anticoagulation induced bleeding situations may warrant the use of 4FPCC for the reversal of alternative mechanistic anticoagulants that lack reversal agents since the rapid development of other oral agents that have exceeded the development of focused reversal agents. The primary objective of this study is to evaluate the use of 4FPCC at an academic medical center.

Methods: A retrospective chart review was conducted from April 2013 to August 2016. All patients who had a 4FPCC order placed at any point during the emergency room stay or hospitalization were included. Data collection comprised of pertinent patient demographics, anticoagulation agent and indication, type of bleed or urgent implication for 4FPCC, and doses prescribed with confirmation of administration of 4FPCC. Pertinent laboratory values gathered were: INR, PT, APTT, TT, viscoelastic assays, and ecarin. Other data points collected included: use of vitamin K, use of fresh frozen plasma, adverse effect profile related to 4FPCC administration, and patient disposition. Descriptive statistics were performed. This project was approved by the Augusta University institutional review board as a not human subjects research. This project is also a part of the health system medication use evaluation and improvement program.

Results: Inclusion criteria were met in 16 orders. Of the 13 patients with available target INR ranges, five (38.5 percent) had an admission INR within the indicated target range, four (30.7 percent) had supratherapeutic INR values, and four (30.7 percent) had a subtherapeutic INR. Of the 11 patients who had documented 4FPCC administration, eight patients (72.7 percent) received 4FPCC for its approved indication for the reversal of warfarin. Incorporating INR values for dose guidance, only one out of eight patients received the incorrect 4FPCC dose based on the packet insert. At discharge, three out of the eight patients (37.5 percent) expired and five patients (62.5 percent) continued care at rehabilitation, one being the overdosed patient. The remaining three out of 11 patients (27.3 percent) received 4FPCC for the off-label reversal of either non-warfarin anticoagulants or no anticoagulation use. Dosing was varied in the off-label group, ranging from 25 to 50 units per kilogram per dose of 4FPCC. At discharge, two out of three patients received continued care at an outside location, and one patient expired.

Conclusion: Overall, the use of 4FPCC for its approved indication appears to be dosed appropriately. Further, there was a greater than 60 percent survival following approved use. Due to the lack of established dosing strategies of 4FPCC for off-label uses and the lack of an institutional protocol, off-label dosing varies widely. Although our institution's usage of 4FPCC is small, survival numbers are consistent between on-label and off-label indications. Future research and the implementation of a standardized dosing protocol should be conducted on a larger population to further validate both on-label and off-label dosing in the absence of alternative reversal options.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 3-064

Poster Title: Evaluation of an autologous hematopoietic stem cell transplant (auto-HSCT) mobilization protocol at an academic medical center

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Purpose: Collection of CD34-positive stem cells for auto-HSCT can occur via apheresis after granulocyte colony stimulating factor (GCSF, filgrastim) administration for 4 or 5 days. Mobilization failures or an increased number of apheresis sessions, which are costly and not devoid of risk, may occur with GCSF alone. Plerixafor, a chemokine receptor-4 antagonist, added to GCSF has been shown to increase stem cell yield and reduce days of apheresis; Cost-effective utilization of plerixafor is paramount. The purpose of this study was to evaluate a pharmacy and therapeutics committee-approved mobilization protocol using pre- and post-implementation data at an academic medical center.

Methods: This retrospective, IRB approved medication use evaluation included all auto-HSCT patients who underwent apheresis since protocol approval (n=23, post-implementation cohort) as well as the same number of patients prior to protocol implementation (n=23, pre-cohort). Both filgrastim and plerixafor were available per physician discretion prior to protocol approval. The protocol and its associated order forms were enacted to standardize dosing while maximizing mobilization efficiency with a goal to reduce number of apheresis sessions while utilizing plerixafor only in those patients deemed high risk of failure or who needed collection of cells for tandem transplantation (e.g., myeloma). The protocol divided patients into single transplants (goal 5 million cells/kg) and anticipated tandem transplants (goal 10 million cells/kg). Patients on the single algorithm only received plerixafor if day 5 CD34 was less than 20, while tandem patients received day 5 plerixafor routinely. Only patients with peripheral CD34-positive counts less than 60 not at goal collection after one apheresis received additional plerixafor. The protocol established dose rounding for filgrastim and weight/renal function appropriate dosing for plerixafor. Outcomes compared between the pre- and post- protocol

cohorts included: appropriateness of GCSF/plerixafor utilization and dosing, number of apheresis sessions, stem cell yield per day and total (million cells/kg), whether a patient received their transplant, and stem cell amount infused. Demographic data collected included age, gender, type of malignancy, weight, and renal function.

Results: Twenty-five pre-protocol and 23 post-protocol charts were screened resulting in 23 patients proceeding to apheresis in each cohort. Forty-six patients (33 percent lymphoma, 66 percent myeloma/amyloidosis) were evaluated: median age 61 years, 59 percent male. Pre-protocol data: median 4.2 million cells/kg collected in 1(n=8), 2(n=11), 3(n=2), 4(n=1), and 6(n=1) apheresis sessions; 96 percent received transplantation. First day of apheresis: median CD34 count was 53.5 cells/microliter (range 7-186). Post-protocol cohort doses were appropriate per weight/renal function in 100 percent of filgrastim and 81 percent of plerixafor. Further, 71 percent of plerixafor doses were appropriate per protocol (n=4 patients receiving n=8 inappropriate doses.) Post-protocol data: median 4 million cells/kg collected in 1(n=10), 2(n=10), 3(n=3) apheresis sessions; 91 percent revieved transplantation with one additional transplant pending. Median and range of peripheral CD34 counts for post-protocol patients on single (n=10) and tandem (n=13) algorithms were 51 cells/microliter (8-825) and 124 cells/microliter (28-348), respectively. However, half of patients on single algorithm received plerixafor off protocol. All forty-six patients who completed apheresis achieved the minimum of 2 million cells/kg, 78 percent in both pre- and post-protocol cohorts achieved at least 5 million cells/kg, and 43 vs. 54 percent achieved greater than goal 10 million cells/kg, respectively.

Conclusion: Implementation of a protocol to standardize auto-HSCT mobilization did not change either the number of cells collected per session (median approximately 4 million cells/kg) or apheresis sessions required (median n=2). The protocol did reduce the number of patients with greater than 2 apheresis sessions (17.4 vs. 13 percent) which represents 16 versus 9 apheresis sessions for those 4 versus 3 patients. However, non-adherence to the protocol (approximately 30 percent of plerixafor was administered off protocol) confounds the clinical interpretation of the protocol's effectiveness. Going forward, education of prescribers and pharmacists will be beneficial to increase adherence to the protocol.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 3-065

Poster Title: Predictors of hospital mortality for multi-drug resistant Acinetobacter baumannii infections in critically ill adults

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Purpose: Acinetobacter baumannii, a gram-negative pathogen with intrinsic resistance, can cause infection by both environmental exposure and nosocomial transmission. Due to increases in multidrug resistant (MDR) infections, this bacterium poses an imminent threat associated with increased length of stay and mortality. Despite understanding its mechanisms of resistance, factors associated with poor outcomes of MDR A. baumannii infections are not fully understood. Previous studies have examined risk factors for hospital-acquired A. baumannii infections, but few have included non-hospital acquired infections. This purpose of this study is to identify factors that predict morality in critically ill patients with MDR A. baumannii infections.

Methods: This institutional review board approved, single-center retrospective cohort study examined patients 18 years of age with culture confirmed MDR A. baumannii infections who were admitted to the medical, surgical, or cardiac intensive care unit (ICU) between January 1, 2012 and July 31, 2016. For this study MDR was defined as resistance to more than one class of antimicrobials. Patients were excluded if they were pregnant, had an anaphylactic allergy to penicillin, or a positive urine culture with A. baumannii. Data collected included demographic characteristics, antibiotic use within 3 months of admission, incidence and duration of mechanical ventilation, prior hospitalizations, surgeries, or previous long-term care facility (LTCF) stay within 12 months. Clinical parameters involving laboratory, and microbiologic data were identified at time of admission, and time of positive culture collection. After dividing the population into survivors and nonsurvivors, data was analyzed by descriptive statistics. The

primary outcome was to determine predictors of mortality. Secondary outcomes focused on treatment results including microbial cure, time to appropriate therapy, and ICU length of stay.

Results: Eighteen patients were included in this study; 61 percent males, with a mean age of 56.8 plus or minus 20.1 years. A higher mortality rate was observed in patients greater than 50 years of age, 58 percent versus 17 percent respectively. Seventy-eight percent were admitted from LTCF; twelve resided in a single facility. ICU length of stay was not related to mortality. Sixty-seven percent of patients were on chronic ventilation, and 22 percent initiated after admission, with respective mortality rates of 21 and 75 percent. Sixty-six percent had respiratory comorbidities; those with Asthma were noted to have a higher mortality rate (2/2) compared to those with Chronic Obstructive Pulmonary Disease (0/2). Sequential Organ Failure Assessment (SOFA) scores on admission greater than 10 were associated with increased mortality (78 percent, 7/9). Patients with bloodstream infections had a higher mortality rate compared to respiratory tract infections, 63 percent (5/8) and 30 percent (3/9), respectively. Polymicrobial infections further increased mortality rates. Of the 22 percent of patients who were started on empiric therapy not active against organisms isolated, 75 percent died. An increase in serum creatinine greater than 1.5mg/dL during hospitalization was associated with 100 percent (4/4) mortality.

Conclusion: This study analyzed patient history, comorbidities, culture data, and clinical labs to provide predictors of mortality in patients infected with MDR A. baumannii. Advanced age, increasing serum creatinine, and SOFA scores greater than 10 were associated with a greater mortality. Respiratory comorbidities and mechanical ventilation status were also factors. Increased rates of mortality were seen in bloodstream involvement, polymicrobial infections, and empiric antibiotic selection without in vitro activity. By determining predictors of mortality, patients who would benefit from increased care can be identified and provided closer monitoring with more aggressive antimicrobial therapy.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 3-066

Poster Title: Retrospective evaluation comparing a non-benzodiazepine versus benzodiazepine based sedation strategy during targeted temperature management following non-traumatic cardiac arrest in critically ill adults

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Purpose: Targeted temperature management (TTM) following non-traumatic cardiac arrest is a therapeutic approach intended to improve neurologic outcomes. Complications associated with TTM include shivering and hypotension. Current guidelines suggest a non-benzodiazepine strategy over benzodiazepines, although this is derived from data targeting light sedation. The need for and choice of sedative agents are not known in patients requiring TTM. Side effects associated with various sedatives may affect complication of TTM. The purpose of this study is to compare non-benzodiazepine and benzodiazepine sedation strategies in critically ill adults during TTM.

Methods: This was a single-center retrospective observational cohort study conducted at a large community teaching hospital. It was approved by the institutional review board with waived consent. All patients over 18 years old admitted to the medical, surgical, or cardiac intensive care units (ICU) who underwent TTM between October 1, 2015 and July 31, 2016 were eligible for inclusion. Patients were excluded if TTM was initiated for any indication other than non-traumatic cardiac arrest or if they did not receive any sedative agents. Patients were divided into two groups for comparison based on the choice of sedative received for deep sedation: non-benzodiazepines (i.e. propofol) and benzodiazepines (i.e. midazolam or lorazepam). Demographic characteristics, type and amount of analgesic and sedative medications, incidence of adverse effects, and mortality were extracted from the electronic medical record. The primary outcome of the study was the need for neuromuscular blocking agents (NMBA). Secondary outcomes included the need for vasopressor support and in-hospital mortality. Descriptive statistics were used to analyze the data.

Results: A total of 19 patients were evaluated for inclusion. Five patients were excluded for TTM indication other than non-traumatic cardiac arrest (n equals two) and no use of sedative agent (n equals three), leaving 14 patients to be included for analysis. Twelve patients received a non-benzodiazepine based strategy, and two patients received a benzodiazepine sedation strategy. No patients received lorazepam in the benzodiazepine group. Demographic characteristics including age and admission weight were similar at baseline between the two groups. Severity of illness determined by a Sequential Organ Failure Assessment (SOFA) score appeared to be similar, with a SOFA score of 11.8 in the non-benzodiazepine group and 10.5 in the benzodiazepine group. The need for NMBA occurred in six (50 percent) patients in the non-benzodiazepine group compared with two (100 percent) patients in the benzodiazepine group. Vasopressors were required in ten (83.3 percent) patients in the non-benzodiazepine group compared with two (100 percent) patients in the benzodiazepine group. Eight (66.7 percent) patients and one (50 percent) patient died in the hospital in the non-benzodiazepine and benzodiazepine groups, respectively.

Conclusion: The interim analysis showed the need for NMBA to be more profound in the benzodiazepine group. This finding may suggest that side effects from a benzodiazepine approach may impact complications of TTM such as shivering more so than a non-benzodiazepine approach. However, the preferred sedative agent for deep sedation in TTM remains uncertain. Further investigations are warranted to assess the safety and efficacy of these sedation strategies.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Evaluative Study

Session-Board Number: 3-067

Poster Title: Pharmacists as educators: A survey of nurse responders during an epinephrine formulation shortage

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Purpose: Approximately 209,000 hospitalized patients in the U.S. face cardiac arrest every year. These emergencies are seldom expected, making familiarity with crash cart supplies one of the most crucial factors for rescue. Floor nurses are often the first to arrive and need to be comfortable administering urgent epinephrine, but drug shortages can negate consistency between epinephrine administration methods. This survey of nurses in an Atlanta, GA hospital during a widespread crash-cart epinephrine change aims to prepare responders by finding an optimal model of preemptive pharmacy education.

Methods: Due to a shortage of standard crash-cart epinephrine 1mg/10mL syringes, an Atlanta hospital planned to substitute them for 1mg/1mL vials with new administration instructions. In order to best prepare nursing staff for this change, five simple methods of pharmacy-led education were devised and laid out on a survey sheet for nurse response. Methods posited were: (1) pharmacist outreach to charge nurses; (2) educational flyers in break areas; (3) short, in person pharmacy demonstrations; (4) A hospital-specific intranet message; or (5) 'other,' in which nurses could specify an alternative method. Questions were posed in a face-to-face manner in randomized order. Method options were not mutually exclusive, enabling the nurses to select as many of the options as they preferred. However, each nurse sampled was also encouraged to limit selections to his or her top 2 options. Nurses could specify any option for 'other' that they could think of, with no limitations. Inclusion criteria were any patient-caring nurse who was employed by the hospital health system. Exclusions were non-patient care nurses and any non-nurse personnel. Nurses who were asked and chose not to reply were also included. No health-related information or personal data of any sort were collected while surveying, and an IRB exemption is currently pending.

Results: Amongst 13 units, 50 nurses were sampled and included in the final results. Of those 50, 7 were from critical care units. Overall, 30 (60%) nurses selected “short, in person pharmacy demonstrations;” 21 (42%) selected “educational flyers in break areas;” 16 (32%) selected “pharmacist outreach to charge nurses;” and 8 (16%) selected “hospital-specific intranet message.” ‘Other’ educational methods concocted by nurses included: making it a shift huddle highlight (2 nurses); involving the designated unit educator (3 nurses); using simple and clear labeling on crash cart drug tray; ensuring that both day and night staff were notified of changes; and holding a pharmacy specific seminar. Two nurses highly encouraged employing all of the options in order to provide wide reaching support. One surveyed nurse chose not to provide feedback.

Conclusion: The majority of nurses preferred an in-person demonstration, with informational flyers being the second most valued method. By employing both of these tactics, pharmacists can help keep other healthcare professionals updated and prepared during an emergent drug shortage. While not surprising, these results are also indicative of the receptiveness of nurses to pharmacist involvement and communication. Many hospital systems may currently underutilize pharmacists in this particular educator capacity due to a lack of time or resources, but additional involvement would likely improve outcomes in cardiac arrest and other disease states.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-068

Poster Title: Evaluation of the use of isavuconazonium at an academic medical center

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Purpose: Isavuconazonium is a broad-spectrum antifungal approved by the FDA in 2015 to treat invasive aspergillosis and invasive mucormycosis. Due to it possessing several favorable properties (no renal dose adjustment, high oral bioavailability, oral and intravenous formulations, etc.), it may readily be over and improperly utilized if not monitored by pharmacists. The purpose of this medication use evaluation was to ascertain the characteristics of patients treated with this medication at our medical center and to evaluate the outcomes of these patients.

Methods: The institutional review board approved this quality improvement project. All patients receiving isavuconazonium at our medical center from April 2015 to August 2016 were included in this retrospective chart review. Results were entered into and analyzed using Excel. Patient factors analyzed were age, gender, indication for isavuconazonium, intravenous or oral form utilized, whether or not infectious disease providers were consulted and whether or not they approved the use of isavuconazonium, previous antifungal use in the past 90 days, duration of isavuconazonium therapy, isolation of fungal organisms, and comorbidities (using the Charlson comorbidity index). Outcomes analyzed were adverse effects secondary to isavuconazonium use, breakthrough fungal infections while on isavuconazonium and discharge disposition.

Results: During this 16-month period, 18 patients were treated with isavuconazonium at our facility. The average age of a patient in our study was 47 years old with a median of 54.5 years. The most common indication isavuconazonium was utilized for was fungal pneumonia. Fifty percent of patients utilized strictly the intravenous form, 22 percent utilized strictly the oral form and 28 percent utilized both formulations. Infectious disease providers were consulted

and approved the use of isavuconazonium 100 percent of the time. Antifungal therapy in the past 90 days had been provided to 83 percent of the patients with the most common antifungal being voriconazole followed by posaconazole. The average duration of use of isavuconazonium (excluding patients on indefinite use) was 24 days. Fungal organisms were isolated in 44 percent of patients with the most common organism being aspergillus. The average Charlson comorbidity index score was 2.5. Only one patient had a potential adverse effect due to isavuconazonium noted with it being eosinophilia. No patients had a documented breakthrough fungal infection while on isavuconazonium. Eleven patients were alive at discharge while 7 passed away before discharge.

Conclusion: The use of isavuconazonium at our institution seemed to mostly be devoid of adverse effects. Additionally, the data indicates that it helped in preventing any breakthrough fungal infections while the patient was being treated. While ideally, we would like 100 percent of our patients to be alive upon discharge, many of these patients presented in an already immunocompromised state due to leukemia or lymphoma treatment.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 3-069

Poster Title: Assessing the impact of a pharmacotherapy clinic in veteran patients with type 2 diabetes

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Purpose: Type 2 diabetes mellitus can result in increased morbidity and mortality if uncontrolled. Veteran patients with uncontrolled diabetes, hypertension, and hyperlipidemia can be referred to a pharmacotherapy clinic to have therapeutic regimens optimized and to receive more frequent follow up by a clinical pharmacist. The purpose of this study was to evaluate the impact of a clinical pharmacist on achieving favorable outcomes in diabetes, hypertension, and hyperlipidemia in an ambulatory care setting.

Methods: This retrospective chart review was determined to be institutional review board exempt as a quality improvement project. In this study, the patients' data at baseline served as the control. Inclusion criteria included a diagnosis of type 2 diabetes at baseline and enrollment in the clinic between November 1, 2015 and September 1, 2016. The exclusion criteria included a baseline hemoglobin A1c (HbA1c) of less than 8.00 percent, less than two clinic appointments, or only one HbA1c lab since the initial visit. The primary outcome measure was a change in HbA1c from baseline. Secondary outcomes included the number of patients at goal for hypertension and hyperlipidemia. Patients with diabetes were considered at goal for hypertension if the systolic blood pressure was less than 140 mmHg and the diastolic blood pressure was less than 90 mmHg. Hyperlipidemia was considered at goal if patients were on the appropriate statin therapy based on the four statin benefit groups.

Results: Out of the 88 patients who had been seen in pharmacotherapy clinic during the study period, 42 patients were excluded, leaving the final sample size to be 46 patients. The mean HbA1c at baseline was 9.64 percent, with a standard deviation of 1.64 percent. The range HbA1c at baseline was between 8.00 and 14.10 percent. At the conclusion of the study period, the mean HbA1c had decreased to 7.93 percent, with a standard deviation of 1.06 percent. The range HbA1c at the conclusion of the study period was between 6.30 and 11.10 percent. A

decrease in HbA1c was observed in 41 patients, while an increase in HbA1c was observed in four patients. One patient did not experience a change in HbA1c. For hyperlipidemia management, 35 patients were considered at goal at baseline compared to 45 patients at the conclusion of this study. For hypertension management, 36 patients were at goal at baseline compared to 42 patients at the completion of the study.

Conclusion: Patients enrolled in the clinical pharmacist-driven pharmacotherapy clinic for diabetes management had an improvement in glucose control, demonstrated by a decrease in HbA1c. Additionally, the majority of patients being followed by the pharmacotherapy clinic were at goal for hypertension and hyperlipidemia management. This suggests that clinical pharmacists at the clinic can make important contributions to chronic disease state management for diabetes, hypertension, and hyperlipidemia.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 3-070

Poster Title: Assessment of antimicrobials prescribed before and after implementation of a pharmacist-directed penicillin skin testing consult service for patients with a self-reported penicillin allergy

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Purpose: Penicillin skin testing (PST) is indicated for assessment of penicillin hypersensitivity in patients with suspected IgE-mediated penicillin allergy. Nearly 90 percent of patients with a self-reported penicillin allergy are not allergic. Successfully transitioning these patients from broad-spectrum antimicrobials to a penicillin or cephalosporin has demonstrated decreased healthcare costs and potentially decreased antimicrobial resistance. The purpose of this study is to evaluate the outcomes of a pharmacist-directed penicillin skin testing consult service.

Methods: This study is a non-randomized, observational chart review over an open enrollment period of 60 patients concurrent with prospective use of PST at a single not-for-profit community hospital. Prescribing of the test is restricted to infectious disease physicians or other clinicians pursuant to review by pharmacists from the Antimicrobial Management Program (AMP). The PST is administered by a nurse via an approved protocol and overseen by an AMP clinical pharmacist to ensure consistency in result interpretation. The protocol involves a three-step process (puncture test, intradermal test, and optional oral penicillin test) that takes approximately 45 minutes to complete. For a negative test, the AMP pharmacist makes recommendations for therapy changes with the ordering physician. Patients were excluded if they had a history of anaphylaxis in the past 10 years from beta-lactam antimicrobials or from any cause within the past 4 weeks, any condition that could interfere with test interpretation, or immunocompromised. Demographics, antimicrobial therapy before and after testing, allergy history, and results of PST were collected. The primary outcome is beta-lactam days of therapy defined as either a penicillin or cephalosporin therapy (not carbapenems). Included will be those changed from a non beta-lactam to a beta-lactam or de-escalated from broad to narrow

spectrum beta-lactam. Secondary outcomes include direct antimicrobial savings from a switch in therapy.

Results: Sixty patients were enrolled after evaluation for inclusion and exclusion criteria. Of the patients who underwent PST, 58 (96.7 percent) tested negative for penicillin allergy and 41 (68.3 percent) of those patients were changed to a beta-lactam or de-escalated in beta-lactam therapy. Due to antimicrobial changes, there was an average of 6.8 beta-lactam days of therapy for the 41 patients. In addition, 20 patients were also discharged on beta-lactams. Reasons patients were not changed from their original therapy included: extended spectrum beta-lactamase producing organism, penicillin-resistant bacteria, initiation of hospice care, and discharge immediately following the test. Two (3.3 percent) of the 60 patients had a positive PST result; one had a 9 millimeter indurated red wheal from the penicillin G intradermal test, while the other had all 4 intradermal sites positive, being at least 7 millimeters in induration. There were no adverse events that led to the discontinuation of beta-lactam therapy. Due to the changes in therapy, there was a cost savings of $18,427.26 which equates to an average cost savings of $307.12 per person.

Conclusion: This study demonstrates that pharmacist-directed PST in a community hospital results in patients receiving optimal therapy, with no adverse effects from antimicrobial changes, and reduction in cost. Not only were PST costs offset, they were far exceeded by savings. The PST results confirm that many self-reported penicillin allergies are not “true” allergies and that de-escalation of antimicrobial therapy to a beta-lactam is safe and feasible. PST can be a beneficial tool to help patients receive optimal therapy and aid in cost savings, making it a valuable antimicrobial stewardship initiative.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-071

Poster Title: Assessment of vancomycin co-administration with anti-motility agents and toxin-binding agents in the treatment of Clostridium difficile

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Purpose: Clostridium difficile (C. difficile) causes symptoms ranging from multiple watery stools per day to severe colitis. The 2010 IDSA guidelines recommend oral vancomycin as a primary treatment, especially in severe disease. Some physicians prescribe bile-acid sequestrants (BAS) and anti-motility agents to attenuate C. difficile associated diarrhea. This practice is not supported by IDSA guidelines and may impede treatment by decreasing toxin elimination (anti-motility agent) or binding the vancomycin itself if given within 2 hours of dose (BAS). This study evaluates the frequency of ordering and inappropriate administration of aforementioned agents.

Methods: This Institutional Review Board-approved retrospective, observational study was performed via an electronic chart review on patients who received oral vancomycin at a community health system from August 1, 2015 to July 31, 2016. Patients who were treated for active C. difficile infection as confirmed by laboratory testing were included. A total of 229 patients were identified and reviewed for inclusion. The primary outcome measures were to assess for the presence of a BAS and/or anti-motility agent on the electronic medication administration record among patients receiving oral vancomycin for active C. difficile infection and to determine the total number of BAS administrations that occurred within 2 hours of a vancomycin dose.

Results: Of the 229 patients who received oral vancomycin, 147 patients had laboratory confirmed C. difficile. Twenty-one of the 147 patients (14%) were prescribed both oral vancomycin and a BAS. Among these 21 patients, a total of 166 doses of BAS were given. Seventy-two of the 166 doses (43%) were given incorrectly. Four of the 21 patient profiles included explicit instructions to separate the vancomycin and BAS from one another. Despite specific directions, all four of these patients received at least one dose of BAS incorrectly (6 doses total).
Twenty-one of the 147 patients were prescribed oral vancomycin and an anti-motility agent together. Sixteen of the 21 patients received at least one dose of the anti-motility agent while receiving vancomycin. Seven patients were prescribed both an anti-motility agent and a BAS, with 5 of the 7 receiving both medications.

Conclusion: The majority of the patients on oral vancomycin for active C. difficile infection were not prescribed a BAS or anti-motility agent. However, of the patients who received both oral vancomycin and a BAS, a significant number of the BAS doses were administered inappropriately, possibly increasing the risk of treatment failure. A majority of the patients who were prescribed an anti-motility agent with vancomycin received at least one dose of the anti-motility agent. Methods to decrease co-administration of BAS or anti-motility agents have the potential to improve treatment outcomes of C. difficile infections.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-072

Poster Title: Time to first dose of antibiotics in the emergency department at an academic medical center

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Purpose: Emergency department providers are challenged with limited patient information, complex disease states, and high patient turnover. Time delays in administration of antibiotics have been associated with negative outcomes. The primary objective of this study was to evaluate the mean time to first dose of antibiotics in the emergency department at an academic medical center prior to and following the opening of a satellite pharmacy. The results of this evaluation will support quality improvement initiatives that address the current limitations of the time of delivery and time of initiation of antibiotics in the emergency department.

Methods: A retrospective chart review was performed for a random sample of patients who were admitted to the emergency department and prescribed intravenous antibiotics between March 1, 2016 and August 31, 2016. This time frame included patients admitted before and after the opening of the satellite pharmacy. All patients were administered their first dose antibiotic in the emergency department. The pre-selected antibiotics included vancomycin, ciprofloxacin, piperacillin-tazobactam, and ceftriaxone. Miscellaneous antibiotics included tobramycin, gentamicin, meropenem, ertapenem, and cefepime. Data collection included type of antibiotic given, indication for antibiotic, if the patient was transferred before drug administration, and whether the medication was dispensed from the pharmacy or an automated medication dispensing cabinet located in the emergency department. Additionally, the time the order was placed by the physician, verified by the pharmacy department, and documented in the chart as given by the nurse was collected. The primary outcome measure was the mean time from order placement to administration of the first dose of antibiotics in the emergency department comparing the pre-satellite and post-satellite period. Secondary outcomes included the mean time differences based on the location of antibiotic preparation, patient transferred before drug administration, and the type of antibiotic prescribed. This

project was part of the institution's Medication Use Evaluation and Improvement Program, which has been reviewed by the Institutional Review Board and determined not to be human subjects research.

Results: Of the 100 patients analyzed, 50 patients were admitted prior to the opening of the satellite, and 50 patients were admitted following the opening of the satellite. The mean times from physician order to nurse administration for the pre-satellite and post-satellite group were 3 hours, 50 minutes and 3 hours, 32 minutes, respectively. The mean times between physician order and pharmacy verification for the pre-satellite group and post-satellite group were 28 minutes and 30 minutes, respectively. The mean times between pharmacy verification and nurse administration for the pre-satellite and post-satellite group were 4 hours, 1 minute and 3 hours, 3 minutes, respectively. During the pre-satellite period, 82 percent of antibiotics were prepared in the pharmacy and 18 percent were from the automated dispensing machine. During the post-satellite period, 62 percent were from the pharmacy and 38 percent were from the automated dispensing machine. With antibiotics prepared in the pharmacy, the mean times from physician order to nurse administration for pre-satellite and post-satellite group were 3 hours, 44 minutes and 3 hours, 31 minutes, respectively. With antibiotics from the automated dispensing machine, the mean times for pre-satellite and post-satellite group were 5 hours, 9 minutes and 3 hours, 35 minutes, respectively.

Conclusion: In this medication use evaluation, the time to first dose antibiotics in the emergency room was reduced following the opening of the satellite pharmacy. There was minimal impact on the time between physician order and pharmacy verification. However, the opening of the satellite pharmacy was associated with a decrease in time between pharmacy administration and nurse verification, as well as a decrease in time between physician order and nurse administration. Future research should be conducted to identify additional barriers and determine where implementations to improve can be made in time of first dose of antibiotics in the emergency department.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 3-073

Poster Title: Risk of lactobacillus infection in critically ill adults receiving lactobacillus probiotics

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Purpose: Probiotics have been advocated in critically ill patients to mitigate risk for developing Clostridium difficile infection and ventilator associated pneumonia. Critically ill patients display suppressed immune response of the intestinal mucosa and increased digestive tract permeability increasing the likelihood that probiotic bacteria may translocate into the blood and cause opportunistic infection in this population. Published case reports and case series describe lactobacillus bacteremia following administration of probiotics. The purpose of this retrospective, observational medication use evaluation is to determine the incidence of lactobacillus infections in critically ill patients that were prescribed probiotics during their intensive care unit (ICU) stay.

Methods: This study is a single-site, retrospective, non-randomized, observational medication use evaluation from January 1st 2014 and December 17th 2015. Adults greater than 18 years of age admitted to an ICU who received at least one dose of Culturelle probiotic (Lactobacillus rhamnosus GG, NDC 49100-0363-74) were included. The primary endpoint was the incidence of culture positive lactobacillus infection following probiotic administration. Secondary endpoints included both characterization of Culturelle use and clinical outcomes. Medical records were reviewed to collect information regarding patient demography, past medical history, location of care, probiotic dosing, and clinical outcomes. Descriptive statistics were performed. This study received approval from the institutional review board.

Results: A total of 99 critical care patients received at least one dose of Culturelle during the evaluation period. The population was 53.5 percent female with a mean age of 46 years old (standard deviation 29.7). Clinicians prescribed Culturelle once daily in 37.4 percent, twice daily in 60.6 percent, and three times daily in 2.0 percent of patients for a mean 22 days (standard deviation 4.95). The surgical unit admitted 37.4 percent, medical unit 43.4 percent, trauma unit

10.1 percent, and neurology unit 9.1 percent of patients for a median ICU length of stay of 32 days (standard deviation 15.6). Hospitalizations lasted for a mean 41 days (standard deviation 2.83) with a 13.1 percent in-hospital mortality. Four patients developed infections with positive cultures for Lactobacillus spp. while concurrently on Culturelle (4.04 percent). All patients with positive cultures were admitted to the surgical unit for a median 84 days ICU days with total length of hospitalization lasting a median 101 days. Of patients that received probiotics and treated in the SICU, 10.81 percent had a positive culture for Lactobacillus spp. Of those with positive cultures, there was a 50 percent in-house mortality rate.

Conclusion: A total of four patients developed infections with culture positive Lactobacillus spp. for a rate of 4.04 percent per hospitalization. All patients that had positive cultures were admitted to the surgical ICU. In 2013, Simpkins, et, al. conducted a comparable single-site retrospective review. A rate of 0.17 percent (2 out of 1176) per patient hospitalization was reported to describe risk of developing a Lactobacillus spp. related infection. This less frequent incidence may be explained because this study did not exclusively evaluate critically ill patients. The relatively high infection rate observed in critically ill, surgical patients requires further investigation.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 3-074

Poster Title: Assessment of fluoroquinolone use for empiric treatment of urinary tract infections in a community hospital setting over a 6-month period

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Purpose: To determine whether fluoroquinolones are an effective treatment option for urinary tract infections (UTIs). UTIs are widespread among patients admitted to community hospital settings where they are treated empirically with fluoroquinolones. In May of 2016, the FDA released an alert stating that fluoroquinolones should not be used in uncomplicated infections due to the disabling side effects involving tendons, muscles, joints, and nerves. In addition, Escherichia coli is the most common cause of UTIs and is developing high resistance to fluoroquinolones. For this reason, it is important to limit fluoroquinolone usage and look for safer less resistant options.

Methods: This institutional review board approved this retrospective chart review. A report of patients who had a positive urine culture and received fluoroquinolones from December 1, 2016 to May 31, 2016 was generated. This report was used to identify patients who received fluoroquinolones empirically for a suspected UTI and had a positive urine culture with culture and sensitivity data. Data was collected in a de-identified spreadsheet. The primary endpoint was the overall susceptibility of fluoroquinolones in UTIs. The secondary endpoints included overall susceptibility to fluoroquinolones stratified by health care acquired versus non-health care acquired, complicated versus uncomplicated, and pyelonephritis versus cystitis. The percent of patients in each of these groups was assessed. Other endpoints included the number of patients who were asymptomatic and the percent of the asymptomatic patients requiring treatment, the percent of each organism isolated, and the overall susceptibility to antibiotics on the panel. This was further analyzed in symptomatic patients and health care acquired versus non-health care acquired UTIs. The susceptibility of the 3 most common isolates to antibiotics on the panel was also determined. For all endpoints, if a UTI was polymicrobial, the infection

was considered susceptible if all causative pathogens were susceptible to the antibiotic. Based on the primary endpoint, a total of 126 patients were required in order to have a power of 0.8 and alpha of 0.05.

Results: 120 patients qualified for the study; therefore, power was not met. More patients were excluded than expected because several patients were not treated empirically. The overall susceptibility of fluoroquinolones used in empiric treatment of UTIs was 60.80 percent with a 95 percent confidence interval from 51.70 to 70.00 percent with a P value of 0.005 and a null hypothesis of 72 percent based upon susceptibility of Escherichia coli at Eastside Medical Center. 55.83 percent of patients were asymptomatic with only 4.48 percent of those patients requiring treatment. The common pathogens were Escherichia coli, Klebsiella pneumoniae, and Enterococcus faecalis. Fluoroquinolones were not beneficial in any subgroup. 53.25 percent of health care acquired UTIs were susceptible to fluoroquinolones. 74.42 percent of non-health care acquired UTIs were susceptible to fluoroquinolones. 56.04 percent of complicated UTIs were susceptible to fluoroquinolones. 75.86 percent of uncomplicated UTIs were susceptible to fluoroquinolones. 74.19 percent of UTIs classified as pyelonephritis were susceptible to fluoroquinolones. 56.18 percent of UTIs classified as cystitis were susceptible to fluoroquinolones. Escherichia coli had a 59.68 percent overall susceptibility to fluoroquinolones. Better empiric options include nitrofurantoin, gentamicin, cefuroxime, ceftriaxone and cefotaxime based on their spectrum and higher susceptibility rates.

Conclusion: At East Side Medical Center, fluoroquinolones are no longer an effective treatment option for UTIs. This is due to the low overall susceptibility of fluoroquinolones in UTIs and susceptibility specifically to Escherichia coli. Further support is given by the new FDA alert, which states that fluoroquinolones should be reserved for more complicated infections because of the side effect profile. Fluoroquinolones do not provide any additional benefit to the specific subgroups of UTIs. Instead, alternative empiric agents should be considered.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 3-075

Poster Title: Comparison of in-person vs. telephone anticoagulation appointments with clinical pharmacists in a Veteran's Affairs Medical Center

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Purpose: Due to the complexities of managing warfarin therapy, pharmacists have held an increasing role in the management of anticoagulation. The purpose of this project is to determine whether pharmacist-led anticoagulation clinics are more effective in-person or by telephone. By assessing patients' current INR, goal INR, and percent time in therapeutic range (TTR), we will be able to compare whether patients are more likely to have a greater percentage of TTR within the two types of pharmacist-managed anticoagulation clinics: telephone and in-person.

Methods: This project was exempt from the Institutional Review Board. This study was completed at the Carl Vinson VA Medical Center, and it was a retrospective analysis. Veterans that had anticoagulation appointments with two clinical pharmacists either in the telephone-only or in-person clinic, between April 1, 2016 and June 30, 2016 were included. The exclusion criteria included Veterans either being bridged during the time frame or prescribed a target-specific oral anticoagulant (TSOAC). Data was collected from the Computerized Patient Record System (CPRS) and included: indication for anticoagulation, comorbidities, INR, clinic style (telephone vs. in-person), current weekly warfarin dose, time in therapeutic range, age, sex, race, and pharmacist's conclusions on reason for supra or sub therapeutic INR. Percent time in the therapeutic range was calculated for all patients with active warfarin prescriptions, diagnosis of atrial fibrillation or venous thromboembolism, and at least 3 INRs in the last 120 days. The data was de-identified and given to the author. A two-sample t-test with equal variance was used to test for statistical significance of the time in therapeutic range between the two groups. Statistical significance was defined as a $P < 0.05$ (two-tailed). All analyses were completed using Microsoft Excel.

Results: Out of 59 total screened telephone patients, 10 were excluded for taking target-specific oral anticoagulants and 49 were included in the retrospective analysis. There were 78 screened in-person patients, 26 had target-specific oral anticoagulants exclusion, 6 had bridging exclusion, and 46 were included in the retrospective analysis. The mean percent time in therapeutic range for the telephone group was 78.53% compared to the mean percent time in therapeutic range for the in-person group of 61.4%. This was a statistically significant difference (p equals 0.00142).

Conclusion: TTRs above 60% have the greatest benefit in terms of outcomes. Both clinic styles offer effective methods to reach therapeutic targets. The time in therapeutic range for telephone over in-person appointments was statistically significant. A potential explanation for this difference between groups is that Veterans with telephone appointments are more likely to be stable. Telephone appointments may be a more viable option depending on length of treatment, INR stability, and transportation needs of each patient. Future research should show if type of appointment has effect on other measures of safety and efficacy for warfarin, such as stroke or major hemorrhage.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 3-076

Poster Title: Analysis of legally distributed opioid consumption in the United States and selected developed countries in North America and Western Europe

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Purpose: Opioid consumption in the United States has increased dramatically in the past twenty years, both increasing their availability for management of pain as well as increasing opportunities for misuse and diversion. Although the United States is the only country to use hydrocodone in large quantities for pain control, other developed countries are nonetheless experiencing increased consumption of pharmaceutical opioids. The objective of this research is to analyze pharmaceutical opioid consumption trends in the United States and make drug utilization comparisons with the following three countries also experiencing increased opioid consumption: Germany, Canada, and the United Kingdom.

Methods: Data from the International Narcotics Control Board (INCB) were analyzed to compare opioid utilization between the United States, Germany, Canada, and the United Kingdom. The 2014 raw annual consumption values for fifteen different opioid agents were obtained from the INCB Narcotic Drug 2015 report and then converted into defined daily doses for statistical purposes (S-DDD) that represent the daily dose, in milligrams, for a typical patient. Converting overall mass utilization into S-DDD provides a number of doses that can be compared across various opioids. All conversions for the S-DDD were obtained from the INCB Narcotic Drug 2015 report to ensure consistency. Next, these S-DDD were converted into per capita doses to account for varying country sizes, and the utilization values for the various opioids were compared. Overall consumption per capita was analyzed as well as the most commonly utilized opioids based on the INCB consumption values. The opioids included in the analysis were: buprenorphine, codeine, dihydrocodeine, ethylmorphine, hydrocodone, morphine, oxycodone, pholcodine, dextropropoxyphene, diphenoxylate, methadone, pethidine, tilidine, fentanyl, and piritramide.

Results: The 2014 annual consumption in S-DDD per million people is 52,041 for the United States, 51,491 for the United Kingdom, 32,850 for Canada, and 29,032 for Germany. Although the per capita rate of opioid consumption in the United States is highest among these countries, it is only slightly higher than the consumption rate in the United Kingdom and less than double the consumption rates in Germany and Canada. Fentanyl accounts for over half of the opioid consumption in Germany and is the primary opioid consumed in Canada, however, consumption in Canada is more evenly divided amongst other high-potency opioids and codeine. Buprenorphine accounts for nearly half of the consumption in the United Kingdom, although lower-potency opioids (codeine and dihydrocodeine) play a large role, as well. Specifically, the 2014 consumption for the United States comprises 48.1 percent hydrocodone, 13.7 percent oxycodone, 12.6 percent fentanyl and 10.5 percent methadone. The consumption for the United Kingdom comprises 46.7 percent buprenorphine and 24.5 percent codeine/dihydrocodeine. The consumption for Canada comprises 38.9 percent fentanyl, 19.6 percent methadone, 18.7 percent codeine, 11.2 percent morphine. Finally, the consumption for Germany comprises 62.2 percent fentanyl and 14.2 percent tilidine. Any opioids not listed contributed less than 10 percent.

Conclusion: While hydrocodone-containing pharmaceuticals are the most highly consumed opioids in the United States, the lack of hydrocodone utilization in other countries does not prevent these countries from having estimated per capita pharmaceutical opioid consumptions comparable to the United States. For example, while hydrocodone is not approved for pain in Canada and is not available in Germany, these countries still have opioid utilization comparable to the United States due to increased fentanyl consumption. Availability can also potentially influence utilization; codeine/dihydrocodeine are two of the most highly utilized opioids compared to other opioid alternatives in the United Kingdom and are available over-the-counter.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 3-077

Poster Title: Pharmacy Student Interventions Within an Interprofessional Healthcare Team at a Free Clinic

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Purpose: The changing healthcare environment makes it essential for healthcare professionals to work as a team while providing patient care. As a result, inter-professional education has become an integral part of the training environment for healthcare professionals. Indigent care clinics provide an excellent environment for learning to care for complex patients while also serving the underserved. The purpose of this project was to describe the patients commonly encountered at Mercy Health Center, a free clinic in Athens, GA, and to quantify the number and type of interventions made by pharmacy students while working within an interprofessional team.

Methods: The institutional review board at the University of Georgia approved this retrospective study of patients seen at Mercy Health Center during interdisciplinary clinics. Patients were seen by an interprofessional healthcare team consisting of first and second year medical students, third year pharmacy students, and a supervising attending physician. The pharmacy student role included performing medication reconciliations, making recommendations to resolve drug-related problems, and patient education. The study time period was between October 1, 2015 and April 4, 2016. The data points collected from the electronic medical record included age, gender, race, number and type of chronic conditions, and number of medications. In particular, the study looked at three common chronic conditions including diabetes mellitus, hypertension, and chronic obstructive pulmonary disease (COPD). Medication related problems were categorized by: unnecessary drug therapy, needs additional

therapy, suboptimal drug selection, dose too low, dose too high, adverse drug reaction, and nonadherence.

Results: During the study period, a total of 203 patients were seen in the Augusta University clinic at Mercy Health Center. Patients had an average of 4 chronic conditions and 5 prescription medications. The average age of patients was 50. The most common conditions encountered other than diabetes mellitus (30%), hypertension (69%), and COPD (5%) included psychiatric disorders (55%), obesity (45%), hyperlipidemia (38%), gastroesophageal reflux disorder (32%), and arthritis (18%). 50% of patients seen in clinic were Caucasian, 31% African American, and 18% were Hispanic/Latino. Over a six-month period, 69 interventions were recommended by pharmacy students for patient care at the clinic. Interventions based on medication-related problem category produced the following results: 4 inappropriate uses of medications without indication, 20 indications for pharmacotherapy but not receiving, 5 suboptimal drug selections, 9 doses too low, 6 doses too high, 11 instances of nonadherence, 3 adverse drug reactions, and 4 drug-drug/drug-food interactions. Each student made an average of 11.5 interventions, and most of these were for adding pharmacotherapy to eligible patients. Additional recommendations made by the pharmacy student team included updating the patient chart (5) and smoking cessation counseling (2).

Conclusion: These results highlight the value of including pharmacy students in an interprofessional healthcare team. The population at Mercy is particularly at risk for medication-related problems due to the high average number of comorbidities, prescription medications as well as indigent status. Inclusion of pharmacy students in the interdisciplinary team resulted in a variety of interventions. In the future, a larger sample size could be evaluated to determine the impact on hospitalization, morbidity, and cost. To optimize therapy, pharmacists should be included in the decision-making in a healthcare team.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 3-078

Poster Title: Effectiveness of a student-pharmacist managed smoking cessation clinic

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Purpose: Tobacco use is a psychologically and physiologically addictive habit that has long been known to be a preventable cause of morbidity and mortality. There is an abundance of data available regarding tobacco cessation and the benefits therein, but data are limited regarding student-led tobacco cessation programs. This program was designed with a three-fold purpose: to encourage tobacco cessation in the community of Athens, Georgia; to provide a service learning opportunity for rising third year student pharmacists; and to assess the effectiveness of student pharmacists as leaders of a tobacco cessation clinic.

Methods: A six-week tobacco cessation program was implemented that focuses on a different part of the quit process each week. The University of Georgia (UGA) College of Pharmacy team modified, with permission, an existing four-session program developed by Pfizer called Beat the Pack. Modifications to the Pfizer program included the addition of two sessions, one covering pharmacological therapy and another discussing relapse prevention. In addition, forms to aid students with patient counseling and a patient education booklet with in-depth materials were added to better serve the expected patient population. This modified program combined 60-minute weekly meetings that included a brief group activity with one-on-one counseling sessions to formalize a personal quit plan. UGA pharmacy faculty acted as preceptors for third year student pharmacists, who served as the primary counselors for this service learning experience. Students were trained using education materials derived from RX for a Change, a series of educational materials developed by the University of California. Patients were counseled on both behavioral and pharmacological interventions, but the actual use of pharmacotherapy was determined ultimately by a mutual decision between the patient and the patient's primary care physician.

Results: Over the course of 6 years, the tobacco cessation program was offered a total of 10 times. In total, 80 participants enrolled in the program and 76 attended at least one meeting. There was an overall quit rate in those who attended at least one session of 48.7% (37/76). Every patient who quit tobacco attended at least 3 sessions, at which they received relevant cognitive and behavioral counseling, medication counseling, and counseling regarding the health benefits of tobacco cessation.

Conclusion: Results of this program demonstrate that properly trained student pharmacists can be effective in leading tobacco cessation programs. Appropriately designed programs can achieve quit rates that are comparable to or higher than the rates that are demonstrated by data from the 2008 HHS Treating Tobacco Use and Dependence Practice Guideline Update. This program may also serve as a model for the development of tobacco cessation programs led by student pharmacists at other locations; these programs may serve as a training opportunity for students in addition to the benefits that they provide to members of the community who use nicotine.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 3-079

Poster Title: Collaboration between pharmacy and nurse practitioner students in ambulatory care advanced professional practice experiences

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Purpose: The American Council for Pharmacy Education has established the importance of interprofessional experiences in the education of student pharmacists. At the Center for Medication Management (CMM), a pharmacist-managed clinic providing billable services, student pharmacists work closely with nurse practitioner students in many capacities including topic discussions, patient work-ups and patient presentations to practitioners. The goals of this study were to assess the perceptions of student pharmacists and nurse practitioner students regarding their collaboration in an ambulatory care setting and to highlight advanced care experiential education opportunities.

Methods: This study utilized the Student Perceptions of Interprofessional Clinical Education - Revised (SPICE-R) instrument. This validated tool aids in the assessment of health professional students' perceptions of three factors: interprofessional teamwork, roles in collaborative practice and patient outcomes as a result of collaborative practice. The SPICE-R instrument is comprised of ten items related to interprofessional education that are rated using a five-point Likert-type scale (strongly disagree to strongly agree). Nine students from the CMM anonymously responded to the SPICE-R instrument and these data were evaluated. The SPICE-R surveys were given after students had participated in rotation requirements at CMM that involved the collaboration of student nurse practitioners and student pharmacists. Rotation experiences included but were not limited to anticoagulation management, transitional care, heart failure, managed care of hypertension, hyperlipidemia or diabetes, and smoking cessation.

Results: Seven student pharmacists and two nurse practitioner students responded to the SPICE-R survey. Items related to roles and responsibilities of collaborative practice (2 and 7) received responses of “agree” or “strongly agree” from each of the nine responders. Items related to patient outcomes from collaborative practice (3 and 4) received responses of “agree” or “strongly agree” from each responder, with the exception of one pharmacy student responding with “neutral” on item 4. Items related to feelings about team-based care (1, 5, 6, and 8-10) received answers of “agree” or “strongly agree” from each responder, with the exception of one pharmacy student responding “neutral” for item 1.

Conclusion: These data reflect an overall positive perception from the students surveyed in terms of interprofessional work, roles of collaborative practice and outcomes as a result of collaborative practice in the ambulatory care setting. As colleges of higher education continue to require interdisciplinary practice, the Center for Medication Management provides an example of a collaborative advanced practice experience that serves both pharmacy and nurse practitioner students.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 3-080

Poster Title: Apixaban: examining practice patterns in chronic kidney disease at Augusta University Medical Center

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Purpose: New target specific anticoagulants provide alternative options for anticoagulation in nonvalvular atrial fibrillation, venous thromboembolism, and post-orthopedic prophylaxis indications. However, studies eliminate patients with moderate and severe chronic kidney disease and end stage renal disease making anticoagulation in this patient population limited with regards to evidenced based literature. Currently, apixaban is the only target specific agent approved for use in chronic kidney disease and end stage renal disease. The primary objective of this study is to assess physician prescribing practices of apixaban in the chronic kidney disease population admitted to an academic medical center.

Methods: This retrospective chart review was approved by the institutional review board. Patients who are greater than 18 years of age, had an active order for apixaban during hospitalization, had diagnosed chronic kidney disease or a serum creatinine greater than 1.5 mg/dL during the admission were included in this study. Patient records were identified by a targeted drug report using the Cerner discern analytic system to identify all patients who received at least one dose of apixaban in the emergency department or during a hospital stay between the dates of March 3, 2014 to March 3, 2016. Patients were excluded if they did not meet all of inclusion criteria. The primary outcome of the study was to evaluate the physician prescribing practices of apixaban in the chronic kidney disease population by evaluating the indication, dosing, and baseline stroke and bleeding risks. Secondary outcomes included rates of recurrent thrombosis, bleeding, and any barriers of compliance. Since the goal of this study is to evaluate all patients meeting the inclusion criteria, no power analysis was performed.

Results: A total of 572 patients received at least one dose of apixaban between March 3, 2014 and March 3, 2016. Of the 572, 181 patients met the inclusion criteria and were analyzed. Of the patients analyzed, 92 were female, 101 were Caucasian, with an average age of 67.3 years. The most frequent indication for anticoagulation was non-valvular atrial fibrillation where n equals 130. Twenty-six patients were prescribed apixaban for off-label indications such as arterial and graft thrombus. One hundred and sixteen patients were dosed with 5 mg twice daily of apixaban. Based on approved renal dosing indications, 143 patients were prescribed the appropriate dose of apixaban based on renal dosing criteria.The average CHADs-VAsC2 score was 2.5 and the average HAS-BLED score was 2.1. Eight patients experienced a thrombus and 18 patients experienced a bleed within 1 year of taking apixaban with the most common source of bleeding being a gastrointestinal bleed where n equals 10. Of the 26 patients on apixaban for an off-label indication, 5 experienced an adverse event with 4 of the 5 patients having a thrombus.

Conclusion: With apixaban being the only target specific anticoagulant agent with an indication in renal impairment, many prescribers select it in chronic kidney disease and end stage renal disease. The evaluation of apixaban prescribing at Augusta University Medical Center indicates that patients are being prescribed apixaban appropriately based on indication and renal dosing. Comparing bleeding events from the ARISTOTLE trial to this study shows a greater percentage of bleeding events in patients with chronic kidney disease and end stage renal disease, however it would be appropriate to follow patients for longer than one year to see if this trend continues.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 3-081

Poster Title: Evaluation of elevated international normalized ratios in hospitalized patients taking warfarin: a retrospective chart review

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Purpose: The use of warfarin as an antithrombotic agent is challenging because of its narrow therapeutic International Normalized Ratio (INR) range and numerous interactions. Clinical studies and observations have shown increased risk of bleeding with INR above 3 and need for reversal in INR above 5 but few studies have been done to determine the causality of elevated INRs in hospitalized patients taking warfarin. The primary objective of this medication use evaluation (MUE) is to determine the causality of elevated INR above 5 in hospitalized patients at an academic medical center.

Methods: A retrospective chart review was performed at Augusta University Medical Center in Augusta, Georgia, between June 2015 and July 2016, on hospitalized patients taking warfarin who had INR values above 5. Data collection included patient demographics, warfarin indication, and INR goal. Details regarding origins of warfarin initiation were also collected. Other data points gathered included known interacting medications with warfarin, disease states affecting INR such as liver damage or congestive heart failure (CHF) exacerbation, warfarin dose, and others (e.g. noncompliance, heparin induced thrombocytopenia, malnutrition, or chronic diarrhea). Descriptive statistics will be used to analyze this data which was collected on a de identified excel spreadsheet. This project was approved by the Augusta University institutional review board as a “not human subject research”. It is also a part of the health system MUE and improvement program.

Results: A total of 130 patients were evaluated with an average age of 65 years consisting of 57 male patients. Forty three percent of patients were African American, 55 percent Caucasian, and 2 percent Hispanic. The most common indications for being on warfarin therapy were deep vein thrombosis at 21.3 percent, pulmonary embolism at 20.5 percent and atrial fibrillation at

37.7 percent. Overall, 47.5 percent of patients were admitted with INRs greater than 5. Elevations that occurred after hospitalizations occurred in 52.5 percent of patients of which 19 patients were newly initiated on warfarin in the hospital and 45 patients were continued from outpatient. Out of all INR elevation, 59 percent were associated with use of interacting medications; mainly consisting of antibiotics and antiarrhythmic. Thirty one patients out of the 45 patients admitted with a therapeutic INR experienced an elevation in INR during hospitalization due to drug interactions. Other common causes in these patients were CHF exacerbation and liver damage defined from the clinical notes as well as change in dietary intake.

Conclusion: Supratherapeutic INRs are a concerning problem in hospitalized patients. Especially concerning are those that were admitted with therapeutic INRs and due to drug interactions resulted in an elevated INR greater than 5. Since interacting medications were a leading cause of INR elevation, it is important to take extra precautions when administering medications to patients on warfarin. Based on these results, a protocol on medication administration in patients on warfarin may be preventative. Other future directions may include development of electronic resources for screening or high risk interaction identification.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 3-082

Poster Title: Evaluating the use of a Candida panel

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Purpose: Early identification of pathogens is essential to assure patients are receiving optimal therapy as early as possible. The goal of the Candida panel, implemented in April 2016, is to be able to quickly detect if patients have invasive candidiasis. These results, available within 3 to 5 hours, allows for antifungal stewardship. The goal of this study is to evaluate the use of the Candida panel by monitoring adherence to the candidiasis algorithm, a prompt start of antifungal therapy in those with positive results, and quick discontinuation of antifungal in those with a negative result.

Methods: Our institutional review board approved this retrospective study. Our microbiology lab generated a list of patients with orders for the Candida panel. All patients listed were included in the study. Patients' medical records were reviewed for the following information: service that ordered the test, results of the test, and if the Candida panel algorithm was followed. The algorithm starts with patients being on broad-spectrum antibiotic coverage for greater than or equal to 72 hours and still febrile or showing signs of clinical deterioration. These patients must also have presumptive candidiasis, defined by a Candida score greater than or equal to three (one point for the following: total parental nutrition, surgery on intensive care unit admission, multifocal Candida colonization and two points for severe sepsis). If the test results were negative, charts were evaluated to determine what antifungal therapy was prescribed, when it was prescribed, and when it was discontinued. Patients whose test was positive, evaluation was done to see how long before antifungal therapy was started and which agent was chosen. Additionally, medical records were reviewed to determine if antifungal therapy was started before or after the test was drawn and how many hours before or after the

test was drawn was the therapy started. The data was placed into an Excel spreadsheet to determine trends and if the Candida panel is being used properly.

Results: One hundred and thirty three patients were included in this study. Of these, only 23 percent followed the algorithm for ordering the Candida panel. Seventy-one percent of patients not following the algorithm did not have presumptive candidiasis (i.e. algorithm score less than three) making this the most common reason for improper use of the test. Additional reasons included, 44 percent of patients being on antifungal therapy prior to ordering the test, or 7 percent not being on empiric antimicrobial therapy for 72 hours. However, of the 103 patients who did not follow the algorithm, 17 percent of the tests were ordered per recommendations by the Infectious Disease team. Only 5 of the 133 test had positive results, all for Candida albicans/ Candida tropicalis. For those with negative tests, only 52 percent discontinued antifungal therapy, taking an average of 41 hours to discontinue therapy ranging from 1 to 146 hours. Twenty-five patients started on antifungal therapy at the time the Candida panel was ordered which is consistent with the algorithm. Of all the patients on antifungal therapy either before or after the test was ordered, 51 percent were on micafungin, an infectious disease approved drug, and 47 percent were on fluconazole.

Conclusion: The newly implemented Candida panel has not been integrated into therapy as intended. The benefit of the test is to prevent patients from being placed on antifungals when it is unnecessary. Currently the majority of patients receiving the test are still taking unnecessary antifungal therapy. This creates risk for antifungal resistant organisms and added expense to the patient and hospital. Further education needs to be done involving appropriate patient choice, not starting antifungals until Candida panel is ordered, and promptly discontinuing antifungals if a negative result is received.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 3-083

Poster Title: Risk Factors for Hypoglycemia in a 200 Bed Community Hospital

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Purpose: Hypoglycemia is the most common and major adverse event associated with the treatment of inpatient hyperglycemia. Hypoglycemia has had a significant negative impact on healthcare costs, resources, and patient outcomes (increased risk of cardiac events and mortality). This study will describe factors associated with hypoglycemia in a 200 bed community hospital and should provide insight concerning inpatient hypoglycemia, which could allow for opportunities of improvements in patient care.

Methods: This study is a single-center, retrospective, chart review. It includes patients admitted to St. Mary's Hospital from March 1, 2016 to July 30, 2016 who experience hypoglycemia (< 70 mg/dL) associated with drug therapy and are of age equal to or greater than 18 years old. Exclusion criteria includes treatment and discharge from emergency department, hypoglycemia unrelated to use of drug therapy, and pregnancy. Patient health information such as age, A1c, serum creatinine, creatinine clearance, BMI, and drug therapy will be utilized to help identify factors associated with hypoglycemia.

Results: 115 individuals met the criteria of this study. The average age of patients who experienced hypoglycemia was 63.9, where 53 percent of hypoglycemic patients were over the age of 65. 41.7 percent of patients had a A1c value greater than 8 percent, which is not at goal (less than or equal to 8 percent or 7 percent based on patient specific characteristics) per ADA guidelines. 45.2 percent of hypoglycemic patients were obese (BMI >30) and 27 percent of hypoglycemic patients were overweight (BMI 25-29.9), which equates to 72.2 percent of patients having a BMI of at least 25. 66.1 percent of patients were on long acting basal insulin, while 78.3 percent were on sliding scale insulin.

Conclusion: Type 2 diabetics who experienced inpatient hypoglycemia were more likely to be older, have higher A1c values (not at goal), higher BMI, and be on some sort of insulin therapy. Patients admitted with these characteristics warrant close monitoring for the development of hypoglycemia. The sample size for type 1 diabetics was too small to draw conclusions.

Submission Category: Automation/ Informatics

Submission Type: Evaluative Study

Session-Board Number: 3-084

Poster Title: Impact of hospital software on reporting to a state vaccine registry

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Purpose: Reporting accurate and complete vaccination information by immunization providers is critical. It helps identify patients needing vaccinations and aids surveillance programs. In October 2015, Phoebe Putney Memorial Hospital (PPMH) in Albany, Georgia adopted a new software, Meditech, to manage all PPMH patients' health and services information. The primary outcome was to determine if implementation of Meditech has made a difference in the reporting of adult influenza vaccinations to a state vaccine registry, Georgia Registry of Immunization Transactions and Services (GRITS). The secondary outcome was to evaluate the percentage of patients who received flu vaccines and had a high risk comorbidity.

Methods: The University of Georgia institutional review board approved this retrospective review. The retrospective review was conducted on PPMH inpatients and outpatients who received adult influenza vaccines in November 2014 and November 2015. No identifiable subject information was maintained. PPMH Information Systems Department ran a report of all patients whom adult influenza vaccine was ordered and/or dispensed in November 2014 and 2015. Patients less than 18 years old were excluded. From the remaining patients on the list, all patients were reviewed to identify who received the vaccine at the facility, and then further reviewed for documentation in GRITS until 100 patients who received the vaccine had been selected for review in each time period. The included patients were assigned a research number as in 1114001, 1114002, 1114003, etc…for the November 2014 group and 1115001, 1115002, 1115003, etc… for the November 2015 group. The investigators verified whether influenza vaccine administration was documented in GRITS (Yes/No) for the included subjects. The number of patients who did not actually receive the vaccine was compared to the number for whom the vaccine was ordered. Additionally, the investigators collected and evaluated included subjects' age, sex (Male/Female), and presence of following comorbidities: diabetes

mellitus (DM), heart failure (HF), stroke, end stage renal disease (ESRD), liver disease, chronic obstructive pulmonary disease (COPD), and asthma (1 for presence and 0 for absence).

Results: In November 2014, 100 patients received the adult influenza vaccine out of 148 patients for whom vaccine was dispensed; 37 percent were male and 63 percent were female. Out of the 100 patients, 24 percent had DM, 8 percent HF, 6 percent ESRD, 1 percent liver disease, 11 percent COPD, 8 percent asthma, and zero stroke. In November 2015, only 64 patients received the adult influenza vaccine out of 230 patients for whom vaccine was ordered; 50 percent were male and 50 percent were female. Out of the 64 patients, 31 percent had DM, 18 percent HF, 12 percent stroke, 14 percent ESRD, 6 percent liver disease, 17 percent COPD, and 4 percent asthma. In 2014, 2 vaccine administrations (2 percent) were documented in GRITS, and 11 documentations (17 percent) were documented in November 2015. The p-value was 0.0004 using the chi-square statistic test with one degree of freedom and the significance level set at 0.05.

Conclusion: Implementation of a new software, Meditech, at PPMH has made a significant difference in reporting of adult influenza vaccinations to the state vaccine registry, GRITS. However, the number of reporting to GRITS remains low compared to the number of vaccinations administered. Healthcare providers should be continuously encouraged to report in a timely manner.

Submission Category: Infectious Diseases

Submission Type: Case Report

Session-Board Number: 3-085

Poster Title: Cryptococcal meningitis in an immunocompetent patient: Case Report

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Purpose: Cryptococcus is a common fungus that is found throughout the environment, specifically soil. In healthy, immunocompetent patients, ingestion of these spores does not typically cause a problem. However, in immunocompromised patients, such as those with HIV/AIDS or organ transplants, this opportunistic infection can cause serious disease. Cryptococcal meningitis occurs when the infection spreads from the lungs to the brain and spinal cord. Although we have effective antifungal treatment, it has a high morbidity and mortality rate globally due to the poor availability of fungicidal drugs in developing countries. A 26-year-old Vietnamese male, who recently immigrated to the United States, was brought to the emergency department for transient unresponsiveness and generalized weakness. He was previously healthy until 3 weeks prior when he developed a gastrointestinal illness with nausea and vomiting. He was initially treated for Helicobacter pylori but was unable to tolerate the quadruple therapy regimen. When he presented to the ED, he had been experiencing myalgias, weakness, poor sleep and appetite, significant headaches, left eye blurry vision and double vision, right arm numbness and a 13 pound weight loss over 3 weeks. Initial laboratory results included a white blood count of 16.4, potassium of 3.1, C-reactive protein less than 0.3, CT scan of the head was negative and blood cultures were positive for Cryptococcus neoformans, an encapsulated yeast associated with aged pigeon droppings. The patient's HIV test was negative, cryptococcal antigen in both the serum and cerebrospinal fluid (CSF) was greater than 2000, and CSF Epstein-Barr virus DNA was positive for 1,100 copies. He was started on high dose liposomal amphotericin and 5-fluocytosine. Per the IDSA cryptococcal guidelines in an HIV negative patient with neurologic complications, the patient would need 6 weeks of induction therapy. The patient's increased intraocular pressure (IOP) caused papilledema, lateral rectus palsy and blurred vision. A lumbar puncture was performed daily to monitor the open pressure with a goal of less than 25cm. The IOP remained high, requiring the placement of a lumbar drain, which remained in place for 10 days. On Day 23, the lumbar puncture revealed an

increased IOP of 65cm and a new lumbar drain was placed. The lumbar drain was insufficient in keeping the pressure down so a ventriculoperitoneal (VP) shunt was placed on Day 31.The patient had persistent hypokalemia and hypercalcemia due to the drug therapy, requiring constant monitoring and replacement of electrolytes. Due to the high cost of amphotericin and 5-fluocytosine, the patient was discharged after 37 days in the hospital on oral fluconazole. The patient returned to the hospital 2 weeks later with worsening ataxia, evidence of advancing cryotpcoccus and treatment failure. Amphotericin B was restarted and fluconazole was changed to posaconazole and the patient began treatment for tuberculosis, despite no active symptoms, only a positive QuantiFERON Gold test. The patient was discharged to a rehab center on oral posaconazole and a steroid taper. At this point, the patient had completed his second induction with amphotericin. After 20 days in rehab, the patient presented to the ED with recurrence of symptoms (tachycardia, nausea, abdominal discomfort, headache, fever and leukocytosis). The VP shunt was removed due to a CSF culture positive for gram-negative bacteria. The patient was treated with a 21-day course of Merrem for pseudomonal meningitis, associated with the VP shunt and currently remains on posaconazole indefinitely. As this case suggests, the patient may have some underlying immune dysfunction that is aiding in the treatment failure of the cryptococcal meningitis. Further research and evaluation would be beneficial to examine a potential link between cryptococcal meningitis and Epstein-Barr virus.

Methods:

Results:

Conclusion:

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-086

Poster Title: Assessment of therapeutic duplication for inpatients prescribed as needed medications for the treatment of constipation at an academic medical center

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Purpose: The Joint Commission Medication Management Standards require that medication orders are clear and accurate. Furthermore, medication orders must be reviewed by a pharmacist and assessed for therapeutic duplication, which is defined by this academic medical center as prescribing or using multiple medications for the same indication without accompanying clarification. Clarification may include directions for use for specific symptoms, instructions for the sequence of administration or a statement that the use is appropriate given different mechanisms of action. The primary objective of this study was to evaluate the prevalence of therapeutic duplication of as needed medications for the treatment of constipation.

Methods: A retrospective chart review was conducted for a random sample of patients admitted from January 1, 2016 to June 30, 2016 who were prescribed two or more pre-specified as needed medications for the treatment of constipation. Such medications included bisacodyl, docusate, lactulose, polyethylene glycol and senna. Data collection included patient location and hospital service, name and dosage of the medications ordered, dosing intervals, indication and presence of order comments or instructions regarding the sequence of administration. If qualifiers were included in the order comments of every medication order, the use of multiple medications was considered appropriate. However, if the order comments for one or more of the medication orders lacked clarification, the use of multiple medications was considered inappropriate. Inappropriate therapeutic duplication was further stratified into orders that were partially clarified (i.e., instructions for administration were included in one but not all of the medication order comments) and not clarified (i.e., no instructions for use within the medication order comments). Descriptive statistics were used to analyze the data. This project was part of the institution's Medication Use Evaluation and Improvement Program,

which has been reviewed by the Institutional Review Board and determined not to be human subject research.

Results: 129 patient encounters were evaluated for therapeutic duplication of medications prescribed as needed for the treatment of constipation. The average number of as needed orders for the treatment of constipation was 2.5 medications. 84 percent of patient encounters included two active medication orders prescribed as needed for the treatment of constipation, 13 percent of patient encounters included three active medication orders and 3 percent of patient encounters included four active medication orders. No encounters had more than 4 as needed medications for the treatment of constipation. The use of multiple medications was considered inappropriate in 100 percent of the patient encounters evaluated. Only 2 percent of patient encounters included medication orders that were partially clarified. The most common medications prescribed were bisacodyl, senna and docusate. The most common locations of therapeutic duplication were adult medicine, emergency services, trauma and progressive care and adult intensive care units.

Conclusion: Given the results of this medication use evaluation, it is important to develop policies and protocols addressing therapeutic duplication, implement modifications to computerized prescriber order entry, and provide education to staff. Although the prescribing and use of multiple medications for the treatment of constipation may be appropriate due to unique and differing mechanisms of action, it is still essential to define the circumstances for administration to prevent misinterpretation and optimize patient care.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-087

Poster Title: Evaluation of acetaminophen dosing at an academic medical center.

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Purpose: Acetaminophen is frequently used in the hospital as an antipyretic and analgesic. However, excessive use of acetaminophen poses a risk for hepatotoxicity that could ultimately result in death or need for a liver transplant. In order to limit potential for liver damage, the FDA recommends a maximum dose limit of 4,000 milligrams per 24 hours for an adult. For pediatric patients or adults weighing less than 50 kilograms, the maximum daily dose is 75 milligrams per kilogram per day. The purpose of this retrospective evaluation is to assess consistency in not exceeding the maximum recommended daily dose of acetaminophen.

Methods: This project is part of the Medication Use Evaluation (MUE) and Improvement Program, which has been reviewed by the IRB and determined not to be human subject research. A retrospective review was performed on a random sample of one hundred patients who received acetaminophen-containing products at least once during the time period of August 17- August 24, 2016. Evaluation parameters included the acetaminophen product the patient received, the potential dose of medication that the patient could have received in 24 hours, and the actual dose of medication that the patient did receive in 24 hours. Total doses given within 24 hours were calculated to include all scheduled, as needed, and one time doses of acetaminophen during the time period. This review also evaluated concurrent use of more than one acetaminophen- containing product, including oxycodone-acetaminophen, hydrocodone- acetaminophen, and intravenous acetaminophen.

Results: In adults weighing 50 kilograms or more, 67 percent (46/68) did not have the potential to receive greater than 4 grams of acetaminophen in 24 hours with two patients actually receiving more than 4 grams. Of the adult patients weighing less than 50 kilograms, 66 percent (2/3) did not have the potential to receive greater than 75 milligrams per kilogram per day and

one patient exceeded the maximum dose. In the pediatric patient sample, 79 percent (23/29) did not have the potential to receive greater than 75 milligrams per kilogram per 24 hours with 2 patients receiving a dose greater than that upper limit.

Conclusion: Continued improvement is needed on the part of both physicians and pharmacists to ensure that orders are not written and verified that could allow a patient to receive greater than the recommended daily acetaminophen dose. Increased pharmacist involvement in this process could decrease the opportunity for error and improve patient safety. As the medical center is currently considering removing intravenous acetaminophen from formulary, the information from this medication use evaluation may support this decision. The Pharmacy and Therapeutics Committee will meet and discuss the next steps regarding the optimal and safe use of acetaminophen products.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-088

Poster Title: Extended-Interval Aminoglycoside Dosing in Pediatric Patients with Cystic Fibrosis Exacerbations

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Purpose: Optimal dosing of aminoglycoside antibiotics in pediatric cystic fibrosis (CF) patients has long been debated. Arguments have been made in favor of traditional multiple daily dosing (MDD) as well as extended-interval, or once daily dosing (ODD). The Cystic Fibrosis Foundation endorses and recommends extended-interval dosing. ODD of aminoglycosides has concentration-dependent bactericidal activity, less drug accumulation that causes renal and vestibular toxicity, a post-antibiotic effect, and decreased risk of adaptive resistance. The purpose of this study was to determine if ODD of aminoglycosides in pediatric CF exacerbation patients reached and maintained therapeutic serum drug concentrations.

Methods: Pediatric patients (defined as 18 years or younger upon admission) who were admitted for CF exacerbations between September 2015 and September 2016 and received ODD of an aminoglycoside were included in this evaluation. ODD is recommended in ages 5 years and older, so patients under 5 years were excluded. Patients meeting inclusion criteria received extended-interval dosing of tobramycin, the aminoglycoside of choice per institution-specific susceptibilities. Patients were started on a dose of 10 mg/kg administered intravenously once daily. If a patient had previous admission(s) with tobramycin treatment, they were started at the dose that was last found to achieve therapeutic serum drug levels. Levels were drawn 3 hours and 12 hours after the start of the second dose. Therapeutic serum drug levels were defined as those giving a calculated 30-minute post-dose peak of 8-10 times the MIC of the suspected organism(s) (based on institution antibiogram and/or patient history of susceptibility) and a calculated trough of < 2 mcg/ml. The primary endpoint of this evaluation was the percent of patients who achieved therapeutic drug levels with initial dose selection. Secondary endpoints included the number of dose adjustments required to achieve therapeutic

drug levels in patients who did not reach it initially. The institutional review board approved this retrospective drug-use evaluation.

Results: The evaluation population included 23 total patients (n equals 23). This population included 11 females and 12 males ranging from 6 to 18 years of age (average 11.5 years). Of the 23 patients included in this evaluation, 16 patients (70 percent) achieved therapeutic serum drug levels using initial dosing strategies. Of the 7 patients who were found to be outside of the therapeutic range, 6 were subtherapeutic and 1 was supratherapeutic. Of these 7 patients, 2 required 3 dose adjustments and 5 required only 1 dose adjustment to achieve therapeutic levels.

Conclusion: Extended-interval dosing of aminoglycoside antibiotics achieved therapeutic serum drug levels in the majority pediatric cystic fibrosis patients admitted for CF exacerbations requiring antibiotic treatment. Furthermore, the majority of patients who do not achieve therapeutic levels with initial dosing strategies only required one dose adjustment to be within the therapeutic range. This evaluation supports once daily or extended-interval dosing of aminoglycosides in this patient population, and shows that it can be a reliable and efficacious approach to treatment.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-089

Poster Title: Evaluation of antipsychotic prescribing and monitoring for geriatric patients in a long-term care facility for veterans

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Purpose: Antipsychotics are utilized in the geriatric population to treat psychosis associated with multiple disease states, including schizophrenia, bipolar disorder, and dementia. The FDA has issued a black box warning for all antipsychotics for increased mortality in elderly patients with dementia-related psychosis. Therefore, the Centers for Medicare and Medicaid Services (CMS) has published regulations concerning the appropriate use and monitoring of antipsychotics for the elderly in long-term care facilities. The purpose of this study was to assess compliance with these standards at a long-term care facility for veterans.

Methods: This was a retrospective chart review which evaluated all residents of a long-term care facility who had been treated with any antipsychotic agent between July 2015 and June 2016. Patient charts were reviewed for proper indications, monitoring parameters, and attempts at dose reduction. Proper indications included schizophrenia, mania, depression with psychotic features, adjunct use with antidepressants, psychosis, Tourette's disorder, Huntington's disease, and dementia, delirium, amnestic or other cognitive disorders with associated psychotic behaviors. Monitoring parameters included daily behavioral record, annual abnormal involuntary movement scale (AIMS) assessment, fasting plasma glucose, fasting lipid panel, blood pressure, and quarterly body weight.

Results: Out of 161 residents of the long-term care facility, 42 had taken an antipsychotic in the period from July 2015 to June 2016. One hundred percent of patients had an indication documented in the patient chart that was appropriate for antipsychotic use. All had received annual monitoring of AIMS, blood pressure, and fasting blood glucose, as well as quarterly monitoring of weight. One patient did not have a daily behavioral record. Eighty one percent

(34 of 42) had an order for a fasting lipid panel at least annually. Almost half of the patients (20 of 42) were not eligible for dose reduction due to one of the following reasons: documentation of ineligibility in the active problem list or start of an antipsychotic within the past 6 months. Of the remaining 22 patients who were eligible, seventy three percent (16 of 22) had at least one dose reduction within the past year. Of the six patients who did not, two had a recent dose increase and four were eligible for reduction.

Conclusion: Indications for antipsychotic use were consistent with current CMS regulations. Monitoring parameters were measured appropriately, with the exception of yearly fasting lipid panel. While proper dose reduction or documentation of ineligibility were noted in the majority of patients, emphasis should be placed on verification of dose reduction or ineligibility by a pharmacist during monthly medication reviews, as well as education for prescribers on CMS dose reduction regulations.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-090

Poster Title: Evaluation of therapeutic duplication for inpatients prescribed multiple as needed medications for the treatment of nausea and vomiting at an academic medical center

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Purpose: Compliance with the Joint Commission Medication Management Standards requires all medication orders to be clear and accurate. Additionally, medication orders must be assessed by a pharmacist for therapeutic duplication among other characteristics indicating appropriateness. Therapeutic duplication is defined by this academic medical center as the prescribing or use of multiple medications for the same indication without clarification, which may include the sequence of administration. The objectives of this study were to evaluate the prescribing practices of as needed medications for the treatment of nausea and vomiting and to determine if appropriate instructions were included within the medication orders.

Methods: A retrospective chart review was conducted of a random sample of patients admitted to the academic medical center from January 1, 2016 to June 30, 2016 who were prescribed two or more pre-specified as needed medications for the treatment of nausea and vomiting. These medications included ondansetron, metoclopramide, prochlorperazine, promethazine, lorazepam and diphenhydramine. Data collection included patient location, name and dosage of the medications ordered, dosing interval, indication and presence of order comments or instructions regarding the sequence of administration. The use of multiple medications was considered appropriate if all medication orders contained clarification or qualifiers within the order comments. In contrast, the use of multiple medications was considered inappropriate if the order comments for one or more medication orders lacked explanation. Inappropriate therapeutic duplication was further stratified into orders that were partially clarified (i.e., instructions for administration were included in one but not all of the medication order comments) and not clarified (i.e., no instructions for use within the medication order comments). Descriptive statistics were used to analyze the data. This project

is part of the institution's Medication Use Evaluation and Improvement Program, which has been reviewed by the Institutional Review Board and determined not to be human subject research.

Results: 253 patient encounters associated with 560 as needed medication orders were reviewed for therapeutic duplication. The use of multiple medications was considered appropriate in 4 percent of patient encounters. 96 percent of patient encounters included orders identified as inappropriate duplicate therapy due to a lack of clarification. Of the patient encounters with unclarified orders, 35 percent of encounters had partially clarified orders with instructions for one of the medications, and 65 percent of encounters had no clarification. With regard to inappropriate therapeutic duplication, 82 percent of encounters included two duplicate medications, 15 percent of encounters included three duplicate medications and 3 percent of encounters included four duplicate medications. In the instances of duplicate therapy for the treatment of nausea and vomiting, the most common medications prescribed were promethazine, ondansetron and prochlorperazine. 66 percent of patient encounters with unclarified orders included both promethazine and ondansetron. The most common locations of unclarified orders were emergency services, adult medicine and adult intensive care units.

Conclusion: The prescribing and use of multiple as needed medications for nausea and vomiting without instructions for administration may cause nursing confusion and increase the risk for medication errors and adverse drug events. In this medication use evaluation, appropriate clarification was lacking in a vast majority of instances where multiple as needed medications for nausea and vomiting were prescribed. The results of this study demonstrate a need for policy and protocol development, computerized prescriber order entry revision and staff education.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 3-091

Poster Title: Evaluation of medical student perceptions of interprofessional educational experiences alongside pharmacy students in an indigent care, ambulatory clinic.

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Purpose: The study objective was to examine medical student perceptions of interprofessional education while collaborating with pharmacy students in health care teams at Mercy Health Center, an ambulatory care clinic. This included how interprofessional teamwork influenced their education and overall perception of patient care. Additionally, the study evaluated how the students' viewpoints changed throughout the duration of the program.

Methods: The data was collected using a qualitative survey known as the Student Perceptions of Physician-Pharmacist Interprofessional Clinical Education (SPICE) instrument. It was completed by medical students through secure University of Georgia Qualtrics software for web-based surveys. The inclusion criteria was first and second year medical students enrolled at the University of Georgia campus Medical College of Georgia who volunteered at Mercy Health Center at least once throughout data collection period. The IRB was amended to allow for an expanded sample of medical students. Second year medical student clinic managers and pharmacy students assisted in survey distribution. Pharmacy students also promoted the survey at clinics and had both computer and paper copies of the survey available for medical students to complete. Prior to beginning the survey, participants were provided a consent letter and were required to give informed consent in order to continue on to the survey. All data was anonymously collected between December 2014 to May 2016. Results were analyzed and compared to findings from the previous year.

Results: Over the course of two years, 50 medical students completed the survey. Twenty students completed the survey the first year, while 30 completed it the second year. Only 5 students participated in the survey both years. The percentage of students who either agreed or strongly agreed that working with a pharmacy student enhanced their education increased from 68 percent to 84 percent over the two years. 93 percent of students the first year and 82 percent the second year agreed or strongly agreed that health outcomes for the patient were improved by having a team filled with people of multiple disciplines. 75 percent of students the first year and 92 percent the second year agreed or strongly agreed that people within the healthcare profession should be educated in how to establish collaborative relationships with members from other disciplines. 75 percent of students the first year and 93 percent the second year agreed or strongly agreed that physicians and pharmacists should collaborate in teams.

Conclusion: The majority of the medical students who volunteered at Mercy Health Center and had the opportunity to work in a collaborative healthcare team believed that it was beneficial. They felt that it improved their own education as well as improved overall patient outcomes. Perceptions of interprofessional teams improved over the course of two years of survey distribution. Our data suggests that medical students desire to collaborate with pharmacy students in the free clinic setting. Future directions include further evaluation of the interprofessional program and the impact on patient outcomes.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 3-092

Poster Title: Incidence of acute kidney injury with concomitant vancomycin and piperacillin/tazobactam use in pediatric patients

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Purpose: Vancomycin and piperacillin/tazobactam are two antibiotics that are commonly used due to a broad spectrum of activity when used together. However, both medications are independently associated with nephrotoxicity. There are reports demonstrating increased rates of acute kidney injury (AKI) in adults receiving both medications, there are few reports exploring this topic in pediatric patients. The purpose is to assess the incidence of AKI in pediatric patients who receive concomitant vancomycin and piperacillin/tazobactam therapy, and to examine four different criteria to determine a correlation to AKI: dose of vancomycin, dose of piperacillin/tazobactam, receiving other potentially nephrotoxic drugs, and duration of therapy.

Methods: This retrospective study received data from patients admitted to Children's Hospital of Georgia from January 1, 2014 to September 15, 2016. Patients from birth to 18 years of age were included if they received vancomycin and piperacillin/tazobactam simultaneously. Patients were excluded if they demonstrated baseline renal insufficiency (defined as an increase in serum creatinine by at least 50 percent, an absolute increase in serum creatinine by at least 0.3 mg/dL, or a baseline creatinine clearance of less than 60 mL/min), have documented renal injury or disease, or are receiving dialysis. Data collected from the electronic medical record included a medical record number, floor, date of birth, age, sex, weight, height, race, indication of therapy, and duration of antibiotic therapy. Baseline serum creatinine (SCr), BUN, and creatinine clearance (CrCl) were recorded and documented. Serum creatinine, BUN, and urine output were collected throughout antibiotic therapy. Patients were screened for all co-morbidities. The patient's medication list was screened for any other medications that are associated with nephrotoxicity. If the patient was initiated on potentially nephrotoxic medications inpatient, the duration of therapy was recorded. Information for vancomycin and

piperacillin/tazobactam includes dose and dosing interval. Trough levels and changes in dose for vancomycin were recorded. Data was analyzed to assess the incidence of AKI and to determine if a relationship exists between dose of each medication and incidence of AKI.

Results: 25 patients from January 2014 to September 2016 met criteria. Of the 25 patients, 5 developed AKI (20%). Of the patients who were greater than 2 months of age and received vancomycin every 6 hours, 18.2% (2/11) developed AKI. Of the patients who were greater than 2 months of age who received vancomycin every 8 hours, 9.1% (1/11) developed AKI. 2 patients aged greater than 2 months who received vancomycin every 12 hours developed AKI (2/2, 100%). Four of the 25 patients did not have vancomycin troughs drawn. Four patients had trough levels above 20 mg/dL and three developed AKI (75%). Patients greater than 9 months and received piperacillin/tazobactam every 6 hours, 36.4% (4/11) developed AKI. Patients greater than 9 months and received piperacillin/tazobactam every 8 hours, 0 of the 11 patients developed AKI. The potentially nephrotoxic medications that were used in patients that developed AKI included: ceftazidime, ceftriaxone, ciprofloxacin, gentamicin, ibuprofen, pantoprazole, ranitidine, rifampin, and tobramycin. The average duration of therapy was 6 days. Of the 18 patients who received 6 or less days of therapy, 3 developed AKI (16.6%). Of the 8 patients who received greater than 6 days of therapy, 3 developed AKI (37.5%).

Conclusion: There was a correlation between patients receiving concomitant vancomycin and piperacillin/tazobactam therapy and AKI (20%). Patients who received vancomycin or piperacillin/tazobactam every 6 hours, had a vancomycin trough level greater than 20 mg/dL, received a potentially nephrotoxic drug (ceftazidime, ceftriaxone, ciprofloxacin, gentamicin, ibuprofen, pantoprazole, ranitidine, rifampin, and tobramycin), or received a higher duration of therapy had a higher percentage of AKI. If patients are to receive both medications simultaneously, vancomycin and piperacillin/tazobactam should be initiated at every 8 hours, goal vancomycin trough levels should be conservative, limit the use of potentially nephrotoxic drugs, and limit the length of therapy.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 3-093

Poster Title: Survival in critically ill adults with multidrug resistant Acinetobacter baumannii infections treated with ampicillin/sulbactam-containing versus non-ampicillin/sulbactam-containing regimens

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Purpose: Multidrug resistant (MDR) gram negative pathogens pose a serious threat in the healthcare setting. Of these, up to 74 percent of Acinetobacter baumannii infections in the intensive care unit (ICU) are MDR. The optimal antibacterial regimen for MDR A. baumannii is unknown. The efficacy of β-lactamase inhibitors is currently being evaluated, with sulbactam having the greatest intrinsic activity against A. baumannii. To our knowledge, no data is available evaluating ampicillin/sulbactam (AMP/SLB)-containing regimens for the treatment of MDR A. baumanii. The purpose of this study was to compare survival in critically ill patients receiving (AMP/SLB)-based therapy with those who are not.

Methods: The institutional review board approved this single-center retrospective observational cohort study evaluating survival outcomes in patients who received AMP/SLB-based therapy versus patients who did not. All adults 18 years of age or older admitted to the ICU with positive respiratory, blood, or wound cultures within 48 hours of their hospital stay for MDR A. baumannii from January 1, 2012 through July 31, 2016, were included. Patients were excluded if pregnant, had an anaphylactic reaction to penicillin, or a positive urine culture with A. baumannii. MDR A. baumannii was defined as being resistant to at least two classes of antibiotics on an automated susceptibility report. Data collected included antibiotic use in the past three months, hospitalizations or surgeries within the past 12 months, long-term care facility stay within the past 12 months, and the duration of mechanical ventilation, if applicable. The data that was collected was analyzed using descriptive statistics.

Results: Eighteen patients were included in this study. Sixty percent were male with a mean age of 56.8 plus or minus 20.1 years, who were on either AMP/SLB based therapy (22 percent) or a non-AMP/SLB based therapy (78 percent). The mortality rate between the arms was not clinically different. The AMP/SLB arm had two out of four patients die (50 percent) and the non-AMP/SLB arm had six of fourteen patients die (43 percent). Analysis showed that patients with bloodstream infections had a higher mortality than patients with respiratory tract infections. Of patients with bloodstream infections, 63 percent (5/8) died while 33 percent (3/9) of patients with respiratory tract infections died. Patients treated with AMP/SLB based regimens had a decreased length of ICU stay compared to those treated with a non-AMP/SLB based regimen, 7 days to 15 days, respectively.

Conclusion: Based on our data no difference in mortality rate was observed in patients treated with an AMP/SLB based regimen compared to a non-AMP/SLB based regimen. However, length of stay is shorter amongst patients in the AMP/SLB arm. AMP/SLB may represent a better option for patients infected with A. baumanii.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-094

Poster Title: Evaluation of therapeutic duplication for inpatients prescribed as needed antihypertensive medications at an academic medical center

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Purpose: In efforts to provide highest-quality patient care, healthcare professionals must collaboratively ensure that medication orders are clear and accurate. Pharmacists, in particular, play a critical role in reviewing the appropriateness of all medication orders. Therapeutic duplication is a component of this review and is defined by this institution as the presence or use of multiple medications for the same indication without clarification or a specified sequence of administration. The primary objective of this study was to assess the occurrence of therapeutic duplication for antihypertensive medication orders with as needed frequency.

Methods: A retrospective chart review was conducted for a random sample of patients admitted to this academic medical center between January 1, 2016 and June 30, 2016 who were prescribed two or more as needed antihypertensive medications during a single admission. These medications included clonidine, hydralazine and labetalol. Data collection included patient location and medical service, name and dosage of the medication ordered, start and stop time of each medication order, route of administration and presence of order comments indicating parameters and/or sequence for use. Descriptive statistics were used to analyze the data. This project was part of the institution's Medication Use Evaluation and Improvement Program, which has been reviewed by the Institutional Review Board and determined not to be human subject research.

Results: 155 patient encounters associated with 329 medication orders were evaluated for therapeutic duplication. Two active orders for as needed antihypertensive medications were noted in 91 percent of these patient encounters, three active orders were noted in 5.8 percent of these patient encounters and four active orders were noted in 3.2 percent of these patient encounters. Review of the 329 medication orders revealed that 94.5 percent of orders included

a comment defining blood pressure parameters for use and/or clarifying the sequence for administration. 5.5 percent of orders did not contain a comment or clarification. Of the 311 orders with comments, 82 percent of orders included the antihypertensive parameters for use only, while 18 percent of orders defined both blood pressure parameters for use and the sequence for administration. Overall, 83 percent of orders did not contain a comment or did not define both the parameters and sequence and, therefore, were considered duplicate therapy. Therapeutic duplication was most commonly noted in patients admitted to intensive care units, and intravenous hydralazine and labetalol were the most common agents prescribed.

Conclusion: Because therapeutic duplication may result in misinterpretation and increase the risk of adverse drug events, it is the responsibility of the prescriber to include pertinent information at the time of order entry and the obligation of pharmacists to seek clarification. The results of this medication use evaluation indicate a need for policy and protocol development related to therapeutic duplication, computerized prescriber order entry modification and staff education.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 3-095

Poster Title: Retrospective evaluation of prescribing patterns of analgesia and sedative medications in critically ill adults during targeted temperature management after non-traumatic cardiac arrest

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Purpose: Targeted temperature management (TTM) is used to help prevent neurological damage in patients who have suffered from non-traumatic cardiac arrest. Patients must be in a comatose state to be eligible for this treatment modality. It is uncertain of the role of analgesic and sedative medications due to the neurologic deficit at the time of cooling. The purpose of this study is to examine the prescribing patterns of analgesic and sedative medications in patients receiving TTM.

Methods: This is a single-center retrospective observational cohort study conducted at a 450-bed community teaching hospital. It was approved by the institutional review board with waived consent. All patients at least 18 years old admitted to the medical, surgical, or cardiac intensive care units (ICU) and received TTM between October 1, 2015 and July 31, 2016 were eligible for inclusion. Patients were excluded if they received TTM not due to non-traumatic cardiac arrest or if they did not receive any sedative agent. Demographic data and baseline laboratory values were manually extracted from the electronic medical record. The type and quantity of analgesic and sedative medications was reviewed in the medication administration record (MAR). The primary outcome is to describe the prescribing patterns of analgesia and sedative medications in critically ill adults during TTM.

Results: Nineteen patients were eligible for inclusion, but 5 were excluded from our study. Two patients underwent TTM for other reasons besides non-traumatic cardiac arrest, and three out of the 17 patients did not receive a sedative during TTM. Of the 14 patients that were included in this study, 6 (43 percent) received analgesia during the TTM via continuous fentanyl infusion.

Also, 5 (36-percent) of the patients received analgesia for the entire 24-hour protocol. The 24-hour fentanyl exposure ranged from 708mcg to 5787mcg.For the choice of sedative, 2 (14-percent) of the patients received midazolam, and 12 (86-percent) received propofol. Thirteen (93-percent) patients received the sedative agent for the entire 24-hour protocol. The doses for patients receiving midazolam ranged from 93.7 to 198.2mg. The doses for patients receiving propofol ranged from 463mg to 5309mg. A total of 9 (64-percent) patients died while in the hospital.

Conclusion: There is variability in prescribing of both analgesic and sedative medications in adult patients receiving TTM. The need for and selection of these agents may impact patient outcomes and/or complications associated with TTM. Further studies are warranted to assess safety and efficacy of these agents.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 3-096

Poster Title: Pharmacy interns' perceptions of Spanish-speaking patients

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Purpose: The Hispanic population of the United States is the nation's largest ethnic minority. The U.S. Department of Health and Human Services has published guidelines to promote equal access to health care for diverse populations. According to these standards, culture and language have a significant impact on how patients access and respond to health care services. This project conducted at the University of Georgia College of Pharmacy (UGA COP) was designed to provide insight into pharmacy interns' perceptions of Spanish-speaking patients.

Methods: The institutional review board at the University of Georgia approved this survey-based study. During a 4-week data collection period in August 2016, a questionnaire was emailed to all pharmacy interns at the UGA COP through college listservs, with three reminder emails sent requesting participation. The survey was divided into 4 sections: demographics of pharmacy students, language assistance services available at pharmacy interns' pharmacies, attitudes of interns towards counseling Spanish-speaking patients, and cultural sensitivity of pharmacy interns. Descriptive statistics were utilized to analyze study results.

Results: Of 567 interns emailed, 73 completed surveys were returned. Of the respondents, 85.7 percent considered language services effective if they had the service available in their pharmacy. The majority, 62.5 percent, also agreed (somewhat agreed to strongly agreed) that non-Spanish speaking pharmacy interns have a responsibility to counsel those who only speak Spanish. In addition, 80.3 percent agreed (somewhat agreed to strongly agreed) that pharmacy interns have a responsibility to interact and learn the culture/language of their patients. However, 64.3 percent disagreed (somewhat or strongly) or were neutral when asked whether the college's instructional strategies sufficiently prepared students to interact with Spanish-speaking patients.

Conclusion: Study results indicated the majority of pharmacy interns at the UGA COP perceive cultural sensitivity toward Spanish-speaking patients as an important component of successful pharmacy practice. In this survey, most pharmacy interns agreed they have a responsibility to learn about different patient cultures and to counsel Spanish-speaking patients. Overall, they felt language assistance services were effective; however, they did not believe sufficient education in cultural sensitivity was provided during pharmacy school. Efforts to encourage cultural sensitivity and education should continue to be made to ensure equal access to pharmacy services for Spanish-speaking patients.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 3-097

Poster Title: Utilization of dalbavancin through a pharmacist-directed pilot project aiming to reduce length of stay at a community hospital.

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Purpose: With the increasing incidence of serious gram-positive bacterial infections and decreased susceptibility, patients are requiring extended hospital stays due to need for parenteral administration of antimicrobials. Dalbavancin is an intravenous (IV) lipoglycopeptide antibiotic that has activity against gram-positive pathogens, including methicillin-resistant Staphylococcus aureus, in acute bacterial skin and skin structure infections (ABSSSI). With an extended half-life of 14.4 days, one administration in an outpatient infusion center provides a full treatment course of antimicrobial activity. Through a pharmacist-directed pilot project at our institution, dalbavancin is recommended in appropriate patients to effectively treat the infection and reduce hospital length of stay (LOS).

Methods: This study is a retrospective chart review to assess the use of dalbavancin between March and September of 2016 at a community hospital. The antimicrobial stewardship program pharmacist provided a list of adult patients who were admitted to the hospital and completed dalbavancin therapy at the outpatient infusion center. All patients included in the study received dalbavancin 1500mg once in an outpatient infusion center affiliated with the hospital. Patients were excluded if they were not previously admitted to the hospital before administration of dalbavancin. Data was collected from the computerized patient record system and included: age, gender, weight, race, IV drug use, LOS, type of infection, outpatient antibiotics, systemic signs of infection upon admission, incision and drainage, microbiology, inpatient antibiotics, and 30-day readmission. The primary outcome of the study is LOS. LOS will be measured from the time of admission for patients admitted for treatment of ABSSSI until discharge. Secondary outcomes include severity of illness upon admission and 30-day readmission, both infectious and non-infectious. Severity of illness is based on presence of

systemic signs of infection upon admission including temperature greater than or equal to 38°C, white blood cells (WBC) greater than 12,000 cells/mm3, and immature WBC forms greater than or equal to 10%.

Results: Out of 28 total patients screened, 1 was excluded for not being admitted to the hospital prior to dalbavancin administration. Infections treated include diabetic foot infection, cellulitis, abscess, osteomyelitis, bacteremia, and infected venous access port. 15 of the 27 patients previously failed outpatient antimicrobials prior to admission to the hospital. Three of the patients were IV drug users that were not appropriate candidates for scheduled outpatient IV antibiotics or central line administration. Dalbavancin, due to the one-time administration, could be given to this patient population safely. All of the patients that were assessed in this study received vancomycin alone or in combination throughout their hospital stay. LOS in the hospital ranged from 2 to 40 days with an average of 6.4 days. The average LOS was 5.1 days for cellulitis and/or abscess and 8.0 days for bacteremia. Based on CDC national average hospital LOS from 2010, LOS for cellulitis and/or abscess is 4.4 days, while the bacteremia LOS is 8.8 days. Systemic signs of infection were present in 14 patients. Of the 27 patients reviewed, there was a one patient with an infection-related readmission within 30 days.

Conclusion: This retrospective study demonstrated dalbavancin is effective for treatment in a variety of infections. Limitations of the study include small sample size that may reduce generalizability. This study suggests gram-positive bacterial infections can be treated with dalbavancin in an outpatient infusion center with low risk of 30-day readmission. While the LOS is longer than the national average, the baseline of this clinical site is unknown and may have been reduced with dalbavancin utilization. A screening protocol would be beneficial to identify appropriate patients for dalbavancin early in their hospitalization to make a larger impact on LOS reduction.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 3-098

Poster Title: The Impact of Pharmacy student involvement on diabetes care in the hospital setting

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Purpose: Performance measures for pharmacy students while on rotations are key to both the school and the institutions in which they work. Together both gain a sense of how students utilize their knowledge while patients benefit from clinical, yet supervised care. In particular, proper inpatient medication therapy and education to strengthen patient compliance upon discharge are essential components of hospital patient care. This poster is meant to display some of the clinical impact that advanced pharmacy practice students have in regards to diabetes care and education in a Joint Commission Disease State Specialty accredited high-ranking hospital.

Methods: IRB approval was obtained. The hospital diabetes care team documents activities regarding diabetes education, management, and follow-up were documented using a Microsoft Access system located on a secure network drive. Data for a xxxx month time period was exported into an excel spreadsheet. Patient data was previously de-identified to follow HIPAA protocol as well keep anonymity of which students made which type of interventions. The student data was extracted from and compared to a larger data base of the diabetes care team interventions. The data presented describes contributions by on their fourth year doctor of pharmacy students in recommending changes in initiation and management of drug therapy, monitoring/assessment of diabetes control using evidence-based guidelines and hospital formularies. Students also counseled and educated patients with diabetes mellitus including pathophysiology, risk factors, home monitoring of blood glucose, management of hyper- and hypoglycemia, lifestyle modifications, and even basic nutrition with certified diabetes educators. Students also counseled patients on insulin use as well as oral medication therapy and identified barriers to accessing medication and supplies.

Results: 2395 patient interactions were documented by students in which various interventions were made. Of those interactions recommendations regarding changes in therapy as well as educational services were documented. A majority of the recommendations were accepted and enacted by physicians, nurses and patients. Preceptors also approved a majority of the student recommendations and co-signed on documentation. The bulk of student interventions involved (patient follow-ups with their primary care physicians, diabetes education and monitoring, assessing compliance, and clarifying home medication regimens. Other interventions included oral and insulin therapy along with associated education, medication clarification, and hypoglycemia evaluation and education.

Conclusion: Pharmacy school students can have a significant impact on the healthcare team in a hospital setting and future endeavors regarding disease education, management, and treatment can be implemented using fourth year pharmacy students to better improve patient care (and reduce errors?) for hospitals. Engaging students in this role of diabetes management also showed the benefits of coordination amongst multiple healthcare disciplines including but not limited to physicians, nurses, medical students and residents, and social work. This can open the door for wider involvement in patient care for pharmacists in other chronic health conditions which can reduce workload for healthcare providers.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 3-099

Poster Title: Evaluation of a nurse-driven electrolyte replacement protocol in the adult intensive care unit at an academic medical center

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Purpose: Electrolyte deficiencies in critically ill patients can have fatal consequences, including respiratory and cardiovascular decline. Historically, ICU electrolyte replacement at Augusta University Medical Center was physician-driven; however, electrolyte management by nurses may allow physicians to focus on higher priority medical issues. A nurse-driven, ICU electrolyte replacement protocol was implemented to provide nurses with the autonomy to order laboratory values and replace electrolytes in critically ill, adult patients. The goal associated with protocol implementation was to more appropriately manage electrolytes through standardized and timely replacement. The purpose of this study is to evaluate the efficacy of a nurse-driven, electrolyte replacement protocol.

Methods: The institutional review board approved this retrospective chart review of electrolyte replacement for potassium, magnesium, phosphorus, and calcium in adult patients admitted to the medical intensive care unit at AUMC. Patients for the pre-protocol group were included in the analysis if they met the current electrolyte protocol's usage requirements (serum creatinine less than 2 mg/dL, urinary output greater than 30 mL/hr, weight greater than 50 kg, not requiring renal replacement therapy, not admitted for a diagnosis of diabetic ketoacidosis, and not undergoing targeted temperature management) and demonstrated low electrolyte concentrations constituting physician-driven electrolyte replacement from January to March 2015. Patients were included in the post-protocol analysis if they were placed on the nurse-driven, electrolyte replacement protocol from April to August 2016. Time to administration, frequency of monitoring after replacement, and ability to adequately increase serum electrolyte levels to normal values were assessed in both pre-protocol and post-protocol

patients. Nursing adherence to the protocol was based upon time to electrolyte order placement and repletion, appropriate dosage form and amount replaced, and appropriate reassessment after replacement (within four hours after completion of electrolyte administration).

Results: Twelve patients in each arm were included in the retrospective chart review and displayed similarities in age, gender, race, weight, and renal function. On average, 36 percent of electrolytes were adequately replaced to therapeutic levels in pre-protocol patients compared to 31 percent in post-protocol patients. The average time to placement of an electrolyte order following an initial low electrolyte level was 173 minutes post-protocol compared to 159 minutes pre-protocol. The time from an initial low electrolyte laboratory value to administration of electrolyte repletion was shorter post-protocol by 30 percent (105 minutes) for potassium replacement, 31.5 percent (97 minutes) for magnesium replacement, and 7 percent (13 minutes) for calcium replacement compared to pre-protocol, however administration of phosphorous replacement was longer in post-protocol patients by 32.5 percent (132 minutes). Appropriate monitoring, which was defined as obtaining another laboratory value within four hours from the completion of electrolyte administration, occurred more frequently in the post-protocol group (35 percent) than in the pre-protocol group (13 percent). In the post-protocol arm, nurses appropriately followed the protocol in 77 percent of patients, with regards to the need for replacement, amount replaced, and dosage form used.

Conclusion: The results of this study demonstrated an improvement with the use of the electrolyte replacement protocol in regards to time to administration for all electrolytes, except phosphorus. Time to placement of electrolyte orders was longer post-protocol and the frequency of appropriate monitoring was still low, indicating a need for re-education of the protocol requirements. The results of this study also illustrate a higher percentage of adequate electrolyte repletion to therapeutic levels prior to the implementation of a nurse-driven protocol, suggesting the need for a more aggressive protocol.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 3-100

Poster Title: Retrospective evaluation comparing balanced crystalloid with 0.9% sodium chloride when used as maintenance therapy in critically ill adults

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Purpose: Hemodynamic management is a vital component in managing critically ill patients. Fluid resuscitation is used to correct baseline volume deficits. Balanced crystalloids (BC) and 0.9-percent sodium chloride (NS) have been compared to determine the optimal fluid for resuscitation. Complications associated with NS include hyperchloremia and acute kidney injury (AKI), whereas BC may cause hyperkalemia. Following resuscitation, maintenance intravenous fluids (mIVF) are commonly administered to sustain intravascular volume. The optimal fluid choice for maintenance infusion has not been evaluated. The purpose of this study is to compare outcomes of critically ill adults that received NS-based mIVF with those that received BC.

Methods: This is a single-center retrospective cohort study conducted at a large community teaching hospital and approved by the institutional review board. All patients over 17 years old admitted to the medical intensive care unit (ICU) between October 1, 2015 and July 30, 2016 were eligible for inclusion. Patients were excluded if transferred from another hospital, ICU stay less than 72 hours, or had past medical history significant for end stage renal disease. Patients were divided into two groups based on type of mIVF received: NS and BC. We defined BC as lactated ringers and PlasmaLyte. Demographic data, laboratory results, type and quantity of resuscitation fluid, and type and duration of mIVF were collected. Resuscitation fluid was defined as any fluid received in the initial 24 hours or infused at a rate greater than 250mL/hr. Maintenance fluid was defined as fluid infused at a rate less than or equal to 250mL/hr. The primary outcome of the study was the incidence of AKI, defined as an increase in serum creatinine by at least 0.3mg/dL within 48 hours. Secondary outcomes included the incidence of hyperchloremia, defined as serum chloride grater than 110mEq/L, and hyperkalemia, defined as

serum potassium greater than 6.5mEq/L, need for dialysis, hospital length of stay, and in-hospital mortality.

Results: Eighteen patients were included in the analysis (BC including 7; NS including 11). Within the BC group, six patients received lactated ringers and one patient received PlasmaLyte. Patients were similar at baseline, with a Sequential Organ Failure Assessment score of 3.5 in the BC group and 4.2 in the NS group. Past medical history was comparable except diabetes, with 0 patients in the BC group and 36-percent in the NS group. The incidence of AKI was similar between BC and NS, 57-percent and 55-percent respectively. A greater number of patients required dialysis in the NS group (27-percent versus 0-percent). Hyperkalemia was more frequent in the NS group (18-percent) compared with BC (0-percent). There was no difference in the incidence of hyperchloremia between BC and NS, 57-percent versus 55-percent, respectively. Length of stay was longer in the BC group with an average ICU length of stay of 13.43 days versus 7.91 in the NS group. These were also the results when looking at hospital length of stay. Conversely, administration of NS led to a higher rate of in-hospital mortality (73-percent versus 57-percent).

Conclusion: The choice of fluid when used as maintenance therapy did not impact the incidence of AKI. Patients treated with NS had a higher rate of hyperkalemia and in-hospital mortality when compared to BC. Use of BC was associated with a longer ICU/hospital length of stay. Practitioners should take this into consideration, as well as patient specific factors, when deciding which mIVF to prescribe in critically ill adults.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Evaluative Study

Session-Board Number: 3-101

Poster Title: Resistance of Escherichia coli urinary isolates in emergency department-treated patients with healthcare-associated risk factors.

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Purpose: Urinary tract infections are a common condition treated in the Emergency Department (ED). While most cases are community-acquired infections, a portion of patients presenting from the community may carry/possess risk factors for healthcare-associated infections that increase chances of isolating a drug resistant pathogen. Escherichia coli (E.coli) is the most common pathogen for all UTI types, but there may be a greater chance of drug resistant E.coli in healthcare-associated (HA-UTI) patients that may not be accurately represented by the cumulative hospital antibiogram. Our study evaluated the rates of E.coli resistance to commonly prescribed oral antibiotics in ED-treated patients with HA-UTI.

Methods: A retrospective medical record review of culture-positive patients treated in the ED of a 200-bed community hospital from January 1, 2015 to June 14, 2015 was performed. Patients with urinary isolates of greater than 100,000 cfu/ml and at least one healthcare-associated risk factor who were treated for UTI in the ED were included. The following healthcare-associated risk factors were used: residence in long term care facility or nursing home, indwelling urinary catheter, immunosuppressive therapy or disease, hospital admission for 2 or more days in the previous 90 days, urologic procedure in the previous 90 days, and chronic dialysis in the previous 30 days. Other potential risk factors for drug resistance such as recent antibiotic therapy and history of previous or recurrent UTI were also collected. Patients who required admission, were pregnant, less than 18 years of age, or who had asymptomatic bacteriuria, no intention to treat by physician, or cultures with less than 100,000 cfu/ml were excluded. For patients who returned to the ED within 7 days of the initial visit with the same

pathogen, only the first encounter was included. Causative bacteria, drug susceptibilities, and antimicrobial therapies were recorded for evaluation. E.coli resistance rates in the subgroup of ED patients with HA-UTIs were compared to the cumulative hospital antibiogram and also to data from a previous study performed at the same institution in 2011.

Results: Of the 385 patients screened, 46 patients were included. The most common risk factors resulting in healthcare-associated designation were indwelling catheter (45.6 percent), long-term care facility/nursing home residence (39.1 percent), and hospital admission for more than 2 days in the last 90 days (39.1 percent). Almost half of the HA-patients received antibiotic therapy in the last three months (47.8 percent) and/or had at least one previous hospitalization in the last 6 months (28.3 percent). The most common causative pathogens included: E.coli, Klebsiella species, and Proteus mirabilis. Nine patients isolated two separate pathogens. Frequently prescribed empiric antibiotic therapies were: cephalexin (32.6 percent), nitrofurantoin (30.4 percent), levofloxacin (23.9 percent), ciprofloxacin (13 percent), and sulfamethoxazole/trimethoprim (10.9 percent). E.coli resistance rates were 48 percent for levofloxacin and ciprofloxacin, 40 percent for SMX/TMP, 20 percent for cephalexin, and 16 percent for nitrofurantoin. Compared to E.coli resistance rates to levofloxacin reported on the hospital antibiogram, HA-UTI patients had much higher fluoroquinolone resistance (27 vs 48 percent, respectively) and also were higher than those seen in a similar 2011 study of HA-UTI patients at the same institution (38.5 percent in 2011 vs 48 percent). Empiric therapy was effective for the causative pathogen in 67.4 percent of cases.

Conclusion: ED-treated patients with healthcare-associated UTIs were found to have higher rates of resistance to levofloxacin than those reported on the cumulative hospital antibiogram and when compared to a previous study of HA-UTI patients in 2011. Interestingly, fluoroquinolones were not the most commonly prescribed oral therapies by our ED physicians in this patient population. This is a prescribing pattern that changed from the institution's previous 2011 study. Identification of HA risk factors in ED-treated patients is important when choosing empiric antibiotic therapy and further study is needed to determine the best antibiotic therapy options for ED-treated patients with HA-UTI.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-102

Poster Title: Evaluation of antithrombin III utilization and dosing strategy in pediatric population at an academic medical center

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Purpose: Thrombate III is commonly used to replace antithrombin (AT) in patients with a hereditary deficiency. Thrombate III is also administrated to patients with iatrogenic deficiency to decrease the risk of coagulation by increasing the level of antithrombin. Even though antithrombin III replacement using Thrombate III in pediatric patients has not been widely studied, it is commonly used off-label in various pediatric clinical settings. The purpose of this study is to evaluate the use and dosing strategy of Thrombate III in the pediatric population at an academic medical center.

Methods: A retrospective chart review was performed on a sample of 26 patients who received at least one dose of Thrombate III (T3) while in the Children's Hospital of Georgia from September 2015 to September 2016. Data collection included patient demographics (age, gender, weight, and location), indication for T3 use, dose of T3, concurrent heparin use and dose, lab values while receiving T3 (AT levels, aPTT, HepXa, ACT, and platelet counts), duration of therapy to achieve AT level within target range, and presentation of adverse events due to T3 and/or heparin administration. This project is part of the health system medication use evaluation and improvement program, which is considered "not human subjects research" by the institutional review board.

Results: Of the 26 patients reviewed, 16 patients (61.5 percent) were in neonatal intensive care unit (NICU) and 10 patients (38.5 percent) were in pediatric intensive care unit (PICU). All NICU patients received T3 for extracorporeal membrane oxygenation (ECMO), 14 patients (87.5 percent) received a standard dose of 125-units/kilogram. Average time to AT trough above 80 percent: 21.6 hours on standard dose, 15.8 hours on lower doses (108 and 114-units/kilogram). All patients received a continuous heparin infusion. Ten patients (62.5 percent) developed clots,

5 (50 percent) required an ECMO circuit change. ECMO was the most common indication for AT administration in PICU (7 patients; 70 percent). Four patients received 125-units/kilogram standard dose, target trough in 21 hours. Three patients received doses ranging 31 to 104.2-units/kilogram, target tough in 56 hours. One PICU patient (10 percent) received T3 for continuous veno-venous hemofiltration at single dose of 53.1-units/kilogram; time to target trough undeterminable. Two PICU patients (20 percent) received T3 for low levels. One patient received 125-units/kilogram, target trough in 4 hours. The other patient received 50-units/kilogram, target trough in 56 hours. All patients received continuous heparin infusion. Six patients (60 percent) developed clots; 1 (16.7 percent) required an ECMO circuit change.

Conclusion: Results suggest the T3 dose in the NICU needs further evaluation in achieving target trough in a timely manner, while the standard dose of 125-units/kilogram may be sufficient in the PICU.

Submission Category: Leadership

Submission Type: Evaluative Study

Session-Board Number: 3-103

Poster Title: Limitations to leading: Student pharmacists' perceptions of leadership opportunities during the third professional year in a 2+2 program

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Purpose: The Accreditation Council for Pharmaceutical Education (ACPE) Standards emphasize personal and professional development for student pharmacists. Colleges of pharmacy are becoming more invested in assessing student leadership potential and involvement. In addition, many colleges of pharmacy now have satellite campuses, adding additional advantages and challenges for student leadership development. The purpose of this study was to identify limiting factors for student pharmacists in the participation of leadership opportunities during the third professional (P3) year at a college of pharmacy with a 2+2 program.

Methods: This study utilized a research protocol and instrument previously approved by the University of Georgia (UGA) Institutional Review Board. This project was a supplement to the original study and was determined to be exempt from full review. Data collection occurred during a one-week period in September 2016. The Qualtrics survey was initially emailed to the UGA College of Pharmacy Class of 2017 (n=144) via the class listserv with two reminders requesting participation. Leadership opportunities were defined at the beginning of the survey. Students were asked to reflect back to leadership opportunities available during their P3 year.

Results: A total of 21 students completed the survey. Only two out of four campuses were represented with one being the main campus. The majority of respondents (86%) planned to pursue leadership opportunities during their P3 year. Respondents were asked to identify limitations to participating in leadership opportunities, selecting all limitations that applied. The limitations identified included school responsibilities (81%), work responsibilities (62%), perceptions of their own leadership abilities (57%), hobbies (33%), relationships (29%), campus

location (24%), and family responsibilities (14%). Two respondents did not identify limitations to participation (9%). When asked to rank the identified limitations from most to least limiting, 38% of respondents selected school responsibilities, 15% selected hobbies, and 15% selected campus location as the most limiting factor.

Conclusion: This study identified multiple limitations to student participation in leadership opportunities during the P3 year. While some factors were personal, other barriers identified may be minimized by college initiatives. For example, for the students who identified perceptions of their own leadership abilities as a limitation, the College could offer leadership development programming to increase students' confidence in their abilities. Campus location was also noted as a limitation. The College continues to examine equality of personal and professional development opportunities among all campuses. However, input is needed from all four campuses to adequately address student needs.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 3-104

Poster Title: Does dysregulated ferritin have sustained adverse effects on morbidity and mortality in adults infected with human immunodeficiency virus (HIV) taking highly active antiretroviral therapy (HAART)?

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Purpose: Identifying modifiable risk factors to better manage HIV as a chronic condition has become critical. The purpose of this study was to assess associations between normal versus dysregulated baseline ferritin levels and changes in five clinical outcomes (immunological status, quality of life [QOL], body mass index [BMI], hospitalization, and mortality) over 18 months in HIV-infected adults on HAART. Iron dysregulation can be corrected through various methods, including iron supplementation, reduction, or chelation therapies. If iron dysregulation adversely affects health outcomes in this population, pharmacists may be able to monitor ferritin levels and correct dysregulated ferritin.

Methods: This 18 month longitudinal study, conducted in Uganda, was approved by the institutional review boards of Harvard School of Public Health and Makerere University School of Public Health. Informed consent was obtained from all participants. Clinical, socio-demographic, and behavioral characteristics were taken from 398 HIV-infected adults on HAART. Participants were divided into three groups by serum ferritin level measured at enrollment. Low ferritin was defined as less than 30 micrograms per liter. High ferritin was defined as greater than 150 micrograms per liter for women and 200 micrograms per liter for men. Those not meeting the definition for low ferritin or high ferritin were considered to have normal ferritin levels. Immunologic status (measured using CD4 cell counts), QOL, and BMI were measured every six months. Time to first hospitalization and death events were calculated as months from enrollment. For non-hospitalized participants, follow-up was calculated as

months from enrollment to last study visit. Multivariable random effects linear mixed regression models quantified the associations between ferritin status and changes in CD4 cell count, BMI, and QOL. Risk differences and 95 percent confidence intervals in mean CD4 cell counts, BMI, and QOL by ferritin status at enrollment were calculated at baseline and every six months. Hazard ratios were calculated for dysregulated ferritin versus normal ferritin groups using Cox regression to reflect differences in time to hospitalization or death.

Results: The study population was 69.1 percent female and the mean age was 35.8 years. Fifty percent of the participants were HAART-naïve at enrollment. Of the 398 participants, ferritin was low, normal, and high in 17 percent, 42.5 percent, and 40.5 percent respectively. The three groups differed by sex (P less than 0.0001), mean age (P less than 0.0001), and mean BMI (P equals 0.0009). There was no difference in mean QOL score or CD4 cell count. Independent of baseline ferritin level, QOL, CD4 cell count, and BMI improved for all participants over 18 months (P less than 0.0001). Baseline ferritin levels predicted changes in QOL (P equals 0.0112) and weight gain (P equals 0.0432) but not CD4 cell count (P equals 0.7720). Both high ferritin levels (adjusted hazard ratio [AHR] equals 1.78; 95 percent confidence interval [CI]: 1.00 to 3.15) and low ferritin levels (AHR equals 1.98; 95 percent CI: 1.01 to 3.86) were associated with increased hospitalization or mortality compared to normal ferritin levels.

Conclusion: Dysregulated ferritin level, both elevated and low, at enrollment predicted greater risk of hospitalization or mortality and lower QOL over 18 months in HIV-infected adults. Weight gain over follow-up was also dependent on baseline ferritin level, but the clinical relevance of this association warrants further elucidation. Our results suggest that clinicians, including pharmacists, should routinely monitor ferritin in HIV-infected patients and correct dysregulated levels. These actions could be useful in avoiding adverse long-term health outcomes in this population.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Evaluative Study

Session-Board Number: 3-105

Poster Title: Resistance of Escherichia coli urinary isolates in patients with community-acquired urinary tract infections treated in the emergency department of a community hospital

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Purpose: Urinary Tract Infections (UTIs) are commonly treated in the Emergency Department (ED) and are frequently caused by Escherichia coli (E.coli). Fluoroquinolones are often prescribed for outpatient UTI treatment, but E.coli resistance is increasing. Our hospital antibiogram reported high E.coli resistance to these agents but is cumulative of a diverse patient population. This study was performed to determine resistance of E.coli urinary isolates to commonly prescribed oral antibiotic therapies in ED-treated patients with community-acquired UTIs (CA-UTI). Additionally, we compared resistance rates of the CA-UTI population to those of a prior study performed in 2011 of ED-treated CA-UTI patients.

Methods: A retrospective medical record review of culture-positive patients treated for urinary tract infections in the emergency department of a 200-bed community hospital from January 1, 2015 to June 14, 2015 was performed. Adult patients with urinary isolates of >100,000 cfu/ml with documented intention to treat were included. Patients who were hospitalized, pregnant, under 18 years of age, with < 100,000 cfu/ml on urine culture, or who did not have documented intention to treat were excluded. For patients who returned to the ED within 7 days of the initial visit, only the first encounter was included. Patients with risk factors for healthcare-associated urinary infection were assessed in a separate review. Healthcare associated risk factors included residence in long term care facility or nursing home, presence of an indwelling urinary catheter, immunosuppressive disease or therapy, hospital admission for 2 or more days in the previous 90 days, urologic procedure in the previous 90 days, and chronic dialysis in the previous 30 days. Information regarding other potential risk factors for drug resistance such as

previous recent antibiotic treatment and history of prior or recurrent UTIs was also recorded. Resistance rates were compared to both the cumulative hospital antibiogram and to data from a 2011 study of E.coli resistance in ED-treated patients at the same institution. Causative bacteria, drug susceptibilities, and antimicrobial therapy were recorded for evaluation.

Results: Of the 385 patients screened, 277 were included in our evaluation. Of the 277 patients included, 83.4 percent (n=231) of included patients were classified as community-acquired UTI (CA-UTI) and 16.6 percent (n=46) of patients had at least one risk factor for a healthcare-associated pathogen. The most common causative pathogens were E.coli (76.1 percent) and Klebsiella species (12.5 percent). Nineteen patients grew multiple pathogens, representing 6.9 percent of the evaluated population. The most commonly prescribed antibiotics were nitrofurantoin (37.7 percent), cephalexin (36.4 percent), levofloxacin (4.8 percent), and sulfamethoxazole/trimethoprim (8.7 percent). For community-acquired patients, resistance of E.coli was 15.9 percent to levofloxacin, 26.1 percent to trimethoprim-sulfamethoxazole, 5.7 percent to nitrofurantoin, and 3.4 percent to cephalexin. Causative pathogens were susceptible to empiric therapy in 88.1 percent of cases. E.coli resistance rates to levofloxacin in the community-acquired ED UTI patients were lower than those reported on the cumulative hospital antibiogram (15.9 percent vs 27 percent, ED vs antibiogram respectively). From 2011 to 2015, resistance of E.coli to levofloxacin increased in community-acquired ED UTI patients (9.2 percent vs 15.9 percent). Also, a noticeable decrease in fluoroquinolone use and an increase in cephalexin and nitrofurantoin use was seen when compared to the 2011 data set results.

Conclusion: Fluoroquinolones remain potential options for ED-treated patients with CA-UTI based on the resistance rates reported in our study. Despite exceeding the 10 percent threshold in the 2011 guidelines, E.coli resistance was lower than reported on the hospital antibiogram and comparable to other oral therapy options--though resistance to levofloxacin has increased from 9.2 percent to 15.9 percent since 2011. Recently, the FDA has recommended that fluoroquinolone use be limited when other alternatives exist due to risk of side effects and potentially overly-broad spectrum. Because of this, further study on resistance rates for other oral antibiotics for ED-treated CA-UTI patients is needed.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 3-106

Poster Title: Bedside medication reconciliation at emergency department discharge

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Purpose: Currently, medication lists are not being reviewed at bedside prior to the patient being discharged from the Emergency Department. As a result, patients leave the hospital with an inaccurate list of medications and higher risk for adverse drug events. The purpose of this study is to determine the efficacy of medication reconciliation process at a community hospital emergency department. The primary endpoint was to identify whether having physicians review the medications lists with patients at bedside will improve medication reconciliation accuracy. Secondary endpoints included number of discrepancies found, number of medication interventions, and total time physicians spent completing medication reconciliation.

Methods: This Institutional Review Board (IRB) approved study is part of Hospital National Patient Safety Goals and Joint Commission Standards. A retrospective chart review was conducted on random sample of adult patients admitted and discharged from WellStar Kennestone Hospital Emergency Department between March 1st and August 31st, 2016. Data collection included patient demographics characteristics, name of medications, dose, frequency, route of administration, number of medications discrepancies found by physicians, type of discrepancies, number of interventions resolved by physicians, and total time physicians spent completing medication reconciliation at bedside. In this study, pharmacy students audited physicians' compliance to complete medication reconciliation at bedside prior discharge. Pharmacy students used EPIC to look at patients' medication lists summary prior to and after ED physicians reconciled the list of medications with patients. Any medication discrepancies between two lists were used to identify medication reconciliation accuracy. Auditors highlighted any discrepancies found by physicians and if physicians responded with clarification. Descriptive statistics were later used to describe the results found from the study.

Results: Out of 25 discharged patients, 23 (92 percent) patients had one or more medication discrepancies identified by the ED physicians during the medication reconciliation process at bedside prior to discharge. The accuracy of the medication list prior to review by physicians was 66.8 percent; however, the accuracy of the medication lists after medication reconciliation completed by physicians was 92.4 percent. Physicians found a total of 60 medication history related errors and resolved 44 (73 percent) of medication errors before discharge. The average time physicians spent completing medication reconciliation at bedside was 4 minutes and 16 seconds.

Conclusion: Medication reconciliation is an important process during transition of care. Medication reconciliation at discharge has the potential to detect and improve medication histories and reduce risk of adverse drug events. This project has demonstrated the usefulness of having a comprehensive medication reconciliation program. By implementing the medication reconciliation process at bedside prior discharge, it gives physicians an opportunity to identify, discuss and resolve any potential medication discrepancies with the patient.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 3-107

Poster Title: Evaluation of the use of ceftazidime-avibactam at Augusta University Medical Center

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Purpose: The purpose of this evaluation is to assess the use of ceftazidime-avibactam at Augusta University Medical Center. By looking at patients treated with this antibiotic we hope to see it is being used for the appropriate indications, organisms, and to determine if the use of this antibiotic resulted in treatment success. As this antimicrobial agent is a last line agent for highly resistant organisms this evaluation would like to determine if it is being used as such.

Methods: This project is part of the institution's Medication Use Evaluation (MUE) and Improvement Program, which has been reviewed by the IRB and determined not to be human subject research. A retrospective chart review was performed on all patients who received ceftazidime-avibactam from January 1, 2015 to August 8, 2016 at Augusta University Medical Center. Collected data includes type of infection, indication, cultures if present, if infectious organisms are carbapenemase-resistant enterobacteriaceae (CRE) or multi-drug resistant (MDR) Pseudomonas aeruginosa are present, clinical improvement, readmission within 30 days, recurrence of infection, and treatment duration. 21 data points from 16 patients were analyzed for the above variables. Patient's protected health information was kept on a secure shared drive and each were given a random identification number on the data collection form.

Results: Out of the 16 total patients who received ceftazidime-avibactam 21 courses of the antibiotic were discovered and analyzed. For type of infection there were 10 incidences of pneumonia or cystic fibrosis (CF) exacerbation, 4 of intraabdominal infection, 1 urinary tract infection, and 2 miscellaneous infections which were febrile neutropenia and bacterial meningitis. It was also discovered that 5 courses were used as empiric therapy for patient who either had suspected CRE, MDR organisms, or a history of such infections. From culture data 42.9% of cultures were positive for CRE and 32.3% were positive for MDR Pseudomonas.

Clinical improvement was defined as if the patients improved enough post antimicrobial course to be discharged which was seen in 71.4% of the patients treated. Average treatment duration was 11 days. Two patients had readmission within 30 days or recurrence of infection, with the most frequent reason being CF exacerbation.

Conclusion: The data analysis determined that ceftazidime-avibactam is being used appropriately at Augusta University Medical Center. All infections with cultures were for organisms that this antibiotic would be the drug of choice for, and the empiric courses were appropriate based on patients' medical history, contraindications, or treatment failures of other agents. Due to the complicated nature of the patients treated ~30% of them passed away before completing a full course. After evaluating the use of this medication it is clear that it is being used appropriately as a last line therapy for difficult to treat organisms and not for everyday infections.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 3-108

Poster Title: Potential risk factors for dual antiplatelet-associated gastrointestinal bleeding following placement of a pipeline embolization device in patients with cerebral aneurysms

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Purpose: The pipline embolization device (PED) offers an alternative to patients with difficult to treat cerebral aneurysms who cannot undergo or have failed traditional endovascular treatments. Due to the PED's inherent risk to cause thrombotic complications, patients require a minimum of 6 months of dual antiplatelet therapy post-procedurally. The combination of aspirin with clopidogrel, ticlopidine, or prasugrel has shown to increase the risk of bleeding after PED deployment, particularly hemorrhaging of the gastrointestinal tract. The purpose of the study is to identify potential factors that contribute to an increased bleeding risk in order to reduce the incidence of gastric complications.

Methods: This retrospective, case-control study was approved by the Emory Institutional Review Board. A list of patients who underwent flow diversion with the pipeline embolization device at Emory University Hospital was used to identify eligible patients. Patients identified as having a gastrointestinal (GI) bleed comprised the case group. The control group was randomly selected from the same list of patients in a 2:1 ratio. Criteria for matching included age, gender, baseline platelet count, and baseline prothrombin time/ international normalized ratio (PT/INR). After the groups were established, data collection was preformed by chart review via Emory's electronic medical record system. Potential causative factors were identified and an odds ratio was calculated for each using an online statistics calculator application.

Results: Out of 218 total patients, 8 had a recorded GI bleed, therefore 16 patients created the control group. Using pantoprazole over famotidine as GI prophylaxis was associated with GI bleeding (odds ratio [OR] 8.25; 95% confidence interval [CI] 0.79 to 85.57; p= 0.077), as was a history of peptic ulcer disease (OR 9; 95% CI 0.75 to 107.39; p=0.082). GI bleeding was also associated with use of selective serotonin reuptake inhibitors (SSRIs), serotonin and norepinephrine reuptake inhibitors (SNRIs), or proton pump inhibitors (OR 4.3; 95% CI 0.67 to 28.12; p=0.124). Patients with subarachnoid hemorrhage were found to have an increased incidence of bleeding (OR 2.6; 95% CI 0.39 to 17.45; p=0.325). Of note, patients taking double dose antiplatelet agents were not found to have an association with bleeding (OR, 0.67; 95% CI 0.09 to 4.58; p=0.68). Lastly, near optimal or suboptimal PIPA scores for adenosine diphosphate (ADP) and arachadonic acid were associated with GI bleeding compared to those with optimal scores (OR 1.32; 95% CI 0.22 to 7.82; p=0.76; and OR 1.67; 95% CI 0.29 to 9.37; p=0.56, respectively).

Conclusion: Due to the small sample, the study was not adequately powered to find statistically significant results, however potential associations were discovered. Patients with below optimal PIPA scores, concurrent SSRIs/SNRIs, or GI prophylaxis with proton pump inhibitors were found to have an association with bleeding. A history of peptic ulcer disease or subarachnoid hemorrhage was also found to theoretically increase the risk of bleeding. It was established that the dose of antiplatelet agents did not have an effect on GI bleeding. Nevertheless, studies with a larger sample size must be completed to adequately assess these risk factors and determine their significance.

Submission Category: Small and Rural Pharmacy Practice

Submission Type: Evaluative Study

Session-Board Number: 3-109

Poster Title: Mental health follow-up appointment adherence for long-acting injectable antipsychotic continuation after discharge from a psychiatric unit at a community teaching hospital in a rural area

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Purpose: Patients with mental illness have a decreased likelihood of adherence to oral psychotropic therapies. Rates of adherence to treatment may be lower in rural communities. Long-acting injectable antipsychotics (LAIA) are intended to improve patient adherence and may be associated with shorter hospitalizations and relapses, however, benefits may not be realized if patients do not continue therapy. This study aims to identify rates of adherence to LAIA and follow-up appointments at a local mental health center post-discharge from a community teaching hospital in a rural area. Continuation of LAIA up to one year post-discharge was also evaluated.

Methods: This study is a retrospective, chart review of patients presenting at two facilities. Patients at least 18 years of age, discharged from the acute inpatient psychiatric unit at a community teaching hospital and initiated on a LAIA during hospitalization with follow-up appointments scheduled at the local county mental health center (MHC) were included in this study. Data obtained from patient charts included demographic data (age, sex, ethnicity, date of discharge, length of stay, diagnoses, insurance provider, marital status, legal status on admission, mode of arrival to psychiatric unit, living with children 18 years or younger, and employment status), the discharge medication list, 30-, 60-, and 90-day readmission status and emergency room presentation, documented nonadherence, date and time of follow-up appointments at the MHC, and adherence to appointments. Subsequent LAIA appointments and medication information for up to one year post-discharge was also obtained. The primary outcome was to examine rates of adherence to follow-up LAIA appointments by evaluating the

frequency in percent at which patients received their next scheduled LAIA dose. Factors describing patients based on LAIA adherence were characterized. Descriptive statistics were used to analyze patient demographics and the chi-square test was used to compare rates of adherence in patient subsets. This study was approved by the University and Hospital's institutional review board.

Results: Of 140 patients discharged between July and December 2014 with follow-up to the MHC, 26 patients received a LAIA during hospitalization. The average age was 41.7 years, with many patients being male, black, single, and diagnosed with psychotic disorders. This was not the first psychiatric hospitalization for approximately 75 percent of patients. Approximately 70 percent of all patients on LAIA had prior medication nonadherence documented. Forty percent of patients discharged on a LAIA received their first follow-up dose from the outpatient MHC. All patients were maintained on the same antipsychotic medication at their first appointment, and over half were maintained on the same dose. Of those continuing injections over a one-year time period post-discharge, an average of 8.7 injections were given and patients continued for an average of 8.5 months. Though patients were frequently maintained on the same medication, the dose and dosing frequency changed approximately 50 percent of the time. Over 90 percent of patients received haloperidol decanoate. Approximately 80 percent of patients were also discharged on oral medications in addition to the LAIA with an average of 1.6 oral medications. The overall average and median number of medications on discharge for all patients was 3.5 and 3, respectively.

Conclusion: Of patients discharged from a psychiatric unit at a community hospital on a LAIA with follow-up appointments at the county MHC, less than half of patients received the next LAIA dose. Of those who did continue LAIA therapy, none had their medication changed by the outpatient provider, though the dose may have been adjusted. Patients receiving the first outpatient LAI dose continued therapy for an average of 8 subsequent months over a year period. Further research should be conducted to identify barriers to adherence, including reasons for nonadherence, which may differ in rural areas, and effective strategies to target nonadherence.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-110

Poster Title: Evaluation of ertapenem use in a community hospital

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Purpose: The Infectious Diseases Society of America (IDSA) recommends cautious and appropriate use of antibiotics in order to decrease resistance and increase antibiotic lifespan. The purpose of this study was to evaluate ertapenem use during the first quarter of 2016 in a 181-bed community hospital in rural Georgia. Ertapenem is a broad-spectrum antibiotic covering certain gram-negative bacteria (including extended spectrum beta-lactamase (ESBL) producing bacteria), gram-positive bacteria, and anaerobes. The primary outcome was the appropriateness of use based on standard guidelines. Secondary outcomes included duration of use, drug-related adverse events, and length of stay.

Methods: The institutional review board approved this retrospective evaluation. The subjects were identified using a computer-generated list of all patients 18 years of age and older who received ertapenem from January 1, 2016 through March 31, 2016. The electronic medical record for each subject was accessed and de-identified data was collected including patient age and sex, drug allergies, history of drug-resistant bacterial infection, indication for use, dosages, duration of use, cultures and sensitivities, drug-related adverse events, and length of stay.

Results: During the 91-day study period, a total of seventy-six patients received at least one dose of ertapenem. The patient population was 60 percent female and had an average age of 53 years. Nine patients had a documented beta-lactam allergy. There were four patients with a documented history of infection with an ESBL-producing bacteria and ten total patients with a history of multi-drug resistant gram-negative rod infection. One patient had a previous infection of carbapenem-resistant enterobacteriaceae (CRE). Sixty patients received ertapenem under the indication of surgical prophylaxis. Other indications included osteomyelitis (1), skin and soft tissue infection (5), urinary tract infection with ESBL-producing bacteria (2), bacteremia (1), healthcare associated pneumonia (4), gunshot wound to the abdomen (2), and post-op

fever (1). The average duration of therapy was 2.4 days and the length of stay was 7 days. There were no drug-related adverse events recorded.

Conclusion: The majority of ertapenem used was prescribed under the indication of surgical prophylaxis. The ISDA guidelines for surgical prophylaxis recommend the use of cefazolin alone or cefazolin in combination with metronidazole for the majority of procedures. As medication experts, pharmacists are vital to improving antimicrobial stewardship efforts in health systems. Potential pharmacist-led interventions to promote guideline-based antibiotic selection for surgical prophylaxis include protocol development as well as prescriber education.

Submission Category: Clinical Services Management

Submission Type: Evaluative Study

Session-Board Number: 3-111

Poster Title: Evaluation of documentation of a pharmacy-driven vancomycin pharmacokinetic service at an academic medical center

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Purpose: While institutions address vancomycin dosing in a variety of ways, pharmacist documentation in the patient's medical record is a typical component of these services. The purpose of this evaluation is to determine how pharmacists currently document vancomycin pharmacokinetic service activities including timing and purpose of notes written, monitoring criteria included, and clinical rationale. Further, these practices were compared with the current protocol directing pharmacists to write notes for any recommendation to adjust or maintain a dose. Results of this evaluation will support quality improvement initiatives addressing the current limitations of the institution's pharmacokinetic consult service.

Methods: This study is a single-site retrospective review of pharmacy vancomycin dosing services at an academic medical center. Data included in this study were obtained from the records of patients who received at least four days of treatment with vancomycin between March 1 and April 30, 2016. The pharmacokinetic notes were evaluated to determine the timing and purpose of notes written, monitoring criteria included, and discussion of clinical thought process. This project was approved by the Augusta University institutional review board as a "not human subjects research". This project is also a part of the health system medication use evaluation (MUE) and improvement program.

Results: Of 38 patients evaluated, the median age and weight were 52.5 years and 81.7 kg, respectively. Fourteen patients were initiated on vancomycin in the intensive care unit and 24 on the general floor. Seven of 38 patients began pulse dosing due to renal dysfunction at some point during therapy. One pharmacokinetic note was written at initiation, documenting the

decision to base dosing on a prior vancomycin course during the patient's stay. Excluding times of pulse dosing, 80 troughs were drawn for which 63 had notes written (79 percent). Thirty-two changes in dose occurred, 28 of which had note documentation (88 percent). Decisions to maintain therapy were documented in 35 notes of 48 troughs for which no changes were made (73 percent). All notes included serum creatinine (SCr), creatinine clearance, and dialysis status. Five of 63 notes included calculated ke and Vd and estimated peak and trough (8 percent). Sixty-two notes included goal trough (98 percent), 4 included goal peaks (6 percent), and 8 documented when the next trough would be ordered (13 percent). Comments written often provided reasoning for why a dose was not changed despite sub- or supratherapeutic troughs such as being drawn early/late, missed dose, or elevated SCr.

Conclusion: The vancomycin monitoring protocol directs pharmacists to document any decision to change dose or maintain therapy. While this institution's pharmacists document dose changes the majority of the time (88 percent), they only document maintaining therapy 73 percent of the time. Few pharmacists include patient-specific pharmacokinetic parameters or goal/estimated peaks. Lack of a standardized template for clinical thought process leads to practice variation. Overall, adherence to current practice was considered appropriate; however, a revision of this institution's vancomycin monitoring protocol could provide pharmacists more direction on which patient details to include in pharmacokinetic notes, enabling more consistent documentation and patient care.

Submission Category: Small and Rural Pharmacy Practice

Submission Type: Evaluative Study

Session-Board Number: 3-112

Poster Title: Mental health follow-up appointment adherence and factors associated with nonadherence after discharge from a psychiatric unit at a community teaching hospital in a rural area

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Purpose: Patients diagnosed with mental illness have high rates of nonadherence and poor attendance to follow-up appointments. Past research has shown that approximately 20-60% of patients are nonadherent. There is evidence that rates may be higher in rural communities. The period after psychiatric discharge is critical due to the high risk of rehospitalization. The purpose of this evaluation was to determine the rate of follow-up to the first outpatient mental health appointment after being discharged from a rural area inpatient psychiatric facility. Additionally, factors that predict nonadherence will be evaluated in order to identify strategies to improve post-discharge adherence and outcomes.

Methods: This study is a retrospective, chart review of patients in rural Georgia who were discharged between July and December 2014 from an acute inpatient psychiatric unit at a community teaching hospital with follow-up appointments at the local county mental health facility. Patients had to be at least 18 years old with a documented follow-up appointment at the local County Mental Health Center (MHC). Each patient's demographic information (sex, race, employment status, insurance, marital status, age, length of stay and legal status on admission), diagnoses, medication regimen (including total number of medications and class of medication), and readmission and/or emergency visit dates were recorded. The primary outcome measure was to identify the rate of patients who attended their outpatient follow-up appointment. Secondary outcomes included the identification of factors, based on previous literature searches, related to patient's nonadherence. Descriptive statistics were used to identify overall patient demographics. Chi-square tests were used to compare adherence in

pre-specified subsets and logistic regression was used to identify predictors of nonadherence. The study was approved by the university and hospital's institutional review board.

Results: A total of 140 patients were included in the study. Overall, substance use disorders were documented in 56.4 percent of patients, 20.7 percent had major depressive disorder and 22.9 percent had schizophrenia. Of the 140 patients, 133 had follow-up appointments scheduled at the time of discharge, with an average of 4.8 days between discharge and appointment. Thirty-six patients completed their follow-up appointment and 50 patients were no-shows. The remaining 54 patients either cancelled, rescheduled, partially completed their appointment or was not a documented patient at the MHC. Over 80 percent of those that were no shows were on a psychotropic of some kind. Seventy-two percent of those had a substance use disorder compared to 41.7 percent in the group that did complete their appointment (p=0.005). Among no-shows, 32 percent had major depressive disorder compared to 11.1 percent in the group that attended their appointment (p=0.024). The majority of patients that did attend appointments had schizophrenia (41.7 percent) and this was significantly different (p=0.004) compared to appointment no-shows. No difference was observed between patients discharged on any psychotropic between groups, though patients that completed appointments were more likely to be discharged on an antipsychotic or traditional mood stabilizer (p=not significant).

Conclusion: Approximately 35 percent of patients did not attend their follow-up appointment. While there appeared to be minimal to no differences among demographics between groups, the majority of patients that did not attend had a substance use disorder and/or major depressive disorder. This adherence data is consistent with past research, although further research is needed to identify generalizability of the study results and to identify effective strategies, such as targeting patients with specific psychiatric diagnoses, to overcome barriers to follow-up appointment adherence.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-113

Poster Title: Transitions of care: Impact of the collaboration between inpatient and outpatient pharmacy on promoting improved quality of care

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Purpose: As the outpatient bedside medication delivery program within an academic medical hospital, Meds2Bed, continues to expand in personnel and increased demand from patients and staff, so too does the potential to improve quality of care from admission to discharge. Therefore, this project evaluated the additional roles pharmacy personnel could adopt and the type of interventions emerging from Meds2Bed to identify areas for improvement and the overall impact of Meds2Bed, respectively. More specifically, data was gathered on the accuracy of patients' admission medication reconciliation and the interventions required on discharge medications for patients enrolled in this program.

Methods: This project is part of the institution's Medication Use Evaluation (MUE) and Improvement Program, which has been reviewed by the IRB and determined not to be human subject research. The clinical neuroscience pharmacist and pharmacist coordinator for the bedside medication delivery program at Augusta University Medical Center developed a data collection form to quantify the types of errors captured in medication reconciliations as well as the type of issues encountered on discharge prescriptions. Between July and September 2016, pharmacy students and two trained pharmacy technicians completed medication reconciliations for a sample of patients enrolled in the program. If available, patients' current medication reconciliation would be retrieved and then verified against the information gathered through patient interviews and, if needed, calling the patients' pharmacies. Any discrepancies on the medication reconciliations were recorded on the data collection forms and all necessary changes were then updated on patients' medical chart. The following types of errors were collected and analyzed on the data collection form: drug missing, wrong drug, wrong/no dose, wrong/no frequency, and no longer taking. These data points were used to

determine the accuracy of the medication reconciliation and where future interventions should occur. The frequency of prescription clarifications on sig, quantity, follow up on missing therapies, or other miscellaneous interventions were also collected to determine the impact of Meds2Bed involvement on discharge prescriptions.

Results: In total, 154 medication reconciliations were re-evaluated and 111 patients had their discharge prescriptions followed through until delivery. Results demonstrated that 71 percent of the medication reconciliations performed by non-pharmacy personnel were incomplete, meaning they were either missing parameters as defined above or had errors. Of 110 medication reconciliations deemed incomplete, a total of 184 discrepancies were found. To further stratify the results, the most frequent error found was drug missing (76) followed by wrong/no frequency (51), no longer taking (48), and wrong drug (9). The data that quantified discharge prescription interventions revealed that 27 out of 111 patients (24 percent) required clarifications on 47 issues. The most frequent clarification was other/miscellaneous (16) followed by sig (12), quantity (11), and missing therapy (8). The other/miscellaneous category represented a wide range of issues and no observed trends were noted.

Conclusion: A large proportion of the medication reconciliations observed in an academic medical center were found to be incomplete. This is an area that could be strengthened by pharmacy staff, especially if the pharmacy technician role is expanded to include medication reconciliation. A moderate amount of prescription clarifications were resolved by the Meds2Bed staff during this study, but the results are not likely an accurate reflection of the impact of this program due to underreporting.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 3-114

Poster Title: Pharmacist's contribution to Diabetic Care at a 200-Bed Community Hospital

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Purpose: Diabetes is a common comorbidity encountered in the hospital setting. Diabetes care teams are commonly used to provide patient education, medication management, and positive treatment outcomes for diabetes. The benefits of a pharmacist as a component of the diabetes care team are poorly documented. This poster describes the contributions of a pharmacist as a member of a diabetes care team.

Methods: IRB approval was obtained. A Microsoft Access database stored on a secure network drive was used to store data on diabetes team interventions over a span of three years and 8 months (January 2013 through September 2016). The pharmacist contribution to these activities was separated and analyzed. This data included various activities ranging from drug therapy recommendations (insulin adjustments, protocol initiation, and medication changes). Pharmacists patient education activities were also recorded. Educational activities included discussing disease progression, risk factors, blood glucose monitoring, insulin dosing, and medication usage. Pharmacy students also contributed to the diabetes care team interventions under the direct supervision of the pharmacist. The student data was also analyzed in the same manner as previously mentioned and reported elsewhere. Discharge therapy from pre-pharmacist team membership in 2008 was compared to discharge data from 2016 to assess impact of pharmacist upon discharge therapy in patients with an A1c value greater than 8%.

Results: Pharmacist initiated 1318 diabetic protocols and documented 1812 educational patient encounters/interactions. Pharmacist also recommended 1976 insulin adjustments and 280 medication changes. 1316 of these recommendations were directed related to reducing risk of both hyperglycemia and hypoglycemia. Pharmacist also completed 29 hospitalist consults and made 2 dietary consult orders. Students under the supervision of the pharmacist suggested

2395 additional interventions. Data collected during the two comparison periods (September-October 2008/June 2016-September 2016) were compared using the Chi-Square test. The data was found to have 2 degrees of freedom, suggesting a moderate association. Analysis of discharge data indicates a significant impact of pharmacist involvement upon discharge therapy.

Conclusion: Pharmacist involvement was shown significant improvement in the care of patients with diabetes in a community hospital. Pharmacists may also improve prescribing of home medications for hospitalized patients with diabetes.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-115

Poster Title: Ipratropium/albuterol inhaler medication use evaluation

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Purpose: Ipratropium/albuterol metered-dose inhaler was removed from hospital order sets in 2015 due to cost concerns. The purpose of this medication utilization evaluation (MUE) was to identify areas to optimize the remaining use of ipratropium/albuterol during hospitalization within Community Health Network (CHNw). The MUE also sought to evaluate instances of medication underutilization and waste.

Methods: A retrospective chart review was approved by the institutional review board and performed using CHNw's electronic medical record. An Epic clarity dispense report was generated for ipratropium/albuterol inhaler usage from January 1, 2016 through May 31, 2016. Adult patients (18-89 years of age) who had a hospital order for ipratropium/albuterol inhaler were included in the MUE. The primary objective of the study was to identify the percent of inpatient orders for ipratropium/albuterol as a continuation of a home medication. Secondary objectives included: percent of patients who had ipratropium/albuterol ordered and/or dispensed but never received a dose during hospitalization, percent of doses used during hospitalization compared to number of doses available, and percent continuation upon discharge. Additional inhaled patient medications prior to admission and at discharge were also reviewed.

Results: Of the 197 patients reviewed, ipratropium/albuterol was a continued home medication for 145 patients compared to being a new order for 52 patients (73.6 percent v. 26.4 percent, respectively). Indications for medication use included COPD (59 percent), asthma (11.7 percent), both (12.2 percent), none (11.2 percent), and other (5 percent). Other indications included of shortness of breath, hypoxia, pneumonia, wheezing, and respiratory distress. Patients in whom the medication was dispensed but patient never received a dose occurred 37

percent of the time. In patients in which ipratropium/albuterol was dispensed but not returned or dispensed and administered, a mean of 6.2 doses (standard deviation 7.7) were given, respectively. Only 2 percent of patients used at least 25 percent of doses in the inhaler device. At discharge, 72.1 percent of patients received an order to continue ipratropium/albuterol. Of the patients who received a new order for ipratropium/albuterol during admission, only 32.7 percent (17/52) were prescribed a continuation upon discharge.

Conclusion: The majority of ipratropium/albuterol orders at CHNw are continuation of a home medication, however ipratropium/albuterol is frequently underutilized. On average, around five percent of available doses were given during admission, requiring CHNw to waste the remaining medication. An alternative formulation of ipratropium/albuterol is available as a single-dose nebulizer solution and may be the preferred substitution. The MUE findings, as well as the availability of a more cost-effective option, support the need for a pharmacy interchange or increased utilization of patient supplied medication.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 3-116

Poster Title: Rituximab use and cost saving analysis at an urban, safety-net hospital

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Purpose: Rituximab is a monoclonal antibody classified as an antineoplastic agent. Restriction criteria is in place to only be prescribed by authorized attending physicians under the scope of hematology/oncology, rheumatology, and dermatology. A formalized dose rounding protocol was initiated to prevent the use of partial vials and the wasting of medication. This medication use evaluation was performed to assess formulary restriction criteria, proper use, cost saving measures, and administrative setting.

Methods: This retrospective study included all patients in the inpatient and outpatient setting that received a rituximab infusion at Eskenazi Health during the study period of October 1, 2014 to May 31, 2015, which included 27 patients. Proper use of rituximab was assessed according to the FDA labeled use and listed off-label uses. Restriction criteria put into place by the institution was also evaluated. Primary endpoints include: administration according to the proper FDA indications, use of Eskenazi Health restriction criteria, and proper dosing and use of dose rounding protocol. Secondary endpoints include: total number of rituximab doses given, adverse reactions (significant fatigue, chest tightness, throat tightness, neutropenia, increased LFT, rigors), incidence of infusion rate pause and/or reduction, incidence of drug infusion discontinuation, administration setting, and number of total patients who received an infusion. A cost analysis was conducted to assess inpatient versus outpatient cost difference and dose rounding to nearest vial size in relation to cost savings.

Results: Over the study period, rituximab was used according to FDA labeled indications for 53% of infusions, 22% for listed off-label indications and 26% for non-listed indications. All patients were pre-medicated prophylactically with acetaminophen, diphenhydramine, + methylprednisolone. Minimal side effects were attributed to the use of rituximab with only 2 out of the 27 patients needing to decrease the rate of infusion due to infusion reactions. Only authorized physicians ordered rituximab, which followed the restriction criteria. There was 1

incidence of improper rounding. The dose was rounded twice, once by the prescriber and once by the pharmacist leading to an increased dose for the patient. However, no harm resulted. The average number of infusions per month was 12.5. All patients who received rituximab were in the outpatient setting; leading to cost saving measures for the hospital and patients due to 340B contracted pricing. The institution saved $249,673 over 6 months by giving all doses in the outpatient setting. Rounding doses to the next whole vial lead to the savings of $9,401.26.

Conclusion: Overall, this study demonstrated that the majority of rituximab doses were administered in accordance with FDA labeled indications or listed off-label uses. Prescribers were compliant with restriction criteria; only authorized physicians prescribed this medication. Dose rounding to the nearest 100mg was completed accurately with the exception of one occurrence. Due to low incidence of adverse effects and cost effectiveness, no further prescribing or administration restriction additions are planned at this time.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-117

Poster Title: Evaluation of an Alternate Dosing Strategy for Intravenous Levothyroxine in the Hospital

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Purpose: Levothyroxine has a half-life of 6.3 days in euthyroid patients and 7.5 days in hypothyroid patients. The resulting studies show TSH levels remain therapeutic for 7 days after withdrawal of levothyroxine with no difference in cardiovascular complications, indicating no need to immediately transition an oral dose to intravenous. The purpose of this study is to evaluate compliance and clinical outcomes to an Ascension Health initiative protocol directed at cost reduction utilizing alternative dosing regimen that starts intravenous levothyroxine 72 hours after last oral dose and given every 72 hours for 2 doses, then daily administration is started on day 7.

Methods: An IRB-approved retrospective chart review conducted on patients, 18 and older, admitted to St. Vincent Indianapolis Hospital between 3/1/2014 and 5/31/2016 and received at least one dose of intravenous levothyroxine. The primary outcome of this study was to evaluate the overall compliance to the protocol, including appropriate conversion from oral to intravenous dose, initial intravenous dose administered at the correct time frame (3 days after last oral dose), utilization of the order set with both intravenous orders selected (every 72 hours x 2 doses and daily starting on day 7), and exclusion criteria followed per protocol. The exclusion criteria of the protocol includes myxedema coma, organ donation, clinical hypothyroidism (TSH of 10 or greater), strict NPO without enteral access for 7 or more days, and pregnant women. The secondary outcome was to evaluate the incidence of clinical outcomes, which were defined as an elevation of TSH within three months of discharge and readmission within 30 days. Patients' electronic medical records were reviewed to capture age, gender, baseline TSH and T4, home and inpatient intravenous dose, intravenous levothyroxine

prescriber, date last oral dose was received, date intravenous ordered and initial intravenous dose given, total number of intravenous doses given, use of both order sets, if patient fit any protocol exclusion criteria, readmission within 30 days of discharge, and subsequent TSH levels within three months of discharge.

Results: A total of 412 intravenous levothyroxine orders were evaluated, producing 279 orders received by patients. Forty-two orders were excluded per protocol, resulting in 120 following and 117 not following protocol. The 237 included orders per protocol for final evaluation displayed an overall protocol compliance of 50.6%.The largest area of protocol noncompliance (n=98) was due to receipt of the intravenous dose within 72 hours of stopping oral levothyroxine.. Additional reasons for noncompliance were incorrect order set use (n=15) and intravenous dose (n=4). Twenty orders (16%) that followed the protocol were readmitted within 30 days compared to 14 orders (12%) that did not follow the protocol. In examining TSH levels 3 months after discharge, 14 (12%) and 19 (16%) patients had a follow up TSH in the protocol and non-protocol groups respectively. There were low rates of abnormal follow up TSH, 1 patient in the protocol group and 5 in the non-protocol group; however none of these patients had a baseline TSH to determine any significant changes due to the alternative dosing strategy.

Conclusion: Intravenous levothyroxine protocol evaluation identified areas for continued improvement and education. Overall, protocol compliance was lacking, therefore cost reduction could be further refined. Clinical outcomes were not significantly different between the groups however, this study is not powered or designed to determine significance. This highlights the importance of future studies evaluating clinical outcomes with alternative dosing strategies.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 3-118

Poster Title: Impact of pharmacy student-led teaching during a short-term medical mission trip to the Dominican Republic

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Purpose: Opportunities for student involvement in global health initiatives and student participation on short-term medical mission trips have been increasing over the past years. There is not literature to support the use of student-led education on medical mission trips, however this teaching technique has proven to be effective in other settings. Because pharmacy students are trained and well-equipped to provide impactful teaching, they present an opportunity to bridge the education gap on medical mission trips. The objective of this study was to assess if pharmacy student-led education improves health professional knowledge on medical mission trips.

Methods: The institutional review board approved this observational study of an educational initiative to expand health professional knowledge through pharmacy student-led teaching on an international medical mission trip. Participants included doctors, medical residents, and nurses working in the Dominican Republic. The verbal, case-based education was provided by five doctor of pharmacy students on their advanced pharmacy practice experience rotation. A medical Spanish translator was used to interpret the presentation. Study participants received a 10 question multiple choice pre and post assessment. They were asked to complete the pre assessment prior to the education and the identical post assessment after the completion of the education to evaluate knowledge gained. Questions were written to equally represent material from the four topics that were covered throughout the educational initiative: antibiotic resistance, medication safety, hypertension and diabetes. Assessments were graded with one point awarded for each correct answer, with a maximum possible score of 10.

Results: The average score on the pre assessment was 6.14 (standard deviation of 1.52) out of 10, which increased to an average score of 7.59 (standard deviation of 1.53) out of 10 on the post assessment. When the data was analyzed using a paired samples T-test, the difference in the means between the pre and post assessments was 1.45 questions (95 percent confidence interval, -2.03 to -0.88, P value less than 0.05). The greatest increase in knowledge was observed with questions relating to antibiotic resistance, hypertension and diabetes.

Conclusion: On a short-term medical mission trip to the Dominican Republic, pharmacy student-led teaching demonstrated an increase in health professional knowledge. Based on the findings of this study, short-term medical mission trips should include a student-led teaching component. This innovative addition could benefit not only the students in their training to become competent healthcare providers, but also the providers, patients, and communities that these medical mission trips serve.

Submission Category: Oncology

Submission Type: Descriptive Report

Session-Board Number: 3-119

Poster Title: How to explain cancer to a child and the effects of coloring therapy in children with cancer

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Purpose: It has been studied and proven that art therapy can help with anxiety, depression, and even some diseases such as cancer. When a child who has cancer is waiting to be seen in a doctor's office, a coloring book can keep his or her mind off of the diagnosis, provide entertainment, and elicit a relaxing mindset. The purpose of this thesis is to determine if we, as an inter-professional team after studying the current body of literature, can create a children's book to address an unmet need in educating children on cancer while at the same time incorporating art therapy.

Methods: Today, art therapy is widely practiced in a variety of settings including hospitals and in patients who have adverse physical health conditions such as cancer. Art can encourage emotional expression, improve relationships, encourage self-confidence, help to control anxiety or depression, and help to take your mind off pain or discomfort. Children's coloring books are an important aspect of children's healthcare that should be utilized for every child that has cancer in order to put them at ease and hopefully explain some questions that they may have about cancer.

Results: Research was conducted on the effects of art therapy in cancer and on the current availability of children's books about cancer. Ultimately this resulted in the co-writing of a children's book focused on incorporating art therapy for cancer patients through coloring, which addresses an area of unmet need. Writing a children's book was a group effort that consisted of two college of pharmacy majors, two business majors, two college of education majors who have experience in children's literature, and an illustrator. The storyline includes a young character with leukemia to help explain cancer to children. The children's book was designed as a coloring book in order to provide entertainment, relaxation, and therapy to those who choose to heal through art.

Conclusion: Art therapy should be utilized to calm cancer patients and provide them with a distraction, while simultaneously offering children dealing with serious illnesses a chance to express their feelings. Additionally, a coloring book with a storyline could help explain unanswered questions a child might have and equips parents with a helpful resource for explaining cancer. This type of book could be utilized in children's hospital waiting rooms and patient rooms, or could be sold simply as a coloring book with an educational storyline.

Submission Category: Automation/ Informatics

Submission Type: Evaluative Study

Session-Board Number: 3-120

Poster Title: Implementation of a student-developed electronic medical record in a Dominican Republic underserved health clinic

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Purpose: In 2009, Congress passed the Technology for Economic and Clinical Health Act (HITECH), which emphasized the "meaningful use" of health technology. Research has shown that electronic medical records can increase patient safety, increase documentation accuracy, and improve outcome measures. However, there has been difficulty expanding this technology to smaller populations of underserved patients, such as international medical mission trips, due to cost. The purpose of this study was to implement a student-developed electronic medical record in a Dominican Republic underserved health clinic and to assess the perceived improvement of patient care attributed to the technology.

Methods: Three doctor of pharmacy students collaborated with a team of students from the "Engineering Projects in Community Service" undergraduate course at Butler University to design and develop an electronic medical record for non-profit organization Barnabas Task. It was specialized to meet the demand of clinic work flow and was based off of previous paper medical records used by Barnabas Task. Six iPads were purchased using a 1500 dollar grant. The institutional review board approved this cross-sectional study in which a survey was sent out via email to the students and trip leaders who attended the May 2016 medical mission trip to the Dominican Republic. One multiple choice and two free response questions were included to assess the participant's perception of the electronic medical record's impact on patient care and potential improvements for the future. Multiple choice question data was analyzed using frequencies and percentages. Qualitative responses were organized to look at trending themes.

Results: The electronic medical record was successfully developed and implemented in the underserved Dominican Republic health clinic during four clinic days seeing 329 total patients. Out of 23 possible participants, 18 completed the survey. Over 60 percent of participants either agreed or strongly agreed that the electronic medical record improved patient care. Additionally, 22.22 percent of participants were neutral and 16.67 percent had other responses to the impact on patient care. No participants disagreed or strongly disagreed that the electronic medical record improved patient care. Qualitative feedback showed that establishing a medical history for the patients and helping with organization of the clinic were the largest perceived impacts on patient care. Participants agreed that fixing basic maintenance issues and improving the prescription entry could enhance patient care at future clinics.

Conclusion: Student-developed, specialized electronic medical records can successfully be implemented into international medical mission clinics at a low cost to the non-profit organization. Overall, there was a positive perception of the electronic medical record's impact on quality of patient care during the underserved clinic in the Dominican Republic.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-121

Poster Title: Adult antimicrobial renal dosing policy evaluation: A retrospective chart review

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Purpose: Renal dosing adjustments have been found to lessen the prevalence of antibiotic dosing errors in renally impaired patients. With the increase of acute kidney injury, there is a need to review appropriate medication dosing in order to prevent adverse outcomes while maintaining disease treatment. This study evaluates the compliance to an adult antimicrobial renal dosing policy where specific antimicrobials were adjusted based on patient renal function, change in renal function during therapy, and adverse events.

Methods: An IRB-approved retrospective chart review was conducted on patients 18 years of age and older who received one of seven antimicrobials while at St. Vincent Indianapolis, St. Vincent Carmel, or St. Vincent Fishers hospitals from March 1, 2016 through May 31, 2016. The seven target antimicrobials evaluated were intravenous acyclovir, intravenous ciprofloxacin, oral ciprofloxacin, intravenous levofloxacin, oral levofloxacin, intravenous piperacillin/tazobactam, and intravenous cefepime. Baseline demographics and antimicrobial agent, dose, and length of therapy were collected and patient creatinine clearance and change in creatinine clearance were determined using the Cockcroft Gault formula per serum creatinine lab values. Patients who were less than five feet in height, not given the ordered antimicrobial, or did not have a measured serum creatinine within three days of admission were excluded. The primary outcome of this study was to evaluate overall compliance to the renal dosing protocol. The secondary outcomes included examining documented adverse effects or clinical worsening of renal function.

Results: There were 1,504 patients that had at least one target antimicrobial during the study time period. Per a random number generator, 100 patients were randomly selected from this group for analysis. Ninety-five patients met inclusion criteria, resulting in 126 antimicrobial orders for evaluation. Intravenous cefepime and piperacillin/tazobactam accounted for 63.5% of the antimicrobial orders. The overall compliance to the antimicrobial renal dosing policy for the initial dose was 68.3%, with cefepime being the least at 45.5%. For subsequent doses, 15% of incorrect orders and 30% of orders with renal function change during therapy were appropriately changed. An antimicrobial dosing alert was fired for 33 orders, but 27 of those orders had no intervention documented. However, no adverse events were documented for any patients.

Conclusion: Adult antimicrobial renal dosing policies may prevent dosing errors in patients, especially the renally impaired. This study identifies the need to improve renal dosing adjustments for antimicrobials, specifically with intravenous cefepime and worsening renal function. Although no adverse events were reported, future studies' further investigation may help determine the significance made by renal dosing policies.

Submission Category: Infectious Diseases

Submission Type: Case Report

Session-Board Number: 3-122

Poster Title: Cronobacter sakazakii pneumonia in a burn patient requiring mechanical ventilation.

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Purpose: This case report describes a Cronobacter sakazakii infection in a burn patient requiring mechanical ventilation. Cronobacter sakazakii, formerly categorized as an Enterobacter spp., is a gram-negative, non-spore forming rod. It is most commonly associated with neonatal meningitis secondary to food contamination from breast milk or dry powder. This organism has been previously reported in the wound of a burn patient but has been unreported in a burn patient's lungs. The patient is a 38-year-old female who sustained 39 percent Total Body Surface Area full thickness and deep partial thickness burns to her lateral trunk, bilateral upper extremities, bilateral thighs, and face after her clothes ignited while smoking a cigarette. She was electively intubated at an outside hospital due to increased oxygen requirements and transferred via helicopter where she was admitted to our Burn Center. She presented afebrile with a WBC of 9.7 k/mm3. Her past medical history was significant for an underlying neurological condition that was unknown at the time, multiple sclerosis, and chronic necrotic wounds on bilateral thighs. On Post Burn Day (PBD) 1, a bronchoscopy showed no evidence of inhalation injury, a nasojejunal tube was placed for enteral nutrition, and she was initiated on Assist Control Ventilation Control mode mechanical ventilation. On PBD2, she received debridement, escharotomies, and a homograft placement in the operating room. On PBD4, she was transitioned to Continuous Positive Airway Pressure-Pressure Support ventilation mode. A chest x-ray on PBD5 showed a small left pleural effusion with bibasilar atelectasis, sputum cultures were obtained, and cefepime 2 grams IVPB every 8 hours was started empirically. Vancomycin was added on PBD6 for empiric coverage of ventilator-associated pneumonia after the patient developed a fever of 102F. A loading dose of Vancomycin 2000mg (24mg/kg) IVPB was given followed by 1500mg (18mg/kg) IVPB every 12 hours. On PBD8, her WBC was 18.1 k/mm3, Tmax was 103.6F, and she began producing thick, yellow sputum. In response to these

symptoms, a bronchoscopy was performed. Quantitative cultures of bronchoalveolar lavage (BAL) fluid and blood culture were collected. The sputum culture and BAL culture both grew gram-negative rods, later identified as Cronobacter sakazakii. Blood cultures became positive in two out of four bottles, later identified as a Streptococcus spp. and Enterobacter cloacae. Cronobacter sakazakii was found to be susceptible to cefepime with an MIC less than or equal to 1 on PBD9, so therapy was continued. The patient's clinical status improved on PBD9 with successful extubation to room air and decreased sputum production despite an increase in WBC to 20.6 k/mm3. On PBD10, she continued to respond clinically to cefepime as her WBC decreased to 18.2 k/mm3 and she became afebrile. The decision to move to comfort care with symptom-only management was made by the patient, her family, and the medical team during a meeting on PBD11 due to her underlying neurologic condition, associated life expectancy, and quality of life concerns. At that time, all antibiotic therapy was discontinued with no further cultures obtained. To our knowledge, this is the first reported case of successful treatment of a ventilator-associated Cronobacter sakazakii pneumonia in a burn patient.

Methods:

Results:

Conclusion:

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-123

Poster Title: Scopolamine transdermal patch medication use evaluation at St. Vincent Indianapolis Hospital

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Purpose: Scopolamine transdermal patches are widely used in the pre- and post-operative areas of St. Vincent Hospital to prevent nausea and vomiting associated with anesthesia in surgery. Guidelines recommend scopolamine as an adjunct to other antiemetic therapies since up to 80 percent of surgical patients may be affected. However, reports suggest that if patch removal does not occur within 72 hours of placement, a withdrawal syndrome may cause symptoms consistent with rebound cholinergic activity. The documentation for the actual scopolamine order, patch placement, and patch removal at St. Vincent was identified as a potential opportunity for improvement to prevent scopolamine withdrawal.

Methods: This is a retrospective medication use evaluation of patients at St. Vincent Indianapolis Hospital with a documented charge for a scopolamine patch and a charge for a Level 1 through 10 surgery between September 1, 2014 and August 31, 2015. There were 1,475 patients identified based on these criteria. Patients were arranged in order by birth date to separate children (less than 18 years of age) and adults (greater than or equal to 18 years of age) into two separate lists. These two different patient populations were then arranged in order of the date of service and assigned numbers to be used in a random number generator. The patients were randomized, identifying 10 pediatric patients and 61 adult patients for evaluation. The patients were individually evaluated based on scanned images of their paper charts and their electronic medical record to collect the following scopolamine data points: documentation of administration, complete drug order (drug, dose, route, and frequency), administration documentation and removal task fired in the Sunrise Clinical Manager electronic medical record, completion of removal task, discharge within or after 72 hours of patch placement, and written discharge removal instructions. Data was evaluated using mean and percentage difference between groups.

Results: In the adult and pediatric populations, the results proved to be similar regardless of outpatient or inpatient status. Approximately 94 percent of all of the patients included in this evaluation had documentation of administration of the scopolamine patch within their chart or electronic medical record. Of these patients, approximately 69 percent of patients had a complete order including the drug name, dose, route, and frequency. Approximately 61 percent of patients had administration documentation and a removal task fired within the electronic medical record, with only 7 percent having completion of the removal task. In the adult patients, 34 patients were discharged prior to the full 72 hours of the scopolamine patch administration, yet only 2 of these patients (6 percent) had written discharge instructions to remove the patch. On the other hand, in the pediatric population, no patients had completion of the removal task or written discharge removal instructions in their paperwork.

Conclusion: The results of this medication use evaluation demonstrates that a majority of anesthesiologists are documenting the placement of the scopolamine patch on their anesthesia records and/or writing a complete order for scopolamine patches, but there is still room for improvement. There needs to be a focus on removal order documentation for the task and/or documentation that the patient was instructed how and when to remove the patch if they were discharged prior to removal. Proper documentation is essential in order to ensure that transitions of care are effectively communicated to reduce the risk of scopolamine withdrawal syndrome.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 3-124

Poster Title: Outcomes of extended infusion cefepime in pediatric patients

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Purpose: The use of extended infusions of cefepime has been shown to optimize pharmacokinetic and pharmacodynamic parameters. Optimization improves clinical outcomes in adults with infections secondary to gram-negative pathogens, but there are no studies demonstrating benefit in pediatric patients. The objective of this study was to compare clinical outcomes in pediatric patients receiving extended and traditional infusion cefepime.

Methods: This was a retrospective cohort study of patients aged 30 days to 17 years receiving extended versus traditional infusion cefepime at a tertiary care children's hospital from January 1, 2007 to April 30, 2016. Patients were included if they received cefepime for at least 48 hours for a susceptible gram-negative bacteremia with no concomitant gram-positive or fungal infections. Patients were excluded if they received both regimens, did not receive active antimicrobial therapy within 24 hours of the first positive blood culture, or received more than 24 hours of empiric therapy with a beta-lactam other than cefepime. The primary outcome was a composite clinical outcome comprised of infection-related mortality within 14 days of antibiotic initiation, bacteremic relapse with the same organism within 30 days of culture clearance, and treatment failure. Treatment failure was defined by lack of defervescence, normalization of white blood cell (WBC) count, or negative follow-up blood cultures. Patients who failed to meet the criteria for defervescence, WBC normalization, or culture clearance or any single component when no other information was available were considered treatment failures. Secondary outcomes included bacteremia duration, hospital and intensive care unit (ICU) length of stay (LOS), infection or colonization with a multi-drug resistant (MDR) organism, and adverse effects of cefepime.

Results: Thirty-nine patients were included in the analysis; 12 patients (30.8 percent) received extended infusion, and 27 patients (69.2 percent) received traditional infusion. Traditional infusion patients were significantly younger with a median (interquartile range [IQR]) age of 0.4 (0.2-3) years compared to 5 (1.1-9.8) years amongst extended infusion patients (p equals 0.023). The median initial mg/kg doses were similar between groups (approximately 50 mg/kg intravenously every 8 hours). The most common infectious organism was Escherichia coli (10/39 cultures) followed by Klebsiella pneumoniae (9/39 cultures). The most common minimum inhibitory concentrations (MICs) amongst organisms were less than or equal to 1 (36/39 cultures), though 1 organism within traditional and extended infusion had MICs equal to 2 mcg/ml, and 1 traditional infusion organism had an MIC of 4 mcg/ml. The primary outcome occurred in one patient in each group (p equals 1). Development of MDR infection did not differ. Clearance of bacteremia within 24 hours was observed in 4 patients (33.3 percent) receiving extended infusion versus 6 patients (22.2 percent) receiving traditional infusion (p equals 0.693). Length of stay was similar between groups. One adverse effect was reported with extended infusion compared to 3 adverse effects with traditional infusion.

Conclusion: Use of extended infusion cefepime in pediatric patients with documented gram-negative bacteremia led to similar clinical outcome as traditional infusion in this cohort of children with low bacterial MICs. Larger studies including patients that are infected with organisms with higher MICs may be more likely to detect significant difference in outcomes.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Descriptive Report

Session-Board Number: 3-125

Poster Title: Outlining Medicare Part B versus Part D coverage for outpatient medications in Indiana

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Purpose: Most outpatient medications are covered by Medicare Part D. Medicare Part B also provides coverage for outpatient prescriptions. Due to special circumstances, unique dosage forms, and an unclear definition of 'usually" self-administered, determining if a product is covered under Part B or D is difficult. Patients and advocates utilizing the Medicare Plan Finder to compare Part D plans must enter the list of medications covered only by Medicare Part D. This project was developed to assist with accurate Medicare Part D lists for the plan finder. Created for Indiana, it may also serve as a guide for other states.

Methods: The first step in developing a tool to compare Medicare Part B and D coverage was to list outpatient medications covered by Medicare Part B. Resources provided by the Centers for Medicare and Medicaid Services (CMS) were used to start the list. Most of these medications have specific requirements for coverage under Medicare Part B. The specific requirements for each medication were carefully evaluated using several detailed documents from the Centers for Medicare and Medicaid Services (CMS) and WPS Local Coverage Determination and consolidated billing documents.

Results: The results are provided in a PDF document with three parts. First is a summary table outlining all the Medicare Part B covered outpatient medications by medication category. Following this is a detailed bulleted list outlining the coverage requirements for each medication. Finally, a separate appendix was created for injectable medications that are excluded from Medicare Part B coverage and are therefore covered under Part D.

Conclusion: This tool has been used by pharmacists and patient advocates to create an accurate Medicare Part D list for patients using the plan finder in Indiana.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 3-126

Poster Title: Analysis of corticosteroid prescribing patterns following ICU transfer

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Purpose: Corticosteroids are administered in patients with acute exacerbations of chronic obstructive pulmonary disease (COPD) as they may shorten recovery time and improve lung function. Literature describing the use of corticosteroids for COPD exacerbation specifically in critically ill patients is limited. Patients in the intensive care unit (ICU) commonly receive intravenous methylprednisolone initially with subsequent dose tapering and/or conversion to oral prednisone. Following ICU transfer, missed opportunities during care transition may occur resulting in prolonged intravenous or oral corticosteroid therapy and inadvertent adverse drug events. This study aims to evaluate corticosteroid prescribing patterns following ICU transfer.

Methods: This retrospective cohort study was approved by the Institutional Review Board at Parkview Health. Male and female patients aged 18 years and older, who had a coded diagnosis for acute respiratory failure or COPD exacerbation and received intravenous methylprednisolone were included. Patients who not admitted to the ICU, received an initial daily dose of methylprednisolone more than 500 mg per day, completed the entire course of corticosteroid therapy while in the ICU, expired while in the ICU or were directly discharged from the ICU, or had chronic corticosteroids listed on their home medication list were excluded. Data was collected from electronic medical record for patients who met the inclusion criteria from January – December, 2015. Data collected included total dose and duration of corticosteroid therapy before, during and after ICU transfer, discharge medication list containing corticosteroid therapy, incidences of hyperglycemia following ICU discharge, and post-ICU discharge length of stay. Two groups of patients were specified for comparison, those with a discontinuation/taper plan set for corticosteroid therapy following ICU transfer by critical care providers and those without a set discontinuation/taper plan. The primary outcome is the

difference in the duration of corticosteroid therapy following ICU transfer in the two treatment groups. The Mann-Whitney U test was used to compare differences in post-ICU duration of corticosteroid therapy between the two groups.

Results: We identified 102 patients admitted to the ICU during the specified timeframe. Of these 102 patients, 41 patients were included for analysis, 23 of whom had an intensivist-initiated corticosteroid discontinuation/taper plan and 18 patients who did not. There was no difference in the duration of corticosteroid therapy prior to transfer (5.0 vs. 5.0 days), dose (in prednisone equivalents) before transfer (770 vs. 512 mg), or post-ICU length of stay (3.0 vs. 3.5 days) between those who had an intensivist-initiated corticosteroid discontinuation plan and those who did not. Patients who had an intensivist-initiated corticosteroid discontinuation plan had a shorter duration of corticosteroid therapy after transfer from the ICU (8.0 vs. 14.5 days; p=0.023) and a shorter total duration of corticosteroid therapy (15 vs. 20 days; p=0.035). There was no difference in dose of corticosteroids following ICU transfer or days with hyperglycemia following ICU transfer.

Conclusion: An intensivist-initiated corticosteroid discontinuation plan is associated with reductions in duration of corticosteroid therapy following transfer from the ICU and total duration of corticosteroid therapy. Targeted interventions during transition out of the ICU may help reduce unnecessary exposure to corticosteroid therapy. Further studies are warranted to evaluate the impact of these findings on clinical outcomes including adverse effects, hospital length of stay, and readmission rates.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 3-127

Poster Title: Effect of pharmacist intervention during transitions of care on heart failure patient readmission rates

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Purpose: The impact of poor medication reconciliation, patient education, and medication-related problem interventions upon admission, during hospitalization, and at discharge has increased adverse drug events and healthcare costs. Studies of pharmacist interventions in each of these areas separately have yielded conflicting results for multiple disease states, including heart failure. The primary aim of this study is to evaluate the effect of bundled interventions (medication reconciliation, discharge education, and multiple post-discharge follow-up phone calls) on reducing readmission rates for heart failure patients. The secondary aim is to describe this novel practice in terms of types and number of interventions made per patient.

Methods: The institutional review board approved this retrospective chart review comparing two groups: those who have had pharmacist intervention during transitions of care and a historical control group without pharmacist intervention. Patients 18 years and older with a discharge diagnosis of heart failure admitted between the dates of June 1, 2015 to August 31, 2015 (historical control) and June 1, 2016 to August 31, 2016 (intervention group) were included in this pilot analysis. Patients transferred to hospice care or another hospital were excluded. The pharmacist intervention consisted of three stages: admission medication reconciliation, discharge medication education, and follow-up phone calls. The follow-up calls were series of at least 4 phone calls over the first 30 days after discharge: the first within 24-72 hours of discharge, then once weekly thereafter for three more calls (for a total of four calls in four weeks). The pharmacist had the option to provide more frequent and numerous calls for some patients, where deemed necessary based on professional judgement. The primary outcome, 30-day readmission rates, was analyzed using the chi square test. Baseline demographic differences between groups were analyzed using student t test for continuous

variables and chi square for nominal variables. Secondary outcomes were analyzed using descriptive statistics.

Results: Twenty-seven patients were identified for analysis: 16 in the intervention group and 11 patients in the control group. Patients in the control group were older (mean age 84.7 vs. 74.5 years, p-value 0.036), while the average number of medical conditions was greater in the intervention group (8.1 vs. 5.5, p-value less than 0.001). There was no statistically significant difference between groups in gender, location admitted from (home vs. skilled nursing facility [SNF]), discharge disposition (home vs. SNF), number of home medications, or hospital length of stay. There was no statistically significant difference between groups in 30-day readmission rates (12.5 percent intervention group vs. 27.3 percent control group; p-value greater than 0.05). In the intervention group, admission medication reconciliation was completed for 88 percent of patients, with an average of 4.2 discrepancies in the initial admission medication list uncovered per patient. The most common discrepancies identified were missing prescriptions, prescriptions that the patient was no longer taking, and incorrect directions on over-the-counter products. Discharge education was completed for 14 percent of patients; post-discharge follow-up phone calls were completed for all patients. Each patient was successfully reached an average of 2.5 times, with an average of 1.6 interventions per patient.

Conclusion: Bundled pharmacist services during transitions care helped identify and resolve multiple medication-related problems. Pharmacist involvement in transitions of care can prevent drug adverse events, potentially reducing the rate of hospital readmissions although this study was not sufficiently powered to accurately detect a difference in this outcome. Larger and longer timeframe studies are warranted to evaluate the impact of multiple pharmacist transition of care interventions on 30-day readmission rates in heart failure patients. Ongoing studies of this practice are in process with the objective of evaluating larger numbers of patients to accurately assess for a statistically significant difference in readmission rates.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 3-128

Poster Title: Impact of serum chloride levels on kidney function in patients receiving vancomycin and piperacillin/tazobactam

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Purpose: Previous studies have indicated that the use of vancomycin in combination with piperacillin/tazobactam concomitantly and hyperchloremia are independent risk factors for the development of acute kidney injury. The primary objective of this study is to determine if hyperchloremia impacts the rate of acute kidney injury in critically ill patients receiving the combination of intravenous vancomycin and piperacillin tazobactam. Secondary objectives will assess if chloride levels are in these patients impact ICU length of stay, hospital length of stay and hospital mortality.

Methods: This study is a retrospective chart review cohort study to evaluate the impact of chloride level on renal function in patients who are receiving concomitant piperacillin/tazobactam and vancomycin. Data will be collected from the electronic medical records for any patient > 18 years of age who were admitted to the Intensive Care Unit or Progressive Care Unit of Parkview Health Systems (Allen County Hospitals) between January 1, 2016 and June 30, 2016 with the diagnosis of sepsis or pneumonia and received both vancomycin and piperacillin/tazobactam for > 24 hours. . Data to be collected includes: age, sex, weight, height, BMI, ICU and hospital length of stay, inpatient mortality, length of vancomycin and piperacillin/tazobactam therapy, baseline SCr and chloride level, peak SCr and chloride level following initiation of vancomycin and piperacillin/tazobactam, length of time to peak SCr and chloride level (days), presence of acute kidney injury requiring hemodialysis, and the requirement of mechanical ventilation or vasopressor medications within the first 24 hours of hospitalization. Patient's categorization of kidney function will be defined by the Acute

Kidney Injury Network (AKIN) criteria. For all primary and secondary endpoints, with the exception of hospital length of stay, a Chi-squared test will be utilized for statistical analysis. For hospital length of stay, the Mann-Whitney U test will be used. Multivariate logistic regression will be used to determine confounding variables.

Results: 145 patients met criteria for entry into the study. Of these patients, 13 (8.9%) met AKIN criteria during their hospitalization and treatment with piperacillin/tazobactam and vancomycin. Among those patients with hyperchloremia (serum chloride > 111 mmol/L), 7% (n =5) developed AKI. In contrast, those patients without elevated chloride levels developed AKI in 12% (n = 8) of cases. In those patients with hyperchloremia who developed AKI, the overall hospital length of stay was much longer than those who met AKIN criteria who were not hyperchloremic (13 days vs. 7 days). Mortality among those with and without hyperchloremia was similar (24% vs 25%) and was not significantly influenced by the presence of hyperchloremia.

Conclusion: Overall rates of acute kidney injury with the combination of vancomycin and piperacillin/tazobactam were lower than seen in previous studies. The influence of hyperchloremia on the development of acute kidney injury and mortality was not observed in this population.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 3-129

Poster Title: Quantifying services provided by the pharmacy team in a family medicine clinic

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Purpose: Services provided by pharmacists in an outpatient setting have expanded beyond the role of dispensing medications. Pharmacists are now involved in direct patient-care and medication therapy management. Services provided by the pharmacy team have been available at the family medicine clinic since 2012, but no analysis of services provided by the team have been described. Services provided by the pharmacy team at the clinic include medication therapy management, identification of drug-related therapy problems, and assistance with transition-of-care. The purpose of this retrospective study is to quantify and characterize the interventions made by the pharmacy team in the family medicine clinic.

Methods: All services rendered by the pharmacy team over a period of four months will be analyzed. The pharmacy team will use a paper tracking tool to record details of each patient encounter. Documentation of each encounter will be completed by the end of each business day. The information recorded on the paper form will be entered into an excel spreadsheet. Data to be collected includes the type of intervention or recommendation performed by the pharmacy team and whether or not the recommendation was accepted by the physician. Patient demographic information (age, sex, language and ethnicity), co-morbidities, number of medications prescribed, and identification of high risk medications will also be recorded. The pharmacy team member performing the intervention, type of patient encounter, and physician associated with the intervention or encounter will also be collected.

Results: The pharmacy team had a total of 232 patient encounters from the June 2016 thru September 2016. The mean age of the patients was 56 years, and males represented 40 percent (93/232) of the sample. There were 663 interventions that were made by the pharmacy team. Medication reconciliation, detection of drug discrepancies, and drug therapy

recommendations were the most frequent interventions, with 180, 153 and 121 interventions respectively. Ninety-two percent of the recommendations were accepted by the physicians.

Conclusion: The pharmacy team made many interventions, which may be associated with improved outcomes and cost avoidance. Most drug therapy recommendations were accepted by the physicians. Services provided by the pharmacy team are an essential part of patient care at the family medicine clinic.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 3-130

Poster Title: An evaluation of sources of fluid intake in medical ICU patients

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Purpose: Patients admitted to the ICU often receive large volumes of intravenous fluid to help restore end organ perfusion. Recent evidence has suggested a positive fluid balance during an ICU stay may be associated with diminished organ function and increased mortality. The objective of this study was to focus on sources of intravenous fluid administration in the first 24 hours in patients admitted to the medical ICU. We recorded all intravenous fluid administration, including those volumes specified by physicians and volumes administered from other sources.

Methods: This retrospective cohort study was approved by the Institutional Review Board at Parkview Regional Medical Center located in Fort Wayne, Indiana. The admission log in the medical ICU was used to identify patients over a 6-week period in June and July of 2016. The electronic medical record was used to extract data included in this analysis. Patients were excluded if they died or were discharged from the ICU within 24 hours of admission or if they were transferred to the medical ICU from another ICU within the same facility. Volume of all fluids administered in the first 24 hours of ICU admission was recorded and specified as discretionary fluid or non-discretionary fluid. Discretionary fluids included volumes specified by the treating physician and included bolus and maintenance intravenous fluids, enteral feedings, and blood products. Non-discretionary fluids included those in which the volume was not set by the treating physician. This included fluid from antibiotics, sedatives, analgesics, vasopressors, electrolytes, and intravenous flushes. The primary objective was to describe the volumes of intravenous fluids administered to patients in a medical ICU, comparing volumes specified by a treating physician and those not specified and their contribution to fluid intake at 24 hours. We also compared fluid volumes in patients with confirmed or suspected sepsis to those without sepsis to evaluate the impact of this diagnosis on fluid administration.

Results: During the specified timeframe, 195 patients were admitted to the ICU and 169 patients remained after exclusions. The mean age of the patients was 63 years and 99 (58.5%) were male. The mean volume of fluid administered in the first 24 hours of ICU admission was 4,412 mL in all patients. The average discretionary and non-discretionary fluid administration during the first 24 hours was 3,144 mL and 1,268 mL, respectively. Patients with confirmed or suspected sepsis received higher discretionary fluid volumes in the first 24 hours (4,175 vs. 2,735 mL); however, the non-discretionary fluid volumes were similar between septic and non-septic patients (1,307 vs. 1,253 mL). Mean volumes of non-discretionary fluid from different sources were as follows: “other” intravenous medications (528 mL), antibiotics (295 mL), sedatives/analgesics (150 mL), vasopressors (138 mL), electrolytes (115 mL), and intravenous flushes (43 mL). Patients with sepsis tended to receive more maintenance fluid and fluid boluses as well as more fluid from antibiotics and vasopressor agents compared to those patients without sepsis.

Conclusion: Fluid administration from non-discretionary intravenous fluids contributes more than 1 liter to total fluid intake in the first 24 hours of ICU admission. Patients with sepsis patients receive higher volumes of discretionary fluids; however these patients received similar volumes of non-discretionary volumes compared to non-septic patients. Healthcare providers should consider the volume of fluid administration from non-discretionary sources for patients admitted to the medical ICU and the impact on fluid balance and patient outcomes. Further evaluation of the impact of non-discretionary fluid administration on clinical outcomes including organ function, length of stay, and mortality is warranted.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 3-131

Poster Title: Evaluating management strategies for peripherally inserted central catheter-associated thrombosis

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Purpose: Peripherally inserted central catheters (PICCs) are useful in hospitalized patients that require the infusion of multiple intravenous medications. PICCs are less complicated to insert than other central venous catheters. Associated complications include infection and venous thrombosis. The true incidence of PICC-associated venous thromboembolism (VTE) is unknown, as diagnosis and testing modality vary between institutions. The CHEST guidelines do not provide specific recommendations on management of PICC-associated superficial venous thrombosis (SVT). The purpose of our study was to examine current management strategies for PICC-associated SVT and evaluate management strategies and outcomes associated with their use.

Methods: We conducted a retrospective cohort analysis looking at patients admitted to Parkview Regional Medical Center between January 1, 2014 and December 31, 2015 who had a Current Procedural Terminology (CPT) code for PICC-line insertion and an ICD-9 code for superficial vein thrombosis in the basilic or cephalic veins during the same hospitalization. We evaluated patient demographic data including age, weight, reasons for admission, location of admission (floor vs. ICU), use of mechanical ventilation, and past medical history which may predispose the patient to VTE. We also evaluated the use of pharmacologic VTE prophylaxis at the time of diagnosis. We evaluated SVT management strategies implemented for these patients including removal of the PICC-line or initiation of therapeutic doses of anticoagulant therapy. We also evaluated the use of follow-up ultrasound to determine if SVT progressed to a DVT and observed the proportion of patients who were discharged on anticoagulant therapy

without an indication other than SVT. Descriptive statistics were utilized to report data obtained from this analysis.

Results: We identified 64 patients in the specified timeframe with PICC-associated SVT who met inclusion criteria. The majority of excluded patients were excluded due to concomitant deep vein thrombosis at the time of recognition of SVT leaving 35 patients for evaluation. The average age of patients was 58.1 years and 54% were male. Patients were more commonly admitted for a medical diagnosis (63%) than a surgical diagnosis (37%). 74% of patients were receiving pharmacologic VTE prophylaxis at the time of recognition of superficial vein thrombosis. The PICC-line was removed in 43% of patients in response to superficial vein thrombosis and therapeutic anticoagulation was initiated within 24-hours of recognition in 40% of patients. A repeat duplex ultrasound of the upper extremities was ordered in 11 patients (31.4%) at a median of 9 days following initial recognition and in 2 patients the superficial vein thrombosis had progressed to DVT. Ten patients (28.6%) were discharged on anticoagulant therapy without an obvious indication other than SVT.

Conclusion: We observed significant variation in practice in the management of patients with PICC-associated SVT including PICC-line removal and use of therapeutic anticoagulation. The use of pharmacologic VTE prophylaxis did not appear to be protective against PICC-associated thrombosis. We observed a low rate of follow-up duplex ultrasound and progression to DVT so it is difficult to discern how management strategies may impact progression of thrombosis. These findings highlight the need for more research into prevention and management strategies for PICC-associated SVT.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 3-132

Poster Title: Impact of an interprofessional team-based approach for providing transitional care management (TCM) services on 30-day readmission rates among Medicare beneficiaries

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Purpose: This study sought to determine the effectiveness of post-discharge TCM services with an interprofessional team in reducing rates of hospital readmission at 30-days following an index hospitalization compared with patients who did not complete post-discharge TCM services.

Methods: TCM services at this study site are furnished by a transitional care coordinator, a pharmacist, and a physician at an academic patient-centered medical home (PCMH). Complying with the requirements set forth by the Centers for Medicare and Medicaid Services, the following three components for a TCM encounter in this study includes: an interactive contact, certain non-face-to-face services, and a face-to-face post-discharge visit. The effectiveness of an interprofessional team-based approach in providing TCM services on 30-day readmission rates was assessed through a retrospective chart review. Convenience sampling of Medicare beneficiaries aged 18 years or older with an acute care admission to a local hospital were identified by the transitional care coordinator from April 2015 to February 2016. Using the electronic medical record a total of 226 hospitalizations were included in the study, demographic data was collected on the corresponding patients in addition to hospital length of stay (LOS), number of chronic medications prescribed, functional health literacy status, and calculation of the Charlson comorbidity index. Baseline characteristics will be evaluated by descriptive statistics. Pearson's chi-square test and an odds ratio (OR) will be utilized to analyze the comparison rates of 30-day readmission based on patient's completion of post-discharge TCM services. Ethics committee approval was obtained for the study at the site.

Results: Of 181 patients identified during the specified timeframe, 226 total hospitalizations were analyzed. It was found that 75 hospitalizations (33 percent), accounting for 68 patients, completed the post-discharge TCM services. The remaining 151 hospitalizations (66 percent) in 113 patients did not complete post-discharge TCM services. The odds ratio for readmission when participating in post-discharge TCM services was 0.49 (p=0.181). Rates for readmission for any cause at 30 days were 6.7 percent in patients who completed the post-discharge TCM services and 12.6 percent in patients who did not (p=0.174). The two groups demonstrated balanced baseline demographics (age, race, ethnicity, language spoken, employment status, hospital LOS, and average number of medications). Differing baseline characteristics in patients who completed post-discharge TCM services compared to patients who did not participate included a higher female population 53 percent vs. 45 percent, respectively, and a lower average Charlson score of 2.74 vs. 3.04, respectively. Functional health literacy status also differed, in patients who received post-discharge TCM services it was found that 16 percent demonstrated low functional health literacy, while 40 percent demonstrated high functional health literacy. Patients who did not complete post-discharge services demonstrated equal rates of both low and high health literacy at 4.6 percent.

Conclusion: Nearly 1 in 10 hospitalizations during the specified timeframe was followed by a repeat hospitalization within 30 days, of which more than half were in patients who did not receive discharge TCM services. In this analysis the 30-day any cause readmission rate was reduced by 51 percent among patients who participated in an interprofessional team-based transition care management services. Reducing readmission rates allows for better patient care, better outcomes, and enhanced billing opportunity.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-133

Poster Title: Evaluation of radiochemical purity of technetium-99m mertiatide and technetium-99m tetrofosmin stored at 30 degrees Celsius during the shelf-life

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Purpose: The summaries of product characteristics for technetium-99m mertiatide and technetium-99m tetrofosmin recommend refrigeration of radiolabelled products at 5 plus or minus 3 degrees Celsius after manufacturing. However, these products are not typically refrigerated during transportation to various end-point hospitals. The vehicles used to transport radiopharmaceuticals are designed to limit radiation exposure but not refrigerated. The purpose of this project was to evaluate the radiochemical purity of technetium-99m mertiatide and technetium-99m tetrofosmin at 30 degrees Celsius for up to 12 hours in order to determine whether transport in an unrefrigerated vehicle would affect radiochemical purity and stability of the radiolabelled products.

Methods: One kit each of technetium-99m mertiatide and technetium-99m tetrofosmin was prepared on three separate dates. The kits were prepared within manufacturer reconstitution limits. After preparation, the radiolabelled kits were placed in a heated water bath set to 30 degrees Celsius for 12 hours. The products were subject to radiochemical purity testing in triplicate at times 0, 2, 4, 6, 8, 10, and 12 hours after preparation. Thin layer chromatography (TLC) was used to determine radiochemical purity. A radiochromatogram scanner was used to trace the radioactivity profile of each TLC strip, and a chromatography integrator was used to measure the areas of radioactive peaks in order to calculate radiochemical purity. In order to meet the minimum requirements for clinical use, as per the manufacturer's summary of product characteristics, radiochemical purity was required to be greater than 90 percent for technetium-99m tetrofosmin and greater than 94 percent for technetium-99m mertiatide. The mean radiochemical purity with a 95 percent confidence interval was calculated for each time point evaluated.

Results: For technetium-99m mertiatide, 57 out of 60 quality control tests met the minimum radiochemical purity. For technetium-99m tetrofosmin, 62 out of 63 quality control tests met the minimum radiochemical purity. For all four tests that failed, the others strips tested at the same time points passed for each product, suggesting operator error. The lower limit of the 95 percent confidence interval for mean radiochemical purity at each time point did not fall below the minimum percentage required to pass, indicating that these products remain stable for up to 12 hours when stored at 30 degrees Celsius. The radiochemical purity did not appear to decrease over time for either product.

Conclusion: Although the respective manufacturer guidelines for these radiopharmaceuticals recommend refrigeration after preparation, both remain stable at 30 degrees Celsius for up to 12 hours. These results suggest that both products can be safely transported in an unrefrigerated vehicle at temperatures up to 30 degrees Celsius. Although this project showed that these two products maintain radiochemical purity under these conditions, they may not maintain sterility. It is important to continue to consider antimicrobial integrity and refrigerate these products whenever possible once transportation has been completed.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 3-134

Poster Title: Zoledronic acid use analysis and renal adjustment and monitoring protocol development at an urban, safety-net hospital

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Purpose: Zoledronic acid is a bone resorption inhibitor in the bisphosphonate class used intravenously for the treatment of hypercalcemia of malignancy along with multiple myeloma and bone metastases from solid tumors. This project was designed to assess the use of zoledronic acid at an urban, safety-net hospital in regards to indication for use, doses used, monitoring of renal function via serum creatinine, patient demographics, and administration setting.

Methods: A retrospective chart review was conducted on 40 patients that received zoledronic acid from November 2015 to May 2016. The sample of 40 patients was randomly selected from a total of 75 patients. Patients were selected who had received at least one dose of zoledronic acid in the inpatient or outpatient setting at an urban, safety-net hospital in which they were billed for the medication. The primary endpoint was the indication for receiving zoledronic acid. Secondary endpoints included strength and number of doses administered, appropriateness of doses adjusted for renal impairment, administration setting, patient demographics, and days elapsed since last serum creatinine level was drawn.

Results: The primary endpoint revealed that 100 percent of zoledronic acid doses administered in the inpatient setting were given for hypercalcemia of malignancy. Indications for outpatient use included osteoporosis, lytic lesions from multiple myeloma, metastatic bone lesions from solid tumors, prevention of aromatase inhibitor-induced bone loss in breast cancer, and prevention of androgen deprivation-induced bone loss in prostate cancer. Of the 79 doses received by the 40 patients, 74 were appropriately administered based on renal function, and 72.2 percent of all doses were 4 mg. Unlike the 4 mg doses, the 3, 3.3, and 3.5 mg doses had more episodes of inappropriate dose adjustments associated with them, with the amount of

incorrect dosages totaling 6.3 percent. The incorrect dosages were dosed lower than necessary based on renal function, but no harm resulted. Of the 40 patients, 36 received zoledronic acid in the outpatient setting. For demographics, 65 percent of patients were female, and the age of the patients ranged from 30 to 89 years. Excluding serum creatinine levels drawn the same day in which the dose was administered to the patient, 0-60 days had elapsed since the last serum creatinine level had been drawn in 80 percent of the patients.

Conclusion: Zoledronic acid usage was appropriate in 74 of 79 total doses administered. Inappropriate underdosing occurred in 5 of 79 patients. Because 20 percent of patients had a serum creatinine level drawn more than 60 days from dose administration, a renal dosing and serum creatinine monitoring protocol was created within a standardized order set. This allowed for serum creatinine to be ordered at the time of the next dose to obtain a level within 60 days. Zoledronic acid 5 mg was capped at 4 mg versus the labeled dose for osteoporosis and Paget's disease due to lack of state reimbursement.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-135

Poster Title: Vancomycin Therapeutic Dosing Evaluation

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Purpose: The American Society of Health-System Pharmacists (ASHP) and the Infectious Diseases Society of American (IDSA) have recommended an increased vancomycin trough range of 15-20 mg/L for most indications in order to achieve optimal therapeutic outcomes in patients. Published primary literature suggests that the percentage of patients who achieve initial vancomycin troughs of 15-20 mg/L from using various dosing strategies and nomograms is around 50 percent. The purpose of this project is to present a retrospective chart review of a change in vancomycin dosing practice.

Methods: The institutional review board approved this project. Adults greater than or equal to 18 years old who were on vancomycin treatment regimens in the pharmacy dosing service were included. Those patients with a calculated creatinine clearance of less than or equal to 30 mL/min were excluded. One month of data was retrospectively collected via a computer generated report. This data was evaluated by identifying initial vancomycin concentrations in therapeutic regimens, mg/kg of maintenance doses, age, initial serum creatinine, and calculated creatinine clearance. The pharmacy dosing service subsequently initiated a vancomycin dosing nomogram similar to one noted in the literature. The same data parameters were collected seven weeks after implementation.

Results: A total of 192 patients were evaluated. Sixty-two patients were evaluated in the initial one month data collection and 130 patients were evaluated in the seven weeks following the dosing change. The percentage of patients who obtained vancomycin concentrations between 15-20 mg/L in the one month data was 18 percent, compared to 39 percent in the seven week data. The percentage with initial concentrations less than 15 mg/L was 63 versus 21.5 percent, and the percentage with initial concentrations greater than 25 mg/L was 13 versus 24 percent in the one month and seven week data collections, respectively. Additionally, 5 percent of patients in the one month collection had concentrations between 21-25 mg/L, compared to 15

percent in the seven week collection. One article evaluated patients with concentrations of 13-22 mg/L. Data collected in this project showed 41 percent (one month data) and 58 percent (seven week data) of patients were in this range. Regarding average age, average maintenance dose mg/kg, average initial serum creatinine, and average creatinine clearance in the one month and seven week collections, respectively, the values are as follows: 56.4 versus 57.6 years, 16.3 versus 15.3 mg/kg, 0.9 versus 0.9 mg/dL, and 84.3 versus 84.5 mL/min.

Conclusion: After the implementation of a dosing nomogram, patients were more likely to present with initial vancomycin serum concentrations in the 15-20 mg/L range and substantially less patients fell in the less than 15 mg/L range. It was also noted that a higher percentage of the patients had concentrations greater than 20 mg/L after the dosing change. Further evaluation of subgroups will be pursued for future reference.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 3-136

Poster Title: Quality assurance assessment and pharmacist perception of a five day antimicrobial stop date program at a community teaching hospital

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Purpose: Recently the Centers for Disease Control and Prevention summarized recommended core elements for hospital antibiotic stewardship programs (ASP) to help improve antibiotic prescribing. The increased focus on stewardship has prompted many healthcare systems to implement initiatives to help improve antimicrobial prescribing and reduce antimicrobial resistance and hospital-acquired infections. One initiative implemented was a five day automatic stop date program for all antimicrobial agents. Pharmacists worked with providers to define antibiotic drug regimens, including clarifying durations of therapy. This project was designed to assess the quality and accuracy of the program, while also evaluating pharmacy perception.

Methods: Pharmacy staff added a stop date of five days for all antimicrobial orders without a provider entered stop date (excluding chronic or suppressive therapy). In the 24 hours preceding the automatic-stop date, pharmacists were to call the primary provider to discuss the therapy plan and clarify further duration of the antimicrobial agent when indicated. Clinical surveillance software was used to collect the following data daily: a report of all antimicrobial orders in the hospital, a report of antimicrobial orders that were expiring that day, and a report of antimicrobial orders that were to expire the next day. All reports were compared for accuracy at one month regarding the input of stop dates, as well as made sure that no antimicrobial agents were being discontinued without discussion with the providers. The following resources were provided to pharmacy staff to promote antimicrobial stewardship and conversation between pharmacists and providers regarding durations of therapy and appropriate antimicrobial use: Sanford Guide to Antimicrobial Therapy 2016, durations of therapy document, and electronic drug information references. Four months after the initiation of the program, a survey was conducted to assess pharmacists' perceptions of the program.

Results of the study have been shared with site leadership for ongoing process improvement planning.

Results: One month after the initiation of the program, the average number of antimicrobial agents without stop dates each day was 19 (18.82 percent of all antimicrobial agents being ordered in the hospital). Additionally, an average of 56.87 percent of antifungal medications and 60.11 percent of antiviral medications were without stop dates each day. A quality assurance assessment showed that no antimicrobial agents were being discontinued without a discussion with the primary provider. Survey results from 11 pharmacists regarding perception of the program showed that 81.81 percent felt that the program was beneficial in reducing the duration of antimicrobial therapy, and 90.91 percent felt that providers were either somewhat receptive or very receptive to the program. Furthermore, 60 percent felt that they were able to make recommendations regarding durations of therapy most of the time when they were calling providers, and 100 percent utilized one of the resources provided to guide their recommendations.

Conclusion: The five day antimicrobial automatic stop date process was successfully implemented into the daily pharmacist workflow. After one month, the number of antimicrobial medications without stop dates was low, suggesting that antimicrobial stewardship efforts were taking place. The majority of surveyed pharmacists supported the program and felt it and the resources provided were beneficial.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Descriptive Report

Session-Board Number: 3-137

Poster Title: Assessment of safe prescribing of low molecular weight heparin treatment across Barts Health National Health Service (NHS) Trust

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Purpose: The use of low molecular weight heparin (LMWH) retains a significant role in many disease states that require anticoagulation. As high-risk medications, LMWHs may produce adverse events such as major bleeds, resulting from inappropriate dosing. Assessing the clinical prescribing patterns for LMWHs is important in reducing adverse events. This audit was designed to evaluate the safe prescribing of LMWH treatment doses in a large UK National Health Service (NHS) Trust, in accordance to patients body weight, renal function and concomitant therapeutic anticoagulation.

Methods: All four sites within the Trust were audited for the purpose of this study. From August 15th to 26th, 2016, data was collected prospectively from a total of forty-three wards across two hospital sites and the respective outpatient pharmacies. From August 30th to September 9th, data was collected prospectively from an additional thirty-one wards from the remaining two hospital sites, and the respective outpatient pharmacies.
A data collection tool was developed to track the hospital, date, patient demographics, dose and indication of the LMWH prescribed, renal function (both creatinine clearance and estimated glomerular filtration rate were collected and compared), latest INR readings for patients taking concurrent warfarin, and concurrent direct oral anti-coagulant (DOAC) use. Pharmacists and nursing staff at each site were notified of the audit and requested to identify eligible patients. Patient identification forms from each ward were checked daily during the collection, and relevant patient information was recorded on the data collection tool. Eligible patients included current inpatient or outpatient patients on treatment regimens of a LMWH.

Patients were excluded if they were on pediatric, obstetrics, gynecology, or acute assessment wards.

Results: There were 162 patients on treatment dose LMWH across the trust, with 109 (67%) of the patients receiving all doses in the safe and recommended range. Forty-one (25%) patients were prescribed enoxaparin and 120 (75%) patients were prescribed tinzaparin. Fifty-three (33%) patients were not dosed appropriately according to their body weight at some point during the data collection time frame. Forty (25%) patients were on concurrent warfarin at some time during the study, with no patient at therapeutic INR. Also, no patient was on concurrent DOAC, which would indicate inappropriate prescribing. Six (4%) patients had received LMWH doses that were not appropriate for their renal function. For fifteen (9%) patients, the difference between the renal function estimations impacted clinical dose adjustments. After reviewing the electronic medical records and drug charts for all patients not dosed appropriately, it was noted that inaccurate information were contributing heavily to the dosing errors (both overdosing and underdosing).

Conclusion: Thirty-three per cent of patients received inappropriate doses of LMWHs based on either their weight or renal function translating to either inadequate cover (thrombosis risk) or excessive dosing (bleeding risk). In order to ensure patients are receiving an appropriate LMWH dose, weight, height and renal function need to be obtained and updated in a timely manner. Frequent INR checks should be performed, and INR results assessed prior to administering LMWHs for patient concurrently on warfarin. With the recent introduction of DOACs, this may offer a safer alternative to LMWHs as well a potentially being preferable to patients being oral therapy.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 3-138

Poster Title: Efficacy of transdermal clonidine patches in difficult-to-treat hypertension patients attending a specialist blood pressure clinic in the United Kingdom.

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Purpose: Hypertension is a major risk factor for cardiovascular morbidity and mortality. Control rates in treated patients are sub-optimal despite availability of numerous medication classes. This may reflect poor adherence to anti-hypertensive medications with persistence rates at one year estimated to be less than fifty percent. Poor adherence is often related to medication posology and adverse drug reactions. Transdermal clonidine applied once-weekly, although unlicensed, could be useful for patients who report difficulty with taking daily medication or report intolerances to oral medication. The purpose of this study was to determine the effectiveness of clonidine patches in real-world patients with difficult-to-treat hypertension.

Methods: A retrospective analysis of patients in a specialist Hypertension Centre outpatient service between January 2015 – August 2016 was performed. Patients prescribed transdermal clonidine (TTS-1, delivery 100 micrograms daily) were identified by hospital pharmacy records. Data regarding demographics, co-prescribed medications, and blood pressure values were extracted from electronic health records. Patients were included for analysis if: clinic systolic blood pressure greater than 140 mmHg or diastolic blood pressure greater than 85 mmHg immediately prior to transdermal clonidine prescription; prescription was continued for more than one month; patient was wearing transdermal clonidine patch at follow-up; follow-up clinic blood pressure was recorded. Patients who initiated clonidine TTS-1 with an additional anti-hypertensive medication were excluded. Final clinic blood pressure was used from the last clinic visit prior to: additional anti-hypertensive medication prescription; transdermal clonidine cessation; increase in weekly dose of transdermal clonidine. All clinic blood pressures were measured in triplicate by trained nurses according to national guidelines using validated blood

pressure machines and the lowest value was considered as clinic blood pressure. Data are presented as mean plus or minus standard deviation unless otherwise specified and statistical analysis was performed as paired t-test as data exhibited Gaussian distributions (D'Agostino and Pearson omnibus normality tests). Study was approved by trust research and development office.

Results: Of the 79 patients that received any dose of transdermal clonidine since January 2015, 36 patients satisfied inclusion and exclusion criteria and data were extracted for analysis. Mean age was 57 (plus or minus 13) years and 86 percent were female. Self-reported intolerance was to 3 (plus or minus 4) classes of medications and 4 (plus or minus 3) individual anti-hypertensive medications used previously. Baseline clinic blood pressure was 186 mmHg (plus or minus 21) over 101 (plus or minus 13) mmHg on 4 (plus or minus 2) medications. The addition of transdermal clonidine TTS-1 was associated with reduction of blood pressure by 23 mmHg (plus or minus 33) over 10 (plus or minus 18) mmHg (p less than 0.001 and p equals 0.002 respectively) over median 11 weeks (mean 18 weeks; range 4-134 weeks). Twenty-five (69 percent) patients were deemed to be responders (clinic systolic blood pressure reduction of greater than 10 mmHg). Transdermal clonidine was stopped in a small number of patients due to: reversible dermatological reactions (n=2); fatigue (n=2); diarrhoea (n=1); headache (n=1) and insomnia (n=1). Additionally, transdermal clonidine was also stopped due to perceived ineffectiveness (n=2) and excessive effect (n=1).

Conclusion: These are the first contemporary data in a real-world setting demonstrating the sustained blood pressure lowering efficacy of transdermal clonidine at the lowest available dose in patients with significant history of intolerance to standard oral anti-hypertensive medications. There was a robust blood pressure response in greater than two-thirds of patients but there was an appreciable adverse drug event rate of almost 1-in-5. These data confirm the potential of transdermal clonidine as an effective non-oral anti-hypertensive formulation. This may have utility in specific populations of patients with medication intolerance, resistant hypertension, or where oral dosing may not be possible.

Submission Category: Leadership

Submission Type: Descriptive Report

Session-Board Number: 3-139

Poster Title: A topic discussion designed to articulate a study abroad experience in an interview session

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Purpose: In 2003 Purdue University College of Pharmacy (PUCOP) established an eight-week global health advanced pharmacy practice experience (APPE) in Eldoret, Kenya. Historically students have found it difficult to summarize their growth in clinical knowledge, professional skills, and emotional maturity into a concise, articulate response when asked about their APPE in Kenya during job and residency interviews. Typical responses sound oversimplified, generic, and lack connection to the skills needed in US-based positions. This project aimed to strengthen students' confidence and ability to create articulate responses about the skill set developed while in Kenya during interviews.

Methods: A preceptor-led topic discussion was developed that allowed students the opportunity to reflect on all aspects of their APPE and put it into the context of commonly asked interview questions. To assess students' ability prior to the discussion they were asked to provide a brief response about their time in Kenya as if asked about it during an interview. Then they were lead through the topic discussion and asked to repeat this exercise. The content of the discussion included brainstorming on ways the students have grown as clinical practitioners during the rotation, applying their thoughts to commonly asked interview questions, and then finally providing feedback on what they learned through the activity and what could be improved about it. After completion of the topic discussion, students completed an online survey to assess the impact the activity had on their ability to articulate answers during interviews. The 19 question survey was distributed electronically using Qualtrics (Provo, UT) online survey software one month after graduation for two classes of students (in 2015 and 2016). A 5-point Likert scale was used for most questions. Demographics were also collected.

Results were extrapolated from the data collected and the institutional review board approved of this study.

Results: Over a two-year period there were 37 students who completed the interview preparation topic discussion. There were 24 students who completed the online survey to assess the activity. The students reported participation in a total of 97 interviews. Of those 97 interviews, 71 (73 percent), had asked about Kenya during the interview. More than half of the students, 13 of the 24, were asked about Kenya in every interview they participated in. The survey asked students questions about their confidence during interviews after going through the topic discussion and ranked questions based on a 5-point Likert scale. Based on the survey, 18 of the 24 students "strongly agreed" that they were able to apply their experience in Kenya to typical interview questions after completing the topic discussion and having completed interviews. The majority of the students, 23, either "strongly agreed" or "agreed" that the topic discussion prepared them well enough to defer interview questions away from the topic of safari. Additionally, 14 of the students either "strongly agreed" or "agreed" that the discussion helped them overall be more successful with interviews. Seventy five percent of students "strongly agreed" that the topic discussion should be continued for future students.

Conclusion: Students who participated in the interview preparation topic discussion had improved confidence and ability to articulate their experience in Kenya when asked about their APPE experience during an interview. Additionally, students felt more comfortable steering discussion about Kenya away from safaris and adventures and shifting it towards discussion about skills and personal strengths acquired during that APPE that are desirable skills in a candidate. Overall, this topic discussion helped student pharmacists be better prepared for successful interviews. Future plans include expanding this topic discussion to include other international APPE experiences offered at PUCOP.

Submission Category: Leadership

Submission Type: Evaluative Study

Session-Board Number: 3-140

Poster Title: Expansion of pharmacy students' involvement in global health and international clinical rotations

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Purpose: According to the international migration survey conducted by the UN in 2015, more than 14%, increasing from 12.3% in 2000, of the entire US population were born in another country. Student pharmacists' global engagement has demonstrated positive patient impacts; however, limited opportunities exist for student pharmacists at Purdue University College of Pharmacy (PUCOP). As a result, identifying the needs and expanding student pharmacist access to global engagement experiences are critical to meet the changing needs of the US population. The aim of this study was to identify the needs for increasing global engagement experiences offered at PUCOP.

Methods: A survey was developed using Qualtrics online survey software (Provo, UT) and distributed to all first, second, and third year student pharmacists at PUCOP. This survey was distributed via email and data collection occurred between August 31, 2016 and September 22, 2016. Survey responses were anonymous. The specific locations of interest included existing programs in Kenya and the United Kingdom (UK) and potential future sites in Colombia and Tanzania. The survey questions were classified into 5 categories: (1) participation interests, (2) preferences in locations, (3) reasons to participate, (4) reasons not to participate, and (5) interests towards an elective or course focusing on international pharmacy practice. The survey utilized a five-point Likert scale and allowed participants to type in their own responses for certain questions. Lastly, demographics were collected to differentiate whether students' background influenced their interest in participating in global pharmacy experiences. Descriptive statistics were computed to analyze the results. The study was approved by the Institutional Review Board.

Results: The survey was sent to a total of 460 students and 148 of them participated. One hundred and thirty-two students (89.2%) were interested in global health and/or international clinical rotations or an elective course coupled with an experience abroad. The majority of students were interested in going to London, UK (56.2%) whereas 23.1% for Eldoret, Kenya, 13.1% for Colombia, and 7.7% for Kilimanjaro, Tanzania. The top three reasons for participation were “to explore differences in medical care outside of the US” (13.0%), “challenge myself” (12.5%), and “work in an interdisciplinary team including attending physicians, residents and medical students” (11.5%). On the other hand, the least likely motivations for participation were “to provide patient care to underserved patient populations in resource constrained settings” (9.8%), “broaden pharmaceutical knowledge about diseases not endemic to the home region” (8.1%), and “go on weekend travel excursions” (7.9%). For students who were not interested, top reasons were “time away from family and friends” (40.0%), “scheduling conflicts” (20.0%), “safety” (20.0%), and “financial constraints” (20.0%). Lastly, 78.0% of the students reported prior experience abroad.

Conclusion: This study demonstrated PUCOP student pharmacists desire participation in global engagement opportunities. In additional to expanding current partnerships in Kenya and the UK, there is necessity to explore opportunities for partnerships with key universities in Colombia and Tanzania. The advancement of global engagement opportunities will promote students’ cultural awareness and sensitivity, expose students to treatment of diseases not commonly seen in modern Western medicine, and cultivate future leadership for the growth of global pharmacy practice.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 3-141

Poster Title: Analysis of the cost-effectiveness of low molecular weight heparin (LMWH) treatment across a large National Health Service (NHS) Trust in the United Kingdom

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Purpose: This study was designed to examine the potential cost-savings to the Barts Health NHS Trust, in switching eligible inpatients, outpatients and discharges from a treatment dose of LMWH to a direct oral anti-coagulant (DOAC). DOACs are licensed alternative treatments for venous thromboembolism (VTE) and non-valvular atrial fibrillation (AF). Unlike LMWHs, which require a subcutaneous (SC) injection and subsequent patient discomfort, DOACs are administered orally. District nurse visits are also not needed post-discharge, leading to further cost-savings with DOACs, in addition to the direct savings from drug-cost as some DOACs are less expensive than LMWHs.

Methods: Data was collected across each site of the Trust from August 15 to September 9 of 2016, excluding weekends, encompassing 74 wards. Ward pharmacists identified patients on treatment doses of LMWHs. Study data was collected from paper drug-charts and electronic medical records. Additional patients on LMWH treatment were identified by screening the discharge summaries. The exclusion criteria were current cancer treatment/active cancer, poor renal function (defined as a creatinine clearance (CrCl) less than 15mL/min), major surgery within the last 14 days and indications other than VTE or non-valvular AF. LMWH administration post-discharge was examined for the administrative needs of district nurse visits, as patients may also self-administer. Cost was calculated per dose, as LMWH varies with patient weight, which in turn affects costs. Cost-comparisons were made to edoxaban for VTE treatment and rivaroxaban for non-valvular AF treatment based on present costs of these medications to the Trust.

Results: One-hundred and sixty-one patients on treatment doses of LMWHs were identified. Fifty-six patients (34.78 percent) were eligible to switch to a DOAC, of which 51 (91.07 percent) were inpatients. Of the eligible patients, 40 (71.43 percent) were on VTE treatment and 16 (28.57 percent) on non-valvular AF treatment. In total 253 LMWH doses, costing £1,120.06 to the Trust, were dispensed to patients eligible to be on DOACs. The cost of the DOACs would have been £401.60. Therefore, in that ten-day period there was a £718.46 cost-savings potential. This is approximately £26,000 per year in cost-savings. Nineteen patients were also discharged, of which five (26.32 percent) were advised for district nurse visits to support administration of LMWH at the patient's home, adding additional unnecessary costs to the health system.

Conclusion: Prescribing DOACs in accordance to licensed indications as opposed to LMWHs offers a conservative financial cost-saving for the Trust of just over £26,000. As restrictions were placed on inclusion criteria, cost-savings are likely greater than the estimates presented. A prior Trust audit found safety reasons to prescribe DOACs. This current study adds to the evidence that the Trust adopt new guidelines in which DOACs are given in preference to LMWHs in the treatment of VTEs and non-valvular AF at the point of diagnosis.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 3-142

Poster Title: Evaluating the appropriateness of weight-based sugammadex dose utilization at an urban, safety-net academic medical center

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Purpose: Sugammadex was approved in December 2015 as a selective reversal agent for rocuronium and vecuronium. By binding these agents at the neuromuscular junction, sugammadex provides immediate reversal. Food and Drug Administration-indicated doses are two milligrams per kilogram (moderate routine blockade), four milligrams per kilogram (deep routine blockade) or 16 milligrams per kilogram (immediate reversal of blockade). When evaluating sugammadex for addition to formulary, effectiveness and cost were both compared to its alternative, neostigmine with glycopyrrolate. With a significant volume of use over the previous five months, a retrospective chart review was conducted to evaluate the appropriateness of sugammadex dosing.

Methods: A retrospective chart review was conducted to evaluate all patients over the age of 18 who received sugammadex at Eskenazi Health from May 11, 2016 to September 9, 2016. Demographic, dosing, administration and outcome data were evaluated. The primary endpoint was the appropriateness of the weight-based dosing of sugammadex. This was defined as a dose of two to four milligrams per kilogram (plus or minus 10 percent). Secondary endpoints included indication (routine versus immediate), location of administration, efficacy, and adverse drug events.

Results: One hundred and thirteen patients were initially included, and 91 patients were over the age of 18 with documented administration of sugammadex. Lack of documentation related to weight-based dosing (height, weight, sugammadex dose given) excluded 10 patients. The average age was 46.1 years (14.01) with 41 male patients (48.4 percent). The mean ideal body

weight was 63.1 (13) kilograms. The median (IQR) dose of sugammadex was 200 (200, 200) milligrams. All doses ranged from 100 to 600 milligrams. The primary outcome (patients who were dosed appropriately) occurred in 38.5 percent of patients (n equals 35). Subgroup analysis showed a statistical difference between patients who received appropriately dosed sugammadex versus those who did not (median (IQR)) (2.0 milligrams per kilogram (1.923, 2.120) versus 2.535 milligrams per kilogram (2.326, 2.941); (95 percent confidence interval -0.663, -0.293; p less than 0.001). Neostigmine and glycopyrrolate administration occurred in nine patients prior to receiving sugammadex; no patients received these after sugammadex. Only two of 91 (3.3 percent) patients experienced an adverse event after sugammadex; two patients required a second dose, one patient required a medication for respiratory depression.

Conclusion: This retrospective chart review observed only 38.5 percent of patients received an appropriate dose of sugammadex and a statistically significant difference was identified when comparing the weight-based dose of sugammadex in appropriately and inappropriately dosed patients. This data indicates that providers were more likely to round to a vial size than draw up a patient specific dose, potentially leading to more adverse events and unnecessary resource utilization. Future steps will be needed to be taken to address the misutilization within the institution using the electronic medical system.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 3-143

Poster Title: Risk Factors and Prevalence of QT Interval Prolongation in Adult Burn Patients Receiving Methadone

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Purpose: Previous studies support methadone use in burn patients as a means to decrease opioid use, ventilator days, and delirium development. The American Pain Society recommends electrocardiogram (ECG) monitoring for patients on methadone with certain risk factors for prolonged rate-corrected QT interval (QTc). There is a lack of data regarding methadone-associated QTc prolongation in burn patients. A QTc monitoring protocol for burn patients receiving methadone was implemented at the study institution to optimize care for high-risk patients. The purpose of this study was to determine the prevalence, risk factors, and cardiac outcomes related to methadone-associated QTc prolongation in burn patients.

Methods: This retrospective cohort study included 91 adult patients admitted to our Burn Center from 06/01/10-05/31/16 with at least one dose of methadone for pain, a baseline ECG prior to the first dose, and at least one follow-up ECG after initiation. Baseline QTc and maximum QTc after methadone initiation were recorded, and patients were divided according to those who had a prolonged QTc (> 470 for males; > 480 for females) versus those who did not (controls). Primary outcomes were incidence of cardiac events and change from baseline to longest QTc.

Results: Prolonged QTc was found in 27% of patients (n = 25). Median (IQR) maximum QTc was 458 (442,477) overall, 492 (479,520) in the prolonged QTc group, and 450 (437,462) in the control group. Both primary outcomes were significant: more patients had cardiac events in the prolonged QTc group (44%, n=11) than in the control group (9%, n=6) ($p < 0.001$), and median (IQR) change from baseline QTc was higher in the patients with QTc prolongation [61 (18,88), n=23)] than in the control group [233(13,38), n=43] ($p < 0.001$). The following risk factors for

prolonged QTc were similar between groups: age (p=0.5519, female gender (p=0.262), black race (p=0.388), number of QT-prolonging medications (p=0.181), number of CYP inhibitors (p=0.061), prior stimulant use (p=0.876), history of QTc prolongation (p=0.393), history of cardiac disease (p=0.945); history of CHF (p=0.572), and history of liver disease (p=1.000). Patients in the prolonged QTc group had higher TBSA [n (%)] [43.0 (21.7) versus 31.4 (14.9), p=0.005] and required higher total daily doses of methadone [milligrams; median (IQR)] [90.0 (52.5,97.5) versus 52.5 (30.0,75.0), p=0.004]. A post-hoc analysis revealed a moderate correlation between total daily dose of methadone and overall change in QTc from baseline [Pearson correlation coefficient = 0.498 ($p < 0.001$)].

Conclusion: Patients with prolonged QTc had a higher TBSA, longer LOS, and experienced a significantly higher rate of adverse cardiac events versus control patients. Of the risk factors studied, only total daily dose of methadone was significant. This study demonstrates the need for a standardized approach to routine ECG monitoring for QTc prolongation in burn patients receiving methadone. Regardless of presence or absence of other known risk factors for prolonged QTc, larger doses of methadone may correlate to longer QTc and higher rates of adverse cardiac outcomes in burn patients.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 3-144

Poster Title: Analyzing adverse drug event reports to improve patient outcomes: Twitter versus FAERS data

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Purpose: Utilization of social media as a data resource is increasing, especially as this information pertains to market research. Patients and consumers frequently post on Twitter regarding medications and use thereof. Similarly, the SafeRx database was created by the Purdue University Center for Medication Safety Advancement as a source of meaningful data, including data from the Food and Drug Administration Adverse Event Reporting System (FAERS). This current study was designed to collect and compare reported adverse drug events (ADEs) for Cymbalta (duloxetine) from Twitter to ADEs from the FAERS database, in order to highlight potential areas of improvement regarding medication safety.

Methods: Cymbalta (duloxetine) was selected for this study because it is the #21 drug in the Food and Drug Administration Adverse Event Reporting System (FAERS) database as listed by "number of reaction reports by drug." Tweets mentioning "cymbalta" from 6/9/16 to 7/11/16 were collected, analyzed, and compared to FAERS data from the same time period in 2015 (6/9 to 7/11), for the top 20 FAERS adverse drug events (ADEs) for Cymbalta. Three hundred tweets mentioning the search criterion "cymbalta" from the time period of 6/9/16 to 7/11/16 were manually collected from Twitter. Retweets and tweets containing internet links mentioning "cymbalta" were excluded from collection. Tweets classified as containing an ADE were required to contain both person reporting the event and person experiencing the event, as required by the FDA event reporting system. Tweets containing an ADE were then classified with a one or two-word, author-determined ADE description, such as "insomnia." FAERS data from the same time period in 2015, 6/9/15 to 7/11/15, was collected via the SafeRx database entitled "Common Reactions for Drug," for "Cymbalta." FAERS data from this time period in 2016 was unavailable when data was collected. There were 411 FAERS reaction reports for Cymbalta during this time period.

Results: 96 ADEs were reported in 300 collected tweets (32%) which mentioned “cymbalta,” spanning a timeframe from 6/9 to 7/11 in 2016. 82 of 300 tweets (27%) contained at least one ADE. 14 of 300 tweets (5%) contained more than one ADE. Withdrawal syndrome was most commonly-reported, with 22 ADEs, and confusional state was second, with 7 ADEs. 1227 reactions affiliated with Cymbalta were collected from the SafeRx database for the “Top 20 ADEs” for Cymbalta, contained in 411 FAERS reports from the 6/9 to 7/11 time period in 2015. 140 ADEs (34%) were classified as “drug withdrawal syndrome,” the most-commonly reported ADE. Of note, “suicidal ideation” was listed as the #12 reported reaction in the FAERS database with 46 reports from 6/9 to 7/11 in 2015. Percentages for each of the top 18 ADEs, of the total number of reports both from Twitter and FAERS data, respectively, were determined and compared. The top 18 Twitter ADEs, based on frequency, were included because 18 ADEs were mentioned more than once in the selection of 300 tweets, with the exception and addition of “suicidal ideation” due to the significance of this event, as it had only 1 report in 300 tweets.

Conclusion: Similar ADEs were reported to Twitter and the FDA. However, 6 of the top 18 ADEs were only reported on Twitter, and 7 of the top 20 FAERS ADEs were not reported on Twitter. Consequently, both Twitter and the SafeRx database are beneficial for collecting medication use data which may positively impact patient safety. Withdrawal syndrome was the most commonly-reported ADE for Cymbalta, both on Twitter (7%) and in the FAERS database (34%). Accordingly, tapering regimens should be emphasized to provide better therapeutic results for patients. Mood-related ADEs and suicidal ideation were also commonly-reported, indicating a need for further surveillance.

Submission Category: Small and Rural Pharmacy Practice

Submission Type: Descriptive Report

Session-Board Number: 3-145

Poster Title: Using the Bridging Income Generation with GrouP Integrated Care (BIGPIC) model as a method for addressing chronic disease management in a peri-urban, resource-limited setting.

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Purpose: Prevalence of non-communicable diseases (NCDs) is rising in low and middle income countries. Adoption of sedentary, calorie rich lifestyles contribute to the rise in NCDs. Urban areas are highly impacted by this lifestyle shift, but have accessible healthcare. Peri-urban and rural areas are also impacted, but present barriers to addressing NCDs due to lack of accessible healthcare infrastructure. The Bridging Income Generation with GrouP Integrated Care (BIGPIC) model was developed for and has been proven to work in rural settings in western Kenya. This project evaluated the adaptation and acceptance of the BIGPIC model in a peri-urban slum.

Methods: Purdue University faculty and student pharmacists worked with providers from Moi Teaching and Referral Hospital (MTRH) and the AMPATH Consortium to establish a BIGPIC program at the Tumaini Center to serve the Munyaka slum and neighboring communities outside of Eldoret, Kenya. The program follows the 6 pillars of the BIGPIC model. 1) find patients portably, 2) link to peer/microfinance groups, 3) integrate education, 4) treat portably, 5) enhance economic sustainability, and 6) generate demand for care through incentives. Student pharmacists and faculty procured the supplies and medications necessary for screening events and care groups and created a sustainable work plan for the establishment of a new BIGPIC care program. They also brought together leaders of the Munyaka community, Tumaini Center administration, and AMPATH and MTRH providers to ensure community and provider support of the program.

Results: Munyaka and surrounding community chiefs and elders have been engaged and are in support of the establishment of these care programs. Screening events for hypertension and diabetes have been set for January 2017 and the microfinance team from AMPATH will create BIGPIC groups from the patients who screen positive. The providers who will care for patients in the groups at the Tumaini Center have been identified and group care has been put into their work assignments starting in February 2017.

Conclusion: The BIGPIC model, which has been proven in rural areas to effectively manage diabetes and hypertension, can be adapted and accepted in economically vulnerable populations in peri-urban areas in western Kenya. Future studies will compare patient care metrics and results from the establishment of this program outside of Eldoret to care results from rural populations to measure success of this program in peri-urban areas. This model may be replicable for other underserved populations in similar regions around the world.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 3-146

Poster Title: Evaluation of the effectiveness of a veterinary pharmacotherapy elective to prepare pharmacy students for handling veterinary prescriptions in the community setting

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Purpose: As a result of the cost savings and convenience community pharmacies can provide, an increasing number and complexity of animal-related prescriptions are being referred to community pharmacies. Pharmacists' knowledge and education can be used to develop working relationships with veterinarians so that community pharmacists can properly dispense animal medications. However, many pharmacy schools do not incorporate veterinary pharmacology into their required courses and only some offer a veterinary pharmacology elective. The objective was to determine if a veterinary pharmacy elective offered to pharmacy students improved their ability to address veterinary-related questions compared to classmates who did not take the elective.

Methods: A one-credit veterinary pharmacotherapy elective course was offered at Purdue's College of Pharmacy for second and third professional year students. The course consisted of 7 two-hour meetings, a one-hour recorded lecture and a written final exam. Thirty-two students (5 third year, 27 second year) enrolled in and completed the course. A 17 question survey was used to assess the competence and confidence with which students answered veterinary pharmacy questions. The survey consisted of three demographic questions, seven multiple choice clinical questions focusing on veterinary scenarios a pharmacist may encounter in the community setting, and seven questions assessing respondent's confidence in answering each clinical question. The survey was administered using Qualtrics. It was distributed to students in the veterinary pharmacotherapy course and students were asked to complete the survey prior to the first class session. At the end of the semester the survey was distributed to all second and third professional year students. Survey responses were anonymous at all stages. This research was exempted by the Purdue University Institutional Review Board. The primary

endpoints of this study were number of correct responses to the seven clinical questions and the respondents' confidence in their answers between responses at the beginning and end of the course and between students who had taken the course versus those who had not.

Results: Thirty-two students took the course. Thirty-one students took the survey before the start of the course (second year: 87 percent, third year: 13 percent). Twenty-four of these students took the second survey at the end of the course. After the elective, 93 students took the survey (second year: 59 percent, third year: 41 percent), including the 24 students who had taken the course and 69 students who had not taken the course. Students who took the survey at the end of the elective chose the correct answers a higher percentage of the time than when they took the survey at the beginning of the elective, yielding statistically significant results for 4/7 questions. Additionally, students who took the survey after the elective answered questions with more confidence than when they took the survey at the beginning of the elective, yielding statistically significant results for 7/7 questions. Students who took the elective consistently chose the correct answers a higher percentage of the time versus students who did not, yielding statistically significant results for 4/7 questions. Additionally, students who took the elective were more confident in answering the survey questions than their counterparts who did not, yielding statistically significant results for 7/7 questions.

Conclusion: This particular elective course did significantly increase the knowledge of students with regards to veterinary pharmacy topics that may be common in a community setting. However, the universally significant increase in confidence regardless of correct answer could be a potential cause of concern. These results are also applicable to other specialty electives. Because such courses are only foundations, it is important to emphasize that drug information resources and/or specialists may still need to be consulted when there is any uncertainty about veterinary prescriptions to ensure patient and caregiver safety.

Submission Category: Pharmacy Law/ Regulatory/ Accreditation

Submission Type: Evaluative Study

Session-Board Number: 3-147

Poster Title: United States Food and Drug Administration advisory committee outcomes and agency approval analysis from 2010 - 2015

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Purpose: Advisory committee meetings hosted by The United States Food and Drug Administration (FDA) are part of the pre-market approval process for many pharmaceuticals in which the opinion of external experts is solicited to help address areas of uncertainty. Advisory committee meetings are of substantial importance to sponsors as they come after significant time and financial investment and can have a large influence in a drug's ultimate approval. Given such implications, this analysis sought to quantify voting behavior and other characteristics of advisory committee meetings and compare that with the FDA's approval decisions in the years of 2010 - 2015.

Methods: An analysis of the Center for Drug Evaluation and Research (CDER) advisory committee meetings for the years of 2010 – 2015 was conducted by utilizing publicly available information. Information pertaining to the advisory committee (number of voting sessions, votes, and meetings; percent of meetings that were joint meetings; percent of committee members voting yes, no, abstain, or non-voting; breakdown of voting question) was obtained from the FDA's website, particularly from available meeting minutes and transcripts for each advisory committee. Information regarding the FDA's decision for approval and rationale for issuing a complete response letter was based on material gathered from drugs@fda or directly from the sponsor's website.

Results: There were 163 voting sessions, 207 votes, and 229 meetings. 25 percent of meetings were joint meetings. Voting patterns remained fairly constant with an aggregate voting pattern of 64 percent yes, 34 percent no, 2 percent abstain, and 0 percent non-voting. These percentages changed when assessing voting patterns relative to instances of favorable voting

(86 yes, 12 no, 2 abstain, 0 non-voting) and unfavorable voting (17 yes, 81 no, 2 abstain, 0 non-voting). The advisory committee voted favorably 67 percent of the time and unfavorably 33 percent. Voting questions assessed approval (63 percent), acceptable risk-benefit profile (19 percent), efficacy (8 percent), safety and efficacy (7 percent), and safety (3 percent). The FDA's approval decision supported the committee's decision in 90 percent of cases. When such agreement didn't occur (21 cases), this was due to differences in clinical opinion (43 percent), manufacturing deficiencies (14 percent), lack of manufacturing data (14 percent), and a post advisory committee event (5 percent). There wasn't enough information to determine why there was a differing opinion in 24 percent of cases. In instances in which the FDA had a differing opinion, the agency typically didn't approve a substance in which the committee recommended approval (81 percent).

Conclusion: The results support past research examining a comparable subject matter from 2001 – 2010. Voting patterns were relatively constant and generally heavily favored one outcome. The FDA's ultimate approval decision was in line with the advisory committee vote in the vast majority of cases. When it wasn't, available information indicated this was usually due to the FDA having a differing opinion on presented material's clinical importance, furthering the notion that advisory committee insight is heavily considered but not the final determinant in agency action.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 3-148

Poster Title: Retrospective review of ifosfamide associated encephalopathy for patients admitted to the inpatient oncology unit at the Indianapolis University (IU) Health, University Hospital, Simon Cancer Center

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Purpose: Ifosfamide is an alkylating agent metabolized by CYP3A4 into its active form and two inactive metabolites, one of which is neurotoxic and can lead to encephalopathy. Aprepitant, a neurokinin-1 receptor antagonist, is known to be a moderate inhibitor of CYP3A4 and is used as an anti-emetic prior to administration of ifosfamide. Anecdotal reports have suggested a possible interaction between ifosfamide and aprepitant although this idea has not currently been supported by clinical trials or recent pharmacokinetic data. This study aimed to evaluate the incidence of ifosfamide-induced encephalopathy.

Methods: All patients admitted to the inpatient oncology unit from 5/1/15-3/31/16 who had received ifosfamide were included. Patients with multiple visits were only included in the analysis one time. The primary objective of this study was to evaluate the incidence of ifosfamide-induced encephalopathy in patients receiving aprepitant versus those not receiving aprepitant as antiemetic prophylaxis. Secondary objectives compared patient characteristics among patients that developed encephalopathy versus patients who did not including: cancer diagnosis, chemotherapy regimen, dose of ifosfamide, day and cycle number when encephalopathy occurred, cisplatin use, serum creatinine level, and albumin level. An additional secondary objective was to identify other potential factors that could have exacerbated the symptoms of encephalopathy such as drug interactions, presence of brain metastases, use of opioids, benzodiazepines, or other anti-emetics. As this was a retrospective review, encephalopathy cases were categorized into “no encephalopathy” and “proven/probable encephalopathy” cases based on the description of symptoms in the medical records. They were also classified by the common terminology criteria for adverse events (CTCAE) and

separated into grades 1/2 and grades 3/4 encephalopathy. This study was approved by the Indiana University Institutional Review Board.

Results: Fifty-one unique patients received ifosfamide during this time period and 14 of 51 (27.5 percent) developed encephalopathy. Of the 51 total patients, 34 patients received aprepitant and 17 did not. The incidence of proven or probable encephalopathy was 17.6 percent (6 out of 34) in patients receiving aprepitant and 47.1 percent (8 out of 17) in patients not receiving aprepitant (p equals 0.045). Based on these data, the interaction between aprepitant and ifosfamide was not found to be statistically significant in regards to increasing the incidence of encephalopathy and there were no appreciable differences in the baseline characteristics between the groups. Of the 14 patients that developed encephalopathy, 6 were classified as CTCAE grade 1/2 and 8 were classified as grade 3/4. Encephalopathy occurred during the first cycle for 12 of the 14 patients (85.7 percent) and occurred on the second day of the cycle for 7 of the 14 patients (50 percent). Notably, there were no significant differences in any of the secondary outcomes analyzed.

Conclusion: The results of this study suggest that patients who received aprepitant were actually less likely to develop encephalopathy, therefore the use of this effective anti-emetic may not need to be avoided when using ifosfamide.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 3-149

Poster Title: Board of pharmacy practices related to medication errors and the impact on patient safety

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Purpose: Individual state boards of pharmacy are responsible for developing regulations to govern the practice of pharmacy. Individual rules for governing practice may vary by state, but the primary premise for these regulations is to protect the public health. All boards must deal with reported medication errors and determine the most appropriate course of action with regard to each individual case. Actions taken as a result of an error may not always be in the best interest of public health. This study evaluated the policies and procedures of boards of pharmacy in response to medication error cases.

Methods: This study was approved as exempt from full review by the Purdue University Institutional Review Board. The primary objective of this study was to identify and compare "error response" practices among 54 boards of pharmacy that are members of National Association of Boards of Pharmacy (NABP). The survey was distributed to state boards of pharmacy contacts. The contact list was obtained from NABP. Survey responses included an electronic survey with phone follow up for clarification or non-responders. All complete responses were included in final data analysis. The survey was administered using the Qualtrics (Provo, Utah) survey software and consisted of 15 closed response questions, of which 3 questions were case-based. The case-based questions presented responders with a medication error event occurring and the subsequent response that their board of pharmacy would have taken depending on the level of harm (no harm, temporary harm, permanent harm, or death). The survey remained open from August 20, 2015 to September 24, 2015. The survey questions were designed to collect demographic information, information regarding various disciplinary options, and specific improvement plans associated with any board action. Comparator data was also collected, including: board composition (i.e., size, practitioner expertise, and public involvement), state population or state geography (US region). Collection of survey responses occurred automatically through the Qualtrics survey manager.

Results: The survey was completed by 24 individuals representing different state boards of pharmacy, representing a 44.4% response rate. The majority of respondents were the state executives of the board of pharmacy (80%), were pharmacists (63%), and had more than 5 years of experience on the board of pharmacy (54%). A majority of responders (63%) reported that their state does not require medication safety or medication error training of its licensees or registrants. The survey also revealed that a majority of responders (71%) indicated that board members are not provided orientation materials related to medication safety or medication errors. When a medication error is reviewed, 42% of responders stated that their board of pharmacy does not require performance improvement or system re-design strategies to be employed. Ninety-one percent of respondents reported that actions taken against pharmacists who commit errors are developed on a case by case basis. The cases showed similar levels of actions levied against pharmacists depending on the severity of harm to the patient among the different situations without much regard to the actual action taken by the pharmacist and whether or not the case represented negligence and recklessness, natural human error, or a flawed system.

Conclusion: This study demonstrates an opportunity for boards of pharmacy to improve consistency of practice. Current opportunities for improvement are error reporting, safety training, and process improvement. This study demonstrated that boards of pharmacy make punitive decisions based on outcome to a patient in response to a medication error without regard to the nature of the error and make minimal efforts to avoid similar problems for future patients. Aiming to protect public health, boards of pharmacy should strive to be proactive and prevent future errors instead of punishing an action of the past.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 3-150

Poster Title: Exploratory comparison of the PRIMROSE-LDL and PRIMROSE-BMI equations versus the Pooled Cohort equation for cardiovascular risk prediction in patients with serious mental illness

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Purpose: Studies have shown that patients with serious mental illness (SMI) are at a higher risk for cardiovascular mortality and metabolic disorders than the average population. Interventions in these patients can reduce cardiovascular risk factors, however, a significant amount of patients are not optimally managed to reduce these risk factors. Various risk calculations have been established to predict cardiovascular risk, but it is unknown how accurate these predictions are in patients with SMI. The purpose of this study was to describe the correlations between calculations with PRIMROSE-LDL and PRIMROSE-BMI equations and the pooled cohort equation in patients with SMI.

Methods: The institutional review board approved this retrospective chart review. We identified patients using schedules of providers at the clinic. We included patients if they had a diagnosis of schizophrenia, schizoaffective disorder, bipolar disorder, or other mental illness with a component of psychosis (e.g., major depressive disorder with psychotic features), and were between the age of 40 and 79. We recorded sex, age, home medications, race, high-density lipoprotein (HDL) level, total cholesterol (TC) level, most recent systolic blood pressure (SBP), weight, height, current diagnoses, alcohol use history, smoking status, and Area Disparity Index quintile for each patient. We used these values to calculate and record 10-year risk of a cardiovascular event using the PRIMROSE-LDL, PRIMROSE-BMI, and Pooled Cohort equations for each patient. We tested the results for normality using the Shapiro-Wilk Test. We tested for differences in values from each equation using Friedman's ANOVA, and then the Wilcoxon signed-rank test if the results from Friedman's ANOVA was significant. The significance level for

Friedman's ANOVA was set a priori at $\alpha=0.05$. To decrease bias from multiple comparisons for the Wilcoxon signed-rank test, we adjusted the significance level to $\alpha=0.0167$ using the Bonferroni correction.

Results: We identified a total of 39 patients. The average ten-year risk of cardiovascular events was 12.4% (95% CI 9.2 – 15.6%) with the Pooled Cohort equation, 8.0% (95% CI 5.8 – 10.2%) with the PRIMROSE-LDL equation, and 11.8% (95% CI 9.1 – 14.5%) with the PRIMROSE-BMI equation. After evaluating the data using Friedman's ANOVA, there was a statistically significant difference in risk predictions between the three equations ($\chi2=25.436$, $p < 0.001$). After evaluating using the Wilcoxon signed-rank test, there was a statistically significant increase in risk prediction with the PRIMROSE-BMI equation than the PRIMROSE-LDL equation ($r=-0.78$, $p < 0.001$), and statistically significant decrease in risk prediction with the PRIMROSE-LDL equation than the Pooled Cohort equation ($r=-0.53$, $p=0.001$). There was not a statistically significant difference between the PRIMROSE-BMI and Pooled Cohort equations ($p=0.989$).

Conclusion: Use of the PRIMROSE-LDL equation gave a lower ten-year risk of cardiovascular events than the Pooled Cohort equation and the PRIMROSE-BMI equation. This raises questions of whether different populations have different correlations and differences in risk prediction when using one equation over another. The results from this study spurred the interest of the investigators to perform another study with a larger sample size, to better describe these correlations.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 3-151

Poster Title: Retrospective review of adult patients with solid tumor cancers receiving rivaroxaban therapy: Assessment of associated bleeding risks

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Purpose: Oral direct factor Xa inhibitors such as rivaroxaban are used to prevent venous thromboembolic events. The current National Comprehensive Cancer Network guidelines do not recommend rivaroxaban therapy for acute and chronic management in patients with cancer. However, the use of this agent has increased in the oncology population. The purpose of this study is to evaluate toxicities associated with rivaroxaban anticoagulation therapy in oncology patients at Indiana University Health University Hospital and the Simon Cancer Center.

Methods: This retrospective review was conducted at the Indiana University Health University Hospital, the Simon Cancer Center, and their associated outpatient oncology clinics in Indianapolis, Indiana. The electronic medical record system identified patients from these sites who had received rivaroxaban for anticoagulation management. Patients were included if they were eighteen years of age or older, had cancer listed in their past medical history, and received rivaroxaban for anticoagulation management from January 2013 to February 2016. The exclusion criteria included patients with hematological cancers, benign tumors, basal cell carcinomas, multiple cancers, and unknown indication for rivaroxaban. Data was collected from one hundred and forty-four patients who met the inclusion criteria. The data collection sheet included the following: age, gender, weight, cancer type, cancer stage, cancer treatment history, rivaroxaban indication, rivaroxaban dose, rivaroxaban duration of therapy, major bleeding (any bleeding requiring treatment or hospitalization), minor bleeding (any bleeding not requiring treatment or hospitalization), recurrent thrombosis, previous anticoagulation therapy, smoking status, history of atrial fibrillation, and survival status. All data were collected without patient identifiers. This study was approved by the Indiana University Institutional Review Board.

Results: Sixty four (44 percent) out of one hundred and forty-four patients experienced bleeding while receiving rivaroxaban therapy. There were six cancer types that had a higher incidence of bleeding: bladder, breast, melanoma, pancreas, prostate, and renal cell. Six out of fifteen bladder cancer patients (40 percent) experienced bleeding with 26.7 percent and 13.3 percent classified as major and minor bleeding, respectively. Seven out of thirteen breast cancer patients (53.8 percent) experienced bleeding with 46.2 percent and 7.7 percent classified as major and minor bleeding, respectively. Five out of ten melanoma patients (50 percent) experienced bleeding with 10 percent and 40 percent classified as major and minor bleeding, respectively. Eleven out of nineteen pancreas cancer patients (57.9 percent) experienced bleeding with 36.8 percent and 21.1 percent classified as major and minor bleeding, respectively. Ten of out twenty-two prostate cancer patients (45.5 percent) experienced bleeding with 13.6 percent and 31.8 percent classified as major and minor bleeding, respectively. Lastly, five out of nine renal cell cancer patients experienced bleeding (55.6 percent) with 44.4 percent and 11.1 percent classified as major and minor bleeding, respectively. No other data collected identified any increased risk of bleeding in these patients.

Conclusion: Patients on rivaroxaban therapy with bladder, breast, melanoma, pancreas, prostate, or renal cell cancers were at higher risk for bleeding than other solid tumor cancers. Major bleeding incidences were higher in patients with bladder, breast, pancreas, and renal cell cancers. Minor bleeding incidences were higher in patients with melanoma and prostate cancer.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 3-152

Poster Title: A study of medication disposal practices through a state-wide collection project

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Purpose: Demand for prescription medications is on the rise, with 4.4 billion prescriptions filled by pharmacies in the United States in 2015. Of those, one third, or about 200 million pounds of medication are unused and often accessible for misuse. In 2014, more people died from drug overdoses than ever before. Additionally, improper medication disposal poses a threat to our environment, contaminating our land and water. The purpose of this study is to describe disposal practices and attitudes of patrons using the Yellow Jug Old Drugs medication disposal program in an attempt to address these growing concerns.

Methods: In the fall of 2015, a Purdue pharmacy faculty member and an advanced pharmacy student led a duel initiative in the Purdue University Pharmacy to begin a medication disposal program (Yellow Jug Old Drugs - operated by Great Lakes Clean Water Organization) in addition to an IRB-approved survey research project to study the practices and attitudes of patrons bringing in medication for disposal. In the spring of 2016, additional Indiana-based pharmacies participating in the same disposal program agreed to collect and share information. These include an independently owned pharmacy, as well as outpatient clinics affiliated with Eskenazi Health in Indianapolis - a Level I trauma center and teaching hospital serving vulnerable populations in Marion County, Indiana. The anonymous, voluntary paper survey involved 20 multiple choice and yes/no questions about the participants' demographics, reason(s) for participation, who the medication owners were, where the medications were obtained, knowledge on opportunities for disposal within their community, willingness to pay for a disposal service, as well as other questions. The number of medications returned per participant were tracked as well. Descriptive statistics were performed using Excel 2016 and the data were analyzed for frequencies and trends.

Results: Forty seven medication disposal surveys were completed by pharmacy patrons utilizing the disposal service. In total, approximately 400 different types of medications were collected for disposal by those completing the surveys. Eighty-five percent of medications collected were prescription and obtained from a local pharmacy. Eighty-seven percent indicated their primary reason for visiting the pharmacy was for medication disposal and almost 45 percent first learned about the take-back program while visiting the pharmacy for another purpose. Sixty-two percent indicated that their medication had expired and 36 percent indicated their medication regimen had changed. Fifty-one percent noted that their primary motivation for using this service was to protect the environment, with 43 percent indicating a concern of theft/abuse. Prior to using this service, approximately 60 percent of participants reported disposing of unwanted medications either by flushing them down the toilet/sink, or placing them in the trash. Twelve participants reflected in writing on barriers to properly disposing of medications with the majority (67 percent) listing “limited access” to opportunities as the greatest barrier. Sixty-six percent indicated it was their first time disposing of medications through a service, with 85 percent stating they are likely to recommend this program to a friend.

Conclusion: Each year, more than one billion medications go unused in the United States. Medication consumers are concerned that improper disposal is harmful to the environment and may promote medication misuse and abuse. Results suggest that consumers want to properly dispose of medications, but do not know best practices for medication disposal, or have limited access to medication disposal programs. The Yellow Jug Old Drugs medication disposal program is one method of providing a convenient, accessible option for consumers to safely dispose of unwanted medications in an environmentally friendly manner.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 3-153

Poster Title: Calibrated Peer Review to Introduce the Pharmacists' Patient Care Process: Student Perceptions Survey

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Purpose: Pharmacists' patient care process (PPCP) is an approach used to optimize health outcomes using patient-centered care with collaboration from other healthcare professionals. However, activities related to these are difficult to implement and assess in large enrollment healthcare courses. Calibrated peer review (CPR) is a tool that allows students to practice PPCP skills and interprofessional communication through cases. CPR provides an advantage over multiple-choice because students have the opportunity to develop clinical skills, and evaluate themselves and peers using rubrics. The purpose of this study was to assess pharmacy student perceptions of CPR to introduce and assess aspects of the PPCP.

Methods: A voluntary survey was administered to first year professional doctor of pharmacy students during the fall semester. The survey focused on outcomes related to the PPCP: collecting information, assessing available information, creating a patient-specific plan, implementation of the plan, and follow-up. Students were asked to complete the survey prior to completing the first PPCP assignment. Since students tend to struggle with the subjectivity of the PPCP, the survey assessed first year professional students' confidence in their ability to use CPR. Students ranked their confidence levels using a five-point Likert scale to rate their confidence: as very confident (extremely sure of his or her decision and no need for further guidance), confident (sure of his or her decision with limited guidance needed), somewhat confident (sure to some extent of his or her decision requires some guidance), slightly confident (unsure of his or her decision and requires much guidance), and not at all confident (completely unsure of his or her decision and unable to do on his or her own).

Results: The survey was administered to first year professional students and received 165 responses with 100% of students responding. 65.5% of students (108/165) reported previous use of CPR with non-pharmacy assignments. When asked about patient-specific tasks, over 50% of students were less than confident on each task with the exception of writing a SOAP note. Only 35.2% (58/165) were less than confident in their ability to prepare a SOAP note. Students reported their ability to create a ranked problem list as 67.9% (112/165) less than confident. Students responded with 64.8% (107/165) being less than confident in determining pertinent patient specific factors. When asked their ability to recommend patient-specific recommendations, 75.2% (124/165) were less than confident in their ability to provide recommendations with 59.4% (98/165) less than confident about being able to provide supporting evidence for their recommendation. When then asked about their confidence to develop written communication to another healthcare professional, 66.7% (110/165) were less than confident in their ability to do so. Finally, 75.8% (125/165) were less than confident in their ability to prepare a care plan.

Conclusion: The survey found many first year professional students were not confident in their ability to perform PCPP skills. In addition to current curricular activities, CPR is a tool that can develop and enhance students' ability to make patient specific decisions and improve patient outcomes. By practicing skills and evaluating themselves and peers, CPR enables students to apply and reinforce the necessary PCPP skills to enhance patient care.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 3-154

Poster Title: Outcomes of empiric urinary tract infection (UTI) management versus empiric treatment with ampicillin and gentamicin

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Purpose: Urinary tract infections (UTI) are a common problem in the United States. Treatment options are relatively well-studied for acute uncomplicated cystitis in the outpatient setting; however, there is less data regarding treatment of complicated UTIs in the hospital. Local susceptibility data has shown that commonly used agents, such as ciprofloxacin and ceftriaxone, cover less than 70 percent of organisms seen in the urine. The purpose of this study is to evaluate the agents currently used at Methodist Hospital for efficacy and susceptibility rates of urinary pathogens to compare with a newly implemented initiative treating UTIs empirically with ampicillin and gentamicin.

Methods: The institutional review board approved this prospective evaluative study. A data reporting system, MedMined, was used to generate a report of patients with positive urine cultures between October 1 and December 31st, 2015. Patients were included if they were greater than 18 years of age, and showed at least 105cfu/mL white blood cells on urinalysis if un-catheterized, and 103cfu/mL if catheterized. Patients were excluded if they did not receive antimicrobial treatment for a UTI during their hospital stay, received antimicrobials for another infection, were never inpatient, died or were admitted to hospice within 48 hours of positive urine culture. Patient's culture and susceptibility were recorded, as well as the length of initial therapy and the need for a change in therapy. Time of total active therapy was calculated, as well as time without active antibiotics. Active therapy agents were reported, and the patient was evaluated for clinical success. Primary endpoint was clinical success defined as a combination of not needing to change therapy to cover identified organism, no readmission for UTI and no repeat urine culture with same organism. Secondary outcomes will be percentage of urinary pathogens covered by selected antimicrobial(s), time to initiation of active therapy and microbiological cure in patients with repeat culture data available.

Results: Preliminary results represent a sample group of 80 patients, 45 of whom met inclusion criteria. This preliminary data showed a clinical success rate of 58 percent. 27 percent of patients required a change in therapy. Ceftriaxone and ciprofloxacin were the two most commonly selected systemic agents for initial therapy (24 percent and 15 percent respectively). Unfortunately, ceftriaxone covered only 42 percent of pathogens, and ciprofloxacin covered only 44 percent. By comparison, these preliminary findings showed that ampicillin with gentamicin would cover 70 percent of pathogens. The most common pathogen was Escherichia coli, making up 36 percent of infections. Klebsiella pneumoniae was the second most common, followed by Enterococcus species. On average, patients went 24 hours without appropriate antibiotic coverage.

Conclusion: Initial antimicrobial therapy for UTIs is often based solely on susceptibility rates of Escherichia coli. Our preliminary findings show that there are other organisms commonly identified and the majority of patients were initially treated with antibiotics that have poor coverage for most UTI pathogens. Low rates of clinical success and the need to change therapy often with current practice support the initiative to empirically treat UTIs with the combination of ampicillin and gentamicin.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 3-155

Poster Title: Adherence to spironolactone

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Purpose: Spironolactone is a potassium-sparing diuretic and an aldosterone antagonist. While this medication can contribute to reduced cardiovascular risk and mortality, patient adherence to this medication is usually lower than other anti-hypertensive medications without documented reasons. The study objective is to observe adherence rates and side effects among patients prescribed spironolactone considering gender and race.

Methods: We conducted an observational study using electronic medical record data from the Indiana Network for Patient Care (INPC). This patient population is representative of patients in the state of Indiana, USA. The population of interest for this study includes patients 18 years of age and older taking spironolactone and/or other antihypertensive medications at some point during 2003-2014. We assessed reported side effect rates from prescriber notes using text mining technology and assessed adherence from pharmacy fill records. This study was approved by Indiana University institutional review board and all analyzed data was de-identified.

Results: According to proportion of days covered (PDC) at 180 and 365 days, patients taking spironolactone had lower adherence rates when compared to all other anti-hypertensives combined. Whites had higher adherence rates at 90 and 180 days compared to blacks and males had higher adherence rates than females. After text mining of patient charts was used to determine potential causes for this difference, it was shown that blacks had higher rates of documented adverse events than whites, which is reflected in the lower adherence rates for black patients. When examining text mining results for gender, males had higher rates of

documented adverse effects than females, yet adherence rates for males were higher than females.

Conclusion: Adherence rates and adverse events for patients taking spironolactone need to be examined further in order to determine the reason(s) for these differences.

Submission Category: Pediatrics

Submission Type: Descriptive Report

Session-Board Number: 3-156

Poster Title: Creating a Play Area for Shoe4Africa Pediatric Hospital: A Purdue University College of Pharmacy Service Learning Project

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Purpose: Opened in 2015, Shoe4Africa is East Africa's first public pediatric hospital. With just over 100 beds, the hospital provides quality inpatient and outpatient care to hundreds of children daily. Purdue University student pharmacists participate in patient care activities at the hospital. During this experience, a need was identified for a play area for the children and their families. Therapeutic play has been shown to improve outcomes for hospitalized children. The purpose of this project was to develop an area for therapeutic play at this hospital and provide an opportunity for student pharmacists to address patient needs outside of the pharmacy.

Methods: While in Kenya, student pharmacists explored ways to further their involvement at the local practice sites and impact the local community. Building a safe play area for the pediatric patients at Shoe4Africa was identified as an opportunity for growth and further engagement for Purdue students. An extensive literature search was performed to identify the needs for therapeutic play and improved patient health outcomes. Student pharmacists further researched appropriate equipment to maximize the benefits children are able to gain through therapeutic play. A meeting with child-life leaders at Shoe4Africa was arranged to discuss and determine the location-specific needs and requirements. Plans were tailored to build a stimulating, safe, and inclusive playground for the local pediatric population. Existing equipment was evaluated and it was decided that some could be repurposed. The need for new equipment was crucial to provide an appropriate and safe area. The cost of the additional parts and equipment was researched to develop a plan for the play area. A service learning grant application was submitted to obtain the funds to support this project.

Results: Literature shows support of therapeutic play as a method to improve health outcomes in pediatric patients. According to the Child Life Council Evidence-Based Practice Statement on therapeutic play in pediatric healthcare, "Research provides evidence for the effectiveness of therapeutic play in reducing psychological and physiological stress for children facing medical challenges." This statement is based on nine quantitative and one qualitative studies. Additionally, over ten professional organizations throughout the globe are strong supporters of therapeutic play. To finance the project a service learning grant for $1,500 was obtained through the Purdue University Office of Engagement. These funds were used to purchase the materials needed to build new equipment and refurbish the existing pieces in order to provide an appropriate environment for children to play. The area is providing a creative outlet for hundreds of children that walk through the doors of Shoe4Africa each day. Six student pharmacists were directly involved in the initiation of the project. Additionally, each year 24 student pharmacists on an 8-week advanced pharmacy practice experience in Eldoret will continue the project involvement by enhancing the equipment, building cross-cultural bonds with pediatric patients through play, and expansion of the current services provided.

Conclusion: This project and grant provided a foundation for child-life services and therapeutic play at Shoe4Africa. Participation in this project allowed student pharmacists to learn about patient care and community engagement outside of the pharmacy, develop communication skills, and break cultural barriers. Student pharmacists are now given the opportunity to develop skills beyond their pharmacy training though engaging in therapeutic play that can later translate to interactions with other pediatric populations. Future plans for the play area include incorporating medication education for the parents conducted by student pharmacists and promoting healthy activities for children and their families.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 3-157

Poster Title: Retrospective review of the safety and efficacy of everolimus use post liver transplantation in patients with hepatocellular carcinoma

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Purpose: Liver transplantation is the most effective treatment for hepatocellular carcinoma (HCC); however, recurrence is common. One prevention strategy uses mammalian target of rapamycin (mTOR) inhibitor based immunosuppressive regimens due to their direct antitumorigenic effect. Since everolimus gained Food and Drug Administration approval for liver transplant in 2013, it has replaced sirolimus at Northwestern Memorial Hospital (NMH) as the primary mTOR inhibitor used in liver transplant recipients. Clinicians at NMH have reported everolimus intolerance and subsequent discontinuation in this patient population. The purpose of this study was to determine discontinuation and adverse effect rates of everolimus in liver transplant recipients.

Methods: This was a single-center, retrospective study conducted at NMH in Chicago, Illinois. Patients 18 years of age and older with a diagnosis of HCC who received everolimus at any point post-liver transplant from January 1, 2007 to August 17, 2016 were included in this study. Patients were excluded if they were on sirolimus at any time prior to everolimus initiation or if they had a history of human immunodeficiency virus. A chart review was performed to collect basic demographics, duration of everolimus use, concurrent immunosuppression and drug levels, adverse effects, incidence of rejection, treatment of rejection, and graft and patient survival. The primary objective of this study was to determine the discontinuation rate in patients using everolimus. Secondary objectives included identifying reasons for discontinuation, duration of everolimus therapy prior to discontinuation, adverse effects related to everolimus, average everolimus and tacrolimus levels during therapy, rate and type

of rejection episodes, and graft and patient survival. Further endpoints examined the need for additional drug therapy required to treat adverse effects such as hypertriglyceridemia and neutropenia. This study was approved by the NMH institutional review board.

Results: Thirty-nine liver transplant recipients with a diagnosis of HCC were included in this study. Everolimus was started a median of 84 days after transplant with a median exposure of 387 days for all patients. Twelve patients (30.8 percent) discontinued therapy due to adverse effects after using everolimus for a median of 95 days. The most common reasons for discontinuation were mouth sores (n equals 3, 25 percent) and lung toxicities (n equals 3, 25 percent). Median everolimus levels for those who continued and discontinued therapy were 4.43 ng/ml and 4.93 ng/ml, respectively, and were not statistically different (p equals 0.92). Most patients experienced at least one adverse effect (n equals 33, 84.6 percent). Common adverse effects among all patients included infection (n equals 13, 33.3 percent), diarrhea (n equals 12, 30.8 percent), elevated liver enzymes (n equals 10, 25.6 percent), and neutropenia (n equals 10, 25.6 percent). Rejection was seen in four patients (10.3 percent); three episodes of acute-cellular mediated rejection and one episode of antibody-mediated rejection. Concurrent immunosuppression most often included tacrolimus (n equals 36, 92.3 percent) and mycophenolate mofetil (n equals 12, 30.8 percent). There were no episodes of HCC recurrence, graft failure or mortality reported.

Conclusion: Everolimus remains a viable immunosuppression option for HCC patients undergoing liver transplant. This study demonstrated that overall adverse effects secondary to everolimus were common, and approximately one-third of patients discontinued therapy due to adverse effects. Our findings were consistent with those seen in a pivotal trial with everolimus for liver transplant, where 96.3 percent of patients reported any adverse reaction and the discontinuation rate was 28.6 percent. Whether the risk of adverse effects outweighs the potential benefit of preventing HCC recurrence will still need to be determined in a larger, randomized controlled study with long term follow-up.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 3-158

Poster Title: Development of a novel interdisciplinary mobile application to enhance healthcare students' medical/medication knowledge and verbal communication skills

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Purpose: To develop, pilot, assess and describe a new interdisciplinary game-based phone application intended to help healthcare students learn medication/medical terminology, as well as enhance their ability to communicate this information to a variety of audiences, including patients, healthcare providers, preceptors and insurance companies. The research question is: Do students believe this application increases their knowledge of medication/medical terminology, and understanding of the importance of assessing the audience's health literacy and adapting communication style? Originally designed as a teaching tool, user feedback will also help the researchers determine the utility of the application as a study tool.

Methods: This IRB-approved project called "PharmPhrase" was developed using an application-development software program. The pilot involved multiple groups of competing teams composed of volunteer, first professional year pharmacy students randomly assigned into teams of three to five. Each group of two teams required one cell phone loaded with the application. Players within each team have defined roles: "user" (person explaining the term from the app), "responders" (team members deducing the term), and "scorekeeper" for the opposing team. The first user begins the timed game by selecting from categories of pre-loaded medical terms and presses "GO" to randomly generate the first term. The user explains the term to team members based on assumptions of medical literacy within the team. If team members do not understand/identify the term, the user must rephrase their explanation in order to "win" the play. Teams rotate play until time is up. Scores, including the number and reasons for skipping terms, were recorded for future analysis. Following the game, players were asked to complete an electronic survey that asked for demographic information, perceptions, and feedback on the app in order to answer the research questions.

Results: Thirty-one first-year professional pharmacy students participated in the pilot of this application and completed a retrospective pre- and post-survey by indicating their level of agreement with statements using a five-point Likert scale with 1 indicating strongly disagree and 5 indicating strongly agree. Following use of PharmPhrase, the participants' understanding of the importance of assessing health literacy did not significantly change from pre to post (mean 3.94, SD 0.772; mean 3.97, SD 0.752, respectively; P equals 0.813). Slightly more than half (58 percent) of participants agreed or strongly agreed that they were familiar with the medical terms in the application on the pre-survey (mean 3.55, SD 1.06); however, after using PharmPhrase, nearly 81 percent agreed or strongly agreed that they better understood these terms (mean 4.10, SD 0.79, P equals 0.03). Fifty-eight percent of students agreed or strongly agreed that they routinely adapted their style of communication to their audience's needs prior to use of the app (mean 3.52, SD 0.626). After using PharmPhrase, 90 percent of the students agreed or strongly agreed that they are more likely to adapt their communication style to meet the needs of their audience in future healthcare interactions (mean 4.06, SD 0.772, P equals 0.001).

Conclusion: This application is intended to be an additional active-learning teaching tool to help move students' conceptual knowledge to that of understanding and application. The researchers will conduct additional pilots with other healthcare disciplines so students can learn how best to communicate with one another. Pilot results with pharmacy students demonstrated increased perception of knowledge and an increased ability to adapt communication style to the audience. Students viewed the app as a fun and engaging education tool, with promise for use as a study tool.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 3-159

Poster Title: Drug screening policies and procedures at colleges and schools of pharmacy

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Purpose: Substance abuse is on the rise, and healthcare students are at risk due to a rigorous curriculum, knowledge of and easy access to drugs, and social and extracurricular pressures. Pharmacy administrators, more than ever before, are in the position of safeguarding the welfare of students and patients they serve, as well as protecting the integrity of their programs and the reputation of the pharmacy profession. The purpose of this study was to explore the drug screening policies and procedures in U.S. colleges and schools of pharmacy, frequency of drug-related incidents, and types of substances most frequently abused among pharmacy students.

Methods: The institutional review board approved use of this web-based survey. The survey was reviewed and tested by 9 individuals, including a Dean of Student Affairs and Academics/Assessment, Experiential Program Director, Associate Professor of Pharmacy Practice, and Clinical Associate Professor of Pharmacy Practice from four schools prior to implementation. Topic areas included administrative perspectives on drug screening students, determination of the entities which create and administrate drug screening policies and procedures, types and frequencies of incidents, and methods to address inappropriate drug use following positive test results for both incoming and current students. The survey instrument used skip logic and consisted of 4 to 26 questions, depending on responses, plus 6 demographic questions. An email describing the research project and an invitation to complete the survey was sent to 129 Accreditation Council for Pharmacy Education (ACPE) accredited and 6 candidate status school of pharmacy administrators, including deans, experiential education, and student services personnel. A reminder email was sent two weeks later. Lastly, a paper copy of the survey was sent to non-responding schools. Responses to questions were

confidential and not linked to any individual or school, but were combined and analyzed collectively to provide a national perspective.

Results: An administrator from 98 schools of pharmacy responded to the survey for a 73 percent national response rate. Fifty-eight percent have a drug screen program and 42 percent do not. Approximately 71 percent of schools that identified as private, drug screen students, compared to only 44 percent of schools that identified as public. Schools with a program provided initial motivation(s) for the implementation of their program and primary reasons included experiential site requirement (68.5 percent), pharmacy school admission requirement (32.9 percent), protection of the profession (23.3 percent), deterrence of drug abuse/addiction (16.4 percent), and/or a specific drug-related incident (6.8 percent). Known incidents involved the following substances: alcohol (79.5 percent), marijuana (61.1 percent), amphetamines (42.3 percent), opiates and heroin (26.9 and 7.7 percent, respectively), benzodiazepines (14.1 percent), cocaine (7.7 percent), and others (16.9 percent). On average, schools that drug screen students are aware of 0.85 (standard deviation equals 1.06) drug-related and 1.44 (standard deviation equals 1.95) alcohol-related incidents per year, compared to 0.95 (standard deviation equals 1.2) drug-related and 2.47 (standard deviation equals 2.47) alcohol-related incidents at those that do not. Approximately 76 percent of administrators responded that they feel random drug screening would deter pharmacy students from substance abuse.

Conclusion: The results of this national survey are one consideration when evaluating the need to institute or enhance a drug screening program in a school of pharmacy. A drug screening program can assist in safeguarding students' health and welfare while in the school's charge, promote compliance with federal and state laws/regulations, help ensure optimal patient care, and protect the integrity of the school and the profession of pharmacy.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 3-160

Poster Title: Impact of cardiovascular comorbidities on healthcare costs in patients with diabetes

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Purpose: Cardiovascular (CV) disease is two to four times more prevalent in patients with diabetes compared to people without diabetes. Among diabetes patients age 65 or older, more than half die from some CV condition and 16 percent die of a stroke. Since CV disease is a common diabetes complication, this study sought to quantify the impact of CV comorbidities in diabetes patients on the total healthcare expenditure.

Methods: A sample was drawn from 2014 Medical Expenditure Panel Survey (MEPS), a survey of a nationally representative sample of the U.S. population. Adults aged 18 years and older with self-reported diagnosis of diabetes that was confirmed by a follow-up question asking patients if the diagnosis was from a healthcare professional were included in the sample. Individuals with any missing data on study covariates were excluded. Patients were classified as having cardiovascular comorbidity if they reported having ever been diagnosed with any of the following conditions: hypertension, coronary heart disease, angina or angina pectoris, heart attack or myocardial infarction, stroke, or other kind of heart disease. Due to skewed distribution of healthcare expenditures, a generalized linear model with gamma distribution and log link were used to assess association between CV comorbidity and healthcare costs among patients with diabetes. The model adjusted for age, gender, race, education, family income, insurance coverage, self-perceived health status and duration of diabetes. The MEPS sampling weights were used to adjust for the complex survey design. An a priori alpha of 0.05 was used to determine significance. Data analyses were performed using SAS version 9.4 and STATA version 14.1.

Results: A total of 2,022 individuals met study criteria, of which 1,656 (81.9 percent) had one or more CV comorbidities. Patients with CV comorbidity were older, 62.3 mean years (standard deviation equal to 13.0 years) compared to those without CV comorbidity, 52.2 mean years (standard deviation equal to 14.4 years), p-value less than 0.001. There was no significant difference in prevalence of cardiovascular comorbidity among males (83.6 percent) and females (80.6 percent), p-value equal to 0.091. Non-whites had higher prevalence of CV comorbidity (85.2 percent) than whites (80.0 percent), p-value equal to 0.004. Patients with CV comorbidity had longer duration of diabetes, 12.9 mean years (standard deviation equal to 9.9 years) than those without CV comorbidity, 9.7 mean years (standard deviation equal to 8.7 years), p-value less than 0.001. The unadjusted cost associated with CV comorbidity was 7,454 U.S. dollars (USD) per year (95 percent confidence interval, 5,541 USD to 9,366 USD), p-value less than 0.001. After adjusting for study covariates, the estimated cost associated with CV comorbidity decreased to 5,606 USD per year (95 percent confidence interval, 3,282 USD to 7,931 USD), p-value less than 0.001.

Conclusion: Cardiovascular comorbidity is a significant contributor to healthcare expenditure in patients with diabetes with an annual associated cost of 5,606 USD. Subjects with older ages and longer duration of diagnosis tended to have a higher risk of CV comorbidity.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 3-161

Poster Title: Perceived roles of community pharmacists and pharmacy technicians in patient referrals to community-based health resources: A study from the Medication Safety Research Network of Indiana

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Purpose: Community pharmacists are ranked among the most trusted healthcare providers. Pharmacies often serve as informal community health access points with pharmacy staff as the first point of care for many patients. Given their accessibility and affordability, community pharmacists are a significant link between patients and information relevant to their health. The purpose of this study was to explore the attitudes of community pharmacists, pharmacy technicians, and patients regarding their perceptions of pharmacist referrals of patients to community-based health resources.

Methods: Community pharmacies were recruited through the Medication Safety Research Network of Indiana: Rx-SafeNet, a practice-based research network of community pharmacies in Indiana. A purposeful sample of pharmacists and pharmacy technicians was recruited to allow for a balanced and maximized perspective of the pharmacy environment, and patients were recruited using convenience sampling at the participating pharmacies. Three interview guides were designed to elicit information from pharmacists, pharmacy technicians, and patients. Face-to-face, semi-structured interviews were audio-recorded with permission from participants. Audio recordings were transcribed verbatim, and interview transcripts were coded and analyzed by two members of the study team using an open-coding approach to qualitative thematic analysis. A comprehensive codebook was compiled from identified trends and themes, with more specific and descriptive sub-codes accompanying broader main codes. MAXQDA, a qualitative data analysis software program, was used to systematically organize, code, and evaluate data. Cross-tabulation analyses were conducted according to participant

type and pharmacy site to assess trends across different participant groups. This study was approved by the Purdue University Institutional Review Board.

Results: Interviews were conducted with seven pharmacists, fifteen pharmacy technicians, and fifteen patients recruited from four different independent community pharmacy locations. Pharmacists were acutely aware of lapses in patient health literacy and awareness of available resources, and they identified pertinent barriers to expanding the promotion of community programs. General follow-up after referrals was lacking, and most pharmacy staff reported not knowing the impact of their recommendations on patients' health. A large segment of participants recognized the pharmacy technician as underutilized in the provision of pharmacy services; pharmacy technicians often described their own roles as limited due to lack of knowledge or fear of overstepping the confines of their positions. Patients were generally aware of the pharmacist's day-to-day responsibilities but were unaware of the pharmacist's role in referring patients to community health resources. While many patients were able to name general community-based resources, fewer were able to accurately identify specific health-related resources. Despite the lack of follow-up, patients reported strong satisfaction with their pharmacists, placing significant value on pharmacist-patient interactions. While demographic differences existed between the four locations, cross-site responses were consistent in nature. In contrast, trends in responses differed strongly based on participant type, as described previously.

Conclusion: Patient perspective of the pharmacist role may need to be expanded beyond the traditional function in filling prescriptions to allow for a larger pharmacist role in patient referrals. Additionally, opportunities appear to exist to improve patient awareness of available community resources. Further education is necessary to expand the pharmacy technician role. Increased utilization of the pharmacy technician role may allow for pharmacists to take on additional responsibility in the promotion of community programs. Strong, positive relationships with patients already exist, but increased follow-up is needed to maximize the role of pharmacy staff in increasing access to community services.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 3-162

Poster Title: Evaluation of piperacillin-tazobactam adverse effects in pediatric cystic fibrosis patients

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Purpose: Piperacillin-tazobactam is used in the treatment of cystic fibrosis for acute pulmonary exacerbations. Cystic fibrosis patients are commonly colonized with Pseudomonas aeruginosa making piperacillin-tazobactam an important drug; however, there has been concern regarding a high incidence of adverse effects in cystic fibrosis patients. The purpose of this study is to determine the incidence of adverse effects in pediatric cystic fibrosis patients treated with piperacillin-tazobactam and identify potential risk factors.

Methods: An institutional review board approved this retrospective chart review evaluating cystic fibrosis patients hospitalized and treated with piperacillin-tazobactam for a cystic fibrosis exacerbation. Patients who received at least one dose of piperacillin-tazobactam between January 1, 2007-December 31, 2015 were included in the analysis. Patient charts were reviewed for an adverse drug reaction after administration of piperacillin-tazobactam; the type of adverse reaction and time in days, to the onset of the reaction, were recorded for each adverse reaction. The Naranjo Scale was used to calculate scores for all patients with an adverse reaction to determine the probability of a valid attribution of the adverse reaction to piperacillin-tazobactam administration. Allergies to beta-lactams, carbapenems, and sulfa drugs were tracked for all patients, to evaluate these allergies as potential risk factors for developing an adverse reaction to piperacillin-tazobactam. Chi-square analysis was used to evaluate nominal data and student's t-test was used to analyze continuous data.

Results: The analysis included 204 patients; of which, 24 patients (11.7 percent) experienced an adverse reaction after administration of piperacillin-tazobactam. Patients in the reaction group were older and heavier with an average age of 12 years (standard deviation 4.6) and weight of 36.5 kilograms (standard deviation 14.8) compared to 7.2 years (standard deviation 4.82) and

21.7 kilograms (standard deviation 14.4) in the non-reaction group (p less than 0.001, p less than 0.001). The two groups did not differ on gender, reaction group 37.5 percent male and non-reaction group 46.7 percent male (p equals 0.39). Of the patients with a reaction, 8 patients' reactions were classified using the Naranjo Scale as possibly related to piperacillin-tazobactam and 16 reactions as probable. The average Naranjo score was 4.8 (standard deviation 1.8). 3.9 days (standard deviation 4.4) was the average days from piperacillin-tazobactam start to the onset of an adverse reaction. The presence of a concurrent beta-lactam allergy was more prevalent in the reaction group at 66.67 percent versus 0.1 percent (p less than 0.001). There were 3 patients with carbapenem allergies, all in the reaction group. The number of patients with sulfa allergies was not significantly different between the two groups (p equals 0.15).

Conclusion: The incidence of adverse effects with administration of piperacillin-tazobactam was 11.7 percent in this pediatric cystic fibrosis population. This is similar to other reported adverse effects rates for piperacillin-tazobactam in this population. Patients with a piperacillin-tazobactam adverse reaction were more likely to have beta-lactam and carbapenem allergies. The difference in prevalence of carbapenem allergies between the two groups may be related to patient exposure. Sulfa allergy rates do not seem to be associated with piperacillin-tazobactam reactions.

Submission Category: Pediatrics

Submission Type: Descriptive Report

Session-Board Number: 3-163

Poster Title: Pediatric counseling: Assessing student pharmacists' skill, competence, and confidence within a controlled environment

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Purpose: Children are a vulnerable patient population that pharmacists encounter in most community pharmacies and health systems. Although pharmacists interact with children in practice these interactions are not frequently simulated in the didactic pharmacy curricula. Due to the known benefit of simulated interactions for other patient populations, incorporating these activities focused on pediatrics into curricula should better prepare student pharmacists for situations they will encounter. The study aims are to evaluate the students' effectiveness in communicating accurate inhaler technique and side effect information to a child and guardian pair and perceived value of the experience.

Methods: In 2015 a pediatric focused asthma counseling activity was implemented within the first year professional program lab at Purdue University College of Pharmacy. In 2016, 154 students and 11 child (aged 1 to 10 years) and guardian pairs participated in the activity. Students provided patient education on either a rescue inhaler or inhaled corticosteroid (ICS). After the session, the parent (and child, if old enough) utilized a dichotomous yes/no evaluation for each student on completeness and accuracy of the clinical information provided and the ability to interact with the child. They evaluated the student on knowledge and confidence using a 5-point likert scale. Students completed individual reflection assignments, which allowed them to discuss their prior experience working with children and level of confidence interacting with them before and after lab. Students addressed whether they would recommend keeping the exercise in the curriculum. IRB approval was obtained for this study. Both the parent evaluations and student reflections were analyzed to assess overall student performance, confidence, and perceived value of the counseling activity. The quantitative and

qualitative data was analyzed for mean values, significance, and overall themes and Wilcoxon rank sum test was used for non-parametric data.

Results: Ninety-four percent of students interacted with the child at least once during the session. For the students who counseled on the rescue inhaler, 81 percent correctly stated how to administer it while 59 percent remembered to address tremor or shakiness as a side effect. For the students who counseled on the ICS inhaler, 89 percent correctly stated twice daily administration and 91 percent correctly discussed oral thrush as a side effect. Most students (72 percent) clearly differentiated the difference between a rescue inhaler and controller medication to the patient during the exercise. Only 39 percent of students demonstrated how to use the inhalers and repeated key points to ensure understanding. The majority of guardian/children pairs (91 percent) stated they would return to their student pharmacist to fill another prescription. The mean values for overall knowledge and confidence as assessed by the parent were 4.35 and 4.4, respectively. There was a statistically significant improvement in student perceived confidence for counseling a child with an average of 2.5 prior and 3.92 after (p-value less than 0.01). When reviewing students' confidence levels, 89 percent increased 7 percent remained unchanged, and 4 percent decreased. Almost all students (99 percent) recommended keeping the activity.

Conclusion: Overall, the activity was deemed successful by faculty and students. Child/guardian pairs had a positive interaction with the students and the majority of students self-reported an increase in confidence after the conclusion of the activity. The data revealed areas for continued improvement in students' knowledge retention and effective communication skills for this vulnerable patient population. This activity will continue to be refined and utilized for future classes. Due to the success of this activity, future plans are to continue incorporating pediatric patient simulations in more labs throughout the entire didactic curriculum.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Evaluative Study

Session-Board Number: 3-164

Poster Title: An exploratory, retrospective evaluation of clinical pharmacist implementation in a community hospital emergency department and its effect on intravenous antibiotic utilization

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Purpose: Selection and timing of appropriate antibiotic therapy has become more challenging, especially with the increasing rates of resistance and acuity level of patients. This is even more challenging in the emergency department for practitioners due to large patient volumes, limited time and lack of information. Benefits of pharmacist implementation in the emergency department are well-studied and have shown decreased medication errors, improved antibiotic stewardship and decreased administration time of time-sensitive medications. The purpose of this study was to assess intravenous antibiotic utilization prior to and after pharmacist implementation in the emergency department of a community hospital.

Methods: A retrospective chart review was completed for patients who received at least one dose of IV antibiotics in the emergency department prior to clinical pharmacist implementation (January 2015 to June 2016) and post-implementation (January 2016 to June 2016). Data was randomly collected for 100 patients in each group. Randomization was performed by a computer generator. Data that was collected included diagnosis, arrival time of patient, antibiotics ordered, order entry time, pharmacist verification time, antibiotic administration time, number of septic patients, number of admissions, length of stay, 30-day readmissions and number of pharmacist interventions. Additionally, demographic data, which included patient sex, age and nationality, was collected for all patients who were studied. The study was approved by the Institutional Review Board.

Results: When comparing pre-pharmacist implementation to post-pharmacist implementation, a decrease in the average antibiotic order time (151.75 minutes vs. 135.12 minutes), verification time (14.81 minutes vs. 3.75 minutes) and administration time (195.32 minutes vs. 173.90 minutes) was observed after pharmacist implementation. Additionally, a trend of

decreased prescribing of fluoroquinolones (22 vs. 12) and meropenem (6 vs. 1) was observed after pharmacist implementation. However, pharmacist implementation was not observed to have a noticeable impact on length of stay or 30-day re-admittance rate.

Conclusion: Implementation of a clinical pharmacist in the emergency department may decrease times to antibiotic ordering and administration. Additionally, this implementation may decrease prescribing of broad-spectrum antibiotics. However, because of our small sample size, further research is warranted to assess the true clinical significance of the implementation of a pharmacist in the emergency department.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-165

Poster Title: Occurrence of hospital-acquired clostridium difficile infection in patients admitted to a community hospital on proton pump inhibitor therapy

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Purpose: Widespread and overuse of proton pump inhibitor (PPI) therapy has become increasingly common in patients across the healthcare system in the United States. Evidence continues to show patients receiving PPIs are at an increased risk of short-term and long-term adverse effects, including gastrointestinal infections such as Clostridium difficile colitis. The purpose of this study is to evaluate a correlation between the incidence of hospital-acquired Clostridium difficile infection (HA-CDI) in patients receiving PPI therapy compared with patients who developed HA-CDI without PPI use. The results of this study will then be used to optimize the hospital's PPI protocol.

Methods: This study has been approved by the Sullivan University Institutional Review Board. A retrospective chart review will be performed for hospitalized adult patients admitted from July 1, 2014 to June 30, 2016 to identify patients with HA-CDI utilizing International Classification of Diseases (ICD) 9 and 10 codes for Clostridium difficile colitis. Patients with community-acquired Clostridium difficile colitis (CA-CDI) or admitted to the study hospital with Clostridium difficile infection, admitted from an outside hospital, and /or prisoners will be excluded from this study. The following data will be collected: patient age, sex, length of stay, reason for admission, number of days post-admission of CDI diagnosis, if the patient received at least one dose of a PPI or histamine-2 receptor antagonist (H2RA) and if it was a home medication, the clinical indication for the PPI or H2RA, if the PPI or H2RA was discontinued upon HA-CDI diagnosis, if the patient received any dose of antibiotics and the classes of antibiotics received. The percentage of patients who developed HA-CDI and received at least one dose of a PPI or H2RA will be compared to the percentage of patients who developed HA-CDI without any PPI or H2RA therapy, respectively.

Results: Results to be presented at ASHP Midyear Clinical Meeting.

Conclusion: Conclusion to be presented at ASHP Midyear Clinical Meeting.

Submission Category: Leadership

Submission Type: Descriptive Report

Session-Board Number: 3-166

Poster Title: Current pharmacy employer views on curriculum vitaes (CVs) and resumes of new graduates

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Purpose: Employer requirements for CVs and resumes are continually evolving to reflect the advancing role of pharmacists and their needed qualifications. These views are not always transparent to new graduates which may ultimately affect job placement. This study aimed to identify what current employers value in new graduate CVs and resumes to enhance successful job application and placement.

Methods: An electronic survey was created that posed questions regarding individual portions and format aspects of CVs and resumes. IRB approval was obtained from Purdue University. Survey participants identified areas of value for those documents in relation to their hiring criteria and respective fields of pharmacy. Questions allowed participants to highlight requirements for their particular area of pharmacy including: value of GPA, specific sections of importance, and reflection on format requirements. The anonymous survey was administered via Qualtrics and sent out by email to 100 randomly selected current hiring pharmacists in various fields of pharmacy throughout Indiana and surrounding areas, including post-graduate training directors. Descriptive statistics were used to examine the quantitative data. Specifically, responses were measured using percentages for each question. Participants' feedback to open-ended questions on the survey were analyzed using thematic analysis and key quotes were provided to illustrate recurring responses.

Results: Of those selected for participation, 41 completed the survey from twelve different areas of pharmacy practice. The majority (95%) were involved with reviewing new graduate pharmacists' applications. Employers found the following to be the most important information

to include on an applicant's resume or CV: professional education (100%), professional work experience (93%), licensure (93%), professional leadership (64%), and professional involvement (64%). From the sites that were surveyed, only 14% identified a GPA cutoff at their practice site. Of this group, the cutoff existed between 2.8 and 3.0 on a 4.0 scale. Other items that were encouraged and influential, but not necessarily required included: leadership within professional pharmacy organizations (93%), descriptions of advanced pharmacy practice experience (APPE)/professional work experience (71%), teaching experience (68%), awards/honors (32%), and community service involvement (29%). Leadership within non-pharmacy, collegiate organizations (86%) was slightly less valuable to employers when compared with collegiate pharmacy organizations (93%). Presentations were also considered very valuable to an applicant's CV or resume: in-services (73%), formal pharmacy presentations (73%), and pharmacy-related extracurricular presentations (63%) made the top of the list, respectively. Optional experience, such as prior research (53%) or technology experience (59%) (Cerner/Epic) was considered highly valuable.

Conclusion: Other than pharmacy education and certifications, which are expected, leadership through teaching, work experience, and professional organization involvement is considered valuable. Awards, honors, and community service are also very appealing to hiring employers. Evaluating employers' thoughts and suggestions about new graduate pharmacists' CVs and/or resumes identified the most important sections and formatting requirements for new graduate pharmacists' application materials. Overall, this study met its objective of identifying key areas of interest for current employers which will help guide new graduates in the preparation of their application materials.

Submission Category: Oncology

Submission Type: Descriptive Report

Session-Board Number: 3-167

Poster Title: Implementation of a low-cost unna boot alternative as adjunctive treatment for Kaposi Sarcoma in Kenya.

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Purpose: Globally 36 million people live with HIV, with 70% residing in Sub-Saharan Africa (SSA). Furthermore, 1.1 million deaths occur due to opportunistic infections (OIs) that can be minimized by initiation of antiretroviral therapy. In Kenya, the OI Kaposi Sarcoma (KS) is especially debilitating physically and psychosocially; magnifying the stigma that patients with HIV already fear. Research has begun to evaluate the effectiveness of an Unna boot as adjunctive therapy to speed healing of these lesions, yet this product is too expensive and not commercially available in SSA. This project was designed to develop a cost-effective alternative "kit" with local resources.

Methods: A literature review was conducted to understand the utility of the Unna boot for leg ulcers in KS and other causes. After gathering the data, including the Unna boot components, locally available materials were obtained. The modified kit was created and piloted on a healthy leg. Piloting was done to test ease of use, durability, and shelf life. After completing successful pilots, production of the modified kits began for implementation within an HIV clinic affiliated with the Academic Model Providing Access to Healthcare (AMPATH).

Results: To date, 25 modified kits have been created. Continuous local acquisition of all components has been present and sourced for lower prices than originally quoted. The kit is currently being implemented in a rural AMPATH clinic in Turbo, Kenya, where a provider with a special interest in wound care has been trained by a US-trained dermatologist to use the modified unna boot. Patients with venous ulcers or KS lesions will begin utilizing the kit weekly

for a nominal cost of 2 USD/kit. In addition, the provider will assess for changes in clinical status of the wounds and changes to quality of life with use of the kit. Feedback after implementation of the kit has suggested decreasing the width of the gauze for improved ease in wrapping of leg ulcers. Future plans include implementation at larger clinics providing care to patients with KS in order to understand its use in that population.

Conclusion: Assembly of a locally-sourced, low cost Unna boot kit has led to its use in one clinic with anticipated scale-up throughout the AMPATH system in Kenya. Further observation and data collection from its current use may show potential for this modified kit to undergo additional review as a potential change in standards of care for patients living with HIV and KS.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Case Report

Session-Board Number: 3-168

Poster Title: Rivaroxaban-induced alopecia

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Purpose: This case report illustrates one incident among the increasing number of incidents of direct oral anticoagulant induced alopecia. Historically, we have seen alopecia occur as an adverse effect of anticoagulation therapy; in unfractionated heparin, low molecular weight heparin, and warfarin. This is based on numerous published case reports and patient reports. This discussion of drug-induced alopecia requires an explanation of the 3 stages of the hair growth process, namely the anagen, catagen, and telogen phases. During the anagen or growth phase there is rapid mitotic activity of the hair matrix, and hair grows continuously for months to years. The catagen or cessation phase is when the hair matrix stops growing as its cells undergo apoptosis. In the telogen or rest phase, hair follicles shorten as the mature hair moves upward and awaits shedding through friction (shampooing or combing) or displacement by newly growing hair. At any given time, 85 to 90 percent of scalp hair is in the anagen phase, 9 to 14 percent is in the telogen phase, and 1 percent is in the catagen phase. These estimates vary depending on the individual. Hair loss can be exacerbated by medications via 2 mechanisms; anagen effluvium and telogen effluvium, which both affect hair growth in the anagen phase. Anagen effluvium is caused by chemotherapy and other cancer treatments, and hair loss progression is typically more rapid, within days to weeks of drug exposure. Telogen effluvium results from hair growth shifting prematurely from the anagen to catagen phase, and is seen in traditional anticoagulants like heparin and warfarin, and hair loss progression is slower, around 2-3 months after drug initiation. The observation that both heparins and coumarins cause a similar pattern of hair loss suggests a shared mechanism related to their anticoagulant activity. Therefore, this implies that alopecia can be seen as an adverse effect of direct oral anticoagulants like rivaroxaban and dabigatran. To date, the World Health Organization has received 405 reports of direct oral anticoagulant-associated alopecia, and the real-world

Dresden direct oral anticoagulant registry calculated an alopecia incidence of 4.4 out of 100 patient years. In our case report, a 71 year old female presented to our clinic with significant alopecia a few weeks after she was initiated on rivaroxaban for atrial fibrillation. She claimed that clumps of her hair were falling out, especially while showering, and she noticed visible bald spots. She took biotin supplements to attempt to slow the alopecia symptoms and expressed a strong desire to switch to a different agent. After 5 months of being on rivaroxaban, the patient was switched to apixaban, and after taking the apixaban for 1 month, the patient reported less significant hair loss, although it did not completely resolve. Her past medical history included paroxysmal atrial fibrillation and atrial flutter, dyslipidemia, hypertension, gastroesophageal reflux disease, sciatica, and hypothyroidism. Her medication list included Xarelto 20 mg PO daily, flecainide 100 mg PO BID, levothyroxine 25 mcg PO 3 times every week, lorazepam 0.5 mg PO at bedtime as needed for insomnia, metoprolol succinate 25 mg PO daily, omeprazole 20 mg PO daily, Klor-Con 20 mEq PO 3 times every week, Dyazide 37.5-25 mg PO daily, senna-docusate 8.6-50 mg PO as needed for constipation, metronidazole 0.75% vaginal gel as needed, Epipen 0.3 mg/0.3mL IM as needed for anaphylaxis, biotin 10,000 mcg PO daily. This case report demonstrates the need for more data and larger controlled studies in order to establish a causative link between rivaroxaban, and possibly other direct oral anticoagulants like dabigatran and apixaban, and alopecia, and to determine if an FDA-labeled adverse effect is warranted.

Methods:

Results:

Conclusion:

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 3-169

Poster Title: Future health care professionals' perspectives on direct to consumer advertising

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Purpose: The purpose of this study is to gather information on future health care professionals' opinions on direct to consumer advertising of prescription medications.

Methods: This project was approved by the Institutional Review Board of MCPHS University. Students in select health care programs at our University, including pharmacy, nursing, and optometry, were solicited voluntary written surveys regarding their opinions on direct to consumer advertising of prescription medications. The survey included questions concerning demographics of participants such as program of study, expected year of graduation, gender, and age. The remaining questions focused on student knowledge and opinions of direct to consumer advertising of prescription medications such as whether they felt it influenced patients, whether it guides patients to medications they need, and whether information regarding risks and benefits of prescription medications is balanced, clear, truthful, accurate, misleading, or confusing. The survey also asked questions about the role of health care professionals in providing product information and whether direct to consumer advertising should be adjusted or eliminated.

Results: A total of 600 students responded to the written survey, most of which were female pharmacy students between the ages of 21-30 years in our accelerated Doctor of Pharmacy program. Twenty percent of students were unfamiliar with the term "direct to consumer advertising", but recognized the practice when provided with a description. More than 90% of participants agreed current direct to consumer advertising of prescription medications was influential but did not guide patients to products they need and left gaps in fully informing patients about medications. More than 70% of students either disagreed or strongly disagreed that direct to consumer advertising was clear, truthful and accurate, or balanced risks with benefits, which could all lead to a good chance for confusion among patients. As future health

care professionals, students felt the need existed for practitioners to re-educate and fairly present information to facilitate safe medication selection rather than relying on direct to consumer medication advertising. However, there were mixed views about how FDA regulations for direct to consumer advertising of prescription medications should be adjusted or even eliminated.

Conclusion: Future health care professionals, especially pharmacy students, do not view direct to consumer advertising of prescription medications positively. Instead, students feel that health professionals should be the primary informants for patients regarding their medications.

Submission Category: Geriatrics

Submission Type: Evaluative Study

Session-Board Number: 3-170

Poster Title: Similarities between the Alzheimer and diabetes hippocampus: A comparison of gene expression profiles

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Purpose: Patients with Alzheimer's disease (AD) undergo structural changes resulting in the loss of gray matter in the hippocampus, which is associated with learning and memory. Patients with Diabetes mellitus [DM] (Type 1 and Type 2), have been associated with the same deterioration in the hippocampus as AD. Both diseases are characterized by cognitive decline, oxidative stress, and insulin resistance. The purpose of the study is to explore the similarities between AD and DM by identifying common gene expression patterns in the hippocampus among patients with AD versus those with DM.

Methods: Three data sets were analyzed: A diabetes model data set of the hippocampus (GSE34451) in which streptozotocin-treated Wistar rats were compared to controls was used for DM type I. For DM type II, Goto-Kakizaki rats were used. A second data set included human autopsy AD of the hippocampus with non-AD controls (GSE36980). The third data set used consisted of samples from the hippocampi of triple-transgenic AD mice, which bear the PS1(M146V), APP(Swe), and tau(P301L) transgenes, characteristic of AD. This triple- transgenic dataset (GSE32536) consisted of mice treated with pioglitazone and non-treated controls. The various data sets were normalized and background-corrected using the gcrma method. Differentially expressed (DE) genes were identified using the siggenes package of Bioconductor. DE genes were analyzed for over-represented pathways/processes using the Reactome database.

Results: Gene Set Enrichment Analysis results show that innate immune genes are enriched in the control verses DM type 1. Ten genes downregulated in the DM type 1 hippocampus have their orthologues also downregulated in the AD hippocampus. They are: SLC6A17, PRKCB, SYP, HCN2, STX1A, LDB2, CAMLG, MMP17, TTC9B, and L1CAM. Similarly, ten genes downregulated in the DM type 2 hippocampus have their orthologues also downregulated in the AD hippocampus: PRKCB, XYLT1, PRPF8, NPTX2, GRB14, PRKCG, DGKZ, CHRM1, SEPT3, and CFL1.

Certain genes, with suppressed expression in DM or AD, had increased expression in the Pioglitazone treatment model. They are: Plag1, which was suppressed in the DM type 1 model, Cul3 was suppressed in DM type 2, and NRSN2, MCFD2 and NOV which were suppressed in AD.

Conclusion: Genes with suppressed expression in AD or DM are associated with the innate immune system and hemostasis, both of which are linked with cognitive decline. Pioglitazone reverses the decline in some, but not all those genes, underscoring the similarity between AD and DM.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 3-171

Poster Title: Evaluation of pharmacy intern awareness regarding the accessibility and use of emergency naloxone

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Purpose: The growing opioid crisis in the United States is starting a nation-wide conversation about opioid abuse prevention and treatment. The September 2015 standing order in Massachusetts for the dispensing of emergency naloxone in community pharmacies is paramount in combating opioid overdose deaths. With this current opioid epidemic, it is vital that future pharmacists are aware of the standing order and are competent in naloxone use and counseling. This study aimed to assess the knowledge and comfort level of pharmacy interns regarding emergency naloxone before and after a student-led educational session.

Methods: Pharmacy interns were asked to complete an anonymous, voluntary pre- and post-survey. Informed consent was obtained from all participants and the study design was approved by the institutional review board. The pre-survey, administered prior to the educational session, was comprised of 7 questions. The post-survey was comprised of 5 questions (questions 3-7 from the pre-survey). This allowed for a direct before versus after comparison of responses to identify the impact of our educational session. Questions 1 and 2 of the pre-survey were demographic information questions. The educational session discussed what naloxone is, how to recognize an opioid overdose, overdose intervention steps, components of the “orange” box, how to assemble and administer intranasal naloxone, what to expect with precipitated withdrawal, and how and where to obtain naloxone. An opportunity was provided for interns to practice with placebo naloxone kits after the presentation. The survey questions examined knowledge about the standing order, where emergency naloxone is available, confidence in naloxone counseling, and what components are in a standing order dispensed intranasal naloxone kit.

Results: A total of 47 interns completed the pre-survey and 41 interns completed the post-survey. Overall intern knowledge significantly improved in all questions on the post-survey. Intern confidence in counseling patients on how to use emergency naloxone was reported on a scale of 1-5, 5 being most confident. Using Student's t-test, the reported confidence level significantly improved from 1.96 to 3.59 on the pre- and post-survey, respectively (p value less than 0.0001). Using Fisher's exact test, the post-survey results showed a significant improvement in the knowledge of pharmacy interns about the absence of the nasal atomizer in the "orange" box (p value equals 0.030), access to naloxone without a prescription (p value less than 0.0001), places where members of the public can obtain naloxone (p value equals 0.026), and proper billing of patient insurance (p value equals 0.031).

Conclusion: Evaluation of pre- and post-survey results showed increased confidence in counseling and knowledge of using naloxone in an emergency situation and obtaining naloxone via standing order. It is hoped that pharmacy intern knowledge and awareness about emergency naloxone may increase dispensing via the standing order and its use in emergency situations.

Submission Category: Geriatrics

Submission Type: Descriptive Report

Session-Board Number: 3-172

Poster Title: Burden Medicare patients face with COPD medications

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Purpose: Since 2004, the World Health Organization stated that Chronic Obstructive Pulmonary Disease (COPD) has inflicted over 64 million people and by 2030 will be ranked as the third leading cause of death. With a closing doughnut hole, one would expect a decrease in out of pocket expense and a push for more generics on the market to increase adherence and limit out of pocket costs. The purpose is to analyze the costs associated with current inhaler treatment of COPD on the market for various Medicare Part D Plans and evaluate changes in cost and drug development from 2012-2017.

Methods: Three common insurance plans, AARP, Blue Cross Blue Shield, and First Health were analyzed from 2012 to 2017. Data such as full cost of the drug, initial monthly copays, formulary changes, cost during the coverage gap and catastrophic coverage were obtained from www.medicare.gov and q1medicare.gov. Differences from 2012-2017 were reviewed and costs associated with brand name COPD medications were tracked.

Results: Data showed with each passing year the cost and out-of-pocket burden that Medicare beneficiaries with COPD faced was actually increasing. Looking at the three insurance plans, in 2012, the initial monthly copayment of brand name COPD medications were lower than in 2017. Over a 6-year period, the nineteen medications listed specifically for COPD had no generic on the market to date. Besides the annual total medication cost increase, Medicare beneficiaries with COPD are also faced with limited options when seeking alternative affordable medication forms. The three insurance plans show an upward trend in costs with brand name medications each year, and some medications have been completely removed from insurance formulary plans leaving the patient paying the full price upfront. Over a 6-year period the percent increase from 2014-2017 on total cost of medication has spiked by 142 percent and the

cost in the doughnut hole has increased by 42 percent. While the manufacturer covers 50 percent of the cost during the doughnut hole the percent difference between the doughnut hole and the total cost of medication correlates with negative savings outcomes.

Conclusion: Medicare beneficiaries are faced with increased burden with costs associated with COPD treatment. Armed with this knowledge pharmacists can work with pharmaceutical and insurance companies to push for feasible pricing options and alternative medications to possibly help bring down treatment costs.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 3-173

Poster Title: Emergency intranasal naloxone education for addiction healthcare providers

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Purpose: Professionals in the setting of addiction recovery management play a crucial role in educating patients and their families on intranasal naloxone for bystander administration. Their role is crucial for both the teaching of proper administration technique as well as for spreading awareness of this resource, which is now available to the public via standing order in Massachusetts' community pharmacies. The purpose of this study was to determine gauge the effect of a pharmacy student-led training program on the use and procurement of emergency naloxone delivered to an audience of addiction healthcare professionals.

Methods: Researchers delivered an educational presentation to a group of healthcare professionals practicing in addiction rehabilitation centers in Massachusetts. The primary presentation medium was a PowerPoint slideshow with virtual animations of the steps required for device assembly and drug administration. Also covered in the presentation was information regarding the procurement of naloxone at community pharmacies under its recently established standing order. Following the presentation, attendees asked questions and practiced assembling a sample device. Consenting attendees were administered surveys prior to and immediately following the program. The surveys had been preapproved by the MCPHS University institutional review board and contained one question gauging self-reported confidence in providing patient education on the topic as well as four knowledge-based questions pertaining to either the specifics of the intranasal naloxone device or its procurement. Both surveys were identical with the exception of an additional two demographic questions on the pre-survey (seven questions total). The change in performance was then evaluated based on questions answered correctly before versus after the presentation in order

to gauge the effectiveness. Fisher's exact test and unpaired t-test were performed to determine the significance of the results using $p < 0.05$.

Results: Twenty-one behavioral healthcare professionals participated in the study. The audience was composed of professionals specializing in addiction rehabilitation in both inpatient and outpatient programs. On average, subjects reported having daily interactions with opioid addicts and having previously had 2-3 discussions with patients on the topic of naloxone prior to the educational session. The level of confidence in providing naloxone training was assessed on a five-point scale, with a change from pre and post intervention showing improvement from 3.14 to 4.48 ($p < 0.0001$). Subjects showed significant improvement in their understanding of the contents of the emergency naloxone kit. Pre-intervention, only 6 (4.76%) subjects accurately asserted that the nasal atomizer attachment is an additional piece that must be supplied, whereas afterwards, 17 (80.95%) answered correctly ($p < 0.0004$). The audience proved to have adequate baseline knowledge of the procurement of naloxone as 19 (90%) before the presentation and 21(100%) after were able to correctly assert that emergency naloxone does not require a prescription in Massachusetts ($p=0.488$). The audience demonstrated a similar unremarkable improvement from an already elevated baseline level of knowledge for the other questions pertaining to insurance billing and locations that provide naloxone kits to the public.

Conclusion: Behavioral healthcare professionals working in an addiction medicine setting have frequent interactions with opioid addicts and are thus instrumental in promoting the education and awareness of emergency naloxone. Participants had a high baseline knowledge in certain aspects of emergency naloxone, but deficiencies in knowledge regarding familiarity with delivery system and confidence in their own ability to train on its use. Overall, the intervention met its objective of improving these deficiencies. Expanding healthcare professionals' knowledge and confidence in training for bystander naloxone administration may improve public access to this drug, but future studies are needed to confirm.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 3-174

Poster Title: Pharmacy, nursing, and physician assistant students' perspectives on interprofessional collaboration using a patient case simulation activity

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Purpose: Interprofessional education (IPE) includes four core competencies for interprofessional collaboration (values and ethics, roles and responsibilities, communication, and teamwork), and promotes improved patient care. IPE is an accreditation standard for Doctor of Pharmacy programs, and embedding IPE activities into the curriculum can be instrumental in introducing students to the concept of collaborative care. These activities may be used to assess student perceptions and the similarities/differences regarding interprofessional care. The purpose of this project was to simulate interprofessional collaboration among nursing, pharmacy and physician assistant students and identify differences, by profession, in their perceptions related to interprofessional collaboration.

Methods: Approval from the University's Institutional Review Board was obtained prior to beginning this study. Student participants from the University's pharmacy, physician assistant, and nursing programs participated in the activity. Participants in the activity were organized into interdisciplinary groups and included students from each of the respective programs. Faculty members from each program were also present to facilitate the case simulation activity and administer the survey that followed. After viewing a video case simulation, students had the opportunity to work together and create an action plan for the patient. Following the activity, a thirteen-question survey using a five-point Likert scale was administered to the participants. Survey questions asked participants about demographics, prior IPE experience, and perceptions on collaborative care. Student responses to the Likert scale questions were sorted by the students' academic program, and whether or not the student had participated in prior IPE experiences, either at work, on a clinical rotation, or as part of their academic studies.

Results: A total of 311 students participated in the IPE case simulation activity and were comprised of 40 percent physician assistant, 33 percent nursing, and 27 percent pharmacy. Prior IPE experience was reported by 81 percent of participants. Responses to the question, "I prefer to work within my own profession," differed between each of the academic disciplines. Of the 134 students that answered either undecided, agree, or strongly agree, 40 percent were from physician assistant studies, 35 percent from nursing, and 25 percent from pharmacy. When asked whether working in an interprofessional team involves more time and effort than working alone, 41 percent of students agreed or strongly agreed. These responses represented 38 percent physician assistant, 34 percent nursing, and 29 percent pharmacy. When asked whether interprofessional teamwork allows for more effective and enhanced patient care, 94 percent of students agreed or strongly agreed. When asked for specific examples of what they learned from other cohorts, students commonly reported the following: physician assistant students reported medication dosing/adjustment and monitoring (31 percent) and medication selection (21 percent), nursing students cited medication selection (51 percent), and pharmacy students reported the use of visiting nurses and home care (27 percent).

Conclusion: The case simulation activity identified differences, by discipline, in perceptions related to interprofessional collaboration. Students contributed their own expertise and knowledge to the activity which supports the incorporation of IPE into health professional curricula. Many participants agreed or strongly agreed that interprofessional collaboration provides enhanced patient care, yet they also felt that interprofessional collaboration requires more effort. Increasing the number of IPE activities offered to students may enhance their ability to work more easily together as a collaborative interdisciplinary healthcare team.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 3-175

Poster Title: Sensitizing refractory prostate cancer cells to combination cytotoxic and targeted therapies.

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Purpose: Prostate cancer is the second leading cause of cancer-related deaths among men. By the end of 2016, an estimated 180,890 new prostate cancer cases and 26,120 deaths will be recorded. Treatments that combine chemotherapy with targeted therapy are more effective compared to single treatments in many tumors. However, adverse effects and acquired tumor resistance limits their full clinical benefits. The study evaluated the sensitization of drug resistant prostate cancer cells upregulated with the epidermal growth factor (EGFR) and the SOX2 oncogene using a combination of low dose cytotoxic (docetaxel, camptothecin) and EGFR-targeted therapy (gefitinib).

Methods: DU145 and PC3 prostate cancer cells were treated with different concentrations of gefitinib, docetaxel, and camptothecin alone and in combination. Cells were investigated for effect of treatment on cell viability, cell migration, apoptosis, and expression of SOX2 and EGFR proteins.

Results: Gefitinib, camptothecin, and docetaxel demonstrated varying anticancer activities on PC3 (concentrations that inhibited 50 percent of cell population were: greater than 10.0 micromolar, 3.334 micromolar, and 0.081 micromolar respectively) and DU145 (concentrations that inhibited 50 percent of cell population were: greater than 29.241 micromolar, 7.677 micromolar, and 0.355 micromolar respectively). Gefitinib (1.0 nanomolar) reduced PC3 cell viability by 24.80 percent, 29.65 percent, and 36.95 percent as combination treatment with 10 nanomolar camptothecin, 10 nanomolar docetaxel, and 20 nanomolar docetaxel respectively. In DU145 cells, gefitinib (10 nanomolar) in combination with 1.0 nanomolar, 10.0 nanomolar, and 20.0 nanomolar docetaxel reduced cell viability by 19.89 percent, 14.40 percent and 16.82

percent respectively. Gefitinib (5 micromolar and 10 micromolar) and camptothecin (0.1 micromolar) combination treatments inhibited cell migration and induced apoptosis in DU145 cells. SOX2 and EGFR proteins were upregulated in DU145 and PC3 cells and combination treatment with gefitinib and docetaxel reduced their expression following a 48-hour treatment.

Conclusion: DU145 and PC3 cells demonstrated varying degrees of sensitivities to different concentrations of gefitinib, docetaxel and camptothecin, and their combinations at the cellular and molecular level. Importantly, low doses of combination gefitinib with either docetaxel or camptothecin inhibited cell viability, migration, and the expression of EGFR and SOX2.

Submission Category: General Clinical Practice

Submission Type: Case Report

Session-Board Number: 3-176

Poster Title: Series of unfortunate drug-induced events

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Purpose: Adverse drug events (ADE) account for 2 million hospital stays in America per year. Elderly patients (>65 years) are at an increased risk of ADE due to their heavy medication burden. The incidence of hospital admission due to ADE in the elderly is one in three. ADE worsen patient outcome and increase cost of care. This case depicts a patient who experienced a sequence of three well described, inter-related ADE over 2 months. A 71-year-old male with a past medical history significant for ischemic cardiomyopathy, ventricular tachycardia (VT), chronic kidney disease and transient ischemic attack was admitted into the hospital for refractory VT. His home medications included: apixaban 5mg twice daily, carvedilol 3.125mg twice daily, digoxin 0.0625mg daily, hydralazine 100mg every 8 hours, isosorbide mononitrate 120mg daily, pravastatin 20mg daily, ramelteon 8mg at bedtime as needed, torsemide 100mg twice daily and amiodarone 200mg daily. The patient underwent ventricular ablation and his chronic amiodarone dose was increased to 600mg daily; however, intermittent VT continued to be significant. Thyroid function test obtained 3 days after the amiodarone dose increase reviewed low TSH levels of 0.09 mIU/L, and high total T4 of 11.8 ug/dL. Amiodarone thyrotoxicosis was diagnosed. Methimazole 40mg daily and prednisone 40mg daily were initiated for treatment, while Amiodarone was discontinued. After 8 weeks of treatment, the methimazole was discontinued and the steroid regimen was tapered to a maintenance dose of dexamethasone 2mg daily. Two weeks later, the patient was readmitted for shortness of breath. He was treated initially for presumed decompensated heart failure. However, the patient continued to have significant dyspnea despite successful diuresis. A chest X-ray reviewed a classic pattern of pneumocystis pneumonia (PCP), presumably due to immunosuppression by the corticosteroid. The patient was treated empirically with trimethoprim 160mg/sulfamethoxazole 800mg four times daily for 21 days and discharged

home. Five days later, the patient was readmitted to the hospital due to extreme fatigue. He was found to have potassium level of 6.8mEq/L. His medication regimen and renal function had not changed. He was treated for possible trimethoprim induced hyperkalemia. His PCP treatment therapy was changed to atovaquone 750mg twice daily to complete the course. Amiodarone induced thyrotoxicosis occurs in 3% of patients. Amiodarone contains iodine atoms, which acts on the pituitary and liver as a thyroid hormone analog. Amiodarone induced thyrotoxicosis is usually reversible with discontinuation of therapy, as well as treatment with corticosteroid and anti-thyroid therapy for 2-3 months. PCP induced by immunosuppressant therapy has been reported. The threshold of "how much for how long" regarding steroids and risk for PCP is unclear, and the critical amount of immunosuppression necessary to increase the risk for PCP is not measurable. Prophylaxis has generally been suggested in patients who receive corticosteroid therapy for longer than 4 weeks at a dose equivalent to 20mg of prednisone daily. This patient has been receiving an equivalent prednisone taper regimen of 40mg for 30days, 26mg for another 30 days, 13mg for 21 days, 6mg for 7 days and 3mg for 7 days. In this patient's scenario, PCP prophylaxis might have helped prevent the episode. Hyperkalemia is a rarely reported ADE of trimethoprim, mostly occurring in patients with other risk factors. Trimethoprim is structurally similar to amiloride. It competitively blocks the sodium channels in the distal nephron, which impairs renal potassium excretion. Our patient has chronic kidney disease and was on PCP treatment doses of trimethoprim/sulfamethoxazole, which may have increased his risk of developing hyperkalemia. This case illustrates the importance of therapeutic drug monitoring in elderly patients who are at high risk of developing ADE, even for low incidence side effects.

Methods:

Results:

Conclusion:

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 3-177

Poster Title: Vancomycin-induced nephrotoxicity in neutropenic oncology patients: A retrospective review

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Purpose: Historically, vancomycin has been associated with causing nephrotoxicity. However, there are limited studies saying that an increase in vancomycin's serum concentration directly leads to a decline in renal function. The purpose of this study was to determine the effect of neutropenic oncology/hematology patients receiving vancomycin on renal function. A correlation between the vancomycin dose given, serum trough concentrations obtained, serum creatinine, and a decline in renal function were analyzed. Secondary outcomes such as drug-drug interactions, other nephrotoxic drugs, co-morbid conditions, contrast dyes received, and length of treatment were also assessed.

Methods: Participants in this study included patients admitted into the hematology/oncology unit at Beth Israel Deaconess Medical Center in Boston, Massachusetts who have received vancomycin from January 1st 2015- September 30th 2015. Patients were included if they met this criteria. Patients were excluded if vancomycin was discontinued within 48 hours of initiation, received vancomycin per institutional hemodialysis protocol, and received only vancomycin oral liquid. Patients were included more than once if multiple orders met this criteria. Baseline serum creatinine was recorded on the day of vancomycin initiation. Concomitant nephrotoxic drugs that were assessed were tacrolimus, cyclosporine, amphotericin, cidofovir, foscarnet, and the aminoglycosides. Results were analyzed using descriptive statistics.

Results: Out of 194 patients admitted, 104 vancomycin patients met the inclusion criteria. 17 patients were included more than once therefore 87 patients were evaluated overall. The age range was 21-89 years old (mean age, 59 years) with 38 [44%] being female. Among the 104 vancomycin patients evaluated, 12 patients [12%] developed unstable renal function with either an increase in serum creatinine greater than 50% from baseline or an increase of 0.5

mg/dL or greater from baseline. 10 out of these 12 patients with unstable renal function had a recorded trough level >20 ug/mL at least once during treatment. Of these 12 patients with unstable renal function, 1 patient was on concurrent use of tacrolimus and none were on cyclosporine. The patient on tacrolimus also had a recorded trough level >20 ug/mL during treatment.
8 of the 12 patients received contrast dye during their course of vancomycin therapy. Out of these 8 patients, 6 patients had a recorded trough level >20 ug/mL at least once during the course of treatment. 3 out of the 8 patients had an increase in serum creatinine within 48 hours of contrast.

Conclusion: Using the Naranjo algorithm, there is a possible chance that the serum creatinine increase in the 12 patients that developed unstable renal function was due to vancomycin. The results show that there are other factors that may have affected the serum creatinine increase such as contrast dyes and nephrotoxic drugs. More studies are needed to assess the correlation between nephrotoxicity and vancomycin's serum concentration in oncology patients. Electronic medical records should be utilizied in the future, the time difference between vancomycin dose given and trough recorded should be calculated, and a more robust review of nephrotoxic drugs should be included.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-178

Poster Title: Relapsing and remitting multiple sclerosis: a review of recently and soon to be approved monoclonal antibodies

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Purpose: Monoclonal antibodies are used to decrease the pathological inflammatory processes occurring in patients with relapsing-remitting multiple sclerosis (RRMS). Until recently, there were two approved monoclonal antibodies in the RRMS treatment guidelines: alemtuzumab, and natalizumab. Recently daclizumab was approved by the FDA as well. Additional agents are in various stages of investigation. Ocrelizumab has recently been granted priority review by the FDA, and Phase III clinical trials studying the use of ofatumumab have commenced. The purpose of this report was to explore the newly approved and emerging monoclonal antibodies for relapsing-remitting multiple sclerosis.

Methods: A literature search was conducted in Embase and Medline (1996 to Week 2 2016) using keywords multiple sclerosis, relapsing-remitting multiple sclerosis, daclizumab, alemtuzumab, ocrelizumab, natalizumab and ofatumumab. Randomized controlled trials and review articles in English were selected for analysis to determine efficacy benefits and any safety risks associated with the newly approved monoclonal antibodies as well as any currently planned Phase III clinical trials scheduled for this year.

Results: Analysis of daclizumab trials both compared to placebo and to interferon beta-1a showed significant decreases in relapses as well as in new brain lesion growth monitored through MRI, however showed some increases in adverse events such as liver damage. Daclizumab is also a monthly injection, which may be preferred by patients over the current daily injection therapies. When comparing ocrelizumab monotherapy with placebo and interferon beta-1a monotherapy, ocrelizumab was associated with reduced total brain lesion

growth. The interferon beta-1a group and placebo group had significantly more adverse events such as infections as compared to the treatment group. Ofatumumab, currently approved for chronic lymphocytic leukemia, is currently scheduled for Phase III clinical trial beginning during the later half of 2016 due to significant Phase II findings that it decreases the number of new brain lesions without increasing the number of serious adverse events. There are no studies as of yet comparing ofatumumab to a placebo or to one of the approved medications.

Conclusion: The recently approved and currently studied monoclonal antibody therapies for RRMS show great promise and efficacy data proving they may be potential drug therapy alternatives to the currently available therapies. The clinical significance of the studies evaluated within this report must be taken into account when new treatment guidelines for MS are released to determine how these new monoclonal antibodies will fit into an updated treatment algorithm. Further studies into long-term risks and benefits of each of the drugs presented will need to be analyzed before these medications can be recommended for use any higher than alternative third line therapies.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 3-179

Poster Title: Smart connected insulin pens and caps: A digitalized approach to diabetes management

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Purpose: Current insulin pens have improved diabetes care in regards to increasing patient adherence. However, these pens do not address issues such as unreliable documentation of therapy and delayed patient care. With innovative health technologies emerging, smart connected insulin pens and caps can enhance existing modalities of care. This poster will gather and compare information on the known commercialized devices with the goal of communicating promising new advances in diabetes care and determining the prospective role of these devices in practice.

Methods: A total of five source categories were used to gather information on smart connected insulin devices, and include: proprietary information, press release statements, case studies, periodic publications, and current news. Proprietary information was the primary source of data. However, all of the resources were utilized to: determine the products that constitute the current landscape of smart connected devices, gather information on product design and function, or both. Additional evidence regarding product availability was retrieved from the FDA 510(k) database.

Results: Search results revealed information about seven commercialized smart connected insulin pens and three commercialized smart connected insulin caps. Of these, the only FDA approved devices include InPen, a Bluetooth-enabled insulin smart pen, and Timesulin, a timer-enabled cap for insulin pens. However, other devices are seeking US market approval and expect FDA clearance in the near future. Smart connected insulin pens function by automatically recording and transmitting insulin dosing data to a device. Data can be transmitted via one of three ways: Bluetooth, short-range radio interface, or by USB. Documented data can then be accessed in real-time by physicians, caregivers, or both. Additionally, the majority of these pens can accommodate all U-100 insulins in 3 mL cartridges. Smart connected insulin caps function by either displaying the time since the patient's last dose or by logging and transferring data to a device, similar to the previously discussed smart pens.

However, compared to smart pens, these devices are smaller and more convenient in regards to transport. Most of these smart caps are also compatible with most major insulin pen brands. Individual product specific design further distinguishes these smart pens and caps from one another.

Conclusion: Smart connected insulin pens and caps offer a promising solution for diabetes management. Through an interactive platform, these devices simplify communication between the patient and clinician. This allows for real-time therapeutic interventions, reliable self-management of diabetes, and reduced disease-state complications. Although this pioneering technology has apparent benefits, limitations do exist. Further investigation of HIPAA compliance, health insurance reimbursement, and user accessibility is paramount to launching this idea to its full potential.

Submission Category: Ambulatory Care

Submission Type: Case Report

Session-Board Number: 3-180

Poster Title: Serotonin syndrome following up-titration of paroxetine: a case report

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Purpose: The purpose of this abstract is to describe the development of serotonin syndrome following up-titration of paroxetine after two months of therapy. Serotonin syndrome is an adverse drug reaction caused by excess activation of mainly central and peripheral 5-HT2A serotonergic receptors. 5-HT1A receptors may also be involved in a pharmacodynamic intercalation that synaptically increases concentrations of serotonin agonists. Symptom onset and progression can be rapid and potentially life threatening. Diagnostic symptoms include: spontaneous clonus, inducible or ocular clonus with agitation and/or diaphoresis, tremor with hyperreflexia, hypertonia, and temperature above 100.4 degrees Fahrenheit. Serotonin syndrome is largely under diagnosed due to variable onset, nonspecific symptoms, evolving diagnostic criteria, and lack of awareness amongst prescribers. A 21-year-old female with a past medical history of mononucleosis, generalized anxiety disorder, headaches, cervicalgia, arthralgia, acute pharyngitis, myalgia, and depression presented to clinic with a chief complaint of widespread burning sensation accompanied by hot flashes without sweating. The patient had a history of rash to amoxicillin and intolerance to metoclopramide (panic attack). Her medication history consisted of sertraline, hydroxyzine, naproxen, cyclobenzaprine, doxycycline hyclate, and levonorgestrel/ethinyl estradiol. Sertraline 25mg daily was used for depression over an eleven-month period before being switched to paroxetine due to increased anxiety. Paroxetine was initiated at a dose of 20mg. After 1 week of therapy, depressive and anxiety symptoms intensified, and the patient reported tremors and an inability to sleep more than 2 hours a night. Melatonin 5mg was added at bedtime and the paroxetine dose was increased to 30mg daily. At the patient's request, her primary care physician ordered Lyme titers. In addition, a sedimentation rate, comprehensive metabolic panel, C-reactive protein, thyroid panel, complete blood count with differential, B12 level, iron profile, rheumatoid factor,

antinuclear antibody screen (ANA), drugs of abuse screen-9, and sexually transmitted disease panel was ordered. Results were unremarkable except for an elevated C-reactive protein of 0.73mg/dL and low positive ANA titer of 1:320. An Epstein Barr viral (EBV) antibody test and TB Quantiferon Gold test were also performed, both of which were negative. Two weeks later, the patient was scheduled for an acute office visit due to generalized body aches, weakness, and dizziness. Upon examination, the patient complained of fatigue, weakness, uncontrollable twitching, hand aches, increasing frequency of resting hand tremors, and random sweating. Review of systems was normal except the patient had an elevated heart rate (103 beats/min). Other baseline vital signs and laboratory values were within normal limits. Serotonin syndrome was diagnosed using the Hunters Criteria because the patient was taking a serotonergic agent and presented with tremor plus hyperreflexia. Consequently, the patient was instructed to reduce the dose of paroxetine to 10mg to minimize serotonergic withdrawal symptoms before completely discontinuing therapy. The next day the patient reported headaches, myalgias, nausea, and confusion. Symptoms were attributed to withdrawal and the patient was monitored, requiring no supportive care. Upon follow up eighteen days later, the patient's primary care physician learned that the patient had completely self-discontinued paroxetine on her own and reported complete resolution of symptoms within a week of discontinuing the paroxetine. A score of 4 on the Naranjo scale classifies this as a possible adverse drug reaction. In conclusion, clinicians should be vigilant regarding the development of serotonin syndrome following initiation or up-titration of serotonergic agents by identifying symptoms early on.

Methods:

Results:

Conclusion:

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 3-181

Poster Title: Evaluation of the efficacy of medium chain triglyceride oil in patients with mild cognitive impairment or Alzheimer's disease

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Purpose: Medium chain triglyceride oil has been utilized as a supplement for its role in enhancing metabolism; medium chain triglycerides are broken down into medium chain fatty acids and are used readily by the liver to provide energy. Recently, medium chain triglyceride oil has been utilized in various clinical trials, investigating its uses in the setting of cognitive impairment and Alzheimer's disease and its ability to improve memory and cognitive function. The purpose of this presentation is to evaluate the results of these trials and introduce potential areas of exploration for medium chain triglyceride oil in healthcare.

Methods: A literature search was performed utilizing Pubmed, Medline (Ovid), and Science Direct databases for clinical trials that utilized medium chain triglyceride oil with the purpose of improving cognition in the treatment groups. The following Medical Subject Heading terms were utilized in the Ovid Database combined with the following Boolean search terms: cognition OR memory OR Alzheimer's disease AND medium chain triglycerides. In the Pubmed and Science Direct databases the key words medium chain triglyceride oil, beta hydroxybutyrate, and Axona were used in various combinations with cognitive impairment, memory, cognition, and Alzheimer's disease. The searches were limited to English, clinical trials, involving humans only. Three articles were found to meet these criteria.

Results: In the setting of mild cognitive impairment, a pilot study by Rebello et al. revealed that when given 6 doses of medium chain triglyceride oil over 24 weeks, patients experienced improvement in memory when assessed by Alzheimer's disease Assessment Scale – cognitive subscale score. In the setting of Alzheimer's disease, two clinical trials demonstrated the effect of medium chain triglycerides. The first study, by Henderson et al., provided 10 grams of medium chain triglycerides daily and increased to 20 grams after one week for 90 days. This study assessed the effect of continued medium chain triglycerides administration on cognition. The second study, by Reger et al., administered 40ml of emulsified medium chain triglycerides

once per visit, for two visits. A baseline assessment of cognitive status was done at the beginning of each visit and again 90 minutes after medium chain triglyceride administration; the effect of the oil on cognition in an acute setting was assessed with this study. Each study also recorded the patient's serum beta hydroxybutyrate levels as a biomarker for ketone levels and included subgroup analyses regarding apolipoprotein-E genotype status. Both studies demonstrated a statistically significant improvement Alzheimer's Disease Assessment Scale – cognitive subscale score.

Conclusion: Aside from its uses in digestion and metabolism, medium chain triglyceride oil has shown promise in other areas of healthcare. It is currently being explored for its effectiveness in improving the cognitive function in patients and has shown promise in Alzheimer's both in the acute setting and with consistent administration. Currently, the biggest limitation with the use of medium chain triglyceride oil for this application is the trial sizes are relatively small. Larger trials are still required to help reinforce the efficacy of medium chain triglyceride oil in the setting of Alzheimer's disease and cognitive impairment.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 3-182

Poster Title: Evaluation of Glucagon-like peptide-1 agonists and their weight loss properties in patients with type 2 diabetes mellitus.

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Purpose: Glucagon-like peptide-1 (GLP-1) receptor agonists mimic the naturally occurring incretin hormone which is released in the small intestine. These agents regulate blood glucose by increasing insulin release after glucose load and inhibiting glucagon secretion. Additionally, GLP-1 receptor agonists induce weight loss in patients through their activity in the brain and gastrointestinal tract. The primary action of weight loss activity is thought to be mainly due to an increase in satiety. The purpose of this study is to evaluate each GLP-1 receptor agonist by comparing their efficacy for weight loss in patients with type 2 diabetes mellitus.

Methods: Randomized controlled trials and review articles comparing weight loss outcomes in patients with type 2 diabetes taking GLP-1 agonists were retrieved using EMBASE, Cochrane Library, Ovid Medline and PubMed. Publications were considered from 2009 to 2016 and were searched by using the MESH words "weight loss" and "GLP-1", as well as the brand and generic names of each drug in the GLP-1 agonist class. The GLP-1 agonists that were reviewed included: liraglutide, exenatide twice a day, exenatide once weekly, albiglutide and dulaglutide. Trials that were included reviewed weight loss in patients as a primary or secondary endpoint and weight loss comparison was done among the dugs in the class or compared to placebo. Most articles were meta analysis comparing GLP-1 agonists with placebo and compiled the information together to display a comparison between each GLP-1.

Results: GLP-1 agonists assessed in this review produced a variety of results. In patients with type 2 diabetes, participants taking liraglutide 1.2 mg and metformin had a mean weight loss of –2.6 ± 0.2 kg at 26 weeks and exhibited an increase in weight loss with an increase dose of 1.8

mg. Exenatide 10 µg twice daily and metformin, however, had an average weight loss of -2.8 ± 0.5 kg at 30 weeks. Whereas the trial assessing exenatide once weekly compare to placebo revealed a greater weight loss of -4.00 kg at the end of a 52 weeks period. Alternatively, albiglutide had an average weight gain of 0.26 kg after 12 weeks based on information compiled from 6 studies with a 95% confidence interval of –0.66 to 1.3 kg. Dulaglutide had an average weight loss of -0.88 kg after 12 weeks with information compiled from 7 studies with a 95% confidence interval of –1.80 to 0.03 kg. Both albiglutide and dulaglutide did not show a statistically significant difference in weight loss compared to placebo.

Conclusion: A comparison on the effect of weight loss of the GLP-1 agonists in patients with type 2 diabetes revealed that different formulations in the class have variable effects. Liraglutide and exenatide showed significant weight loss in patients while albiglutide and dulaglutide did not. When recommending GLP-1 agonists to patients for diabetes management who may also benefit from their weight loss effect, either exenatide twice daily or liraglutide should be recommended as adjunct therapy to lifestyle modifications.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 3-183

Poster Title: New combination insulin containing pens: a guide for pharmacists and pharmacy students

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Purpose: There are many new innovative therapies currently marketed for the treatment of diabetes. Two combination insulin pens IGlarlixi(lixisenatide, a glucagon-like peptide-1 receptor agonist, and insulin glargine) and IDeglira(liraglutide, a GLP-1 receptor agonist, and insulindegludec, a long-acting insulin) are currently awaiting FDA approval. Combination insulin pens are useful for patients to help ease the burden of injections and to help them achieve a better quality of life while living with diabetes. This poster describes the dosing, safety, efficacy, and comparison of these products that was presented to pharmacists and pharmacy students to enhance their knowledge of Type II diabetes treatment.

Methods: Primary literature and clinical trials were researched to investigate two prefilled insulin pens, IGlarixi and IDeglira. Data was gathered from clinical trials to show adverse effects with these combination medications, initial dosing, adjusting dose, and their respective advantages and disadvantages. Tertiary literature was utilized to provide the initial dosing and titration of the long acting insulins, as well as the glucagon-like peptide-1 receptor agonists.

Results: IGlarixi is available in two different types of prefilled insulin pens. One pen can be utilized in insulin naïve patients, while the other pen can be used in patients who were currently prescribed a low dose basil insulin. These pens differ in the ratio of GLP-1 agonist and long-acting insulin which presents one disadvantage. However, it offers good postprandial coverage and it is dosed once a day. Clinical trials revealed that there are no cardiac risks with the pen dose of lixisenatide,and although there were markedly lower rates of nausea and vomiting, there is still a risk of gastrointestinal symptoms in GLP-1 naïve patients. Though there was weight loss associated with IGlarixi, it was not as significant as when compared to

lixisenatide alone. IDeglira comes as a once daily injection from prefilled insulin pen. Ease of dosing was a clear advantage of using IDeglira, however, potentially sub-therapeutic doses of liraglutide used in IDeglira was a major disadvantage. Furthermore, although we do not see a significant weight loss as seen with liraglutide alone, there is a potential -2.5 in weight decrease when compared to insulin degludec.

Conclusion: IGlarixiand IDegliraare two new insulin containing pens awaiting FDA approval. Because these new medications will soon be available for patients, it is important for pharmacists and pharmacy students to be able to help physicians and patients make informed decisions on which medication would be best suited for them. This poster was presented to help educate pharmacists and students learn about these two products, by comparing dosing, side effect profiles, efficacy, advantages, and disadvantages.

Submission Category: Critical Care

Submission Type: Descriptive Report

Session-Board Number: 3-184

Poster Title: Evaluation of the Safety of an IV Electrolyte Replacement Protocol for Critically Ill and Oncology Patients at Beth Israel Deaconess Medical Center

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Purpose: A new sliding scale electrolyte replenishment protocol for critically ill and oncology patients was recently established at Beth Israel Deaconess Medical Center. The protocol specifies a low and a high dose corresponding to each endpoint on the scale to be given when a patient's electrolyte level falls within a certain range. There are three separate sliding scales corresponding to Potassium, Magnesium and Calcium (ionized and unionized). The primary objective of this study is to evaluate the safety of this protocol by analyzing the rates of overcorrection in those patients who received sliding scale orders for Potassium, Magnesium, and Ionized Calcium.

Methods: 1,870 ICU patients who received orders for sliding scale Potassium, Magnesium, and Ionized Calcium between October 1st and January 31st were included in this study. Using electronic medical records patients who reported high values were extracted and separated into three cohorts corresponding to each scale. This equaled 1,046 patients who received orders for Magnesium, 150 patients for Potassium, and 674 for Ionized Calcium. Those patients who reported high values that were due to a lab and/or reporting error or resulted from a lipemic, icteric, or hemolyzed specimen were excluded from further analysis. After application of exclusion criteria this left 163 patients and 386 total values to be analyzed in the Magnesium group, 31 patients and 56 total values to be analyzed in the Potassium group, and 21 patients and 38 total values to be analyzed in the Calcium group. Reasons for high values were assessed and those due to overcorrection were identified.

Results: The rates of overcorrection due to following the protocol was 3/150 (2.0%) in the Potassium group, 2/674 (0.02%) in the Calcium group, and 51/1046 (4.9%) in the Magnesium group. When high values were analyzed in the Potassium group, 11/150 patients reported high values due to overcorrection. Of these patients, three received the dose per protocol and eight were given an inappropriate dose (i.e. patients' level prior to receiving the dose was already in

therapeutic range or the dose given was too high). In the Calcium group, 3/674 patients reported high values due to overcorrection. Of these patients two received the dose per protocol and one was given an inappropriate dose. In the Magnesium group, 75/1,046 patients reported high values due to overcorrection. Of these patients, 51 received the dose per protocol and 24 were given an inappropriate dose.

Conclusion: The sliding scale electrolyte replacement protocol proves to be safe in the Critical Care setting and leads to minimal rates of overcorrection in this patient population. The greatest rate of overcorrection was seen with Magnesium when patient levels were in the upper ranges of the protocol, perhaps suggesting a less aggressive approach when levels are greater than 1.7 mg/dL.

Submission Category: Pain Management

Submission Type: Evaluative Study

Session-Board Number: 3-185

Poster Title: Buprenorphine/naloxone for chronic pain management in patients with a history of opioid use disorder.

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Purpose: Buprenorphine/naloxone is FDA-approved for the treatment of opioid use disorder (OUD) and has a unique mechanism of action as a partial mu-agonist with high receptor affinity, which has made it an ideal drug for the management of OUD. New formulations of buprenorphine have been marketed for the management of chronic pain; however, buprenorphine/naloxone has been used off-label for chronic pain management in patients with past or current OUD. The purpose of this study is to evaluate the role of buprenorphine/naloxone for the management of chronic pain in patients with a history of OUD.

Methods: This retrospective review was conducted at a primary care clinic within a large, urban teaching hospital and was approved by the Institutional Review Board. Patients that were currently receiving buprenorphine/naloxone for chronic pain management within the primary care clinic were considered for inclusion if they met the following criteria: age 18 years or older, in recovery from OUD, history of chronic non-cancer pain, baseline numeric pain rating score of greater than or equal to 7, and had at least two documented clinic visits within the past 12 months. The following parameters were obtained through comprehensive chart reviews for visits occurring within the past 12 months: age, gender, pain diagnosis, details related to the history of OUD, current analgesic regimen, current buprenorphine/naloxone dose, number of clinic visits related to chronic pain, baseline average daily pain, function, and quality of life scores assessed using the PEG scale, current average daily pain, function, and quality of life scores assessed using the PEG scale, number of urine drug tests (UDTs), number of abnormal UDTs, average UDT concentrations for buprenorphine and its metabolites, co-prescribing of benzodiazepines, co-prescribing of naloxone, and adverse effects from therapy. Descriptive

statistics were used to summarize all data. The percent change in baseline and current scores was calculated for each parameter within the PEG scale.

Results: Among the 30 patients currently receiving buprenorphine/naloxone, a total of four patients met the inclusion criteria (3 females and 1 male). The mean age of patients was 65.5 years old (range 56 to 78) and all patients were prescribed greater than or equal to 24 mg of buprenorphine per day. The most common pain diagnoses were chronic low back pain and chronic abdominal pain. Half of patients had a history of heroin abuse, and the remainder of patients had a history of prescription opioid abuse. The calculated mean baseline pain scores, activity scores, and life-enjoyment scores were 10, 9.5, and 9.5, respectively. Calculated percent change in mean pain scores was -30%, activity score was -25.63%, and enjoyment of life score was -25.63%. It is important to note that 75% of the patients were receiving at least one additional analgesic. One patient reported nausea/vomiting, but this was not a reason for treatment discontinuation. The average number of UDTs performed over the past 12 months was 9, and the average number of abnormal urine results was 1.5 per patient. The most common substance identified within the UDT was marijuana. The average ratio of norbuprenorphine to buprenorphine was approximately 10 to 1.

Conclusion: The review has concluded that the use of buprenorphine/naloxone, when combined with adjuvant analgesics, is associated with improvements in pain, function, and quality of life scores in patients with chronic noncancer pain and a history of OUD. This treatment also appeared to be well-tolerated. This demonstrates that an opioid with a unique pharmacokinetic and pharmacodynamic profile can be used safely and effectively in this population. Due to the small nature of the study, a larger randomized controlled trial is needed to further investigate the use of buprenorphine/naloxone in this population.

Submission Category: Ambulatory Care

Submission Type: Case Report

Session-Board Number: 3-186

Poster Title: The successful transition of an extremely insulin resistant patient to regular human insulin 500 units/ml

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Purpose: This abstract will describe a patient's case that was successfully transitioned to human regular insulin 500 units/ml (regular U500) once it was apparent that his insulin resistance required greater than 200 units daily of insulin. The patient is a 61 year-old male with a past medical history of diabetes mellitus type 2, hypertension, dyslipidemia, neuropathy, obesity, chronic renal failure, and congestive heart failure class I-II. He was first referred to Pharmacy in November 2013 with an A1C of 9.3%. He was taking insulin glargine 100 units/mL80 units twice daily and insulin lispro 100units/ml, 10-40 units before meals. Both medications were discontinued and regular U500, 100 units twice daily with meals was initiated due to both, its basal and prandial properties using a tuberculin syringe dosed in both volume and units. Titration was successful and he instituted a better diet and exercise. His medical history precluded the use of other medications besides insulin. His A1C two months later was 7.8%. Over time, he stopped exercising and resumed a poor diet and his A1C elevated. In February 2015, insulin detemir 100 units/mL, 60 units in the morning was added to his regimen and prandial insulin dose was subsequently reduced to 80 units twice daily to diminish hypoglycemia risk. Because insulin detemir effects did not last the entire 24 hours, dose was changed to 50 units twice daily in March 2015 and then increased to 60 units twice a day. He experienced occasional nocturnal hypoglycemia determined to be due to diet when he skipped a meal.. In June 2015,insulin detemir 100 units/mL was switched to insulin glargine 300 units/mL, 80 units every morning to try to reduce the number of injections, but was associated with significant peripheral edema, prompting discontinuation and the re-initiation of insulin detemir at previous dose. Consequently, FBG levels rose and after splitting dose to 60 units twice daily in September 2015 and maintaining the prandial insulin at 130 units twice daily. His

basal insulin regimen required a dose greater than dialing capacity, warranting the transition to insulin degludec 200 units/mL, 120 units once in the evening in February 2016. This basal insulin's pen dials up to 160 units per injection and can be given once a day. The regular U500 dose was decreased to 125 units at breakfast and 50 units at dinner. A trial of lispro 200 units/mL with meals was attempted instead of regular U500 but doses required exceeded 60 units, the max per injection on the pen and regular U500 was resumed. In May 2016, he was switched to the regular U500 insulin pen instead of using tuberculin syringes. His doses have since been titrated to insulin degludec 200 units/mL, 160 units once daily and human regular insulin 500 units/mL 100 units twice a day. His blood sugars are closer to goal when he eats properly and elevates significantly when making poor choices. Due to the risk of hypoglycemia as he refuses to alter his dietary habits, increasing his doses further is not appropriate. It is critical for pharmacists to understand insulin resistance and the use of concentrated insulins. This poster will describe the successful transition of an extremely insulin resistant patient with uncontrolled diabetes to concentrated human regular insulin 500 units/mL and review the available concentrated insulins.

Methods:

Results:

Conclusion:

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 3-187

Poster Title: The role of a pharmacist in transitional care of heart failure patients.

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Purpose: Medication related errors upon the transition of care are the main cause of lengthy hospital stays and re-admissions after discharge. According to the Healthcare Cost and Utilization Project, Medicare patients accounted for 55% of all re-admissions and 58.2% of the costs associated with readmission. In 2011, it was reported that most Medicare re-admissions were due to complications of congestive heart failure. In 2012, the Affordable Care Act implemented the hospital readmission reduction program, which reduced payment to hospitals that have readmission within 30 days. Therefore, there has been an increased effort directed towards implementing interventions that reduce medication related errors.

Methods: Pharmacists have a crucial role in to identifying, preventing, and correcting medication errors related to transition of care in patients with heart failure. This review will identify common challenges posed by multiple studies associated with transition of care in the scope of pharmacy. We will further target these challenges by implementing key interventions to ensure effective and accurate completion of transition of care. This in turn will lead to improved quality of care as well as cost-reduction related to readmission and lengthy stays.

Results: Most medication errors upon transition of care arise due to lack of effective communication, which may lead to incomplete or outdated medication lists. It was reported that these errors may also occur during an acute attack of heart failure due to unintentional discontinuation or inappropriate initiation of chronic medications. There are many challenges that can emerge in regards to medication therapy. These challenges include: abiding by the hospital specific formularies, inter-professional communication between staff from different shifts, lack of understanding from the patient perspective, and missing patient information due to numerous medical records.
The use of standardized forms during the transition process has been helpful in reducing medication errors. These forms provide a template that can be used by the pharmacist in order to extrapolate all of the necessary information from both the patient and their health-care

providers. It is important to provide medication reconciliation in order to obtain an accurate and updated medication list. Upon patient discharge it is beneficial to provide patient centered education, scheduling of outpatient visits, and telephone follow up calls. These steps can all be lead to reductions regarding drug-related problems.

Conclusion: Clinical pharmacists have a beneficial role in the improvement of care in heart failure patients. Their involvement has been proven to reduce medication related errors upon transition of care.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 3-188

Poster Title: Assessment of 4-factor prothrombin complex concentrate (4-FPCC) dosing practices in patients within neurocritical care unit at UMass Memorial Medical Center (UMASS)

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Purpose: 4-factor prothrombin complex concentrate (4-FPCC) is indicated for reversal of bleeding associated with the use of vitamin k antagonists in cases of abnormally elevated international normalized ratio (INR). Since 4-FPCC is dosed by body weight, clinicians will often round doses up or down to the next closest vial size for clinical convenience. It is unknown if this practice will lead to differences in clinical or laboratory outcomes.

Methods: This is a retrospective cohort study using data collected from UMass' database from May 2015 to May 2016 and was approved by the institutional review board. Patients who received a dose of 4-FPCC for the reversal of warfarin-related intracranial bleeding were enrolled in the study. Patients were included if they had received warfarin prior to hospital admission, had an intracranial bleed (spontaneous or traumatic), and had an elevated INR (greater than or equal to 2). Exclusion criteria included receipt of non-warfarin anticoagulants or an extracranial hemorrhage. The primary endpoints were to characterize the current dosing strategies employed for patients admitted to the neurocritical care unit needing reversal of anticoagulation and compare the safety and efficacy of various dosing strategies for 4-FPCC. The secondary endpoints were to determine if there is a correlation between location of intracranial hemorrhage, dose of warfarin taken by the patient, or use of aspirin on patient's outcome based on modified Rankin score upon discharge. We defined clinical success as modified Rankin score upon discharge of 0 to 3 and laboratory success as INR reversal to less than or equal to 1.4 within the first twelve hours after administration of 4-FPCC. We calculated the time spent in ICU/hospital, modified Rankin score upon hospital discharge, and discharge disposition. T-test and Fisher's exact test were utilized for statistical analysis.

Results: Forty two patients were included in this study. The mean age was 75.2 years old. The majority of the patients were male (57.1 percent), who were mostly taking warfarin for atrial fibrillation (66.7 percent). Most of the patients received 4-FPCC for intracerebral hemorrhage (52.4 percent) and had intra-axial hemorrhage (52.5 percent). The mean baseline Glasgow Coma Score and Charlson comorbidity index were 11 and 3.5, respectively. Patients who received rounded down dosing of 4-FPCC had better laboratory success compared to those who received rounded up dosing (95.7 percent versus 55.5 percent, p value equals 0.04). There was no significant difference in clinical success between those who received rounded down or rounded up dosing of 4-FPCC (56.5 percent versus 44.4 percent, p value equals 1). None of the patients experienced myocardial infarction, deep vein thrombosis, pulmonary embolism, or ischemic stroke. Overall, ten patients (23.8 percent) died due to complications of their injury unrelated to 4-FPCC administration. In subgroup analyses, no significant difference was observed in clinical outcomes when intra-axial hemorrhage was compared to extra-axial hemorrhage (38.1 percent versus 75 percent, p value equals 0.07). No significant difference was observed in subgroup analyses of warfarin dosage taken or concurrent use of aspirin.

Conclusion: Laboratory success was achieved more successfully in patients who received rounded down dosing of 4-FPCC. However, rounded down dosing seems to be as effective as rounded up dosing of 4-FPCC in achieving clinical success. Our study does not suggest that warfarin dose or aspirin use, location of intracranial hemorrhage, and dose-rounding of 4-FPCC has an impact on the clinical success/outcomes defined as modified Rankin score of 0 to 3 upon discharge. Future larger studies are needed to identify optimal and safe dosing strategy of 4-FPCC in practice.

Submission Category: Ambulatory Care

Submission Type: Case Report

Session-Board Number: 3-189

Poster Title: Successful transition from U100 insulin glargine to U200 insulin degludec

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Purpose: This abstract will describe a case of a patient who was successfully transitioned to degludec U200 insulin when it was suspected that U100 glargine was not lasting 24 hours and missed doses due to shift-work was identified. The patient is a 57- year-old male with a past medical history of type 2 diabetes mellitus, hypertension, dyslipidemia, nephropathy, retinopathy, and glaucoma. His current medications are metformin XR 500mg two tablets in the morning and two tablets in the evening, empagliflozin 25 mg daily, insulin degludec U200 98 units daily. He works approximately 70 hours per week with shift work,gets no purposeful exercise, and eats a relatively poor diet. He is 6'2, weighs 296 lbs, and his BMI is 38 kg/m2. He was first referred to Pharmacy in June 2012 with an A1C of 14.4%. At this visit his regimen included taking metformin XR 2000 mg, glipizide 20 mg twice daily, and insulin glargine 24 units in the morning. Glipizide was discontinued and glargine 24 units was continued with a titration schedule to increase by 2 units every 3 days until his FBS was 70-130 then stay at that dose. Metformin ER 500mg 2 tablets in the morning and 2 tablets in the evening was continued. Discussed adding liraglutide at a future visit but he refused. Four months later his A1C was 7.5% on the following regimen metformin XR 2000 mg daily and insulin glargine 52 units every morning. He missed follow up appointments and was not seen again until June 2013 when his A1C was 9% and he was taking metformin XR 2000 mg daily and insulin glargine 62 units in the morning. Mealtime insulin was initiated but he was non-adherent and did not follow up with Pharmacy again until March 2016 when his A1C was 10.5%. His regimen at that time was metformin XR 2000 mg daily and insulin glargine 80 units in the morning. It was identified that he was often late or may miss his insulin dose when he wasn't working and it was suspected that insulin was not lasting 24 hours. He also required larger doses of basal insulin that could not be accommodated with a single injection of U100 glargine. His U100 glargine was changed to U200 degludec 90 units and metformin XR 2000 mg daily was continued. He was educated on the need for adding mealtime coverage via a GLP-1 receptor agonist (RA) or mealtime insulin

when dose is stable. There is a 1:1 conversion from U100 glargine to U200 degludec which is easy for the provider and not confusing for the patient to understand. The half-life of insulin degludec is 25 hours and duration of action is 42 hours. The efficacy of U200 remains the same after 8 and 40 hours allowing for a more flexible dosing schedule. Hypoglycemia rates and other adverse effects were the same also. This allows for U200 degludec to be used in patients who require more than 80 units daily, who have variable work schedules, who are often non-compliant, and anyone who may have trouble injecting at the same time every day. With the addition of U200 degludec to his regimen his glycemic control and compliance has improved. Two months later his A1C was 8.5% and he was injecting 98 units of U200 degludec. He refused any additional medications. Three months later his A1C rose to 9.3% and he refused a daily injection of GLP-1RA but was willing to inject a weekly agent that was initiated.

Methods:

Results:

Conclusion:

Submission Category: General Clinical Practice

Submission Type: Case Report

Session-Board Number: 3-190

Poster Title: Role of Desmopressin (DDAVP) and prednisone in acquired hemophilia A: a case report

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Purpose: This case illustrates the role of desmopressin (1-amino-8-D-arginine vasopressin, DDAVP) and prednisone in managing acquired factor VIII deficiency associated with hemophilia A, a congenital bleeding disorder. An 80-year-old Caucasian female with a past medical history including atrial fibrillation on warfarin and low-dose aspirin presented to the emergency room at our institution with increasing weakness, bruising, nausea, and an eight pound weight loss in two months. On examination, the patient had significant bruising of her hands and lips. She was taking warfarin and aspirin at home and upon presentation her INR and PTT were at 2.8 and >150, respectively. Warfarin was held. On hospital day 4, the INR rose to 3.4. Other significant laboratory values included hemoglobin 7.9 and hematocrit 24.0, dropping to 6.1 and 21.5, respectively, within 24 hours. She was given two units of packed red blood cells. The measured activity levels of Factor VIII (less than 1% of the expected value) and factor IX (50% of the expected value) were reported. Ultimately, a PTT mixing study demonstrated there was evidence of factor VIII inhibitor with hexgonal phase lupus anticoagulant. It was determined her clotting cascade was not functioning appropriately. On hospital day 3, she was diagnosed with new onset mild hemophilia A and intravenous DDAVP 15mcg daily was prescribed to help control bleeding. After 4 days of DDVAP therapy, the serum sodium level dropped to 126 mEq/mL. One of its adverse effects is hyponatremia. DDAVP was discontinued. Prednisone 50mg daily for 21 days was started. On the day of discharge, the PTT level dropped to 90 with an improvement of symptoms. She was discharged off her usual warfarin to complete a 21-day course of high dose prednisone. Continued management of her acquired hemophilia A included close monitoring for signs and symptoms of bleeding and a prednisone taper after completion of a 21 day course of high dose drug.
This report describes a case of new onset acquired hemophilia A in an elderly woman, a disease state that is so uncommon, only an estimated 20,000 individuals in the United States have it.

Desmopressin shortens prolonged PTT and bleeding time, by promoting the release of von Willebrand factor with a subsequent increase in factor VIII survival, and is indicated to treat mild hemophilia A. First-line therapy for eradication of factor VIII inhibitors includes methylprednisolone 1mg/kg/day or an equivalent dose of prednisone. Adding oral cyclophoshamide 50-150mg/day can increase response rate. In our patient, DDAVP successfully controlled active bleeding initially. It is noteworthy all bleeding indices improved after initiation of daily high dose prednsione. Initial therapy with DDAVP to control bleeding followed by daily high dose prednisone may be an option in patients with hemophilia A who are not candidates for combination therapy with cyclophosphamide and prednisone.

Methods:

Results:

Conclusion:

Submission Category: General Clinical Practice

Submission Type: Case Report

Session-Board Number: 3-191

Poster Title: Use of anakinra for the management of refractory pericarditis.

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Purpose: Pericarditis is the inflammation of the pericardium. Though the primary cause of pericarditis is idiopathic in most cases, there are a number of disease states that have shown to be associated with pericarditis (e.g. viral infection, tuberculosis, neoplasms, myocardial infarctions, or autoimmune disorders). Aside from treating the underlying cause, treatment of pericarditis involve the use of non-steroidal anti-inflammatory drugs (NSAIDs), colchicine, and corticosteroids to reduce inflammation, pain and prevent recurrence. The use of high dose NSAIDs and colchicine concurrently is the mainstay of therapy, as they both significantly decrease inflammation, and has been demonstrated to reduce recurrence as compare to NSAIDs alone. Corticosteroids although relieve symptoms, has been demonstrated to increase recurrence as compare to NSAIDs and colchicine. Despite proper treatment, recurrent idiopathic pericarditis is a common, problematic complication of acute pericarditis, occurring in approximately 30% of cases. Other immunosuppressive therapy may have to be considered. We present a patient case of refractory pericarditis successfully managed with anakinra, an interleukin-1 receptor antagonist.

The patient is a 61 year old female with past medical history significant for ischemic cardiomyopathy (left ventricular ejection fraction 25%), and coronary artery disease with stent placement. She was admitted for management of a device pocket hematoma after a recent admission for a cardiac resynchronization pacemaker and defibrillator (CRT-D) placement. During her first hospitalization, the CRT-D was removed and patient was treated empirically with a course of antibiotics (clindamycin 600 mg every 8 hours for 7 days). Patient was readmitted a few weeks later to have a new CRT-D placed via epicardial lead approach. Three weeks after the epicardial lead has been placed, the patient presented to the hospital complaining of fever, fatigue and chest tightness. CT scan showed circumferential thickening of

the pericardium consistent with pericarditis. Additionally, her erythrocyte sedimentation rate (ESR) was elevated to 98 mm/hr, C-reactive protein (CRP) to 244 mg/L, and a friction rub was noted on physical examination. She was initiated on ibuprofen 800mg three times daily and colchicine 0.6mg twice daily. Her laboratory tests and fever both improved after a week of treatment and patient was discharged with colchicine only to be continued for 4 weeks (ibuprofen discontinued on discharge due to gastrointestinal upset and improvement of pain and fever). Two weeks later, patient presented with recurrent pericarditis symptoms (fever, ESR 100 mm/hr, CRP 300 mg/L). Patient was restarted on ibuprofen and continued on colchicine. Another two weeks later, patient presented once again with recurrent symptoms (fever, ESR 113 mm/hr, CRP 354 mg/L). Due to symptoms appearing to be refractory to ibuprofen and colchicine, decision was made for a trial of anakinra 100mg daily subcutaneously. The following morning the patient reported decreased chest pain. Repeated ESR and CRP after 4 doses anakinra were 91 mm/hr and 33 mg/L, respectively. The plan was initially to discharge the patient on anakinra daily for 4 weeks, then re-evaluate. However, due to insurance denying payment, patient was initiated on prednisone 30mg daily instead with plan to consider methotrexate therapy after symptoms further improved.

Anakinra is an interleukin-1 receptor antagonist currently approved for treatment of rheumatoid arthritis. Small number of case reports and case series (mostly in pediatric patients) have been published in its use for management of recurrent pericarditis. Anakinra appeared to be well-tolerated in these case reports. Treatment duration in these case reports average from 2 months to 3 years. Recurrence rate after anakinra discontinuation varies in different reports and remains a concern. Controlled clinical trials are necessary to support the use of anakinra in recurrent pericarditis refractory to traditional therapy.

Methods:

Results:

Conclusion:

Student Poster Abstracts

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 3-192

Poster Title: Surgical weight reduction by vitamin/mineral consumption

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Purpose: This abstract describes the development of a PowerPoint presentation, poster, and brochure designed to educate healthcare professionals, patients and members of the community about the nutrients that are compromised in bariatric surgery. Obesity is a growing public health concern making bariatric surgery common in practice today. A greater understanding of the risks of vitamin and mineral deficiencies post-bariatric surgery is crucial for effective interventions. The purpose of this information is to describe the growing prevalence of obesity and bariatric surgery, the risk of vitamin and mineral deficiencies and how to manage proper interventions to prevent complications.

Methods: Under the direction of faculty, students conducted a literature search on all aspects of bariatric surgery and the associated nutrient deficiencies following each procedure. Incidence of obesity and bariatric surgery, screening for vitamin and mineral deficiencies, and recommended management for interventions were all included in the literature search. The informational resources consisted of peer-reviewed articles as well as other reliable sources such as the National Institutes of Health (NIH) and the American Society of Metabolic and Bariatric Surgery (ASMBS). The information was collected, organized, and evaluated to create a comprehensive informational resource for medical practitioners, patients and members of the community. A thorough analysis of a review article authored by research done by NIH and presented by the Health and Human Services as well as basic literature searches were utilized to find the desired information. The search was preformed to understand the prevalence of obesity in our population, to evaluate the increasing popularity of bariatric surgery in common practice, and how to identify and manage vitamin and mineral deficiencies post-surgery.

Results: An educational PowerPoint presentation, poster and brochure were developed to present the incidence of vitamin and mineral deficiencies commonly seen post-bariatric surgery, the physiological mechanisms by which these deficiencies occur, their signs and symptoms, screening parameters, and recommendations for management and interventions. The information will be presented in charts and diagrams to depict the current estimated cases of bariatric surgery annually and the recommended management and prevention of each vitamin and/or mineral deficiency. Approximately 26% to 32% of Americans are considered obese in our population today with a growing increase in prevalence. It is estimated that 43% of Americans will be considered obese in 2018. Cases of bariatric surgery have been increasing exponentially since the 1990s, growing from about 20,000 procedures in 1992 to 120,000 procedures in 2008. The growing incidence of bariatric surgery has led to greater incidences of nutritional deficiencies. The most common vitamin and mineral deficiencies include a variety of B vitamins (thiamine, pyridoxine, folate and cobalamin), vitamin A, vitamin D, vitamin E, vitamin K, iron, calcium and several proteins. Supplementation of these vitamins and minerals are vital to avoid complications associated with these deficiencies.

Conclusion: The presentation, poster and brochures provide a guide to evaluate the overall impact of nutritional deficiencies commonly found in post-bariatric surgery and how to provide effective management of these complications. These materials will serve as a source of recommendations for providers and patients to raise awareness of this problematic issue. Despite great advances in the last few decades of weight loss management with bariatric surgery, nutritional deficiencies still pose a major problem post-surgery to the public health. Effective education regarding the management and prevention of vitamin and mineral deficiencies is necessary to decrease the risk of these complications.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 3-193

Poster Title: The development to an alternative method to testing your blood glucose testing.

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Purpose: This abstract will describe the development of a blog, brochure, and poster designed to educate healthcare professionals and patients on alternative site blood glucose testing. Alternative site testing provides an alternative method to finger stick testing for patients with diabetes to test their blood sugar that is less painful and may result in better compliance for those that do not test due to pain.

Methods: Under the supervision of faculty, the research of alternative site testing was conducted. The research involved reviews and clinical trials from various sources such as American Diabetes Association, PubMed, Becton Dickinson, then information was organized for an internet blog, brochure, and poster to further educate healthcare providers and patients.

Results: An informational blog, brochure and poster were designed to include the value and use of alternative site blood glucose testing, appropriate sites where patients can test and several concerns regarding this method. This information on the blog and poster provide healthcare professionals and patients additional insight on an additional technique for blood glucose testing to those who have and deal with patients with diabetes. A brochure was designed as an at home teaching tool for both healthcare providers and patients/caregivers so they can further read about the method and reinforce the information told to them at the office.

Conclusion: In conclusion, this project is meant to serve as an educational tool for both healthcare providers and patients/caregivers on alternative site testing. It provides them education on when they should and should not use the various sites and which sites should be

used when. The poster will further educate healthcare professionals and patients to better understand what alternative site testing. Additionally, a brochure will serve as a take home tool so the information is reinforced. Overall goal is to increase patient blood glucose testing compliance and reduce pain cessation from fingertip testing.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 3-194

Poster Title: Liposomal doxorubicin: Infusion reactions in different cancers

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Purpose: Liposomal doxorubicin is used in the treatment of a number of cancers. Infusion reactions related to liposomal doxorubicin have been reported to occur in about 10% - 12% of cases, something not seen with regular doxorubicin. Corticosteroids, histamine-1 and histamine-2 antagonists are generally used in the prevention of infusion reactions. However, there is currently no standardized premedication protocol for liposomal doxorubicin at our institution. The purpose of this study was to estimate the percentage of patients that develop an infusion reaction to liposomal doxorubicin, and to identify any factors that may be associated with the development of these reactions.

Methods: This was a retrospective medical chart review and drug-use evaluation, which was approved by the institutional review board (IRB). Patients who received liposomal doxorubicin at our institution between January 2015 and August 2016 were identified using Dana Farber's pharmacy dispensing records and electronic medical records (EMR). These patients were then retrospectively assessed for any documented infusion reactions during cycle 1 or cycle 2 of their treatment, and the description of such reactions, based on the nursing and provider notes from the institution's EMR. Data collected from each patient included their medical record number, initials, age, gender, type of cancer, cycle, cycle date, cycle dose (mg/m2), total administered dose (mg), and administered pre-medications/doses. Patients who had documented hypersensitivity symptoms during liposomal doxorubicin infusion were considered to have had an infusion-related reaction.

Results: A total of 300 patients were identified and retrospectively analyzed for infusion related reactions when receiving liposomal doxorubicin. Fourteen patients were male, while 286 were female. The median age of all patients was 62 years old. Six different types of cancers were observed, the three main ones being gynecological (167 patients), breast (87 patients), and

sarcoma (33 patients). A total of 32 infusion reactions were documented among all 300 patients. Fourteen patients (42%) with sarcoma had an infusion reaction. Patients with gynecological and breast cancers had reaction rates of 7% and 8% of their subgroup population, respectively. There were no infusion reactions documented in the lymphoma (11 patients), gastrointestinal (1 patient), or myeloma (1 patient) subgroups.
The pre-medications administered before each infusion were also analyzed. Among the breast and gynecological cancer subgroups, no patient received all 3 pre-medications (corticosteroid, H1-antagonist or H2-antagonist), while 8 patients received all 3 medications in the sarcoma subgroup. In the breast cancer subgroup, there were 4 infusions that received no pre-medications that resulted in a reaction, while there was 5 in the gynecological subgroup, and only 1 in the sarcoma subgroup.

Conclusion: The results of this study suggests that patients with sarcomas have a disproportionate incidence of infusion-reactions to liposomal doxorubicin when compared to patients with other cancers. Among 300 patients and 32 documented reactions analyzed in this study, almost half the reactions occurred in sarcoma patients. Despite this disproportionate incidence in sarcoma patients, they were also more pre-medicated when compared to patients with other cancers. There is currently minimal data that indicates why sarcoma patients have higher rates of infusion reactions, and further studies should be conducted to identify other risk factors for infusion-reactions as well as the optimal pre-medication regimen.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 3-195

Poster Title: Evidence based protocol for icatibant use in the treatment of angiotensin converting enzyme (ACE) inhibitor-induced angioedema (ACEI-AE)

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Purpose: ACE inhibitors induced angioedema (ACEI-AE) is defined as a swelling of the face, lips, tongue, or larynx that occurs subcutaneously and progresses rapidly with high risk for severe respiratory compromise, and in some cases death. After encountering a patient with ACEI-AE, we recognized that there is a paucity of information on the optimal treatment of ACEI-AE. Therapies like C1esterase inhibitor concentrate, kallikrein inhibitor, and bradykinin receptor type 2 inhibitor (Icatibant) have been the center of new studies for the treatment of ACEI-AE. We will provide clinicians with a protocol based on the evidence available associated with icatibant.

Methods: Literature was accessed through MEDLINE search using the following MeSH terms: ACEI induced angioedema AND icatibant, non-allergic angioedema AND icatibant, ACEI angioedema management, Angioedema AND asymmetric swelling, C1 esterase inhibitor concentrate AND angioedema. Searches were limited to English language, human subjects, and publication dates within the past 10 years. The search focused on the ACEI induced angioedema that is non-allergic and derived by the accumulation of bradykinin that leads to increased vascular permeability and interstitial edema. Additional studies referenced in the retrieved articles were also reviewed. Two controlled clinical trials, one case series, and several case reports were included in the background literature that was used to develop the evidence base protocol. Based on the evidence available and the cost of the 30mg (3ml)-prefilled syringe averaging about 8825 dollars, icatibant would not be considered a first line agent for ACEI-AE and it should be reserved for severe cases refractory to current standard treatment options such as corticosteroids, antihistamines, fresh frozen plasma, and epinephrine.

Results: For our protocol, icatibant use will be reserved to patients: 18 years of age or older, with at least a moderate severity of angioedema, and clinical presentation of tongue swelling, difficulty breathing, difficulty swallowing, voice change, and refractory to current standard treatment options. Patients should be admitted to the intensive care unit (ICU) for proper management and close monitoring. Protection of the airways is very critical due to the high risk of airway obstruction requiring intubation. A 30mg-Icatibant dose should be administered as a subcutaneous injection. If response is inadequate, or symptoms reappear, an additional injection of 30mg may be administered at intervals of at least 6 hours. No more than 3 injections in 24 hours should be given. Patients should be closely monitored for signs of visible decrease in angioedema, which occur slowly within 15-30minutes with the first dose. Near complete resolution of symptoms is expected to occur within 4-10 hours on average. Erythema and injection site reactions are mild self-limiting side effects associated with icatibant. No additional icatibant-specific monitoring parameters are required. Finally, along with permanent discontinuation of ACEI, proper documentation of the reaction should be updated in the patient medical record.

Conclusion: Our patient was managed supportively in the ICU by giving methylprednisolone and famotidine. Given the cost of the product, icatibant was considered but not administered. Other institutions would probably face the same dilemma and would need to create their own protocol for the management of ACEI-AE using icatibant. In addition, we suggest conducting a cost-benefit analysis to determine the suitability of icatibant before it may be considered as an economically and pharmacologically effective option for the treatment of ACEI-AE.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 3-196

Poster Title: Aztreonam: Retrospective utilization evaluation and cost assessment of a penicillin skin testing (PST) as an alternative approach

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Purpose: Aztreonam is a monobactam antibiotic that is prescribed for patients with a severe allergy to β-lactam antibiotics for empiric treatment of an infection caused by gram negative pathogens. Often times, inappropriate prescribing occurs because of incomplete documentation of true allergies to penicillins, leading to an increased use of unnecessary and expensive broad spectrum antibiotics. The purpose of this evaluation is to assess the appropriateness of aztreonam utilization and to assess whether a penicillin skin testing protocol is a cost minimizing alternative approach.

Methods: Pharmacy Meditech database was used to identify patients who were prescribed aztreonam from January 1st, 2015 to May 3rd, 2016. Using a standardized sheet, patients' electronic medical records were reviewed to collect the following baseline and clinical characteristics: age, length of stay, penicillin allergy documentation (timing, causative agent, description of reaction, tolerance of other β-lactams), serum creatinine, clinical indication, microbiological culture results and sensitivities, aztreonam regimen, and occurrence of a side effect attributed to aztreonam.
Utilization of aztreonam was deemed appropriate if dosed according to the package insert, used in a patient with a pathogen only sensitive to aztreonam or in a patient requiring gram negative coverage, or if the patient had an appropriately documented severe allergic reaction to penicillin/β-lactam such as anaphylaxis, angioedema, or hives.
Documentation of the penicillin/β-lactam allergy reaction was deemed absolutely appropriate if it included a clear documentation of the causative agent, and a clear description of the reaction and the specific time of its occurrence. If a patient had a mild or moderate allergy to penicillin (mild rash, diarrhea, nausea/vomiting, itching), or listed as unknown reaction with unknown severity, the patient was deemed a candidate for a Penicillin Skin Testing (PST). The cost of the

aztreonam regimen was compared to the total cost of a suitable per indication predefined alternative β-lactam regimen along with the cost of PST.

Results: 40 patients received aztreonam and were included in this analysis. 199.5g/355.5g (56%) of aztreonam given was considered to be administered inappropriately based on incomplete allergy documentation. No aztreonam usage was deemed inappropriate based on indication and dosing. Three patients did not have allergies to β-lactam antibiotics. The most common allergy causing agent was amoxicillin, causing 6 events (16%). Of the 37 patients who had a documented allergy to penicillin, eight (22%) were found to have absolutely appropriate allergy documentation. We found that only 10 patients (27%) of the 37 with allergies had a recorded specific time of the allergic event occurring. 18 patients (45%) were determined to be appropriate candidates for a skin testing protocol. The total cost of aztreonam therapy among these patients was $5120. The total cost of penicillin skin testing would have been $1871, and the cost of alternative therapy to aztreonam would have been $3,113.49 if ceftazidime was used as the alternative agent for bacteremia, pneumonia and sepsis, or $1154.18 if piperacillin/tazobactam was used. A potential cost saving of $136 when comparing aztreonam regimen to ceftazidime and of $2095 compared to piperacillin/tazobactam.

Conclusion: Overall, aztreonam utilization was not optimal given the lack of appropriate allergy documentation. A penicillin skin testing protocol appears to be a cost minimizing approach in addition to allowing a judicious usage of aztreonam. A hospital wide pharmacist-driven allergy clarification initiative may improve the allergy documentation and may help minimize aztreonam usage based on unclear allergy history. Finally, electronic health record software system should be built to encourage the clear documentation of allergy to avoid vaguely stated allergic reaction such as “unknown”, or “allergic to penicillins/β-lactams” without specifying a causative agent.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 3-197

Poster Title: Evaluation of nutritional supplements as adjuncts to statin therapy for hypercholesterolemia

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Purpose: Despite the long-term benefits of cholesterol-lowering agents, many patients struggle to reach their therapeutic goals due to statin intolerability. To overcome this barrier, patients will often seek over-the-counter (OTC) alternatives. Unfortunately, there are several medications on the market that may not have a definitive place in therapy for the treatment of hypercholesterolemia. The purpose of this review is to provide guidance regarding the safe and effective use of OTC supplements as adjunct to statin therapy for the treatment of hypercholesterolemia.

Methods: Relevant primary literature and review articles were collected regarding nutritional supplements in relation to cholesterol and cardiovascular disease. Various supplements were chosen based on high media prevalence or published controversial evidence regarding benefits for cardiovascular health. The different supplements researched were red yeast rice, niacin, omega-3 fatty acids, garlic, coconut oil, psyllium, flaxseed, coenzyme Q10 , and vitamin D. Articles were identified by searching a total of seven databases with publications from 1996 to the present (2016), and key articles were obtained primarily from Ovid Medline, Embase, PubMed, Natural Medicine and Pharmacotherapy. The MESH terms "cholesterol," "cardiovascular disease," and "myalgia" in addition to the name of each supplement were utilized for the literature search. A comprehensive search was made of Internet resources, primarily the use of PubMed through the National Library of Medicine. Finally, studies were eligible for consideration in this review if they reflected changes in cholesterol levels.

Results: The supplements assessed during this drug literature review were evaluated based on their efficacy in decreasing cholesterol levels, as well as their ability to mitigate statin-induced adverse effects. Of the products reviewed, omega-3 fatty acids, red yeast rice and psyllium were proven to reduce cholesterol levels along with most formulations of flaxseed due to their soluble fiber content. There was conflicting results regarding the benefits of garlic and coconut oil and their effect in reducing cholesterol levels, however use did not warrant any safety concerns. Regardless of the lack of safety concerns, garlic and coconut oil do not largely reduce cholesterol levels. Despite the fact that niacin and red yeast rice have shown to be effective in reducing cholesterol levels, both agents have negative safety profiles when used long-term. Due to these concerns, it is typically not recommended for these agents to be utilized without the supervision of a provider. Lastly, vitamin D showed significant benefits in mitigating the adverse effect of statin-induced myalgia, while coenzyme Q10, on a large scale, did not reveal many benefits.

Conclusion: Several supplements have demonstrated benefit as adjuncts in the treatment of hypercholesterolemia. Although some products showed a reduction in overall cholesterol levels, none proved to have any long-term cardiovascular benefit. Despite the lack of concrete mortality benefits with the use of these agents, most may be utilized in therapy without interfering with cholesterol-lowering agents. Omega-3 fatty acids, psyllium, flaxseed, garlic, coconut oil and vitamin D are routinely utilized in moderation with sound clinical reasoning. However, niacin, red yeast rice and coenzyme Q10 lack substantial data regarding their overall benefit, and may potentially be harmful to a patient.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 3-198

Poster Title: Comprehensive drug utilization review: Liposomal amphotericin b

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Purpose: This drug utilization evaluation aims to review current evidence on safety and efficacy of using liposomal amphotericin B (AmBisome) in newborns with candidiasis, and compare it to the conventional preparation. Conventional amphotericin B (Fungizone) is more commonly used in newborns, but dose limiting adverse effects may compromise its efficacy. This review will go over the advantages and disadvantages of liposomal amphotericin B and define its place in current practice.

Methods: A literature search was carried out to include relevant data available on the liposomal formulation of amphotericin B. The search included studies dating as far back as 1988, comparing the conventional and the liposomal formulations in newborns as monotherapy. Additional pharmacokinetic studies were reviewed to look at available data. The terms 'AmBisome' or 'liposomal amphotericin B' and 'neonatal candidiasis' were entered on both PubMed and Ovid; studies included focused on safety and efficacy of liposomal amphotericin B in newborns with candidiasis. Single case reports were not included in the review due to the limitations of relying on single cases for conclusions. This literature search was done to provide anti fungal therapy guidance in a newborn infant who developed signs of renal and hepatic adverse events following conventional amphotericin use.

Results: The results of this drug utilization review provided insight on the efficacy and safety of liposomal amphotericin B to treat neonatal candidiasis. Most of the studies used in this evaluation did not have statistically significant results due to size and design of the study, however the reported results are consistent with the other studies evaluated. Overall, current studies support liposomal amphotericin B (AmBisome) as an efficacious option, equivalent to the conventional formulation, with no statistically significant in mortality. Additionally, data supports increased safety including decreased incidence of hepatotoxicity and nephrotoxicity, which was statistically significant when comparing to conventional amphotericin B. Studies also reported a shorter duration of therapy needed in patients not previously exposed to the

conventional formulation, which suggests an increased efficacy of the liposomal formulation over the conventional formulation. There is a lack of data regarding the kinetics of the medication, which will limit its use as a first line agent, specifically in the context of fungal meningitis, as CNS penetration data is insufficient. Moreover, there is a reported lack of renal penetration, which prevents its empiric use, as it requires ruling out infectious renal involvement.

Conclusion: Although liposomal amphotericin B seems to be better tolerated and as efficacious as the conventional formulation based on published literature, the limitations of the studies available on the subject cannot be overlooked. Randomized controlled trials are needed in order to determine the place in therapy of this medication. This medication evaluation contributed to get a more in depth understanding of the medication and led to the addition of liposomal amphotericin b to NICU formulary at Brigham and Women's Hospital, pending Pharmacy and Therapeutics Committee approval.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 3-199

Poster Title: Gluten: to wheat or not to wheat

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Purpose: This abstract describes the development of a PowerPoint presentation, poster and brochure designed to educate healthcare professionals, patients and members of the community about a food component, gluten, that is incorporated in many food products found on supermarket shelves. The incidence of gluten-related disorders or gluten sensitivity is currently increasing each year with an estimated worldwide prevalence of about 5% while the estimated occurrence of diagnosed celiac disease remains at 1%. The purpose of this information is to describe the differences between celiac disease and non-celiac gluten sensitivity and how to properly manage interventions to prevent complications of these conditions.

Methods: Under the direction of faculty, students conducted a literature search on all aspects of gluten ingestion as it relates to celiac disease and non-celiac gluten sensitivity including epidemiology, pathophysiology, the types of reactions and the management of such reactions. The informational resources consisted of peer-reviewed articles and other reliable sources such as the National Institutes of Health (NIH) and the American Gastroenterological Association (AGA). A thorough analysis of the research conducted at the Celiac Disease Center and the Institute of Human Nutrition at Columbia University was cited as well as other pertinent literature to supplement this information. The information was collected, organized and evaluated to create a comprehensive informational resource for medical practitioners, patients and members of the community. The information consisted of the epidemiology, pathophysiology, characteristics, classification, cross sensitivities and management of gluten allergies and sensitivities.

Results: An educational PowerPoint presentation, poster and brochure were developed to present the differences between celiac disease and non-celiac gluten sensitivity, their pathophysiology, clinical manifestations, biomarkers, histology, screening parameters and recommendations for management and interventions. The information will be presented in charts and diagrams to depict the differences between celiac disease and non-celiac gluten sensitivity and the recommended food items to consume and avoid for proper management and treatment of both conditions. The incidence of celiac disease is 1% worldwide compared to non-celiac gluten sensitivity, which effects up to 5% of the worldwide population. A thorough knowledge and understanding of the signs, symptoms and clinical presentation of celiac disease and non-celiac gluten sensitivity is vital for a differential diagnosis. Symptoms may be mild as bloating and diarrhea to severe complications such as osteopenia, osteoporosis and peripheral neuropathy. Not only do affected individuals have to observe a life long gluten-free diet, screening for nutritional deficiencies with special attention to iron, folate, vitamin B12 and vitamin D is required.

Conclusion: The presentation, poster and brochures provide a guide to evaluate and differentiate between celiac disease and non-celiac gluten sensitivity and how to review clinical histories, symptoms, serological and histological tests to effectively manage complications. These materials will serve as a source of recommendations for providers and patients to raise awareness of this problematic issue. The incidence rates of these conditions are increasing and lack of knowledge could possibly lead to life long complications. Therefore, proper knowledge of the differences among gluten related disorders is vital for proper recommendations, interventions and treatments.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 3-200

Poster Title: Retard the flame without environmental and health risk blame

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Purpose: This abstract describes the development of a presentation designed to educate the general public about cancer risk in firefighters. Despite years of intervention efforts, cancer rates in firefighters continues to be a major problem, with an abundant number of firefighters developing cancers due to the exposure of carcinogens found in building materials. A greater understanding of carcinogens is crucial for the effective intervention and safety in exposure-response relationships for firefighters. The purpose of investigating current information regarding the most common carcinogens encountered by firefighters during their high-risk exposure will heighten public awareness and provide valuable recommendations to better protect firefighters.

Methods: Under the direction of faculty, students conducted a literature search on all aspects of types of cancer rates in firefighters, including the incidence of exposure, contributing factors, and recommendations for prevention. The informational resources consisted of primary literature as well as other reliable sources such as the National Institute of Occupational Safety and Health (NIOSH), the International Agency for Research on Cancer (IARC) at the World Health Organization (WHO) and the International Association of Fire Fighters (IAFF). The information was collected, organized and evaluated to create a comprehensive informational resource for medical practitioners, patients and members of the community. An analysis of data was conducted based on the number of cancers in firefighters from 1950 to 2004 through the IAFF website. Exposures were classified by most prevalent types of cancer, causes or routes of exposure, and identified substances that are classified as carcinogens. A literature search was then performed to identify contributing factors and recommendations under the following search terms: firefighter AND cancer AND prevention.

Results: According to studies from NIOSH and IAFF, firefighters have been shown to be at a higher risk for multiple types of cancer compared to the general population. Several studies have found a statistically significant increase in specific types of cancer in firefighting including testicular cancer, malignant melanoma, prostate cancer, lung cancer, leukemia and breast cancer. The higher risks of developing cancer (exposure-response relationships) are due to the extended periods of exposure to carcinogens that firefighters face during a fire run. The most common routes of carcinogenic exposure during a fire run are dermal absorption and inhalation. Another major reason for carcinogen exposure is due to the improper removal and decontamination of firefighter equipment, which include turnout gear and self-contained breathing apparatus (SCBA). Studies have also indicated that building materials contain many chemicals that are known carcinogens. These chemicals when inhaled or dermally contacted during a fire may cause carcinogens to enter the body. The most common substances in building materials that cause cancer include arsenic, asbestos, benzene, bisphenol A, formaldehyde, aromatic hydrocarbons, chlorinated plastics (PVCs) and dioxins. A literature search revealed the persistent incidences of cancer among firefighters despite substantial evidence proving this exposure-response relationship and advancement in technology

Conclusion: The presentation, poster and brochures provide a guide to evaluate the increased dangers for firefighters, contributing risk factors and recommendations for improved safety. These materials will serve as a source of recommendations for providers and patients to raise awareness of this problematic issue. Despite great advances in the last few decades, development of cancers in many retired firefighters and the well being of all firefighters remains a crucial concern to public health. Better safety protocols, initiative and research are vital to provide more effective prevention and increased awareness of exposure-response cancers in firefighters.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 3-201

Poster Title: Evaluation of antithrombotic management in patients with atrial fibrillation at a tertiary care academic medical center

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Purpose: Atrial fibrillation (AF) is a common arrhythmia, which affects approximately 5 million people in the United States. While management of heart rate or rhythm is of importance, the single largest concern is the increased risk of stroke. Oral anticoagulation (OAC) is the gold standard for stroke risk reduction in these patients, but published data suggests OAC is under prescribed in patients with AF. The purpose of this study is to assess the antithrombotic management of AF patients at Beth Israel Deaconess Medical Center (BIDMC) and its concordance with recommended evidence-based practices.

Methods: The institutional review board approved this retrospective chart review. Patients with a diagnosis of AF who were admitted to BIDMC between June 1- December 31, 2015 were included. Patients with AF were identified using ICD-9 and ICD-10 codes, where applicable. Pertinent exclusion criteria included patients with a CHA2DS2-VASc and/or CHADS2 of 0 as guideline recommend no antithrombotic therapy, patients with a first episode of AF < 48 hours, and first episode of AF patients receiving cardioversion who remain in sinus after 30 days. Identified patients' medical records were reviewed for pertinent information: age, gender, body-weight, and comorbidities. From these data, risk for stroke was calculated using the CHA2DS2-VASc score. Medical records were reviewed for documented reasons for not prescribing anticoagulation. Pharmacy systems were used to identify therapies prescribed for stroke prevention, therapy start date, discontinuation date (if applicable), any changes in dosing or switching of therapies, and any potential drug interactions. Medical records were reviewed to identify reasons for switching therapy, discontinuations if applicable, and any major adverse outcomes while receiving therapy, such as ischemic or hemorrhagic strokes, and any bleeding events.

Results: Of the 1201 candidates eligible to receive anticoagulation, only 57.9% of patients were prescribed OAC. Subjects in the cohort had a mean CHA2DS2-VASc score of 4.2. Warfarin was used most commonly, accounting for 74% of all OAC use, followed by apixaban with 15.4%, rivaroxaban with 11.2% and. dabigatran with 4%. Most common identifiable reasons for non-prescribing included 2% due to an active bleed, 2% due to patient declining therapy, and lastly 0.5% due to high risk of fall.

Conclusion: Stroke prevention with OAC is underused in AF patients who are at high risk for stroke. Among patients receiving OAC, warfarin is still being utilized more often than the newer agents. Further exploration is needed to identify how to increase anticoagulation use in these vulnerable patients.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 3-202

Poster Title: Explaining the consolidation of the health care industry and its' future implications for consumers and pharmacists

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Purpose: Over the past ten years there has been a large amount of acquisitions and mergers among pharmaceutical companies, retail pharmacy chains, hospital systems, and Insurance companies. These mergers combined with the implementation of the affordable care act in 2010 has caused a contraction across the health care industry. The aim of this research project is to predict whether or not consumers and pharmacists will be affected in a positive or negative manner when navigating the dynamic health care market.

Methods: A multimodal approach was taken when synthesizing and analyzing data for this project. A primary literature search was first performed on PubMed with an emphasis on finding articles that explained: Basic tenants of the affordable care act, different aspects of the health care industry such as the definition of a pharmacy benefits manager and the role they play in negotiating drug pricing, and incentives for pharmaceutical companies to merge with one another. Data was also collected by analyzing annual fiscal earnings of top retail pharmacy chains, insurance conglomerates, hospital systems, and pharmaceutical companies' year over year prior to and after completed acquisitions. Current and archived editorials from The New York Times, Washington Post, and Forbes Magazine were also utilized to understand the financial burden undertaken by companies looking to complete mergers and acquisitions. We also researched the cost of insurance premiums for single coverage patients as well as family coverage over the past fifteen years to learn if insurance premium costs had been rising and if so, what was the root cause that precipitated these increases. A primary literature search was also conducted to obtain data on the job satisfaction rate of retail pharmacists within the past two years and we then compared that to the job satisfaction rate from close to fifteen years ago.

Results: After compiling and analyzing the data, we noted several results. When we looked at year over year profits prior to and after acquisitions it was very clear that for most companies, after making a large acquisition, their profits and stock prices would see financial increases. We also noted that over the past ten years the amount of Pharmacy Benefit Managers that have been acquired either by pharmacy retail chains or insurance companies has skyrocketed. We also saw that since the Affordable Care Act was signed into law in March of 2010, hospital mergers and acquisitions have also start to increase at an exorbitant pace due to the notion that the larger a company is, the more favorable a deal they can make with drug manufacturers and insurers. We also analyzed the cost of insurance premiums for single coverage and family coverage on a yearly basis and we learned that every year since 1999, the cost of premiums have gone up considerably. The last piece of data that was analyzed was a survey commissioned by The American Association of College of Pharmacy in 2014 which showed that retail pharmacists were experiencing the worst job satisfaction rates since 2000.

Conclusion: The amount of mergers and acquisitions occurring in the health care market will continue to increase over the coming years. With this continued contraction, we will see customer choices from which retail pharmacy chains to fill prescriptions at to which insurers they choose for medical and prescription coverage all continue to decrease. From a pharmacist's perspective, with these mergers occurring, they will more than likely experience increased stress while having to deal with increasing workloads. They may even be relieved of their jobs because of a lack of positions that may occur after a merger.

Submission Category: Critical Care

Submission Type: Descriptive Report

Session-Board Number: 3-203

Poster Title: The use of inhaled epoprostanol to treat acute pulmonary hypertension (PAH) in the intensive care unit (ICU)

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Purpose: Epoprostanol is a synthetic prostacyclin conventionally used in the management of chronic pulmonary arterial hypertension (PAH). Inhaled nitric oxide (iNO) is the standard of care for acute PAH, however could be cost-prohibitive. The use of inhaled epoprostanol over iNO for acute PAH carries the potential of being a more cost-effective therapy in the intensive care unit (ICU). The purpose of this study is to evaluate the safety and efficacy of inhaled epoprostanol used to treat acute pulmonary hypertension (PAH) in a select cohort of patients treated in the intensive care units at Beth Israel Deaconess Medical Center (BIDMC).

Methods: Data from patients treated with inhaled epoprostanol were retrospectively reviewed via electronic medical records (EMRs) from March 2013 to November 2015. 48 patients were included who had received inhaled epoprostanol. Data was collected as pre- and post-administration of epoprostanol. Efficacy endpoints included changes various hemodynamic parameters such as the partial pressure of oxygen (PaO2), the ratio of arterial oxygen partial pressure to fractional inspired oxygen (PaO2/FiO2), pulmonary vascular resistance (PVR), and hematocrit (HCT). Safety endpoints included cardiac output (CO), platelet counts, and patient survival. Available data was then graphed or tabulated for each parameter using significance intervals derived from previous literature, and conclusions were drawn from these results.

Results: Most patients who derived benefit from inhaled epoprostanol did so 12-60 hours after the first administration. The median change in PaO2 was 12.5 mmHg (millimeters of mercury), while 37 percent of patients experienced significant improvements in their PaO2/FiO2. The efficacy of epoprostanol was modest due to patients' severe status in the ICU, and each patient had different reasons for admission with various comorbidities, rendering a heterogeneous patient population. All patients who experienced a significant change in cardiac output had

levels above the normal limit, and almost half of patients experienced a significant decrease in platelet counts.

Conclusion: Inhaled epoprostanol may be an effective therapy for acute PAH in the ICU that should be used with caution and monitored carefully. Further research with a larger, more homogenous patient population is needed to better delineate inhaled epoprostanol's place in acute PAH therapy.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 3-204

Poster Title: Impact of matrix-assisted laser desorption/ionization time-of-flight (MALDI-TOF) rapid organism identification technology on time to antibiotic de-escalation in Gram-negative pneumonia

Primary Author: Sofiya Sovalska, MCPHS University, Massachusetts; **Email:** ssova1@stu.mcphs.edu

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Purpose: Typical methods of microbial identification rely on phenotyping characteristics, Gram staining, and other biochemical reactions, which are costly and time consuming. A novel method of microorganism identification, Matrix-Assisted Laser Desorption/Ionization Time-of-Flight (MALIDI-TOF), can rapidly identify pathogens and potentially facilitate a shorter time to antimicrobial de-escalation. Faster organism identification with MALDI-TOF may also result in decreased time to appropriate antimicrobial therapy. The purpose of this study was to assess how changing microbial identification methods would affect the time to antibiotic de-escalation in Gram-negative pneumonia.

Methods: The local institutional review board approved this retrospective study. Per institutional policy, respiratory cultures collected prior to July 1, 2015 were assessed via conventional laboratory identification methods and those obtained after July 1, 2015 were evaluated using MALDI-TOF. Subjects 18 years and older with culture-positive pneumonia caused by a Gram-negative organism from April 1, 2015 to December 31, 2015 were enrolled. Subjects were excluded if: the organism was considered a colonizer or contaminant as determined by the microbiology laboratory, the infection was not treated, the subject expired or was transferred prior to therapy, or the subject had been previously treated for pneumonia during the hospital admission. Data collection was completed via electronic chart review and was documented in an Excel spreadsheet. Data points included age, gender, past medical history, social history, medication history, patient location, length of stay, severity of illness, duration of invasive and non-invasive ventilation, pathogen, antibiotic(s) utilized, timing of antibiotic de-escalation, duration of antimicrobial therapy, mortality, 30-day readmission, and

antibiotic-associated adverse effects. The primary outcome was the time to de-escalation of empiric therapy. Secondary outcomes included: time to appropriate antibiotic therapy, duration of invasive ventilation, length of stay, 30-day readmission, duration of antibiotic therapy, cumulative drug-specific antibiotic hours, development of Clostridium difficile colitis during antibiotic therapy, and antibiotic-related adverse effects.

Results: A total of 91 subjects were included. The mean difference in time to de-escalation was statistically significantly shorter after implementation of MALDI-TOF technology (pre-MALDI-TOF 6.4 hours vs post-MALDI-TOF 1.9 hours, p less than 0.001). However, the use of MALDI-TOF was not associated with a significant reduction in duration of antibiotic therapy (pre-MALDI-TOF 6.4 days vs post-MALDI-TOF 7.6 days, not significant), or cumulative drug-specific antibiotic hours (pre-MALDI-TOF 78.4 hours vs post-MALDI-TOF 91.9 hours, not significant).

Conclusion: Use of the rapid organism identification technique MALDI-TOF was associated with a decreased time to antimicrobial de-escalation. It was not associated with a decreased duration of antibiotic therapy.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 3-205

Poster Title: IV acetaminophen use at a tertiary care medical center

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Purpose: Beth Israel Deaconess Medical Center (BIDMC) aimed to address the issue of frequent intravenous (IV) acetaminophen use at the medical center through an electronic alert, which was implemented on October 2015. This project sought to evaluate the effectiveness of the alert in reducing the rate of inappropriate prescribing of IV acetaminophen. The purpose of this study was to compare the use of IV acetaminophen before and after the implementation of the clinician alert.

Methods: All patients who received an order for IV acetaminophen in the target units from November-2014 – March 2016 were evaluated for appropriateness of therapy. Appropriateness of therapy was defined as a patient not receiving any other oral medication within 8 hours of the receipt of IV acetaminophen. Additional outcomes were assessed, including if IV acetaminophen was given within 8 hours of IV Zofran, IV opioids, or oral acetaminophen. A list of all patients with IV acetaminophen orders were provided and then further narrowed to the nine floors which were previously studied. A thorough search of the patients' history was performed and data was collected from all admissions.

Results: There were 130 patients in the pre-alert group and 307 patients in the post-alert group. The primary outcome of IV acetaminophen use within 8 hours of receiving other oral medications was seen in 39% of the patients in the before group and 73% of patients in the post-alert group, showing no effect of the electronic alert. When evaluating the use of IV opioids in these patients, 50% of patients in the pre-intervention group received opioids compared to 75% in the post intervention group. Concomitant oral acetaminophen use within 8 hours was 39% in the pre-intervention group versus 73% in the post-intervention group.

Conclusion: The implementation of an electronic alert notifying providers of the high cost of IV acetaminophen did not affect prescribing practices. Overall, there was a significant increase in use of IV acetaminophen in conjunction with IV Zofran, oral acetaminophen, as well as IV opioids and oral medications. Additional means of controlling the use of IV acetaminophen are warranted and will be pursued.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 3-206

Poster Title: Know your food allergies to prevent life threatening tragedies

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Purpose: This abstract is designed to educate healthcare professionals, patients and members of the community about common food allergies, cross-reactivity of common allergens and the characteristics of the allergic reactions that may occur in response to exposure to these allergens. Food allergy is a growing public health concern because the response to allergic reactions may be fatal. Educating both patients and practitioners is vital to avoid and prevent life-threatening tragedies. The purpose of this information is to describe the incidence and epidemiology of food allergens, identify the pathophysiologic reactions that occur upon exposure to food allergens

Methods: Under the direction of faculty, students conducted a literature search on all aspects of food allergies including the most common food allergens, epidemiology, pathophysiology, the types of reactions, and the management of such reactions. The informational resources consisted of peer-reviewed articles and other reliable sources such as the National Institutes of Health (NIH) and the American Academy of Allergy, Asthma and Immunology (AAAAI). A thorough analysis of the Mayo Clinic Proceedings was cited as well as other pertinent literature to supplement this information. The information was collected, organized, and evaluated to create a comprehensive informational resource for medical practitioners, patients and members of the community. This information consisted of the epidemiology, pathophysiology, characteristics, classification, cross sensitivities, and management of common food allergy.
An educational PowerPoint presentation, poster and brochure were developed to present the incidence of food allergies, specific food-induced allergic reactions, how to identify cross sensitivities and their relative risk to allergens that cause life-threatening tragedies.
he information will be presented in charts and diagrams to depict the current status of food allergies. According to systematic reviews, food allergy affects between 2% to 10% of the population, including millions of Americans. The National Health and Nutrition Examination

Survey (NHANES) reported that between 2007-2010, the overall prevalence of food allergy was 8.96%, with food allergy affecting 6.53% of children and 9.72% of adults.

Results: The most common foods that cause allergic reactions include milk, tree nuts, shellfish, fish, peanuts, eggs, wheat and soy. Allergic disorders induced by exposure to food are categorized into IgE-mediated allergies, which are more common, and Non-IgE-mediated allergies. IgE-mediated allergies trigger the release of cell mediators such as histamine, prostaglandins, and leukotrienes and include disorders such as angioedema/urticaria, immediate gastrointestinal hypersensitivity, and anaphylaxis. Non-IgE-mediated allergies involve a T-cell response and include disorders such as food protein induced enterocolitis syndrome, allergic proctocolitis, contact dermatitis, and Heiner syndrome. The symptoms of an allergic reaction may be life threatening and often occur quickly after exposure, every time there is an exposure, and can occur even when the amount of exposure is limited. These symptoms include rash and/or hives, itchy skin, shortness of breath, trouble swallowing, chest pain and sudden drop in blood pressure. A food intolerance is not life-threatening, may take hours to onset and does not always occur with exposure. The symptoms of food intolerance include gas, cramps, bloating, heartburn, headache and irritability. Once an allergic reaction is confirmed, first line treatment is epinephrine auto-injector followed by close monitoring and symptomatic interventions

Conclusion: The presentation, poster and brochures provide a guide to evaluate the overall incidence of food allergies, how to identify causative factors and proper management of allergic reactions. These materials will serve as a source of recommendations for providers and patients to increase awareness of food allergies and associated reactions. Despite the increasing awareness of food allergies, exposure to suspected allergens and cross sensitivities still occur, posing risk to the patients and health. In order to decrease this public health concern, effective education on prevention and management is needed to prevent these allergic reactions that may be life-threatening.

Submission Category: Critical Care

Submission Type: Case Report

Session-Board Number: 3-207

Poster Title: Administration of digoxin-specific antibody fragments in an acute overdose of a digitalis-like substance, Pong-Pong: A case report

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Purpose: This case report describes the management of an acute overdose with a digitalis like substance, called pong-pong. A 37yr old man attempted suicide at 6:45am by ingesting five 25mg-diphenhydramine tablets, along with an unspecified amount of “Pong-Pong” powder, which he bought off the internet. He presented to the emergency department (ED) at approximately 11:00am, accompanied by his cousin, and reported feeling nauseous. However, he was alert and oriented and able to answer questions. He was bradycardic with a heart rate in the 40’s, while all other vital signs were normal. Electrocardiogram (EKG) revealed abnormal results. The first EKG showed sinus bradycardia with complete right bundle branch block and non-specific T wave abnormalities. The second EKG revealed complete heart block, with ST wave abnormality. Laboratory data were significant for serum digitoxin level of 57 ng/mL, and serum digoxin level of 1.6 ng/mL. After consulting the poison control center at 11:35am, 10 vials (400mg) of intravenous Digibind were infused over 30 minutes. Normal sinus rhythm was immediately restored. The patient was discharged four days later with no residual symptoms. Pong-pong is the common name for the seeds produced by the Cerbera odollam tree, commonly known as the suicide tree, which belongs to the poisonous Apocynaceae family. This plant grows mainly in salt swamps along the coast of Madagascar and countries in Southeast Asia, such as Kerala in India, Vietnam, Cambodia, Sir Lanka, and Myanmar. The tree is identified by several common names such as nyan, kisopo, samanta, tangena, othalanga maram, kattu arali, or famentana in Southeast Asia, and as pong-pong or buta-buta in Madagascar. Cerebrin is a potent poison found within the tree's seeds, and is an active glycoside with a chemical structure similar to that of digoxin, an antiarrhythmic medication. The ingestion of cerebrin

containing seeds causes severe cardiotoxiciy that can potentially lead to death, thus it has been known to be used as a poison and for suicide.
The laboratory test used to measure serum digoxin levels relies on cross-sensitivity between cardiac glycosides and digoxin, thus an elevated digoxin level only confirms exposure to cardiac glycosides and does not correlate with the severity of toxicity.
Digibind / DigiFab, or digoxin-specific antibody (Fab) fragments, is an antidote for use in digoxin toxicity. However, due to structural similarities, it can also be used to treat poisoning caused by natural cardiac glycosides, such as pong-pong. Digibind / DigiFab binds to the cardiac glycoside preventing it from further exerting its toxic effect. This case report demonstrates the use of Digibind / DigiFab in a symptomatic patient expressing signs of digitalis toxicity after pong-pong ingestion.

Methods:

Results:

Conclusion:

Submission Category: Infectious Diseases

Submission Type: Case Report

Session-Board Number: 3-208

Poster Title: The efficacy of using dolutegravir once daily in patients with known raltegravir resistance

Primary Author: Kevin Lee, MCPHS University - Boston, Massachusetts; **Email:** gahwinglee10@gmail.com

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Purpose: This case report evaluates the use of dolutegravir (DTG – Tivicay) in a patient with raltegravir (RAL – Isentress) resistance. A 47 year old, treatment-experienced male who was diagnosed with HIV in 1997 was initiated on lopinavir/ritonavir (LPV/r – Kaletra) and lamuvidine/zidovudine (3TC/AZT – Combivir). Due to self-reported non-adherence and personal request, the patient was switched to RAL plus Combivir. Within 6 months of starting the RAL-containing regimen, he developed RAL resistance due to poor adherence. At that time, the patient was immediately switched to a boosted darunavir-containing regimen, but was eventually switched to rilpivirine (RPV – Edurant) plus dolutegravir/abacavir/lamivudine (DTG/ABC/3TC – Triumeq) once daily and has remained undetectable since switching to this simplified regimen. Although RPV (non-nucleoside reverse transcriptase inhibitor – NNRTI) and DTG (integrase inhibitor – INSTI) are both cytochrome P450 (CYP) 3A4 substrates, there are no drug-drug interaction between the two medications. Of greater concern is the use of once daily DTG in the presence of documented RAL resistance in this patient. When the INSTI genotype assay was performed, the version of the assay did not report the exact mutations in the resistance pathway, which was a limitation at the time of switching to the current DTG-containing regimen. According to the VIKING trial, which compares the use of DTG once daily versus twice daily in patients with RAL resistance, there is a notable difference in virological suppression (HIV RNA viral load (VL) less than 50 copies/mL) between DTG twice daily versus once daily at the week 24 response. These response rates are 74% and 41%, respectively. In the single-arm VIKING-3 trial, which is an extension of the VIKING trial, authors investigate the use of DTG twice daily in RAL-resistant patients. This study further confirms the efficacy of the DTG twice daily in patients with known RAL resistance. However, the VIKING trials emphasize that

the efficacy of DTG in patients with RAL resistance is mostly dependent on a patient's baseline resistance to INSTI, despite the area under the curve (AUC) of DTG increasing from 53.6 mcg.h/mL to 75.1 mcg.h/mL when given twice daily versus once daily. Based on the VIKING data and the Stanford University HIV Drug Resistance Database, there are currently no resistance mutations that confer absolute resistance to DTG. Instead, the data provides evidence that it is actually the presence of RAL or elvitegravir resistance mutations that decreases the susceptibility of the virus to DTG. According to the VIKING trial, across both cohorts (once daily and twice daily), a virus with Q148 plus additional RAL resistance mutations was more likely to have a greater DTG fold change and thus a lower response to DTG. Furthermore, the VIKING-3 trial reported that for every two-fold increase in DTG resistance, the odds of achieving a VL less than 50 copies/mL were 63% lower. The odds of achieving this same endpoint were 96% lower in subjects with a virus that had Q148 plus two or more secondary mutations compared to the response in those with no evidence of the Q148 mutation. Based on the clinical evidence and the current HIV guideline, the clinical pharmacy team recommends that his current regimen be changed to DTG twice daily plus RPV and Epzicom (ABC/3TC) once daily. However, the patient's preference is for a once daily regimen. Therefore, despite the team's recommendation, the patient continues on his current regimen of RPV plus Triumeq once daily. At this time, he remains virologically undetectable and immunologically above 900 cells/uL. Additionally, the team recommends to monitor VL and CD4 count more frequently, every 3 months, to ensure efficacy. (References for articles will be provided on the poster)

Methods:

Results:

Conclusion:

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 3-209

Poster Title: Evaluation of Cidofovir Use at an Academic Medical Center

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Purpose: Cidofovir is an antiviral FDA approved for the treatment of cytomegalovirus (CMV) retinitis, but also has in vitro activity against adenovirus and BK virus. Over the past few years, cidofovir use has increased at our institution. The main purpose of the study was to determine the indications for cidofovir use at BIDMC. Secondary objectives were to quantify doses used and safety parameters.

Methods: The Institutional Review Board approved this retrospective review. Patients receiving cidofovir from January 1, 2008 through December 31, 2015 were identified via pharmacy databases. All patients who received cidofovir were included, regardless of dose or route. Patients were included multiple times if they received cidofovir on subsequent admissions. Data gathered included: cidofovir indication and dose received, viral levels, patient co-morbidities, and concomitant therapy.

Results: Thirty patients were included: 26 (86.7 percent) were male, with an average age of 55 years. All patients were immunocompromised: 18 (60 percent) stem cell transplantation, 10 (33.3 percent) solid organ transplantation, and 2 (6.7 percent) HIV patients. Cidofovir was prescribed for BK virus in 16 (53.3 percent) patients, adenovirus in 10 (33.3 percent) patients, and CMV in 4 (13.3 percent) patients. Intravenous (IV) therapy was used for all adenovirus and CMV indications. For BK virus, 7 (43.8 percent) patients received IV therapy and 9 (56.3 percent) received intravesicular therapy. Probenecid was co-administered in 16/21 (76.2 percent) of patients receiving IV therapy. Cidofovir dosing varied among indications. For CMV, 5 mg/kg weekly was most common (n equals 4). For adenovirus, 5 mg/kg weekly was most common (n equals 4), followed by 0.5 mg/kg thrice weekly (n equals 3). BK virus dosing widely varied: for IV

therapy, 3 patients received 0.5 mg/kg weekly and 2 patients received 5 mg/kg weekly. For intravesicular therapy, most patients received 5 mg/kg (n equals 6) with different re-dosing intervals. Twenty-one patients (70 percent) had 22 documented adverse reactions: proteinuria (n equals 8), nephrotoxicity (n equals8), and rash (n equals 2) were most common.

Conclusion: The most frequent indication for cidofovir therapy was for BK virus. Cidofovir doses and intervals were highly variable among the cohort. A cidofovir utilization guide would help standardize doses and therapy.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 3-210

Poster Title: The role of a diabetes blog for patient education

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Purpose: This abstract will describe the role of a blog in patient education in relation to diabetes. A pharmacist's role far exceeds just verifying prescriptions and making phone calls. One of many big impacts a pharmacist can make is providing education to patients about not only their medications but their acute or chronic conditions; one of which is diabetes. Blogs are an accessible resource for a majority of patients. Given the growing incidences of patients diagnosed with diabetes, this project serves to be a resource for patients to better understand the many components that come with having diabetes.

Methods: Under the supervision of their preceptor, students were instructed to compose a blog entry in relation to diabetes. These blog entries were written at an 8th grade level to address any potential barriers with literacy for the varying population. Students conducted research on their topic and compiled a list of resources to analyze. Students would submit the blog entry to preceptor for further review for accuracy, proper referencing and content. Blog entry would be submitted for potential publishing to provide easily accessible information to patients about potential concerns that arise with having diabetes.

Results: A diabetes blog entry is posted on a diabetes-focused blog for easy patient access. It provides information to the general public about diabetes as a whole and the various concerns a patient face, especially when first diagnosed. This includes information about potential vitamin B12 deficiency with metformin, importance of checking blood sugar levels, or considerations for when patients are sick and have diabetes. Diabetes and its management are always changing; there is consistently a need to educate our patients about the changes that arise. This blog provides easy-to-access and easy-to-read guides for patients to understand their diabetes.

Conclusion: This blog serves to further educate our patients with the knowledge from current and future pharmacists about the varying matters of diabetes. It also serves as a tool for providers to direct patient to resources that can help them further understand their conditions.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Case Report

Session-Board Number: 3-211

Poster Title: Anticoagulation in the setting of antithrombin iii deficiency, antiphospholipid syndrome, recurrent DVTs/PEs, and neoplasm (in remission): a case report

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Purpose: This case report describes the outpatient use of warfarin in a 53 year-old African American male for the management of antithrombin iii (AT3) deficiency, antiphospholipid syndrome (APS), and history of neoplasm (in remission) and recurrent DVTs/PEs. Each of these pathophysiologies independently increases a patient's risk for future thromboembolic events. There is limited evidence to guide clinical decision-making in a patient with all of the aforementioned co-morbidities. This report adds to the body of literature suggesting difficulty with maintaining a patient's INR in therapeutic range. It also illustrates the complexity in managing multiple hypercoagulable states in a single patient. As the healthcare team progressively managed his anticoagulation therapy, additional barriers were discovered and will be discussed.

Upon inheriting this patient from a different health center, it was discovered that his documented INR goal was 3.0 - 4.0. Upon reviewing available literature, the clinical pharmacy team inquired as to the appropriateness of this goal as opposed to 2.5-3.5 or 2.0-3.0, which is what much of the available literature seems to favor based on outcomes and bleeding episodes. It remains unclear as to the rationale for this higher goal range as the patient's previous cardiologist was not open to changing the goal but did not provide his reasoning despite multiple inquiries. The patient's new primary care provider agreed with the clinical pharmacy team's literature review but opted to proceed as the cardiologist advised. All interactions were noted in the patient's electronic health record.

After reviewing the patient's INR results dating back to 2006, it was found that his Time in Therapeutic Range (TTR) was 28 percent. Literature suggests warfarin use is associated with an average TTR of 60 percent. Numerous barriers were found to impact the patient's compliance

and the medication's efficacy. First, the INR results may fluctuate simply due to the nature of his co-morbidities. The patient also has mental health disparities along with a history of alcohol and substance abuse. His financial and living situations are variable and he is a poor historian. The patient is however very consistent with getting regular and timely INR checks when prompted. Though the care team has benefitted from the patient's frequency and regularity of INR checks, it did not translate to clinical success as demonstrated by the relatively low TTR. Furthermore, communication gaps within the healthcare team along with intermittently suboptimal documentation of patient encounters led to confusion about the patient's comprehensive care plan.

Some literature suggests the use of low-dose vitamin K therapy in conjunction with warfarin can stabilize a fluctuating INR. As such, the care team decided to trial a 100mcg daily dose with the patient's warfarin in the fall of 2015. Early on, the concomitant use seemed to stabilize the patient's INR well. However, cost, access, patient understanding/education, and poor communication within the healthcare team were the likely culprits for the combination's ultimate loss-to-follow-up and subsequent discontinuation.

Today, the patient remains on warfarin with the same INR goal of 3.0-4.0. Genetic testing is not available for this patient to determine any possible pre-disposition to an impaired warfarin response. There are no data to guide use of any of the direct oral anticoagulants (DOACs) in this type of patient and so outpatient management options are understandably limited. A core improvement area that has been determined through caring for this patient relates to optimizing communications within and across the healthcare team while enhancing documentation efforts with regard to patient interactions. While changes in concurrent medications, co-morbidities, and adherence patterns affect anticoagulation in a relatively predictable way, it remains apparent that intra-individual responses to warfarin cannot always be explained.

Methods:

Results:

Conclusion:

Submission Category: Cardiology/ Anticoagulation

Submission Type: Case Report

Session-Board Number: 3-212

Poster Title: Challenge of argatroban monitoring in a critically ill patient with liver failure

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Purpose: JC is a 77 year old man, with ischemic cardiomyopathy with a left ventricular ejection fraction of 25%, atrial fibrillation on apixaban, diabetes mellitus type 2, and hypertension who was admitted intensive care unit with a clinical diagnosis of shock and multi-organ failure: lung, liver, heart and kidneys. His Initial work up has suggested shock with unclear etiology of cardiogenic shock secondary to either a pulmonary embolism, or heart failure or septic shock secondary to pneumonia. His acute kidney injury required continuous veno- venous hemofiltration; and he was supported with an intra-aortic balloon pump. Given suspicion of pulmonary embolism, heparin continuous infusion was started. On day 3 of heparin infusion, his platelets suddenly dropped from 108,000 cells/mm3 to 36,000 cells/mm3. Heparin induced thrombocytopenia (HIT) was suspected and Argatroban infusion was started at a rate of 0.5mcg/kg/min given his liver failure and critical illness. His activated partial thromboplastin time (aPTT) was 32.7 seconds prior to start of the Argatroban infusion. 16 hours into the infusion, one of the aPTT drawn showed an aPTT of 104.7 seconds; accordingly, the infusion was stopped. It took 48 hours for the aPTT to drop to 70.5 seconds and another 24hrs for the aPTT to drop to 48.8 seconds. HIT work-up returned negative, Argatroban order was stopped and the patient was resumed on heparin.
Argatroban is a direct, highly selective thrombin inhibitor. It reversibly binds to the active thrombin site of free and clot-associated thrombin. It inhibits fibrin formation, platelet aggregation, and activation of coagulation factors V, VIII, XIII, and protein C. It is hepatically metabolized via hydroxylation and aromatization as a major pathway and via Cytochrome P450 isoenzyme 3A4 as a minor pathway. The elimination half-life of about 39-51 minutes is extended to 181 minutes in hepatically impaired patients. Similarly, clearance decreases to 1.9ml/kg/min in hepatic impairment from 5.1 ml/kg/min for normal individuals. Even though patient may not be at steady state, it is recommended to check aPTT 2 hours after start of therapy to adjust dose to a target steady state aPTT of 1.5-3 times the initial baseline value

without exceeding 100 seconds. Managing Argatroban or other anticoagulants in patients with liver dysfunction is a certain challenge as seen in JC's case. Liver dysfunction alters the pharmacokinetics of the drugs, and prolongs aPTT values. This poses a challenge when determining a patient's therapeutic range because the elevated aPTT level could be due to the patient's Argatroban treatment or the liver dysfunction.
Currently, package insert and tertiary dosing references recommend a starting dose of 0.5mcg/kg/min. A case report describes a dose of 0.05mcg/kg/min to maintain stable therapeutic aPTT. Hence, our suggestion, based on our experience with JC, is to initiate Argatroban infusion at 0.05mcg/kg/min in critically ill patients with liver impairment and to monitor closely every 2hours and adjust dose as necessary. Further research needs to be conducted with anticoagulation therapy, especially with patients who display liver dysfunction to help clinicians optimize therapy and minimize side effects.

Methods:

Results:

Conclusion:

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 3-213

Poster Title: Process evaluation of 4-factor prothrombin complex concentrate versus fresh frozen plasma for acute warfarin reversal

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Purpose: Therapeutic options for rapid reversal of vitamin k antagonist (VKA) therapy include 4-factor prothrombin complex concentrate (PCC4) and fresh frozen plasma (FFP). These agents have unique requirements for preparation, potential adverse effects, and cost-effectiveness considerations. . To ensure appropriate use and timely administration of PCC4, we optimized the ordering and dispensing process at our institution to require approval of a blood bank attending physician and preparation in the pharmacy sterile products area. We hypothesized this process change would facilitate timely VKA reversal agent administration versus FFP.

Methods: This retrospective, single center study was approved by the institutional review board and informed consent was waived. Data were gathered for patients requiring VKA reversal for life-threatening bleeding or urgent procedures from 4/2015-6/2016. Data include: demographics, laboratory results, indications for VKA therapy and reversal, dosing, time of ordering and administration, use of phytonadione, INR values and adverse events. We primarily assessed time from ordering of reversal agent (PCC4 or FFP) to administration, measured at time of initiation and completion of infusion.

Results: 258 patients were identified and screened for inclusion. Of 90 patients included, 72 received FFP and 18 got PCC4. 77.8% were taking VKA therapy for atrial fibrillation. VKA reversal was indicated for life threatening bleeding in 50% and 77% of FFP and PCC4 patients, respectively (p=0.03). The mean time from ordering to administration for FFP and PCC4 was 100 and 50.2 minutes, respectively (p=0.004). Mean time from ordering to end of infusion was significantly shorter for PCC4 than FFP (60 vs. 171 minutes, respectively) (p=0.0001). Data was analysis was performed using Minitab Express™.

Conclusion: In routine clinical management of patients requiring acute warfarin reversal, PCC4 was associated with faster infusion initiation and completion as compared to FFP.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 3-214

Poster Title: Use of continuous venovenous hemodiafiltration in critically ill patients receiving high-dose aminoglycoside therapy for the treatment of multi-drug resistant organisms

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Purpose: Aminoglycosides are potent antibiotics that are used to treat various infections. One limitation associated with their use is nephrotoxicity, which is more frequently seen in critically ill patients due to the presence of certain risk factors for aminoglycoside-induced nephrotoxicity. As resistance to antibiotics is a growing concern, it is imperative that new methods to treat multi-drug resistant (MDR) organisms be considered. A recent study has shown that utilizing continuous venovenous hemodiafiltration (CVVHDF) in combination with high-dose aminoglycoside therapy in critically ill patients when treating MDR organisms is effective in eliminating organisms refractory to other treatments without causing nephrotoxicity.

Methods: An analysis of a study was conducted involving critically ill adults with sepsis or septic shock being considered for treatment if an infection with a gram-negative organism exhibited resistance to beta-lactam antibiotics and combination therapy, but was susceptible to aminoglycosides. Samples were taken from each patient in order to determine susceptibility and the minimum inhibitory concentration (MIC) of the organism. The patients were administered a high-dose aminoglycoside followed by CVVHDF once the peak concentration (Cpeak) of the aminoglycoside was reached and left on CVVHDF until the end of their treatment. Patients that were already receiving continuous renal replacement therapy (CRRT) when treatment began were converted (if not already receiving) to CVVHDF. Amikacin was administered as a loading dose of 25-30 mg/kg and both tobramycin and gentamicin were administered as an 8-10 mg/kg loading dose. The goal Cpeak/MIC was 8-12. If a patient fell below this level, their dose was increased and if they were above this level, their dose was

decreased. The primary endpoints were clinical efficacy, expressed as response or failure, and microbiological response, defined as eradication or failure.

Results: A total of fifteen critically ill patients were infected with a MDR organism that was refractory to other treatments. The mean age was 61 years and the majority of the patients were male. Four of the patients had sepsis, eleven had septic shock, twelve were mechanically ventilated, and six were receiving CRRT at the start of therapy. Eleven patients received amikacin, three received gentamicin, and one received tobramycin. Doses were adjusted, if necessary, based on the patient's Cpeak/MIC ratio. A clinical response was observed in eight of the fifteen patients, with three of these patients achieving eradication of the offending organism. Six of the eight patients were transferred out of the ICU. Post transfer, the renal function of all patients was assessed. It was seen that one patient who was already dependent on CRRT remained on CRRT and only one of the other patients had a decline in renal function, but did not require CRRT. Five of these six patients were discharged from the hospital. Although the data shows most of these observations to be statistically insignificant, these outcomes are clinically significant in that these patients had failed all other possible treatments and this was used as salvage therapy.

Conclusion: Aminoglycosides are potent antibiotics, however, they are associated with nephrotoxicity, which is more commonly seen in critically ill patients. The risk for nephrotoxicity also increases as the dose increases, which can be problematic as aminoglycosides' bactericidal effects are concentration-dependent. This study provides insight into the use of high-dose aminoglycosides in combination with CVVHDF and shows promise in the treatment of MDR organisms refractory to conventional treatments in critically ill patients. However, since the sample size was so small, larger studies should be performed in order to further investigate the safety and efficacy of this novel treatment method.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 3-215

Poster Title: Not getting enough sleep may raise your blood sugars: the development of an informational blog for patients and clinicians

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Purpose: The following abstract will describe the development of an online blog to further educate healthcare professionals as well as patients on the implications of their blood glucose and insulin resistance based on the amount of sleep they get. With exercise and good eating habits being the main front runners of living a healthy lifestyle for patients with diabetes, many people discard how important sleep is when taking care of themselves. This project reviewed what the effects of having less than an optimal amount of sleep are on glycemic control. It also reviewed sleep hygiene strategies.

Methods: Under the direction of a faculty member in an ambulatory care practice with a specialty in diabetes, research was done by a student regarding the effects of lack of sleep on insulin resistance. The data was then collected from multiple studies that tested these effects on people. A blog was then written about the impact of sub optimal sleep on glycemic control targeting education for patients and health care providers. After being revised for mistakes and worded for ideal patient understanding, it was then posted on a free to access online diabetes information website as well as on the practice's website. Ways to improve sleep hygiene was also researched and added in the blog so readers could utilize the information given and potentially increase their quality of sleep and improve glycemic control.

Results: An educational blog and poster was created in order to review the consequences of lack of sleep on insulin resistance and glycemic control. Studies show that getting four hours or less of sleep has a negative impact on insulin resistance, which results in hyperglycemia. Results showed that a healthy patient's insulin resistance lacking sleep was similar to that of a patient with diabetes on a normal night's sleep. These study results were explained on the blog, along with methods to get a full night's rest and education on sleep hygiene.

Conclusion: This poster outlines the online post regarding adequate sleep and insulin resistance. It hopes to educate both health care professionals as well as patients on how important it is to get a full night's sleep, as well as the consequences of losing sleep. It is a useful resource that is easily accessible for patients. This educates on other factors involved with improved glycemic control in addition to medications, healthy eating habits and daily exercise.

Submission Category: General Clinical Practice

Submission Type: Case Report

Session-Board Number: 3-216

Poster Title: Role of amitriptyline in irritable bowel syndrome with ulcerative colitis

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Purpose: A 45 year-old Caucasian female with a past medical history of ulcerative colitis (UC) presented to our community teaching hospital emergency room after a bout of excruciating abdominal pain, reporting she was no longer able to tolerate food intake. Prior to admission she underwent a barium study that revealed rapid transit time of 15 minutes in her gastrointestinal tract and an upper endoscopy that was unremarkable. No clear diagnosis was made. Her history is significant for a twenty-pound weight loss in the past two months and bouts of epigastric discomfort consisting of severe sharp abdominal pain that lasted four to five hours after eating and included nausea and vomiting. During the last six to eight months, she has also experienced intermittent episodes of diarrhea, passing undigested food in her stool. Two days prior to admission she was prescribed ondansetron and OxyContin™ by her gastroenterologist. She was also taking maintenance dose mesalamine (Delzicol DR). During this admission, the patient was diagnosed with irritable bowel syndrome (IBS). In the absence of an objective biomarker for diagnosing IBS-type symptoms, the diagnosis of IBS was symptom-based in our patient. The antispasmodic, dicylcomine twenty milligrams four times daily, and the antidepressant, amitriptyline, were prescribed for IBS. Amitriptyline is effective in diarrhea dominant IBS. She was prescribed amitriptyline ten milligrams once, then the directions were changed to ten milligrams three times daily as needed. During her three day stay she only took one more dose. Subsequently, amitriptyline was discontinued. The pharmacy team was able to intervene and note to the medical team, the amitriptyline dosing strategy that has been studied is scheduled nightly, not as needed, with a statistical difference in symptoms seen approximately six to eight weeks after initiation for the treatment of diarrhea associated with IBS. The patient presented in this case is unique compared to previous case studies examining the use of amitriptyline for IBS, as this patient has a past medical history of UC. She was subsequently readmitted to the hospital for continued symptoms and inadequate nutrition one

week after hospital discharge. This patient's suboptimal therapy demonstrates the importance of utilizing evidence-based medicine (EBM). The rationale for all treatment should be well understood before administration to a patient. Inappropriate dosing of amitriptyline in the management of IBS may have affected the patient's response to therapy and outcome. This could lead to an incorrect assessment of treatment failure. Additionally, this case report provides a new perspective of using tricyclic antidepressants to treat IBS in patients with UC. The importance of EBM is emphasized in this case report and adherence to the strategies of determining the best treatment for a patient should be utilized prudently. Pharmacists have an important role in implementing EBM to help prescribers make an informed decision and improve patient outcomes.

Methods:

Results:

Conclusion:

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 3-217

Poster Title: Evaluating the evolution of pharmacists' role as accessible and key immunizers and their expanding impact on public health in the United States

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Purpose: Immunizations in the United States have been one of the primary achievements in public health and have led to the eradication and reduction of numerous disease epidemics. The profession of pharmacy has experienced significant change since the development of the first vaccinations, and as a result, pharmacists have taken on a more clinical role to become further involved in the delivery of immunizations. The clinical roles acquired by pharmacists can have a significant impact on the availability, rates, and patient education on immunizations, which in turn can lead to better public health outcomes.

Methods: In order to determine the impact of the evolving role of pharmacists on vaccinations in the United States, an online literature review was conducted to identify sources that evaluated the growing profession. Clinical studies, surveys, news articles, textbooks, and other sources of media were reviewed that described the history of the profession of pharmacy, key points in the timeline of the development of vaccines, as well as the current expanding role of pharmacists as immunizers. The progression of the required degrees to practice pharmacy was also assessed through these sources in order to support the notion of clinical responsibility advancements within the profession. The relevance of vaccines has been analyzed through data across the country in regards to improving the health of the population.

Results: The first discovery of a live vaccine against smallpox was by Edward Jenner in 1798. During this time, apothecaries were primarily responsible for compounding and distributing medications to physicians and patients. By the mid 1800s they expanded their role through aiding in the distribution of smallpox vaccines that extended into the 20th century. The late 1800s showed a shift in pharmacy education requirements, which included mandatory

examinations and registration to practice. A four-year Bachelor of Science Degree was mandated by 1923 and increased to five years in 1960, although pharmacists were only permitted to dispense medications without any counseling. The establishment of pharmacists as immunizers began in 1993 followed by the implementation of the Doctor of Pharmacy degree in 2005. Immunization training programs were incorporated by 1999 into schools of pharmacy. Since then, pharmacists are able to administer various vaccines, such as influenza and pneumonia, in all 50 states. With this integral role as health care providers, they have increased immunization rates by about 20 percent throughout the decade, which in return can decrease the predicted 90,000 vaccine preventable deaths per year. The convenience and knowledge that pharmacists can provide will help achieve the Health People goal of 2020.

Conclusion: The evolution of the profession of pharmacy has had a substantial impact on the delivery and availability of immunizations. From apothecary, to druggists, to now clinically advanced professionals who are key players in immunization administration and education, pharmacists have transformed the profession to have a greater impact on public health. These advancements leave hope that there is still room for exponential growth in the profession within the next few decades.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 3-218

Poster Title: Validation of a medication adherence assessment tool in heart failure patients

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Purpose: Heart failure (HF) is a leading cause of hospitalization in the US. Medication adherence is a vital component in heart failure management, as poor medication adherence is associated with a higher risk of hospital re-admission. The 8-item Morisky Medication Adherence Scale (MMAS-8) is a simple and efficient method to evaluate medication adherence at bedside. While the MMAS-8 has been validated in many disease states, its use has not been fully evaluated in HF population. The purpose of this pilot study was to evaluate the psychometric properties of MMAS-8 in HF patients presenting to HF ambulatory infusion treatment and education center.

Methods: Over a 4 month period, patients were invited to participate in the study if they were 18 years or older, on a loop diuretic for heart failure management, and are able to self-manage medications at home. Subjects who provided a verbal informed consent were administered MMAS-8 questionnaire to assess his or her medication adherence. A total medication adherence score of all items was calculated, ranging from 0 to 8. The MMAS-8 scores correlate to the following three levels of adherence: high adherence (scores equals 8), medium adherence (scores between 6 to less than 8), and low adherence (scores less than 6). Additionally, the loop diuretic was used as the index medication for calculating medication possession ratio, which ranges from 0 to 1, with 1 corresponding to 100% adherence. Internal validity was assessed using Cronbach's alpha coefficient. An alpha of 0.7 or greater indicates an acceptable internal validity. Additionally, convergent validity was evaluated using Spearman's coefficient to assess the correlation between MMAS-8 scores and the medication possession ratio. Correlation coefficients less than 0.50 are considered to be low, while correlation

coefficients between 0.50 to 0.7 are moderate, and correlation coefficients greater than 0.70 are high. This project was approved by the Institutional Review Board.

Results: Twenty-seven patients were included in the study. The mean age of the subjects was 73.2 years (standard deviation equals 8.3), and 70.4 percent were male. Fifteen had high adherence, 9 had moderate adherence, and 3 had low adherence with a mean score of 7.17 (standard deviation equals 1.36). Strong internal consistency was found (Cronbach's alpha equals 0.71), and convergent validity was moderate (Spearman's coefficient equals 0.54; P equals 0.00397). The MMAS-8 sensitivity, specificity, positive and negative predictive values were 60.87 percent, 75 percent, 93 percent, and 25 percent respectively.

Conclusion: Psychometric analyses indicated that MMAS-8 has acceptable internal validity and moderate convergent validity when used to evaluate medication in adherence in the HF population. Therefore, MMAS-8 can be an appropriate way of measuring medication adherence in HF patients given its ease of use.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-219

Poster Title: Bone mineral density adverse effects of tenofovir disoproxil fumarate/emtricitabine HIV pre-exposure prophylaxis and their reversibility after discontinuation of therapy

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Purpose: Truvada (tenofovir disoproxil fumarate/emtricitabine) is the only FDA-approved medication for HIV pre-exposure prophylaxis (PrEP) in combination with safer sexual practices in the United States. Bone mineral density (BMD) decreases have been reported in individuals receiving tenofovir disoproxil fumarate (TDF) products for HIV PrEP due to alterations in gene expression. However, limited research evaluated reversibility of decreases in BMD and increasing numbers of young, healthy individuals are being prescribed PrEP. Thus, we conducted a literature search aimed to review studies which assessed this adverse effect, its risk factors, and reversibility after TDF product is discontinued in the setting of HIV PrEP.

Methods: PubMed and Ovid databases were searched using different synonyms of tenofovir, bone mineral density, reversibility, HIV PrEP, and Truvada. Additional abstract and presentation searches were conducted through the Conference on Retroviruses and Opportunistic Infections and the International AIDS conference using the same synonyms as above. As we limited our search to BMD adverse effects of HIV PrEP therapy, we included only studies with HIV-negative participants. Our search was also limited to papers written in English. A total of three studies were identified that met criteria for review. Two of the studies discussed BMD loss with tenofovir disoproxil fumarate/emtricitabine (TDF/FTC) for HIV PrEP, while one of the studies discussed BMD loss with TDF alone. One study had an extended follow-up that specifically assessed reversibility of BMD loss from TDF/FTC after HIV PrEP therapy discontinuation. One study that investigated TDF/FTC and the study that investigated oral TDF for HIV PrEP did not assess reversibility of BMD loss. Studies were conducted multinationally, in San Francisco, California, and in Botswana.

Results: The three randomized, placebo-controlled clinical trials assessed 902 (498, 184, and 220) subjects. Median age ranged from 18 to 60 years; therapy duration was 0.5, 2 and 2.5 years. Significant BMD loss was defined as more than 3% from baseline. More subjects on TDF experienced significant spinal or hip BMD loss compared to placebo. Net differences included -0.91%(95%CI -1.44,-0.38, P=0.001), -0.7%(95%CI -1.3,-0.3, P=0.003), and -1.62%(95%CI -2.46,-0.78, P < 0.001) in the spine and -0.61%(95%CI -0.96,-0.27, P=0.001), -0.8%(95%CI -1.3,-0.3, P=0.003), and -1.51%(95%CI -2.49,-0.54, P=0.003) in the hip, respectively. Low BMD was associated with recreational drugs, vitamin D deficiency, and genetic factors. Amphetamine and inhalant use was associated with low baseline BMD in one study. One study found that low BMD was associated with increased blood urea nitrogen, high alkaline phosphatase, and decreased creatinine clearance. TDF metabolite plasma levels showed significant inverse relationship with spine and hip BMD changes in two studies. Subjects taking calcium and vitamin D reported less BMD loss. Ninety six trauma-related fractures were deemed not related to TDF. The extended follow-up of one study assessed reversibility within 24 weeks after HIV PrEP discontinuation; spine and hip BMD loss reversed at annualized rate of 1.13%(□0.27, p=0.002) and 1.81%(□0.36, p=0.01), respectively.

Conclusion: Several studies have found a link between BMD loss and TDF when prescribed for HIV PrEP. BMD loss was reported in the hip and spine and patient demographic factors were associated with the extent of the BMD loss as well as with its reversibility once TDF was discontinued. Longer TDF exposure was associated with slower reversibility of BMD loss. Patient demographics as well as the length of time on TDF varied across the studies thus possibly contributing to difference in rate of BMD loss. More long-term follow-up and data on reversibility of BMD loss after prolonged TDF exposure is needed.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 3-220

Poster Title: Cost reduction strategy to replace regadenoson as a pharmacologic cardiac stress agent

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Purpose: Yankee Alliance, a national GPO (group purchasing organization), identified high spend among member institutions for Lexiscan (registered trademark) (regadenoson) during 2016's fiscal year. The purpose of this study is to identify cost savings through consideration of other alternative pharmacologic cardiac stress agents while maintaining clinical and diagnostic efficacy and safety.

Methods: A review of member data identified that Yankee Alliance members were spending approximately 6.5 million dollars on Lexiscan (registered trademark) (regadenoson) during fiscal 2016. The American Society of Nuclear Cardiology (ASNC) lists three drugs as first-line agents for myocardial perfusion imaging: Lexiscan (registered trademark) (regadenoson), dipyridamole, and adenosine; no agent is noted as preferred. A literature search was performed, yielding 12 results to determine differences between their efficacy and safety. These results combined with the ASNC Guidelines on SPECT imaging, medication package inserts, and public drug price figures from Lexicomp Online Database were reviewed. These references were relevant to determine the comparative efficacy and safety of Lexiscan (registered trademark) (regadenoson), dipyridamole, and adenosine.

Results: A cost analysis was performed to determine approximately 5.7 million dollars or 4.3 million dollars in potential savings from switching from Lexiscan (registered trademark) (regadenoson) to dipyridamole or adenosine, respectively. Published data show equivalent clinical and diagnostic efficacy when using these three drugs. Safety data between the three differ, but when proper precautions are taken for at-risk patient populations like COPD and

asthmatics, all have similar incidence and types of adverse events with no agents showing overall superiority.

Conclusion: Dipyridamole and adenosine are safe, effective, and cost-saving alternatives for Lexiscan (registered trademark) (regadenoson) for use as pharmacologic stress agents in myocardial perfusion imaging.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 3-221

Poster Title: An evaluation of the frequency of prescribing concomitant benzodiazepines and opioids in geriatric patients upon hospital discharge.

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Purpose: Benzodiazepines and opioids are both commonly used in hospitalized patients to help manage a variety of acute illnesses. However, concomitant therapy is not without risks and official product labeling was recently updated to require a black box warning about the combination. Opioids have been shown to induce respiratory depression with an increased risk when used with a benzodiazepine. A variety of untoward events may result from the combination, especially if patients are discharged on the duo to an unmonitored setting. The purpose of this study was to evaluate co-prescribing patterns of these drug classes to geriatric patients at discharge.

Methods: An institutional review board waiver was obtained for completion of this retrospective review in a 350 bed community hospital. Demographics recorded included patient age and gender. Hospital information collected included dates of hospitalization, underlying pulmonary conditions, discharge disposition, and specific benzodiazepine and opioid medications prescribed at discharge. Records were included if patients were > 65 years of age, and included at least one benzodiazepine and one opioid prescribed concomitantly while in the hospital. For patients admitted more than once, only data from the first admission were counted. Information was collected on all patients fitting this criteria and admitted between January 1st and March 31st, 2016. Information was recorded ensuring patient anonymity using Microsoft Excel and descriptive statistics were applied to the data.

Results: There were 141 patients that met the inclusion criteria; 63 males (44.7%) and 78 (55.3%) females. The average age of patients included was 76.6 years (range: 66-101) and 51/141 (36.2%) had a persistent baseline condition compromising pulmonary function. Of the study population, 60/141 patients (42.6%) were discharged on a benzodiazepine and opioid combination. Of patients discharged on the combination, 27/60 (45%) also had a persistent pulmonary condition. Those discharged to home or self care represented 27/60 (45%) of the population discharged on the combination. The benzodiazepine most frequently prescribed was lorazepam and oxycodone was the most frequently prescribed opioid.

Conclusion: While adverse events were not evaluated, this review found that geriatric patients are routinely being discharged on concomitant benzodiazepine and opioid therapy. In addition, almost half of these patients had compromised pulmonary function due to underlying pathology. These patients are at risk for a broad sequelae of adverse events, including respiratory depression, falls, mental status changes, and hospital re-admissions. These adverse effects may be especially harmful in patients being discharged to settings without direct healthcare provider oversight. Staff education about the risks of concomitant therapy and procedural safeguards should be evaluated to help keep patients safe.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 3-222

Poster Title: Instructions for administering brand and generic naloxone: Are they easy to follow?

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Purpose: In 2014, opioid overdose deaths nationwide totaled nearly 14,000. To deal with the crisis, 34 states have authorized pharmacies to dispense a rescue medication (generic naloxone or Narcan®) without a prescription under a standing order, along with printed instructions on how to administer it, which are also available online. There is limited research regarding the ease of use of these instructions by the public. When print material is written at a grade reading level higher than 7th grade, reader comprehension is compromised. This study aims to assess the readability, understandability, and actionability of naloxone instructional materials.

Methods: Three naloxone instructional materials were downloaded from the websites of a state government (SG), a pharmaceutical company (PC), and a non-profit organization (NPO). The three authors assessed these written materials for the following: (1) readability, using the Fry Readability Formula, (2) understandability, using the Patient Education Materials Assessment Tool for Printable Materials (PEMAT-P), and (3) actionability, using the PEMAT-P. The Fry Readability Formula assigns a reading difficulty level based on vocabulary and sentence structure. The average numbers of sentences and of syllables per 100 words are plotted on the Fry Readability Graph. Longer sentences and words yield higher grade reading levels. The PEMAT-P is a validated instrument that helps determine whether readers will be able to understand and act on written materials. It yields two percentage scores, one for understandability and one for actionability. The higher the percentage score, the more understandable or actionable the written material. Understandability is assessed using 17 items in 6 categories: Content, Word Choice/Style, Use of Numbers, Organization, Layout/Design, and Visual Aids. Actionability is assessed using 7 items.

Results: The Fry readability results were 7th, 10th, and 17th+ grade reading level for the PC, SG, and NPO materials, respectively. The PEMAT-P understandability scores were 87.5%, 62.5%, and 50% for the PC, NPO, and SG materials, respectively. For the 6 understandability categories, the PC material achieved a score of 100% in Content, 100% in Word Choice/Style, 100% in Use of Numbers, 75% in Organization, 100% in Layout/Design, and 75% in Visual Aids. The NPO material achieved a score of 0% in Content, 0% in Word Choice/Style, 100% in Use of Numbers, 75% in Organization, 100% in Layout/Design, and 100% in Visual Aids. The SG material achieved a score of 0% in Content, 66% in Word Choice/Style, 100% in Use of Numbers, 100% in Organization, 0% in Layout/Design, and 0% in Visual Aids. The PEMAT-P actionability scores were 100%, 100%, and 80% for the PC, NPO, and SG materials, respectively.

Conclusion: Of the three naloxone instructional materials, the PC version had the best readability, understandability, and actionability scores, while the SG material had the worst scores. The three materials had high actionability percentage scores. However, all fell short of the 4th to 6th-grade reading level standard recommended by experts for readability of health care related materials. Reader comprehension is compromised when readability exceeds a 7th-grade reading level. The three naloxone instructional materials must be refined in order for the public to follow the instructions and administer naloxone effectively when responding to an opioid overdose.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 3-223

Poster Title: DNA repair genes are suppressed in breast cancer treated with anastrozole relative to breast cancer treated with tamoxifen

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Purpose: Regardless of race or ethnicity, breast cancer is ranked the most common type of cancer among women. Anastrozole, an aromatase inhibitor, and tamoxifen, a selective estrogen receptor modulator, have been widely used in treating breast cancer. Per National Comprehensive Cancer Network guidelines, anastrozole is considered the first line treatment in postmenopausal women, whereas tamoxifen goes second except in certain cases. Nonetheless, current practice does not depend on genetic information for drug selection. Thus, our research project was conducted to deeply investigate the effect of the two drugs on gene expression profiles in breast cancer.

Methods: The TCGA Assembler package was used to process genetic data of patients' samples obtained from The Cancer Genome Atlas (TCGA). For the analyses, samples from 109 and 137 patients treated with anastrozole and tamoxifen, respectively, were used. Gene expression profiles from the two groups were compared to each other to determine gene expression profile changes associated with each drug. Differentially expressed genes were examined for over-represented biological pathways (reactome.org).

Results: Relative to samples from patients treated with tamoxifen, samples from patients treated with anastrozole had suppressed expression of genes associated with DNA pairing and strand exchange. Further, genes such as FANCI, NELFCD and CDK13, which are associated with TP53 regulation of transcription of DNA repair genes were suppressed. Also, genes associated with signal transduction and cell cycle, such as ARHGAP11B, PSMD12, POGLUT1, PSMD12, BLM, and RPN2, were suppressed in the anastrozole-treated group.

Conclusion: Our results show the changes in gene expression profiles in breast cancer induced by anastrozole and tamoxifen treatments. Critical processes, such as DNA repair and cell cycle are affected differently. Thus, our study is a step towards understanding the molecular effects of adjunctive hormone therapy in breast cancer.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 3-224

Poster Title: Proposal for pharmacist-led refill authorizations

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Purpose: The United States healthcare system has been marred by a disparity between healthcare costs and health quality. The nation's shortage of primary care physicians and subsequent discontinuity in patient care has contributed to the current problems in healthcare. Pharmacists' involvement in authorizing refill renewals for maintenance medications has shown to both improve management of chronic disease states and contribute to reduced healthcare costs. The purpose of this project was to advocate for implementation of pharmacist-led refill authorizations within community pharmacies.

Methods: A literature review of randomized control trials and retrospective cohort studies was performed to assess the impact of pharmacist-led refill authorizations. Studies conducted within community pharmacies and outpatient refill clinics were included for analysis. Primary endpoints of interest included cost-savings data, quality of disease management, physicians' time saved on refill authorizations and physician satisfaction with refill programs. A review of state legislatures was also performed to establish the legal permissibility of community pharmacists' involvement in patient care. Current limitations in implementing pharmacist-led refill services and solutions to overcome these limitations were identified as well.

Results: A 21-month study of a Navy Hospital showed a total 70,691-dollar savings for the 573 patients whose refills were managed by a pharmacist rather than a physician. Another 30-day study serving 32 patients in a pharmacist refill evaluation clinic calculated a 1,235-dollar cost-savings, amounting to 38.59 dollars saved per patient per month. Moreover, this study revealed that more drug-related problems were found, follow-ups were ordered, and medications were optimized when pharmacists authorized refills versus usual care. A Kaiser Permanente experiment demonstrated that pharmacist-led refill authorizations yielded a greater percentage

of patients with adequate medication monitoring compared to physician-led authorizations (49 percent versus 29 percent). This study also demonstrated that intervention physicians spent 17 minutes per day performing refill authorizations compared to 23 minutes in the usual care group. Furthermore, 80 percent of intervention physicians were very satisfied with their refill request duties compared to 27 percent of control physicians. As demonstrated in another refill evaluation clinic, physicians agreed with 99 percent of the refill renewal decisions made by pharmacists. Per legislative review, pharmacists may implement refill renewal services in retail pharmacies by establishing Collaborative Drug Therapy Management agreements with physicians.

Conclusion: Pharmacists have the ability to make a significant impact on healthcare through their involvement in authorizing refills for chronic medications in accordance with Collaborative Drug Therapy Management laws. A multitude of evidence demonstrates that pharmacist-led refill authorizations not only optimize patients' therapies, but also yield cost-savings. These programs also benefit physicians by allowing them time to better focus on more concerning patient cases. Hence, expanding pharmacists' role in authorizing prescription refills is the next reasonable step in resolving the shortcomings of our current healthcare system.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 3-225

Poster Title: Impact of antibiotic use on chronic obstructive pulmonary disease (COPD) exacerbation readmission rates

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Purpose: COPD exacerbations requiring hospitalization increase morbidity, mortality, and health care costs. Antibiotics are one of the therapies frequently used in the management of COPD exacerbations. However, controversy remains as to whether or not antibiotics impact patient outcomes. This study evaluates their role in the management of COPD exacerbations in hospitalized patients and explores the impact that antibiotics have on 30-, 90-, 365-day readmission rate, length of stay, hospital mortality, and time to next exacerbation. The purpose of this study is to elucidate whether or not antibiotics impact clinical outcomes for patients requiring hospital admission for the management of COPD exacerbations.

Methods: This retrospective IRB-approved study assessed patients admitted to a 335-bed academic medical center between January 2008 and December 2014 for a COPD exacerbation. Patients were enrolled if they were at least 18 years-old and admitted to a non-intensive care unit. Study subjects were excluded if they had a co-diagnosis of pneumonia/influenza, lung disease or lung cancer/active malignancy, immunocompromised states, acute decompensated heart failure, were previously hospitalized within the preceding 90 days, transferred from an outside hospital, had code status of comfort measures only or expectation of death within 48 hours of admission, were pregnant/lactating, incarcerated, and/or had miscoded records. The primary outcome was the rate of 30-day readmission rate in those who did, and did not, receive antibiotic therapy during their admission. Secondary outcomes included 90- and 365-day readmission rates, hospital mortality, length of hospital stay, and time to next COPD exacerbation. Non-parametric data were analyzed using the Kruskal-Wallis or Chi-square tests.

Results: 305 patients met inclusion criteria. The included patients had an average age of 74 years, were predominantly of the female gender, were active smokers with an average Forced Expiratory Volume (FEV1) of 50 percent predicted, and had an average Charlson Comorbidity Index of 2. There was no difference in baseline characteristics between the two groups. Of those included, 73 percent (n equals 223) received antibiotics while 27 percent (n equals 82) did not. For the primary endpoint, no difference in 30-day readmission rate was detected between the two groups (12.6 percent versus 12.2 percent, P equals 0.9). Additionally, there was no statistical difference in 90 or 365-day readmission rates, nor was there a statistical difference in hospital mortality and length of stay. However, a nonsignificant trend toward delay in time to next exacerbation was noted.

Conclusion: According to these findings, antibiotics did not significantly impact readmission rates, inpatient mortality, hospital length of stay, or time to next COPD exacerbation. More research is recommended to comparatively assess the effectiveness of different antibiotic classes and further explore the relationship between antibiotic use and exacerbation recurrence. In addition, further investigation should be considered in order to determine the specific patient population that may most benefit from antimicrobial therapy as part of COPD exacerbation management.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 3-226

Poster Title: Incidence of neurotoxicity with cefepime versus piperacillin-tazobactam in renally impaired intensive care unit (ICU) patients

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Purpose: Cefepime is often chosen as empiric therapy for concern of multidrug resistant gram negative pathogens. There is debate over associated rates of neurotoxicity versus other beta lactams, based on recent publications. Multiple providers in this institution have interpreted this to mean any use of cefepime may lead to neurotoxicity, and, therefore, request piperacillin-tazobactam for high risk patients. This study was conducted to identify and describe the relative incidence of neurotoxicity with use of cefepime versus piperacillin-tazobactam in patients with impaired renal function in the intensive care unit (ICU) at a large university affiliated tertiary care medical center.

Methods: As a quality assurance investigation, institutional review board approval was waived. A retrospective chart review of 40 adult ICU inpatients with a creatinine clearance less than 60 milliliters per minute consecutively treated with either cefepime (n equals 20) or piperacillin-tazobactam (n equals 20) intravenous for at least 72 hours between June 2016 and August 2016 was performed. Patients were identified from the computerized prescriber order entry (CPOE) database and medical records were reviewed to establish and compare baseline characteristics. The initial dose of each therapy was reviewed to determine whether it was appropriately optimized for weight, estimated renal function, and site of infection. To assess for drug related neurotoxicity, any reports of altered mental status (AMS) or new onset seizures were reviewed during the course of therapy. Additionally, if performed, the confusion assessment method (CAM-ICU) score was recorded to assess delirium. The primary outcome was the relative incidence of new onset drug related neurotoxicity between cefepime and piperacillin-tazobactam. The secondary outcomes were risk factors for neurotoxicity other than the primary antibiotic, and the number of patients appropriately dosed for their renal function, weight, and site of infection.

Results: Patients were evenly matched except patients in the cefepime group had an average age of 78 versus 68 years in the piperacillin-tazobactam group (P equals 0.01). No patients in either group had a seizure or stroke history, however, at baseline, there were more patients in the cefepime group with delirium, with a trend towards significance (3 versus 0, P equals 0.07). Four (20 percent) and five (25 percent) patients in each group had a baseline psychiatric disorder. There were no documented seizures in either group during therapy. The incidence of AMS with cefepime compared with piperacillin-tazobactam was similar (10, 50 percent versus 7, 35 percent; P equals 0.33) respectively as was the frequency of ICU delirium between the two groups (5, 25 percent versus 7, 35 percent; P equals 0.49). None of the baseline patient characteristics were demonstrated to have an effect on outcomes that met statistical significance. Dosing was appropriate in 17 (85 percent) patients in the cefepime group and 18 (90 percent) in the piperacillin-tazobactam group based on renal function, weight, and site of infection. The use of an inappropriate dose was not significantly associated with neurotoxicity in either group (P greater than 0.05).

Conclusion: The relative incidence of neurotoxicity did not differ between renally impaired ICU patients that received cefepime versus piperacillin-tazobactam. The presence of risk factors did not have a statistically significant effect on outcomes. As this was a small retrospective chart review, this study may not have been powered sufficiently to detect a difference. The clinical significance of these outcomes should be further investigated in a larger study.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-227

Poster Title: Compliance with metformin dosing based on four guidelines

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Purpose: In April 2016, the Food and Drug Administration (FDA) released recommendations to avoid initiation of metformin in patients with an estimated glomerular filtration (eGFR) less than 30 mL/min/1.73 square meters and weigh the risks versus benefits of continuing metformin in patients with an eGFR 30-45 mL/min/1.73 square meters. The purpose of this study was to determine whether the dosing of metformin was in accordance with the new recommendations. Additionally, dosing was assessed to determine if it was compliant with the old FDA recommendations, American Diabetes Association (ADA) guidelines, Canadian labeling, and National Institute of Health and Clinical Excellence (NICE) recommendations.

Methods: This retrospective observational study, approved by the institutional review board, assessed patients admitted to a Boston teaching hospital with an order for metformin identified by the inpatient pharmacy system. A total of 302 patients with orders for metformin between May 1, 2016 and July 31, 2016 were screened for inclusion, of which 156 patients were included in the study. Inclusion criteria consisted of hospitalized adult patients who received at least one order of metformin. Patients who were over the age of 89, prisoners, or those experiencing an acute kidney injury (defined as a rise in serum creatinine of 0.3 mL/min in the past 24 hours or 50 percent from baseline serum creatinine) during their hospital visit were excluded. Exclusion criteria also involved patients who had no documentation of height or weight and patients without a serum creatinine (Scr) available 24 hours prior to receiving the first metformin dose. Per the hospital's renal dosing guidelines, serum creatinine was rounded to 0.8 mg/dL for patients over 70 years of age. Additionally, in patients who weighed over 150 percent of their ideal body weight, creatinine clearance (CrCl) was calculated based on adjusted body weight.

Patient weight, height, age, gender, race, serum creatinine, eGFR, and metformin dosing were collected from corresponding electronic medical records.

Results: Of 146 excluded patients, 13 were excluded due to evidence of acute kidney injury, 126 were excluded due to an unavailable Scr or eGFR, and 7 were excluded due to undocumented height or weight. Of 156 included patients, 66.6 percent were white, 19.9 percent were black, 5.8 percent were Asian, and 7.7 percent were of unknown race. The mean age was 63 years (plus or minus 10.80 years) and 56.4 percent were male. Median calculated eGFR was 88.2 and median CrCl was 82.2. Adjusted body weight was used in the CrCl calculation in 64 patients, while ideal body weight was used in 92 patients.
The metformin order was changed during hospitalization in 26 patients. Of the 6 documented pharmacist interventions, 2 recommended for Scr to be checked.
Metformin dosing was in accordance with the ADA recommendations and the old FDA recommendations in 100 percent of patients. Dosing was compliant with the new FDA recommendations in 99.4 percent of patients and fell into the risk versus benefit category for 0.6 percent of patients. Dosing was in accordance with NICE guidelines in 99.4 percent of patients and with Canadian labelling in 74.4 percent of patients.

Conclusion: The majority of the metformin dosing was in accordance with the new recommendations from the FDA. Additionally, the dosing was mostly compliant with the old FDA recommendations as well as recommendations from the ADA, NICE, and Canadian labeling. The lowest rates of compliance were observed with the Canadian labeling.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 3-228

Poster Title: Influence of IV Vasopressin (IVP) Generic Rebranding on ICU Clinician Practices and Perceptions

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Purpose: While generic medication rebranding is a recognized cause for higher ICU drug costs, the impact of rebranding on the practices and perceptions of ICU clinicians remains unclear. Generic parenteral vasopressin (GPV) [AWP= $8.67/d] has been used on an off-label basis for years to treat septic shock. In April 2014, Par Pharmaceuticals rebranded GPV as Vasoconstrict [AWP=$416/d]. We hypothesize that GPV replacement with Vasostrict has altered the practices & perceptions of ICU clinicians re: IVP use in septic shock.

Methods: A validated, IRB-approved, written survey was administered in March 2016 to a senior critical care pharmacist from 32 of the 50 largest academic and community hospitals across the six New England States. Practices were compared between Jan/14 GPV-only and Jan/16 Vasoconstrict®-only periods.

Results: Respondents (academic 51%;large community 49%), reported running out of GPV, on average, in 08/15. Between 2014 GVP-only and 2016 Vasostrict®-only periods, respondents perceived the proportion of septic shock patients managed with vasopressin to be identical (25vs. 25%,p=0.99) and the use of focused strategies to reduce vasopressin use similar: 1) More dilute (≤40u/bag) infusions (63vs. 59%,p=0.99); 2)Restriction to patients having a norepinephrine infusion ≥15mcg/min (88vs. 100%,p=0.12); 3)Mandatory approval by an ICU pharmacist (25vs. 28%,p=0.99) or ICU MD (25vs. 28%,p=0.99); 4)Formal education to clinicians re:appropriate use (41vs. 47%, p=0.81); and 5)a DUE conducted or planned (13vs. 19%, p=0.73). Most mistakenly perceived evidence supporting vasopressin use in septic shock to be of moderate strength (86%) and that the Surviving Sepsis guidelines provide a recommendation of

moderate strength supporting its use (89%). Likelihood of IV vasopressin use decreased as the cost of IVP increased across 5 theoretical AVP scenarios.

Conclusion: Despite ICU clinicians reporting to be highly 'AWP-sensitive', a 50-fold increase in the AWP of IV vasopressin due to generic rebranding does not appear to have influenced the way in which they use or administer it to patients with septic shock.

Submission Category: Geriatrics

Submission Type: Descriptive Report

Session-Board Number: 3-229

Poster Title: Characteristics of dementia patients using antipsychotics in programs of all-Inclusive care for the elderly (PACE) program

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Purpose: Antipsychotics are commonly used in long term care facilities for the treatment of dementia and off-label reasons, like agitation and aggression, in elderly patients. Antipsychotics have a black box warning for increased risk of mortality when used for the treatment of behavioral symptoms in elderly patients with dementia. This has motivated providers to specify whether the antipsychotic is used for psychosis or behavioral symptoms. The purpose of this study is to assess if patients using antipsychotics at Harbor Health Services, Inc (HHSI) Program of All-inclusive Care for Elderly (PACE) have a psychosis diagnosis or are experiencing behavioral symptoms of dementia.

Methods: This retrospective study looked at antipsychotic use in dementia patients over a 1 year period. Patient charts were obtained from the Harbor Health Services PACE program through online patient profiles on Citrix receiver. The inclusion criteria for this study was a diagnosis of dementia with concurrent use of an antipsychotic medication. The exclusion criteria included patients in nursing homes, since there would not be an accurate documentation timeline for these patients. Patient charts were evaluated based on International Classification of Diseases (ICD) 9 and (ICD)10 codes utilized between January 2015 and February 2016. The ICD 9 and 10 codes search included ones for dementia, psychotic diagnosis, and behavioral symptoms. From our inclusion criteria, 88 patients had a dementia diagnosis and were on antipsychotic medications. For this study, a smaller sample size of 40 patients were used. We used a representative sample size due to time constraints to ensure adequate data collection for each patient. Once the patient sample was defined, we collected data from the patient profiles. The information collected included demographic information, psychosis diagnosis, and behavioral symptoms. From the data collection, we analyzed the results based on the sum of those patients that met a certain criteria. Our primary end point

was behavioral symptoms of dementia without other psychotic manifestation. Our secondary endpoint was the prevalence of behavioral symptoms and which dominated.

Results: Demographic data includes 25 females and 15 males, age ranging from 64-98 (median 81), 37 non hispanic or latino, 2 hispanic or latino, and 1 unreported. Of the 40 patients, 4 had a concurrent diagnosis of schizophrenia, 7 had a concurrent diagnosis of bipolar disorder and 5 had another psychotic manifestations. The behavioral symptoms included: 16 patients with agitation, 1 with apathy, 19 with depression, 14 with anxiety, 2 with mania, and 8 with hallucinations.

Conclusion: Our results show more patients with behavioral symptoms and no psychosis diagnosis than patients with a psychosis diagnosis alone or a diagnosis with concurrent behavioral symptoms. This is aligned with our hypothesis that dementia patients using antipsychotics have more behavioral symptoms then a true psychosis diagnosis. Although we cannot make a direct correlation between behavioral symptoms of dementia and the use of antipsychotics, we feel as our results show the need for more research into the exact nature the the use of antipsychotics.

Submission Category: Geriatrics

Submission Type: Evaluative Study

Session-Board Number: 3-230

Poster Title: Impact of clinical pharmacist involvement in transitions of care in a long-term care setting

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Purpose: Transitions of care are common occurrences for older adults with acute or chronic illnesses. Although such transitions are designed to accommodate patients' changing health care needs during various stages of illness, many transfers are associated with errors in communication and preventable adverse events. The Joint Commission introduced medication reconciliation as a National Patient Safety Goal in 2005 to protect patients from adverse events related to medication discrepancies that might occur during patient transfers between health care settings. The purpose of this study was to show the importance of clinical pharmacists in the medication reconciliation process in a long-term care setting.

Methods: The study was designed as a single-center, prospective, observational study conducted in a multifaceted long-term care facility, servicing predominantly male veterans. Patients were included if the individual was being admitted to the long-term care facility from home or other nursing home facilities or if the individual was transferred out of the facility for acute care then readmitted. Medication reconciliation data were collected for five weekday intervals over a twelve-week period (July 1, 2016 to September 23, 2016) during dayshift hours. Pharmacy interns and clinical pharmacists performed the data collection. Data collection included the patient's age, where and when they were admitted, if the patient had diabetes, hypertension, congestive heart failure, chronic kidney disease, myocardial infarction, chronic obstructive pulmonary disease, and/or if they were on warfarin, and number of medications the patient was currently taking. The clinical pharmacists and pharmacy interns identified discrepancies after reviewing the patient's chart and comparing the data to what was provided in the admission paperwork. All medication discrepancies identified, following pharmacist evaluation, were documented. Medication discrepancies included orders for incorrect dose,

duration, frequency, route of administration, drug and/or dosage form. Other discrepancies included duplication of therapy, omissions, and/or therapeutic substitutions. Identified discrepancies were discussed with the physician, and any unintended medication discrepancy was documented using Microsoft Excel 2013. Descriptive statistical methods were performed for all data analyses.

Results: A total of 45 patients with an average age of 83 and involving 584 medications were included in this study. Greater than 72 percent (n equals 32) of patients included had diabetes, hypertension, congestive heart failure, chronic kidney disease, myocardial infarction, chronic obstructive pulmonary disease, and/or were on warfarin. This information was collected for quality measure and outcome tracking. More than 62 percent (n equals 28) of patients had at least one error associated with a medication ordered on facility admission. Pharmacists and pharmacy interns resolved a total of 73 admission medication discrepancies. The most common type of intervention was stopped medications, which was defined as either a medication being stopped at an outside facility but continued at the long-term care facility or a medication that was active on an outside medication list that the physician deemed inappropriate or unnecessary to continue at the long-term care facility, (n equals 19). The second most common intervention type was therapeutic substitution (n equals 18). In regards to severity, 26 percent (n equals 19) of medication errors were considered significant or serious, which was defined as a discrepancy that required immediate pharmacist intervention.

Conclusion: Medication discrepancies were common at this long-term care facility on admission. Clinical pharmacist involvement during the admission medication reconciliation process at this facility had a significant impact on reducing the number and severity of potential medication errors. The results of this study demonstrated the vital role of pharmacy interns and clinical pharmacists within the medication reconciliation process and the value of having a multidisciplinary team in a long-term care setting. Although cost savings was not tracked during this study, there is potential for cost savings due to direct pharmacy involvement and reduction in medication discrepancies.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 3-231

Poster Title: Evaluation of P3 pharmacy students' perceptions and knowledge regarding herbal supplements

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Purpose: Herbal supplements are widely available to consumers in the United States and with uses ranging from the common cold to dementia, they appeal to a variety of people. As herbal supplement use is becoming more common, this emphasizes the importance of pharmacists having sufficient knowledge in order to serve the needs of their patients. The education that pharmacy schools provide on these products is inconsistent and overall remains relatively minimal. The purpose of this study was to assess pharmacy students' perceptions and knowledge regarding patient use of herbal supplements, given the current Northeastern University School of Pharmacy curriculum.

Methods: This study was reviewed by the Northeastern University Institutional Review Board. The pharmacy students' perceptions and knowledge were collected via a voluntary, anonymous electronic survey. The survey invitation was sent out to all Northeastern University P3 pharmacy students in the Spring 2016 semester, a few months before the start of Advanced Pharmacy Practice Experience (APPE) rotations. To gather perceptions, the survey included many statements regarding patient use of herbal supplements, the pharmacist's role in patient use of herbal supplements, and the students' own current level of knowledge on herbal supplements. Each statement corresponded to a four-point Likert scale from strongly agree to strongly disagree. To assess knowledge, the survey asked students to identify the common uses, adverse effects, and drug interactions of herbal supplements in a multiple choice format. The knowledge assessment questions focused on the top 10 most commonly used herbal supplements in the United States.

Results: Out of the 113 students who received a survey invitation, 42 students participated, resulting in a 37% response rate. Based upon survey data, students believe that herbal supplements are frequently used by patients and recognize that there is a role for pharmacists and their knowledge on herbal supplements. However, the students' perceived knowledge did not necessarily match up with their actual knowledge. For example, 62% of students agreed or strongly agreed they would be able to identify herbal-drug interactions; however, only 52% of students were able to do so when given a multiple choice format. When identifying common uses, 62% agreed or strongly agreed they would be able to correctly identify; however, only 45% were able to do so when given a multiple choice format. Also of note, the students' perceived knowledge did not equate to a level of comfort with talking to patients about herbal supplements. Even though 63% of students agreed or strongly agreed that they could identify and describe the uses, drug interactions, and adverse effects of herbal supplements, 68% percent of students disagreed and strongly disagreed to feeling comfortable talking to patients about herbal supplements.

Conclusion: The students of the Northeastern University P3 pharmacy class that participated in the survey recognized a role for pharmacist knowledge on herbal supplements, yet often overestimated their own current knowledge. It is also important to take into account that these students were in their last semester of class and still have a year of APPEs to build up a solid knowledge base on herbal supplements that is necessary to keep up with the increasing amount of patients utilizing these products.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 3-232

Poster Title: Antimicrobial resistance and empiric treatment patterns in multidrug-resistant gram-negative monomicrobial bacteriuria based on presenting location: community versus non-community

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Purpose: As antimicrobial resistance continues to be a worldwide threat to public health, studies investigating areas for potential antimicrobial stewardship practices are of utmost importance. Few studies have evaluated antimicrobial resistance and empiric treatment patterns in patients with bacteriuria caused by multidrug-resistant organisms (MDRO) presenting from the community and non-community. The current literature is limited and has been focused on evaluating risk factors associated with MDRO, rather than treatment patterns. Our objective was to compare antimicrobial susceptibilities and patterns in empiric therapy among patients with monomicrobial bacteriuria from MDRO presenting from community vs. non-community settings.

Methods: Retrospective clinical data associated with consecutive gram-negative urine cultures from 173 adults who presented with monomicrobial bacteriuria caused by MDRO (non-susceptible to at least 1 drug in at least 3 classes) in the emergency department or inpatient floors of 2 Boston hospitals between 8/2013-1/2014 were collected. Demographics, past medical history, urinalysis and urinary culture, antimicrobial therapy, and documented urinary symptoms were also collected. Empiric antimicrobial therapy, given within 72 hours for the positive urine culture, was assessed for appropriateness based on symptomatology. Concordance of empiric therapy with eventual organism susceptibility was analyzed based on presenting location. Patients presenting from a skilled nursing facility, long-term care facility, or an outside hospital were included in the non-community group.

Results: One-hundred eighteen (68.2 percent) patients presented from the community while 55 (31.8 percent) presented from non-community settings. Escherichia coli was the most frequently isolated organism (n equals 128; 74 percent) followed by Pseudomonas aeruginosa (n equals 16; 9.2 percent). Patients who presented from the community with E. coli bacteriuria had isolates with significantly lower resistance rates to 3rd and 4th generation cephalosporins (22.8 vs. 52.8 percent, p equals 0.001) and fluoroquinolones (54.3 vs. 77.8 percent, p equals 0.02) compared to those presenting from non-community; both groups had isolates with high rates of resistance to trimethoprim-sulfamethoxazole (62 vs. 58.3 percent, p equals 0.8). Patients presenting with P. aeruginosa had isolates highly resistant to fluoroquinolones (90 percent in community, 100 percent non-community, p equals 1.00), carbapenems (70 vs. 66.7 percent, p equals 1.00), and aminoglycosides (60 vs. 50 percent, p equals 1.00). Overall, patients from the community were more frequently prescribed empiric antimicrobials which were eventually determined to be active against the MDRO (57.6 vs 30.6; p equals 0.01). Seventy-five (43.4 percent) total patients presented with asymptomatic bacteriuria caused by MDRO; both groups had high rates of antimicrobial treatment (75.6 in community, 73.3 percent in non-community, p equals 1.00).

Conclusion: Patients who presented with bacteriuria from non-community settings had isolates with higher resistance rates compared those from the community. High resistance rates can make it challenging for clinicians to select active antimicrobial therapy for the empiric treatment of MDRO. In addition, a high proportion of patients with asymptomatic bacteriuria were treated with antimicrobials though clinical guidelines recommend against this practice. Antimicrobial stewardship initiatives for patients presenting with bacteriuria are needed to better assist clinicians with assessment of risk factors for MDRO and initiating appropriate empiric antimicrobial therapy when indicated.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 3-233

Poster Title: Wearables: use of commercially available actigraphy devices in clinical trials for patient-centric outcomes research

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Purpose: Wearable devices combine hardware and software into well designed products such as wristbands, watches, glasses, belt clips, jewelry, etc. Wearables devices paired with analytics software are capable of collecting massive amounts of continuous and objective data enabling consumers and clinicians to closely monitor numerous parameters of health. Wearable devices enable researchers to design innovative clinical trials to conduct patient friendly real world evidence generating studies. Clinically validated wearable devices may allow improved monitoring of patients by pharmacists. This project was designed to analyze the adoption and incorporation of commercially available actigraphy devices in clinical trials.

Methods: We conducted a database analysis of ClinicalTrials.gov national registry for clinical trials using commercially available actigraphy devices on August 30th, 2016. All clinical trials registered in ClinicalTrials.gov registry between January 2011 to September 2016 were included. The top 5 wearable device manufacturers based on market share in the 4th Quarter of 2015 were identified and search queries were conducted on ClinicalTrials.gov using their respective brand names as the search terms. A programmable web scrapper was used to extract data from the Study Record Detail of the 121 clinical trials. The data was checked for quality and clinical trials not using actigraphy devices were removed from the final analysis. Extracted data was organized and analyzed using Microsoft Excel, MySQL and Tableau Desktop software.

Results: Wearable devices have been used in interventional (94% of total studies analyzed) and observational study designs. The adoption of wearable devices into clinical trial design for outcomes has surged in the past four years. In 2015, there were forty-nine total studies using wearable devices registered on ClinicalTrials.gov versus two studies in 2011. The adoption is being primarily led by Universities sponsoring seventy-two studies (33%), followed by hospitals with thirty-nine studies (28%), and pharmaceutical industry with six studies (5%). The top sponsor of clinical trials with wearable devices is University of British Columbia with six studies. Out of the 121 studies we analyzed, Fitbit devices were used in 101 studies (97% of studies). Apple Watch, Garmin Vivofit, and Xiaomi devices were used in one clinical trial each. Wearable devices were used in over 24 different types of conditions. The top three conditions using wearable devices are obesity/physical activity, oncology, and cardiovascular disease states.

Conclusion: Increase in specialty drugs and drug prices led to a greater focus on outcomes and value-based payments. Tracking patient's outcomes data for all medications in every disease state is not scalable. Wearable devices provide a scalable solution to gathering patient outcomes data in a variety of disease states. The increasing adoption of wearable devices into clinical trials may lead to validated wearable dependent outcome measures and monitoring parameters. Pharmacists will have an increasing variety of devices to monitor the health of their patients and greater ability to coordinate care with a patient's primary care team.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 3-234

Poster Title: Impact of alternative payment models on healthcare quality, efficiency, and accessibility

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Purpose: Despite spending more on healthcare, the United States produces poorer health-related outcomes, such as shorter life expectancy and greater prevalence of chronic diseases, relative to other high-income countries. Part of the problem stems from the current reimbursement model, fee-for-service, where providers are compensated based on quantity of services rather than quality of care. Payers are looking for solutions that will improve healthcare quality while containing costs. The purpose of this analysis was to evaluate the effectiveness of alternative payment models on improving healthcare quality, efficiency, and accessibility.

Methods: A systematic literature review was conducted as of September 2016 and relevant published sources were analyzed from 2006-2016, including the following MESH terms: alternative payment model, bundled payments, efficiency, accessibility, and healthcare costs. Research revealed pertinent information from Centers for Medicare and Medicaid Services, Institute for Clinical and Economic Review, The Commonwealth Fund, Association of Bone and Joint Surgeons, and the Society for the Study of Addiction.

Results: In 2006, 4095 patients of the Geisinger Health Plan participated in a pay-for-performance model of reimbursement, where providers were rewarded if their diabetes patients met a set of quality measures. Cumulative hazard ratios measured over a 3-year period for myocardial infarction, stroke, macrovascular disease, and retinopathy were significantly lower among patients in the pay-for-performance program compared to fee-for-service. In 2009 Blue Cross Blue Shield of Massachusetts implemented an Alternative Quality Contract model, where providers were paid a fixed amount for a defined scope of services as well as

bonuses for meeting quality metrics, in the outpatient setting for substance use disorder. During the first 3 years, there were no differences in substance use disorder service use, total spending, or performance metrics between enrollees in Alternative Quality Contract organizations and those that were not. From October 2013 to March 2015, 91 of 216 patients who underwent revision total joint arthroplasty in one health system participated in a bundled payments arrangement. The bundled payment group had a shorter hospital length of stay compared to the non-bundled group. There were no differences in total episode-of-care costs, costs of post-discharge rehabilitation, rate of discharge to rehabilitation facility, or 90-day readmission rates.

Conclusion: Studies analyzing the effect of alternative payment models on certain health-related measures demonstrate contradictory results. Although alternative payment models show promise in improving the quality of healthcare and reducing the length of stay for certain conditions, their benefits on the efficiency and accessibility of healthcare remain questionable. Additional studies are required to further evaluate the impact of alternative payment models on the healthcare system.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 3-236

Poster Title: Reported incidence of adverse drug reactions of furosemide in patients with broad documentation of a sulfonamide allergy using data from a large-scale electronic health record

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Purpose: There is a concern of hypersensitivity to sulfonamide nonantibiotic agents in patients with prior history of allergic reaction to a sulfonamide antibiotics (e.g. sulfamethoxazole/trimethoprim). Often, providers document drug allergies within a whole class instead of particular agents. Providers, for example, will document a patient with a "Sulfa" allergy. Are these broad classifications justified? Should there be concern for use of sulfonamide nonantibiotic agents? The purpose of this study was to examine the incidence of adverse drug events of furosemide in patients who have previously been documented with broad documentation.

Methods: The study was conducted on data from 2,796,073 patients using 13 years of Electronic Health Records (EHR) data from a large multi-hospital academic health system. 11,005 patients who were documented to have a "Sulfa" allergy and subsequently received furosemide were included in this study. Of the patients included, patients who experienced an adverse drug event were included in the final analysis. Patients with a previous allergy documentation of furosemide were excluded. Of all patients with adverse drug events, patients with hypersensitivity reactions were extracted. Adverse drug events were labeled as hypersensitivity reactions if they were reactions related to an overactive immune system. This retrospective cohort study was approved by Partners Institutional Review Board.

Results: Of 159,581 patients with a documented "Sulfa" allergy, 11,005 (6.9%) patients were prescribed furosemide. Of the patients prescribed furosemide, 81.9% patients were over the age of 60, 77.9% patients were females, and 49.7% were Caucasian. Also, of the 11,005

patients, 125 (1.1%) patients experienced an adverse drug event. 75 (60%) of the adverse drug events were hypersensitivity reactions. Dermatological manifestations (70.7%) were the most common hypersensitivity reaction. Other relevant hypersensitivity reactions found were edema, vasculitis, and respiratory compromise.

Conclusion: Utilizing data derived from a large-scale EHR database, this study was able to examine the incidence of adverse drug reactions associated with furosemide in patients who were previously documented to have broad documentation of “Sulfa” allergies. This study also highlights the importance of using big data to better analyze adverse drug events that have low incidence rates. Additional research is needed to understand the relationship between prescribing furosemide in patients with sulfonamide allergies, ADRs, and their associated risk factors to influence prescribing practice changes.

Submission Category: Infectious Diseases

Submission Type: Case Report

Session-Board Number: 3-237

Poster Title: Use of leucovorin for the management of drug-induced pancytopenia in a patient infected with Toxoplasma gondii

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Purpose: This case illustrates the potential use of increased doses of leucovorin to manage hematologic effects induced by sulfonamide and/or dihydrofolate reductase inhibitor administration in a patient infected with Toxoplasma gondii. The patient presented to the emergency department from an outside hospital with altered mental status, presumed to be a result of viral meningitis. Her past medical history is significant for HIV-2 (nadir CD4 count 41 cells/uL at diagnosis) treated with abacavir-dolutegravir-lamivudine and prophylactic sulfamethoxazole/trimethoprim. Empiric therapy started upon arrival at the hospital consisted of vancomycin, ampicillin, cefepime, and acyclovir. Cerebrospinal fluid from a lumbar puncture was positive for Epstein-Barr virus, Varicella Zoster virus, and T. gondii. An MRI revealed innumerable ring-enhancing lesions and leptomeningeal enhancement, suggestive of CNS toxoplasmosis. Intravenous sulfamethoxazole/trimethoprim was initiated as an alternative treatment for toxoplasmosis due to difficulty obtaining pyrimethamine. Over the following three weeks, the patient's hemoglobin, hematocrit, white blood cell, and platelet levels trended downward. On day 21 of hospitalization, the patient's treatment was changed to pyrimethamine, sulfadiazine, and leucovorin, the first-line therapy for toxoplasmosis, from intravenous sulfamethoxazole/trimethoprim. The patient's blood counts continued to decrease. Due to the risks associated with pancytopenia, the team assessed how to best manage the decreased blood counts without discontinuing the first-line regimen. Leucovorin is utilized in the treatment of toxoplasmosis to counteract the hematologic effects of pyrimethamine. Opportunistic Infections guidelines recommend dosing leucovorin at 10-25mg daily, with the potential to increase to 50mg daily or twice daily. Further expert opinion states that hematologic effects can often be reversed by increasing the dose of leucovorin to 10, 25, or 50mg four times daily. A thorough literature search was completed and no evidence was found

regarding the management of pancytopenia induced by dihydrofolate reductase inhibitors or sulfonamides with leucovorin. After weighing the risks and benefits of continuing the therapy, the team decided to increase the leucovorin dose to 50mg daily on day 27, 50mg twice daily on day 29, and then to 50mg three times daily on day 34. No improvements in the patient's blood counts were noted. On day 35 of hospitalization, the team switched the patient to oral sulfamethoxazole/trimethoprim from pyrimethamine/sulfadiazine/leucovorin due to worsening pancytopenia. Over the following week the patient's blood counts improved, however it was unclear whether this was a result of the increase in the leucovorin dosing or the discontinuation of the pyrimethamine/sulfadiazine/leucovorin due to the short timeline in which these interventions were made. It was unable to be elucidated which medication was the offending agent. Though further investigation is necessary in order to establish leucovorin's safety and efficacy in high doses in this population, its mild adverse event profile, high dose use for methotrexate rescue, and lack of pharmacodynamic interactions with pyrimethamine and sulfadiazine could be reasons to justify its use in the management of drug-induced pancytopenia in a patient infected with T. gondii.

Methods:

Results:

Conclusion:

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 3-238

Poster Title: Assessing the interpretation and implementation of USP chapter 797 in institutions throughout New England

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Purpose: Adherence to USP chapter 797 is essential in maintaining sterility and patient safety in the compounding of sterile products. While these guidelines provide a general set of standards that need to be upheld in operating a cleanroom, not all hospitals operate under a standard set of identical practices. The purpose of this study was to detect any discrepancies in terms of deciding beyond use dating in unclear circumstances throughout sterile products areas within various institutions in the New England region, as well as determine the level that USP chapter 797 has been implemented in these institutions.

Methods: The project and survey tool were reviewed by the IRB at Northeastern University. The survey assessed activities performed in each institution's sterile products area. Survey questions covered staffing in the sterile products area, resources utilized by pharmacists, products compounded, as well as pharmacists' understanding of CMS guidelines regarding stability and beyond use dating. The survey was aimed to be completed by a registered pharmacist who works in the IV room regularly, ideally the sterile products area manager. If neither of these personal could be contacted, the survey was sent to the institution's director of pharmacy. Contacts were acquired through calling each institution's central pharmacy and asking for the e-mail addresses of the desired recipients. The survey was then distributed using Qualtrics and results were collected and analyzed using the Qualtrics survey software from March through July of 2016.

Results: Seventeen pharmacists completed the survey of the fifty-one who were requested to complete the survey (33.3% response rate). Through analysis of each question, it became clear that each pharmacist consults different resources when confronted with unclearly defined instructions regarding preparation of sterile products. Each pharmacist stated relative comfort

in the regulations implemented by USP chapter 797, yet not all required practices have been fully executed in each institution. On average, pharmacists were 84.4% comfortable with the CMS interpretive guidelines regarding storage and beyond use dating of parenteral admixtures. Forty percent of pharmacists have implemented USP chapter 797 in its entirety, while 50% stated that there are still a few procedures to be fully implemented. Ten percent of responding pharmacists acknowledged that it has been loosely implemented in their institution. USP chapter 800 has yet to be implemented by most all institutions, with 60% of pharmacists responding that they intend to employ the corresponding procedures and practices in the near future.

Conclusion: Even with the standard set of guidelines for the preparation of sterile products that is USP chapter 797, numerous discrepancies still exist in the operations of sterile products areas among different institutions. In terms of sterility guidelines and beyond use dating, pharmacists would benefit from more universal, evidence-based recommendations. Further evaluation of sterile compounding practices with a larger cohort of responses in a wider geographic area is warranted.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 3-239

Poster Title: Evaluation of interventions by a pharmacist in a renal clinic: a pilot project

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Purpose: Diabetes affects over 29 million Americans and is the most common cause of renal failure, accounting for 44% of new diagnoses. Previous studies have demonstrated that pharmacist-led diabetes management improves patient parameters, such as hemoglobin A1c. Maintaining better control of A1c, blood pressure, and cholesterol, and preventing progression of renal parameters, such as serum creatinine and estimated glomerular filtration rate, helps prevent long-term complications related to diabetes, such as chronic kidney disease. The purpose of this project is to quantify and qualify the impact of a pharmacist, based upon number and type of documented pharmacist interventions in a renal clinic.

Methods: This study investigated the renal clinical pharmacist's impact on patients with type 2 diabetes and chronic kidney disease in an ambulatory setting, by reviewing the number of diabetes-related, hypertension-related and polypharmacy-related interventions. This pilot project was approved by the institutional review board and was a retrospective chart review of patients identified from the pharmacy clinic schedule from January 2016-February 2016. All patients seen in the renal pharmacy clinic for medication reconciliation, hypertension, or diabetes had their charts reviewed for the pharmacy clinic note; interventions recommended in the note, such as dose increase/decrease, change of medication or dose, hold of medication or monitoring recommendations, were all documented in a data collection form. Age, visit type and number, gender, most recent A1c, most recent serum creatinine, and estimated glomerular filtration rate were also gathered. After the information was organized and collected, it was reported in an aggregate table to describe the general frequency of each documented

intervention, as well as to describe the comprehensive services provided by the pharmacist in the renal clinic.

Results: Overall, 33 patients had scheduled visits at the renal pharmacy clinic from January 1st 2016-January 31st 2016. Thirty-two of these patients were included, as one missed their scheduled appointment. For gender, 43.75% of patients were female, and 56.25% were male. Patients' visit number to clinic ranged from their 1st-13th visit at the clinic, with an average visit number of three. For all patients assessed: the average serum creatinine was 2.08 mg/dl; average estimated glomerular filtration rate was 38.74 mL/min; and average HbA1c was 8.57%. The clinical pharmacist made interventions for 27 of the 32 patients, for a total of 67 interventions. Forty-nine of these interventions were diabetes-related, four were hypertension-related, and eight were related to polypharmacy issues identified among the patients. These interventions were further extrapolated into medication related problems. There were five adjustments to medication doses; three medications were changed to an alternative medication and one medication was held. In total, 56 monitoring recommendations were implemented by the pharmacist, making up the majority of the intervention types seen. These monitoring recommendations included specific instructions for testing blood glucose, education on hypoglycemia, proper glucometer use, suggested lab draws for A1c to the physician, diet recommendations, and medication side effect management.

Conclusion: Pharmacist-led disease state management in a renal clinic is a novel approach to managing co-morbidities among this patient population. As diabetes is one of the leading cause of renal failure, adequate diabetes and disease state management is essential in chronic kidney disease patients. Our data shows a pharmacist plays a critical role in this setting. Of patients screened, 84% required pharmacist intervention. These crucial interventions, including dose titrations, glucose monitoring, and diabetes education, may not have been otherwise provided. These results highlight the expected benefit of a clinical pharmacist in this setting and encourage future studies looking at measured outcomes.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 3-240

Poster Title: Evidenced-based medicine interventions in a pharmacist led hypertension clinic

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Purpose: Evidenced-based medicine applies knowledge gained from large clinical trials directly to patient care and has shown benefit in reducing important health outcomes in patients with hypertension. Pharmacists' expertise in medication management can be an asset when managing hypertension. This project was designed to assess the impact of medication-related interventions on overall trend towards evidenced-based medicine in patients seen within a pharmacist led hypertension clinic and to also recognize additional non-medication related interventions within the clinic which may benefit patient care.

Methods: Primary care physicians, midlevel practitioners and cardiologists refer patients with hypertension to the pharmacist-led clinic for education, counseling and medication management. A retrospective patient chart review was conducted for new patients seen by the clinic between 1/1/2016-6/1/2016, which reviewed the number and types of antihypertensive medications, comorbidities, pharmacist interventions regarding blood pressure medications and comparison to 2014 JNC8 evidenced based guidelines. Additional (non-blood pressure medication related) interventions were also reviewed, including ambulatory blood pressure monitoring (ABPM) (in which patients wore blood pressure monitors for twenty-four hours and blood pressure trends were later analyzed by the pharmacist to help guide hypertension management decisions), over the counter (OTC) counseling and management (education and recommendations for discontinuation, based on side effects and/or lack of benefit), pulmonology referrals for obstructive sleep apnea (OSA), smoking cessation counseling (including recommendations for nicotine replacement therapy) and total medication therapy management (MTM).

Results: Thirty-eight patients were seen for an initial consultation in the hypertension clinic. Of those patients, thirty-three returned for a 1st follow-up visit; twenty-three patients returned for a 2nd follow-up. At the initial consultation, twenty patients were on evidenced-based medicine in accordance with 2014 JNC8 guidelines. Fourteen patients were on blood pressure medication that was not evidence-based and four patients were not on blood pressure medication. Of the patients that were not on evidenced-based medicine or not on blood pressure medication, 44.4 percent (8 patients) were converted by 2nd follow-up. There was a 7.9 percent increase in patients on evidence-based medicine after the initial consult, another 5.3 percent increase after the 1st follow-up and 7.9 percent increase after the 2nd follow-up for a total change of twenty-one percent. Overall, there were sixty-three blood pressure-related medication interventions that occurred in patients between the initial consultations, up until the 3rd follow-up visits, including medication initiation, discontinuation, dose increases and dose decreases. There were thirty-one additional (non-blood pressure medication related) interventions. Fourteen were related to over the counter medications, eight ambulatory blood pressure monitoring assessments, five referrals to pulmonology for obstructive sleep apnea, two smoking cessation counseling sessions and two medication therapy management sessions.

Conclusion: A pharmacist-led hypertension clinic focusing on education, counseling and medication management is beneficial to patient care in a variety of ways. Pharmacists' expertise in therapeutics can effectively contribute to evidenced-based medicine in the management of patients with hypertension.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 3-241

Poster Title: Retrospective chart analysis evaluating the impact of a pharmacist led hypertension clinic

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Purpose: Hypertension is the most common condition seen in primacy care, and is often asymptomatic. If not well controlled complications can include heart attack, stroke, or renal failure. The purpose of this study was to assess the improvement in blood pressure control after visiting a pharmacist led hypertension clinic within a level three medical home.

Methods: The institutional review board approved this retrospective chart review of hypertension clinic patients seen from January 1, 2016 through June 1, 2016. Patients with difficult to control hypertension are referred to the clinic by primary care providers for medication management, lifestyle counseling, and disease state education. The initial consultation is an hour long appointment where the pharmacist reviews all medications over-the- counter and prescription to emphasize their importance and identify barriers to adherence. Evidence based medicine is implemented at the clinic and lifestyle modifications are emphasized. The subsequent follow up appointments are 30 minutes and reinforce personalized plans to achieve blood pressure control. Manual blood pressure readings were analyzed at consult, first, and second follow up. Inclusion criteria for this study included having a blood pressure >140/90 at consultation and one follow up appointment within the time frame.

Results: Fifty one patients were seen for an initial consultation. Of these patients sixteen did not follow up and thirteen had a blood pressure at consultation < 140/90. The remaining 23 patients had a mean blood pressure of 149/88 with a standard deviation of 13/12. At the first follow up the mean was 151/87 with a standard deviation of 12/11. A paired sample t-test determined there is no statistically significant change in SBP or DBP from consult to first follow

up p=0.71 (SBP) p= 0.58 (DBP). When evaluating the data based on percentage of patients at their 2014 JNC8 determined goal blood pressure, 14% of patients had a blood pressure below their goal by their first follow up and 31% by their second follow up.

Conclusion: Patients benefit from the opportunity to have specialized counseling, education, and medication therapy management provided by a pharmacist at the hypertension clinic. This is shown by the increasing percentage of patients at their 2014 JNC8 Blood pressure goal with each follow up appointment. In order to show statistical significance a larger study must be conducted to further reinforce the benefit of these specialized pharmacist provided services. A subgroup analysis to identify factors determining the cause of patients not reaching their goal may also be beneficial.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 3-242

Poster Title: Implementation of a pharmacy based care transitions program targeting high-risk diabetic patients in a community hospital

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Purpose: One-third of patients with diabetes are hospitalized annually, accounting for twenty percent of health care spending. Reducing readmission rates of diabetic patients has the potential to significantly reduce healthcare costs while concomitantly optimizing patient outcomes. Studies suggest that high-risk diabetic patients will gain long-term benefit from a coordinated inpatient hospital transitions of care program. Two recent studies have demonstrated that pharmacist telephone interventions reduce thirty-day hospital readmissions and emergency department visits. The aim of this project is to assess the impact of a pharmacist driven transitions of care program within a community hospital that targets high-risk patients with diabetes.

Methods: Diabetic patients admitted to Heywood Hospital on the medical-surgical and intensive care units of the hospital over a ten week period were screened for eligibility into the transitions of care program. Screening occurred Monday through Friday. Patients were included if: they presented with a new diagnosis of diabetes mellitus; diabetic ketoacidosis/hyperosmolar hyperglycemic state; severe hypoglycemia of less than 40 milligrams per deciliter; a HbA1c greater than or equal to 9; or a previous hospital admission within the last 30 days. Patients who refused to participate, did not manage their own medications, without phone access, or were discharged to a place other than home were excluded from the study. Qualifying patients were offered enrollment during their hospital stay. Patients who chose to participate in the program signed a consent form. Patient interviews during hospitalization potentially included medication reconciliation, medication and disease state counseling, and barrier identification. A project specific questionnaire was developed and attempted with enrolled patients to assess medication adherence, literacy, and numeracy.

Enrolled patients were contacted by phone 2-4 times following discharge depending on the needs of the patient, to assess for any health or medication related issues. Data collection on all screened patient included HbA1c, co-morbidities, number of medications on admissions, pharmacist interventions, and questionnaire results. All data was recorded in a confidential data sheet for analysis.

Results: Thus far, 126 patients were screened from August 10th to September 26th 2016. Demographics include: mean age of 69; 92% Type 2 diabetes; 2.4% Type 1 diabetes; 5.6% pre-diabetes; 46.8% were female. Also, the mean HbA1c and number of medications on admissions were 7.48% and 15.97 respectively. The clinical pharmacist completed 99 medication reconciliation interventions and 44 glycemic control interventions among these patients.
Of the screened patients, 27 were eligible for the transitions of care program and 8 were enrolled. Reasons for non-enrollment included 3 declines and inability to reach patients prior to discharge. 66.7% of enrolled patients had a HgA1c greater than 9% and 29.6% had a previous hospital admission within 30 days and 3.7% presented with diabetic ketoacidosis. Of enrolled patients: 87.5% had type 2 diabetes, average age was 62, and average HbA1c was 10.2%. From the 8 enrolled patients, 3 enrollees completed the questionnaire and 7 were contacted for phone interviews, the 8th patient remained inpatient when data was collected. On average, phone interviews took place 6.6 days post discharge. Overall, 7 glycemic control interventions and 7 medication reconciliation interventions were completed among enrolled patients.

Conclusion: Proper diabetes management and education to inpatient high-risk diabetics is essential to their outpatient success. We successfully made numerous clinical interventions among enrolled patients. Furthermore, phone interviews have identified patient barriers post discharge; such as lack of transportation, inability to understand healthcare material, and misplacement of prescriptions and medical devices. We have been able to assist the enrollees in overcoming these barriers while promoting self-management of their diabetes. Of enrolled patients, none have thus far been readmitted to Heywood Hospital within 30 days, highlighting the benefit of a pharmacist led transitions of care program in this patient population.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 3-243

Poster Title: Incorporation of pharmacy and nephrology collaboration into daily pharmacy care team activities to ensure efficacy and safety in tacrolimus and cyclosporine patients

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Purpose: Allogeneic transplant patients are a population that offers a unique subset of variables that impact medication outcomes in patient care. Dosing strategies of the immunosuppressive agents, required to maintain transplant longevity, rely on the experience of the nephrologist, but adjustments are currently being made retrospectively from existing levels rather than prospectively based on predetermined factors. Thus, this project looked to develop a formal method to both monitor and adjust immunosuppressive agents with outlined considerations for variables that may directly impact drug levels in a subtherapeutic or supratherapeutic manner.

Methods: A pharmacist, with advanced training in the transplant population, within a 760 bed tertiary hospital identified a lack of a defined protocol for dosing the calcineurin inhibitors tacrolimus and cyclosporine. With the assistance of a pharmacy intern, a curbside rounding protocol was developed to guide adjustments and to draw focus to potential risk factors for depression or elevation of levels. The development of this dosing tool first sought to examine the impact patient history plays in guiding dose adjustments. This includes transplant type or other calcineurin inhibitor indications, history/status of rejection, as well as time since transplantation to assess desired levels. Next, concurrent medications were examined to determine potential interactions and severity of impact to tacrolimus and cyclosporine levels. These interactions were first weighed according to the hospital's formulary in the interest of succinctness, then broadened to include commonly used medications not on the formulary weighed by the level of potential interaction severity.

Results: With the development of this guided dosing protocol, a quality improvement curbside rounding initiative can thus be implemented. Driven by pharmacists and nephrologists, daily rounding will evaluate patient-specific factors such as length of time since transplant as an indicator of goal levels and impact of concurrent medications. Individual patient kinetics as well as pertinent medical history, such as history of BK virus and rejection status, will also be utilized in rounding evaluation. The developed protocol will seek to guide providers to examine medication interactions that may precede subtherapeutic or supratherapeutic levels. These listed medications may be utilized to examine both the severity and incidence on tacrolimus and cyclosporine levels in a more guided dosing rationale.

Conclusion: With the development of a guided dosing protocol in the daily assessment of admitted transplant patients, a more formalized approach to an often vaguely defined strategy may be achieved. With further assessment and data collection, a retrospective analysis may yield a more defined correlation between level fluctuation and specific interaction type, further guiding and developing the protocol into a more concretely defined algorithm in the future.

Submission Category: Clinical Services Management

Submission Type: Evaluative Study

Session-Board Number: 3-244

Poster Title: Efficacy of an Inpatient Pharmacist Managed Warfarin Protocol

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Purpose: Warfarin is a high risk medication which requires close International Normalized Ratio (INR) monitoring and can be a challenge to manage in the acute care setting. One of the Joint Commission's National Patient Safety Goals regarding warfarin therapy, NPSG.03.05.01, outlines the importance of anticoagulation therapy as it relates to patient outcomes. It also endorses the use of approved protocols for the initiation and maintenance of anticoagulant therapy. The purpose of this study is to assess the efficacy of an inpatient pharmacist managed warfarin protocol.

Methods: This study is a retrospective chart review of patients admitted to a small community hospital between February 1, 2016 and July 31, 2016 who were prescribed warfarin and managed according to a pharmacist driven warfarin protocol. Per hospital protocol, institutional review board (IRB) approval was not required, due to the nature of the study. Patients were excluded if younger than 18 years of age, admitted with an active bleed, admitted for surgery, admitted for two days or less, or if warfarin therapy was discontinued indefinitely. The primary outcome was the time in therapeutic range (TTR). Secondary outcomes included the time to reach therapeutic range and the incidence of bleeding and thromboembolic events.

Results: Of the 86 patient charts reviewed during the study period, the average TTR was 42%. A subgroup analysis of patients who were started on warfarin prior to hospital admission revealed an increase in the mean TTR to 51%. Of the patients studied, 56% were discharged with a therapeutic INR and an average time to therapeutic range of 2.9 days. One patient experienced a thrombotic event and one patient experienced a bleeding event. Patients admitted for CHF exacerbations had a mean TTR of 56% and reached their goal INRs in an average of 1.9 days, while patients without a history of CHF had a mean TTR of 40% and reached their goal INRs in an average of 3 days. Patients who were prescribed warfarin for atrial fibrillation treatment had a mean TTR of 44% and reached their goal INRs in an average of 2.5 days, while patients prescribed warfarin for PE/DVT treatment had a mean TTR of 27% and

reached their goal INRs in an average of 3.8 days. Patients who were administered warfarin without interacting antibiotics had a mean TTR of 46%, while patients receiving interacting antibiotics had a mean TTR of 35%.

Conclusion: An inpatient pharmacist managed warfarin service yielded an average TTR of 42% and provided 56% of patients with a therapeutic INR upon discharge. A successful inpatient anticoagulation service requires close monitoring by pharmacists in addition to support from other health care professionals. The results of this study provide the foundation for possible improvements to an inpatient pharmacist managed warfarin protocol. More specifically, using this information, pharmacists can identify specific patient populations which may require closer management in order to improve these patients' warfarin therapies.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 3-245

Poster Title: Evaluation of antibiotic susceptibilities of gram-negative isolates in oncology patients

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Purpose: Oncology patients are susceptible to infections because of neutropenia (often chemotherapy-induced) and other host factors. Gram-negative pathogens are associated with higher morbidity and mortality among neutropenic patients, necessitating early and appropriate antimicrobial treatments. Clinical Practice Guidelines recommend empiric IV antibiotic therapy with an antipseudomonal beta-lactam [cefepime, a carbapenem (meropenem or imipenem/cilastatin), or piperacillin/tazobactam]. Antibiograms specific to the organization are beneficial, providing local susceptibility rates. Due to increasing resistance and the multiple treatment options, our objective was to determine the best empiric treatment in this population.

Methods: This study was conducted at Baystate Medical Center, Springfield, MA. All patients admitted to the oncology ward at Baystate Medical Center, Springfield, MA with any positive culture from January 2015 to July 2016 were obtained from TheraDoc, an electronic data mining system. Cultures with Gram-negative pathogens were included. Date of specimen collection, type of specimen, and pathogen were obtained. From this information, a chart review was performed to obtain susceptibilities, empiric antimicrobial regimen, and indication. A unit-specific antibiogram was developed, in addition to looking at the susceptibility rates of all pathogens against broad spectrum antimicrobials (piperacillin/tazobactam, meropenem, and cefepime). For patients with multiple cultures from a single admission, only the first isolate was included. Susceptibility was reported for each antibiotic against each pathogen. Other data collected, including indication and empiric therapy, were summarized utilizing descriptive statistics.

Results: A total of 349 unique Gram-negative isolates were reported during this time period. To date, 139 isolates have been analyzed. The most common indications for antimicrobial therapy were community acquired UTI (37/139, 27 percent), healthcare associated pneumonia (16/139, 12 percent), healthcare associated UTI (15/139, 11 percent). The most utilized empiric treatments were piperacillin/tazobactam (57/139, 45 percent), ceftriaxone (35/139, 28 percent), and cefepime (12/139, 10 percent). The most common organisms isolated were Escherichia coli (64/139, 46 percent), Klebsiella spp. (30/139, 22 percent), and Pseudomonas aeruginosa (14/139, 11 percent). Susceptibility rates for piperacillin/tazobactam, cefepime, and meropenem against E. coli were 95, 100, and 100 percent, respectively. Susceptibility rates for piperacillin/tazobactam, cefepime, and meropenem against Klebsiella spp. were 97, 93, and 100 percent, respectively. Of the 102 Klebsiella spp. and E. coli isolates, 8 were positive for the ESBL phenotype. Susceptibility rates of piperacillin/tazobactam, cefepime, and meropenem to the organism Pseudomonas aeruginosa were 93, 71, and 93 percent, respectively. Of the entire cohort of pathogens, susceptibility rates of cefepime were 92 percent versus 93 percent for piperacillin/tazobactam versus 99 percent for meropenem.

Conclusion: Meropenem provided the best in vitro, susceptibility against all Gram-negative organisms causing infections in patients on the oncology ward. Susceptibilities among the broad-spectrum agents to both E. coli and Klebsiella spp. were quite similar. Piperacillin/tazobactam and meropenem have higher susceptibility rates compared to cefepime against P. aeruginosa. For empiric treatment, meropenem provides the best susceptibility against pathogen isolates, though cefepime and piperacillin/tazobactam have greater than 90 percent susceptibility as well. Meropenem sustains this high susceptibility as it provided an advantage over the other agents against ESBL producing pathogens.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 3-246

Poster Title: Identifying opportunities for de-escalation of vancomycin on general medicine and hospitalist services at an academic medical center

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Purpose: Vancomycin is frequently used as empiric therapy due to its bactericidal activity against gram positive organisms, including methicillin resistant Staphylococcus aureus (MRSA). However, to minimize resistance, efforts to de-escalate therapy should be the focus of health care institutions and individual providers. The purpose of this study is to identify clinical scenarios in which vancomycin was initiated inappropriately or continued inappropriately beyond 3 days in patients on a general medicine or hospitalist service.

Methods: This study was a retrospective chart review conducted at an 885-bed academic medical center with a mature antibiotic stewardship program. Patients were included if they received at least one dose of vancomycin while on one of four general medicine services or on the hospitalist service during May through July 2016. Patients were excluded if vancomycin was a continuation of home therapy, used as prophylaxis, administered 3 days or more while the patient was on another service prior to transferring to a general medicine or hospitalist service, or if the patient was transferred from a general medicine or hospitalist service prior to receiving 3 days of vancomycin. A list of patients receiving 1 or more doses of vancomycin during the study period was reviewed in random order to assess for study inclusion. Data collected included renal function, medication allergies, culture data, MRSA risk factors or colonization status, indication for vancomycin at day 1 and day 3, and duration of vancomycin treatment. Three pharmacists with experience in general medicine and infectious disease reviewed the cases to evaluate both the appropriateness of the initial indication for vancomycin and its continuation beyond 3 days of therapy. Vancomycin use was judged to be appropriate if the

patient's condition justified its use and indeterminate if appropriateness could not be determined with certainty.

Results: Data were collected for 74 patients, 52.7 percent were female, mean age was 57.2 years, and median duration of vancomycin use was 3 days. 5 indications were considered to be inappropriate, and 4 indications were indeterminate. The median duration of treatment with vancomycin in those who had appropriate indications was 4 days (range 2 to 17) compared with 2 days (range 1 to 4) in those who did not have an appropriate indication. 36 patients continued treatment for more than 3 days. 5 of these continuations were determined to be inappropriate, and 3 were indeterminate. The median duration of treatment in cases of appropriate continuation was 5 days (range 4 to 17). All 5 patients that received vancomycin inappropriately beyond 3 days of therapy were treated for 1 additional day. After removing indeterminate cases, vancomycin was used inappropriately for 12 days (4.1 percent) of 295 total days of vancomycin therapy.

Conclusion: Although there were opportunities to improve initial selection and de-escalation of vancomycin in certain patients, eliminating inappropriate use would not have a dramatic impact on vancomycin exposure in the general medicine and hospitalist services at our institution.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 3-247

Poster Title: Saccharomyces usage in the treatment of Clostridium difficile infection in hospitalized patients: A retrospective cohort study

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Purpose: Clostridium difficile infection (CDI) is the most common cause of antibiotic associated diarrhea in health systems. Over the past few decades, healthcare professionals have speculated on the efficacy of oral probiotics in the prevention and treatment of CDI. However, the 2010 Society for Healthcare Epidemiology of America (SHEA) Clinical Practice Guidelines for CDI do not recommend probiotic use in the treatment of CDI due to limited evidence to support their addition to standard therapy. The purpose of this study was to determine if the addition of Saccharomyces boulardii to standard antibiotic therapy improves patient outcomes.

Methods: This study was a retrospective cohort study comparing Saccharomyces usage in addition to standard therapy to standard therapy alone. The study was approved by the Campbell University College of Pharmacy & Health Sciences Institutional Review Board. Data was collected on patients admitted as inpatients to a small, rural hospital system. We assessed 150 patients to determine the potential effect of Saccharomyces probiotics on CDI therapy. For inclusion in this study, subjects had to be at least 18 years of age and possess a diagnosis of CDI. Patients were excluded from this study if they had a length of stay less than 24 hours or did not receive treatment for CDI as an inpatient. Cases were evaluated on the use of Saccharomyces probiotics, antibiotic therapy initiated, duration of inpatient treatment, readmission within 30 days for CDI, need for escalation of therapy, and the use of inciting antibiotics prior to diagnosis of CDI. Data was collected by the primary investigators of this study using Microsoft Excel, analyzed using descriptive statistics, and reported as proportions and percentages. JMP was then used to compare patients who received Saccharomyces probiotics in addition to standard therapy versus standard therapy alone in: length of hospital stay using t-test, readmission for

CDI within 30 days using chi-squared test, the need for escalation of therapy using chi-squared test, and inciting antibiotics using chi-squared test.

Results: The average length of hospital stay for the Saccharomyces group versus standard therapy was significantly longer than patients receiving standard therapy alone (6.61 days versus 4.70 days, p equals 0.0116). The percentage of patients readmitted within 30 days following discharge for patients who received Saccharomyces in addition to standard therapy was not significantly lower than patients who received standard treatment alone (6.49 percent versus 16.44 percent, p equals 0.1221). The percentage of patients requiring an escalation of therapy was not significantly higher for patients treated with Saccharomyces versus standard therapy alone (27.27 percent versus 21.92 percent, p equals 0.5606). Significantly more patients in the Saccharomyces group received inciting antibiotics prior to CDI diagnosis than the standard treatment group (54.55 percent versus 34.25 percent, p equals 0.0294). The most common inciting antibiotics were ceftriaxone (29 patients), levofloxacin (18 patients), and piperacillin-tazobactam (11 patients).

Conclusion: With similar readmission rates between the Saccharomyces boulardii and standard treatment groups as well as the increased length of stay that was seen in the Saccharomyces group, Saccharomyces probiotics do not appear to provide additional benefit, and may cause potential harm in the treatment of CDI. Therefore, the potential risks should be weighed against the potential benefits in each patient for Saccharomyces use. Future areas of study could assess the utilization of probiotics in CDI caused by inciting antibiotics, or follow patients prospectively to establish causality between probiotic use and an increased length of stay.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Case Report

Session-Board Number: 3-248

Poster Title: Subtherapeutic anti-Xa levels in a patient with cirrhosis receiving low molecular weight heparin for deep vein thromboses

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Purpose: Cirrhosis is associated with both procoagulant and anticoagulant states, creating a unique challenge when initiation of pharmacologic anticoagulation is required. Reduction in coagulation cascade proteins, such as protein C and antithrombin, create this therapeutic dilemma. Because of this coagulopathy, several studies have attempted to establish new ways to address this challenge. Overall, studies have identified low molecular weight heparin (LMWH) as the treatment of choice in cirrhosis patients. We present a case of a 35 year old male who was admitted for severe bilateral lower extremity cellulitis and a past medical history significant for alcoholic cirrhosis, hepatic encephalopathy, esophageal varices, and gastrointestinal bleeding. He was noted to have moderate ascites, significant hyponatremia, acute kidney injury (AKI), and systemic inflammatory response syndrome (SIRS), with an elevated white blood count (WBC) and tachycardia. On the day following admission, he was also found to have bilateral deep vein thromboses (DVTs). Treatment of the DVTs with LMWH was initiated at 1mg/kg subcutaneously every 12 hours. Due to the AKI, monitoring of anti-Xa levels was warranted to assess and adjust the LMWH dosing. Peak anti-Xa levels were consistently subtherapeutic, despite appropriate LMWH dosing per acute DVT treatment guidelines. When the patient was transitioned from LMWH to treatment dose unfractionated heparin (UFH) for a procedure, an activated partial thromboplastin time (aPTT) in excess of 300 seconds prompted discontinuation of the UFH and investigation of the aforementioned subtherapeutic anti-Xa levels. During a literature review, it was discovered that the severity of liver disease is negatively correlated with anti-Xa levels. According to one study, cirrhosis patients who received LMWH never reached appropriate peak anti-Xa targets. These findings

suggest that dosing LMWH based on anti-Xa levels may have been an inaccurate method of monitoring anticoagulation in our patient. Since several studies question the utility of anti-Xa levels in this population, assessment of therapeutic efficacy must be accomplished via evaluation of other hematologic monitoring parameters such as hemoglobin, hematocrit, and platelet counts. Based on our analysis of the literature, we began dosing LMWH by renal function and discontinued monitoring peak anti-Xa levels. Our case demonstrates that despite use of LMWH as the DVT treatment of choice in this population, monitoring of anti-Xa levels is not recommended.

Methods:

Results:

Conclusion:

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 3-249

Poster Title: Incidence of steroid refractory (SR) graft versus host disease (GVHD) in allogeneic stem cell transplants

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Purpose: Peripheral blood stem cell transplantation (SCT) is a common therapy following chemotherapy for hematologic malignancies. Allogeneic stem cells are collected from a donor and matched to the patient based on major and minor histocompatibility complexes. Variations can result in immune activation of the host against the graft, termed GVHD. Primary therapy of GVHD includes systemic steroids with intravenous methylprednisolone or oral prednisone. However, limited data exists in the treatment of SR- GVHD. The purpose of this study was to determine the prevalence of SR-GVHD as well as commonly used second-line treatment options.

Methods: The institutional review board approved this retrospective chart review performed on patients aged 18 years and older who received peripheral blood allogeneic SCT from January 2013 through April 2016. Potential study subjects were evaluated and excluded if they were diagnosed with aplastic anemia or myelofibrosis, received an autologous or haplo-identical SCT, or utilized bone marrow as the source of stem cells for transplant. Relevant research variables included age during time of transplant, type of hematologic disease, preparative regimen prior to transplant, GVHD prophylactic therapy, classification of acute GVHD, primary GVHD treatment, as well as secondary GVHD treatment. The primary outcome was the incidence of SR-GVHD within 100 days of allogeneic SCT. Acute SR-GVHD was defined as the use of additional treatment within six weeks following primary treatment with either oral prednisone or intravenous methylprednisolone. Secondary outcomes included incidence of acute GVHD, identification of therapy for SR-GVHD, time to disease relapse, and time to death.

Results: One-hundred and twenty-five patients received allogeneic SCT during the study evaluation period with 113 patients meeting inclusion criteria. Sixty-nine patients (61.1 percent) were male and the mean age at time of transplant was 52.9 years. Thirty-nine patients (34.5 percent) received a matched related donor SCT and 59 patients (52.2 percent) received matched unrelated donor SCT. Methotrexate and tacrolimus was the primary prophylaxis for GVHD. Seventy-two patients (63.7 percent) developed acute GVHD. Of the confirmed acute GVHD cases, 29 patients (40.3 percent) received systemic steroids (oral prednisone or intravenous methylprednisolone) and 42 patients (58.3 percent) received local steroid treatment (budesonide or topical steroid creams) as the primary treatment of choice. After evaluating patients who developed GVHD and received primary treatment with systemic steroids, 10 patients (34.5 percent) developed SR-GVHD. When identifying secondary therapy for SR-GVHD, 7 patients (70 percent) received infliximab, 2 patients (20 percent) received basiliximab, and 1 patient (10 percent) received rituximab. Four patients (40 percent) received mycophenolate as additional therapy given in combination with one of the previously discussed therapies. Time to disease relapse and time to death were variable based upon disease severity and development of GVHD.

Conclusion: Development of acute GVHD is common in patients who received allogeneic SCT, but the occurrence of SR-GVHD was clinically non-significant when compared to the total study population and the proportion of study subjects who received first-line systemic steroid treatment. Of the study subjects who developed acute SR-GVHD, infliximab was the most prevalent drug of choice. Treatment options may vary among institutions, thus the most effective primary and secondary treatment options for acute GVHD should be further analyzed for efficacy in larger, long-term retrospective studies.

Submission Category: Ambulatory Care

Submission Type: Case Report

Session-Board Number: 3-250

Poster Title: Dapagliflozin associated euglycemic diabetic ketoacidosis

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Purpose: Dapagliflozin associated euglycemic diabetic ketoacidosis
Dapagliflozin is an oral anti-diabetic medication used to improve glycemic control in type 2 diabetes mellitus in addition to diet and exercise. Dapagliflozin is a sodium glucose co-transporter (SGLT-2) inhibitor which prevents the reabsorption of glucose in the kidneys. SGLT-2 is responsible for 90% of the reabsorption of glucose. This class of anti-diabetics is typically used in addition to other first line agents. The most common adverse reaction seen with SGLT-2 inhibitors is genital mycotic infections, however more concerning is ketoacidosis. On May 5th, 2015, the FDA issued a statement regarding the use of these medications leading to euglycemic diabetic ketoacidosis (DKA). We report a case of euglycemic DKA in a patient taking dapagliflozin for type 2 diabetes. A 45-year-old female was sent to the emergency department from her physician's office after lab results showed ketones in her urine. The previous week she had presented to her physician with complaints of foot pain, polyuria, polydipsia, and polyphagia. At that time, the patient's glucose was found to be over 300 milligrams per deciliter and she also had ketonuria. She was initiated on sitagliptin-metformin 50-1,000 milligrams once daily and dapagliflozin 10 milligrams once daily. At the follow-up visit four days later, she was normoglycemic, however still had ketones present in her urine. She was advised to go to the emergency department, where she was then admitted for euglycemic DKA. The patient had a beta-hydroxybutyrate of 5.75 millimoles per liter, anion gap of 16, and glucose of 118 milligrams per deciliter. Dapagliflozin and sitagliptin-metformin were discontinued immediately and she was started on intravenous fluids. Insulin was held due to blood glucose being between 90-110 milligrams per deciliter. After three boluses of normal saline and lactated ringers, the anion gap normalized, however ketones were still present. Following another liter of lactated ringers and subcutaneous insulin initiation, the beta-hydroxybutyrate level had dropped to 0.45 millimoles per liter. The patient was then discharged with insulin glargine 15 units in the

morning and metformin 1000 milligrams twice daily. Dapagliflozin was not reinitiated in the patient, however it is unknown whether it is safe for them resume therapy when DKA has resolved. According to European articles, it is not advised to restart SGLT-2 inhibitor unless there is a another clear cause to the patient developing DKA. Patients taking dapagliflozin should be aware of the potential risk for euglycemic DKA. This likely occurs due to dapagliflozin preventing glucose reabsorption without stimulating pancreatic beta cells to secrete insulin leading to decreased ketone removal. Further research is needed to determine the exact mechanism of euglycemic DKA and how it can be prevented. At this time, patients should understand the signs of DKA, how they can check for ketones, and when to present to emergency department.

Methods:

Results:

Conclusion:

Submission Category: Cardiology/ Anticoagulation

Submission Type: Case Report

Session-Board Number: 3-251

Poster Title: Sub-therapeutic rivaroxaban concentrations in a 20-year old female (30 kilograms) despite standard adult rivaroxaban dosing

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Purpose: Deep vein thrombosis in younger patients is not as common as adults and is typically due to an underlying condition. Current anticoagulation therapies such as warfarin and enoxaparin, involve frequent monitoring or injections. The direct oral anticoagulation agents, such as rivaroxaban, are appealing due to their ease of use and infrequent monitoring. The pharmacokinetics and dosing of rivaroxaban has not been studied in the pediatric patients, or patients < 40 kg. Two case reports demonstrated that pediatric patients may require more frequent dosing of rivaroxaban to achieve levels similar to that of an adult. We report obtaining subtherapeutic rivaroxaban assay despite the standard adult dose of rivaroxaban at steady state for the treatment of a provoked DVT in an adolescent female who weighs 30kg. A 20 year old female with spina bifida weighing 30.4 kg was admitted for urosepsis related to multi-drug resistant E.coli. Due to the patient's rapid decline in weight, a Nasogastric -tube was placed to achieve adequate nutritional support. Unfortunately due to the PICC line for the intravenous antibiotics, the patient developed a thrombus of the left subclavian vein. The patient was initiated on enoxaparin therapy 30 mg subcutaneous every 12 hours with the intention of transitioning to oral anticoagulation therapy that could be continued on an outpatient basis. Rivaroxaban 15 mg via Nasogastic-tube every 12 hours with food, the standard adult dose for deep vein thrombosis, was initiated and enoxaparin therapy discontinued. A sub-therapeutic rivaroxaban assay level (0.08 micrograms per mL) was obtained following three doses of rivaroxaban, resulting in the re-initiation of enoxaparin therapy. We conclude, the standard adult dose (15 mg enteral twice a day) of rivaroxaban, may not be adequate in achieving therapeutic rivaroxaban levels in younger patients with lower body weight (30 kg). Further studies are needed in order to determine an ideal dosing range in this patient population.

Methods:

Results:

Conclusion:

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 3-252

Poster Title: Interprofessional analysis of the factors affecting achievement of adequate statin use in a multidisciplinary family medicine clinic

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Purpose: The purpose of this study was to identify factors affecting statin underuse in a multidisciplinary family medicine clinic using an interprofessional student team-based quality improvement approach. There is a need for health professionals trained in population health in most healthcare settings. Given that healthcare is advancing towards interprofessional team-based practice, there is also a need for health professional students to be trained and educated within interprofessional models. However, there is limited evidence demonstrating the success of training an interprofessional student team to perform quality improvement interventions expected in a population health management practice.

Methods: An interprofessional team of three students in pharmacy; two in nursing; two in medicine, one in public health; and one in social work completed a new 13-week population health management course at the University of North Carolina at Chapel Hill as part of the Healthcare PROMISE (Populations: Reformed Outcomes Management from Inter-professional Systems-Based Education) initiative and a 13-week immersion period to analyze statin use at a family medicine clinic. During the immersion, students shadowed and interviewed 13 healthcare providers from multiple professions and support staff using the Ottawa Decision Guide. Interprofessional team members conducted a community needs assessment to determine intervention priorities. Data was collected through interviews, subjective observational notes, and statistics on statin use. Data was then analyzed by determining themes, discussing factors that impeded statin use, and utilizing the Primary Care Collaborative

Quality Measures Reporting Guide to prioritize which factors could be most influenced by the team.

Results: The needs assessment indicated that patient and provider knowledge on statin use benefits were the primary concerns. The team recommended a 4-component effort targeting patient education that included a check-in survey, informational posters and brochures, a provider script, and a personalized "statin choice tool." All of these, except the "statin choice tool", were implemented in April 2016. Two months after implementation, statin use in patients with diabetes increased 9 percent (from 57.3 percent to 66.3 percent).

Conclusion: This study demonstrates the effectiveness of a quality improvement plan developed by an interprofessional team of students as part of a population health management course. Continued efforts are needed to further address provider resistance towards statin prescribing. Overall, the 13-week pilot course proved successful in training an interprofessional team to partake in a quality improvement project within the community.

Submission Category: Pain Management

Submission Type: Evaluative Study

Session-Board Number: 3-253

Poster Title: Impact of clinical pharmacists' interventions on pain management in cancer patients referred to palliative care

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Purpose: Approximately 70% of cancer patients report uncontrolled pain. Although early palliative care (PC) has become an integral component of comprehensive cancer care and has been shown to improve quality of life and survival, one of the greatest challenges busy clinicians face is timely follow ups for pain and symptom assessment. One strategy to help improve practice efficiency is to engage qualified clinical pharmacists in the provision of PC. The aim of this study is to investigate the impact of clinical pharmacists' interventions on pain management in ambulatory cancer patients referred to the PC clinic.

Methods: Cancer patients ≥ 18 years old receiving treatment through the PC clinic and referred for a pharmacy assessment between 07/01/2016-09/23/2016 were included in the observational study. At the baseline visit, the PC specialist performed a symptom assessment using the Edmonton Symptom Assessment Scale (ESAS) (0-10 scale; e.g. 0=no pain and 10=worst pain). Pain medications were initiated or modified by the PC specialist and a list of patients requiring intervention within approximately one week was sent to the pharmacist for follow up. The pharmacist performed a pain and symptom assessment using ESAS either in person (e.g. during scheduled infusion) or via phone call. If needed, drug/dose modifications were sent to the referring PC specialist for approval (Assessment #1). Patients who required any intervention had another assessment (#2) performed within seven days to assess clinical response. The primary end point is the proportion of patients who achieved ≥ 2-point reduction in pain score from baseline to assessment #2, which was compared to historical control rates for pain improvement in cancer patients (~32%) using a Chi-square test. A paired t-test was

used to compare the mean pain scores at baseline and assessment #2. Secondary endpoints include: a description of changes in pain scores longitudinally between each assessment; mean duration of pharmacist assessments; and, the reason and type of each pharmacist intervention in patients requiring a therapy modification.

Results: Of 36 patients referred, 23 (64%) required an intervention and were included in the final analysis. The mean age was 55 ± 15 years, 65% were female, 50% had solid tumors, 65% had stage IV disease, and 61% had an ECOG performance status of 0 or 1. Approximately 52% and 48% of patients presented with nociceptive pain only or both nociceptive and neuropathic pain, respectively. Eighteen patients (78%) had ≥ 2-point reduction in pain score from baseline to assessment #2, which was significantly greater than the historical control rate of 32% ($p < 0.0001$). The mean pain scores at baseline, assessment #1, and assessment #2 were 6.3 ± 2.9, 4.9 ± 2.4, and 3.5 ± 2.3, respectively ($p=0.0007$ for assessment #2 vs baseline). The mean time spent for each pharmacist intervention was 18 and 16 minutes at assessment #1 and #2, respectively. The most common reasons for intervention at assessment #1 were uncontrolled pain (52%), lack of response to non-pain related medications (primarily laxatives) (17%) and adverse events (17%). The most common types of interventions performed by the pharmacist were dose adjustments (32%), patient education (e.g. incorrect administration, noncompliance, etc.) (32%), and medication addition (29%).

Conclusion: Clinical pharmacists' interventions occurring after the baseline PC clinic visit resulted in a significantly higher proportion of patients achieving ≥ 2-point reduction in pain scores. Although pain reduction occurred from baseline to assessment #1, the difference was not statistically significant ($p=0.08$). Importantly, implementation of pharmacists' interventions further reduced pain scores at assessment #2, resulting in statistically significant and clinically improved pain scores. The most common reason for intervention was uncontrolled pain and the most common types of interventions were dose adjustments and education. Pharmacists play a pivotal role in pain management and are critical members of the palliative care team.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 3-254

Poster Title: Assessment of Factors Affecting Adherence of Hepatitis C Direct Acting Antiviral Therapy

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Purpose: Treatment of hepatitis C virus (HCV) requires high adherence to new direct acting antiviral (DAA) regimens in order to achieve sustained virologic response (SVR) (i.e. “cure”). High treatment costs and the potential of HCV to develop resistance to these medications add to the impetus of identifying factors in order to optimize patient outcomes. The need to re-examine factors influencing patient adherence to these new medications is imperative. The purpose of this study was to determine what factors affect the rate of adherence to DAAs for HCV patients treated at the University of North Carolina Liver Center.

Methods: Data was collected from adult patients at the UNC Liver Center who qualified for treatment with a DAA for hepatitis C genotypes 1a, 1b, 2, 3, or 4 and had DAA therapy initiated between 1/1/16 – 3/21/16. The impact of (a) face-to-face counseling (FTFC) with a pharmacist, (b) telephone counseling with a pharmacist, (c) age, (d) duration of treatment (8 vs. 12 vs. 24 weeks), (e) daily pill burden (DPB), (f) prior treatment experience (TE) and (g) disease severity (fibrosis) on the rate of adherence of HCV-infected patients treated with DAAs were examined. Adherence was determined by pill counts and self reported during various follow up calls with the pharmacist or clinic visits throughout the duration of treatment. FTFC typically covers indication, administration, common side effects and management strategies, drug-drug interactions and the importance of adherence. The percentage and number of patients with a given characteristic in the “No Missed Doses” (NMD) group was compared to the prevalence of that characteristic in the group of patients that missed at least one dose (MD).

Results: 91 patients were enrolled. 45 patients (50%) had no missed doses compared to 24 patients (26%) that had missed at least one dose. 22 (24%) patients were unable to provide pill counts and were excluded for the data analysis. NMD group had more FTFC (27%[12/45]) prior to initiating therapy than the MD group (17%[4/24]). However, both groups had the same percentage of combined FTFC/phone interventions at 96% (43/45 in NMD vs 23/24 in MD). 12-week duration patients had a higher percentage of missed doses compared to NMD group (67%[16/24] vs 51%[23/45]). MD group had more patients born between 1951-1970 (88%[21/24]) and had received previous treatment (29%[7/24]), compared to NMD group (67%[30/45], 20%[9/45] respectively). MD group had 63%[15/24] patients with DPB of 1 while NMD had 67%[30/45] patients. MD group had a slightly higher percentage of patients with fibroscan scores F2-F4 at 75% (18/24) compared to NMD group of 67% (30/45). NMD group had a slightly higher percentage of patients achieve documented SVR compared with MD group (61% [22/36] vs. 57% [12/21]). Not all patients had reached post treatment week 12 at the conclusion of the study.

Conclusion: Of patients with known pill counts, a majority of patients had no missed doses. However, we found a significant number of patients had missed doses of their DAAs. There was a trend that showed patients with FTFC had higher adherence. Patient characteristics including 12-week duration of therapy, born between 1951-1970 and previous TE were associated more with the MD group. DPB and disease severity did not seem to affect adherence. SVR was higher in NMD group, which highlights the importance of adherence. Pharmacists can use patient characteristics to identify patients that would benefit most from FTFC counseling.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-255

Poster Title: Evaluation of continuous intravenous infusion (CIVI) heparin use at Vidant Medical Center

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Purpose: Continuous intravenous infusion (CIVI) heparin accounts for approximately 40 percent of the anticoagulation errors at Vidant Medical Center (VMC) despite protocols in place for monitoring and titration. There are several alternatives to heparin when anticoagulation is required, including low molecular weight heparin (LMWH), warfarin, and the direct oral anticoagulants (DOACs). The purpose of this study was to evaluate the use of CIVI heparin at VMC to identify opportunities to recommend alternative anticoagulation therapy. This is a quality improvement initiative to proactively address ways to decrease medication errors associated with CIVI heparin at VMC.

Methods: Patients admitted to VMC from May 1, 2016 to June 30, 2016 and on CIVI heparin for at least 24 hours were identified through an electronic health record medication report for CIVI heparin. Patients who were less than 18 years old, pregnant, or incarcerated were excluded. Selected patients were evaluated for age, gender, race, height, weight, length of stay, renal function, anticoagulation indication, heparin indication, prior to admission anticoagulant use, and transition to an oral anticoagulant. Appropriate use of CIVI heparin was defined as indications for heparin in which alternative anticoagulation therapy would not be selected. Safety was evaluated through assessment of appropriate activated partial thromboplastin time (aPTT) lab draws and heparin titration according to approved nurse-driven protocols. The primary endpoint was the percentage of patients with appropriate utilization of CIVI heparin for which alternative anticoagulants would not be indicated.

Results: A total of 100 patients were included in the analysis. Four patients were excluded due to indeterminate heparin indication. Heparin utilization was found to be appropriate in 92 percent of patients. The most common indications for appropriate use of heparin were acute coronary syndrome (ACS) (47 percent), anticipation of a procedure (23 percent), and bridge to an oral anticoagulant (12 percent). Heparin was selected in cases of renal dysfunction in 7 percent of patients. In the safety assessment, only 28 percent of patients had no medication errors with the use of CIVI heparin. An error with the timing of collection of aPTT labs occurred in 32 percent of patients, and an error with heparin titration occurred in 7 percent of patients. An error with both aPTT lab collection and titration of heparin occurred in 33 percent of patients.

Conclusion: Overall, CIVI heparin is being used appropriately for situations in which alternative anticoagulation would not be indicated in patients at VMC. However, there continues to be significant numbers of both lab and titration errors associated with the use of CIVI heparin. Targeting nursing education on the proper use of CIVI heparin may be the most effective method to decrease medication errors due to heparin at VMC.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 3-256

Poster Title: Management of patients undergoing evaluation for heparin-induced thrombocytopenia in a large academic medical center

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Purpose: Heparin-induced thrombocytopenia is a rare, but potentially lethal, complication of heparin administration and occurs in approximately 1-5% of patients. Given the numerous clinical services and providers evaluating for heparin-induced thrombocytopenia, management strategies for these patients are complex. These strategies include discontinuation of all heparin products, performing appropriate laboratory testing, initiating alternative anticoagulants, documentation of heparin allergy, and providing patient education prior to discharge. The purpose of this study was to evaluate the current management strategies for patients evaluated for heparin-induced thrombocytopenia within a large academic medical center.

Methods: This study was approved by the Institutional Review Board at the University of North Carolina Hospitals and Clinics. A retrospective chart review was performed to identify patients who fulfilled the following criteria: (1) at least 18 years of age, (2) admitted between 4/4/2014 and 5/31/2016 and (3) had heparin-induced thrombocytopenia panel (heparin-PF4 antibody ELISA and Heparin-induced platelet aggregometry) ordered during their hospitalization. Charts were reviewed to (1) identify the incidence of continued heparin administration during heparin-induced thrombocytopenia panel testing, (2) identify the incidence of continued heparin administration to patients with a positive heparin-induced thrombocytopenia panel and (3) determine the percentage of patients with appropriate heparin allergy documentation upon discharge. A positive panel was defined as a heparin-PF4 antibody ELISA optical density of ≥0.4 and positive heparin-induced platelet aggregometry OR a positive serotonin-release assay.

Results: A total of 636 heparin-induced thrombocytopenia panels were ordered for the 542 patients included in the study. Forty of 636 panels (6.3%) were positive, and 30 patients were diagnosed with heparin-induced thrombocytopenia. Five panels were indeterminate and deemed to require additional testing. Heparin administration was continued during 50.3% of pending heparin-induced thrombocytopenia panels. Out of 30 heparin-induced thrombocytopenia positive patients, 4 patients (13.3%) received heparin while testing was pending. Out of 512 heparin-induced thrombocytopenia negative patients, 33 (6.5%) currently have a heparin allergy incorrectly documented in their electronic health record. Out of 30 heparin-induced thrombocytopenia positive patients, 2 patients (6.7%) did not have heparin allergy documentation in their record.

Conclusion: Our study found a large number of patients suspected to have heparin-induced thrombocytopenia continued to receive heparin while testing was pending. Further, we found incorrect documentation of patients of heparin allergy was also a significant clinical issue, which could result in inappropriate heparin exposure among patients with heparin-induced thrombocytopenia or withholding of heparin in patients in whom heparin-induced thrombocytopenia was ruled-out. Implementation of institutional guidelines on the approach to evaluation and monitoring of patients with suspected or confirmed heparin-induced thrombocytopenia could help ensure patient safety and promote appropriate management in these complex patients.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 3-257

Poster Title: Evaluation of a pharmacy-to-dose vancomycin protocol in non-morbidly obese patients

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Purpose: Despite extensive experience with vancomycin, achieving therapeutic trough concentrations with empiric dosing remains a significant clinical challenge, especially in morbidly obese patients. Retrospective, observational studies within Carolinas HealthCare System (CHS) have evaluated vancomycin dosing in morbidly obese patients, but the effectiveness of the CHS pharmacy-to-dose vancomycin protocol in achieving therapeutic trough concentrations in non-morbidly obese patients is unknown. Therefore, an evaluation of the effectiveness of the CHS pharmacy-to-dose vancomycin protocol in non-morbidly obese patients, which is consistent with the vancomycin dosing guidelines by ASHP, IDSA, and SIDP, can provide a standard we should strive to achieve in morbidly obese patients.

Methods: The institutional review board approved this single-center, retrospective, observational study conducted at Carolinas Medical Center in Charlotte, North Carolina. Patients identified through pharmacy-to-dose vancomycin consultations ordered from June 1st, 2013 to June 30th, 2016 were included if they were greater than or equal to 18 years but less than 60 years of age, non-morbidly obese (defined as less than 100 kg or greater than or equal to 100 kg but total body weight is less than 140 percent of ideal body weight), had a creatinine clearance (CrCl) greater than 90mL/min, and had at least one vancomycin trough concentration drawn at steady state within 25 percent of the dosing interval (i.e., up to 3 hours before a dose in a patient being dosed every 12 hours). Reasons for exclusion included: unstable renal function in the first 48 hours of vancomycin therapy, pregnancy, dosing strategies outside of the protocol, initiation of vancomycin therapy prior to admission, or if a dose had been rescheduled by more than 50 percent of the interval between doses. The primary outcome was the frequency of the attainment of therapeutic vancomycin trough concentrations of 10 to 20

mcg/mL extrapolated from the first measured trough at steady state. Secondary outcomes included the frequencies of subtherapeutic (less than 10 mcg/mL) and supratherapeutic (greater than 20 mcg/mL) trough concentrations and the frequency of nephrotoxicity.

Results: After screening a total of 396 patients, 45 patients were enrolled, representing an inclusion rate of 11 percent. The median age was 39 years old (interquartile range, or IQR, 28 to 50), the median CrCl was 129 mL/min (IQR, 112 to 138) and the median total body weight was 81.1 kg (IQR, 72.1 to 90.7). The majority of patients had no comorbidities (55.6 percent, n equals 25), and 18 patients (40 percent) were in the intensive care unit. The most common indication for therapy was pneumonia (35.6 percent, n equals 16). Most patients had a goal trough concentration of 15 to 20 mcg/mL (73.3 percent, n equals 33). Nineteen patients (42.2 percent) received a loading dose. The median loading and maintenance doses were 25.3 mg/kg (IQR, 24.4 to 25.7) and 15.2 mg/kg (IQR, 14.7 to 15.9), respectively. The median duration of therapy was 4 days (IQR, 4 to 5). Of the 45 patients included, 12 (26.7 percent) achieved a therapeutic vancomycin trough concentration. Subtherapeutic trough concentrations were observed in 33 patients (73.3 percent) and no supratherapeutic trough concentrations were observed. The median extrapolated vancomycin trough concentration was 7.3 mcg/mL (IQR, 5.1 to 10.1). Nephrotoxicity occurred in three patients (6.7 percent).

Conclusion: This study demonstrates that the current CHS pharmacy-to-dose vancomycin protocol led to the attainment of therapeutic vancomycin trough concentrations in only 26.7 percent of non-morbidly obese patients. The majority had subtherapeutic vancomycin trough concentrations, which potentially places patients at risk for treatment failures and the development of vancomycin-resistant organisms. On the other hand, no patients had supratherapeutic trough concentrations. This study reveals that adjustments to the protocol may be needed in order to increase the frequency of non-morbidly obese patients who attain therapeutic vancomycin trough concentrations, which will, in turn, serve as a standard for dosing in morbidly obese patients.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 3-258

Poster Title: Evaluation of vitamin K utilization at a tertiary care medical center

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Purpose: Warfarin is an anticoagulant used for a variety of indications including therapeutic anticoagulation or thromboprophylaxis. In severe overanticoagulation, major bleeding, or need for emergent surgery, reversal of warfarin is indicated. Vitamin K is a mainstay in warfarin reversal given its low cost and prolonged suppression of anticoagulation. The primary risk associated with warfarin reversal is thrombosis. Given the thrombotic risks associated with vitamin K use, it is critical to ensure that vitamin K is being used appropriately. The purpose of this investigation is to assess the prescribing practices of vitamin K for warfarin reversal at a tertiary care medical center.

Methods: Adult patients age 18 and older who received vitamin K for the reversal of warfarin at a tertiary care medical center between 04/01/2016 and 06/30/2016 were included in this retrospective analysis. All data points were collected via an electronic health record. Items recorded included demographics, indication for warfarin, indication for reversal, dose and route of vitamin K, INR before vitamin K administration, administration of blood products to supplement reversal, the use of concomitant medications which affect bleeding or hemostasis, and incidence of stroke or systemic embolism. Determination of appropriate use for vitamin K was based on an algorithm derived from recommendations from the 2012 CHEST guidelines for Evidence-Based Management of Anticoagulant Therapy: Antithrombotic Therapy and Prevention of Thrombosis and the 2014 ACC/AHA guidelines for the Management of Patients with Valvular Heart Disease. The primary outcome was the incidence of appropriate vitamin K administration, defined as valid indication, route, and dose according to national guidelines.

Results: Within the study period 74 patients received vitamin K for warfarin reversal. The average age of these patients was 72 years. Most common indications for anticoagulation were atrial fibrillation (48 percent), pulmonary embolism secondary prophylaxis (19 percent), and deep vein thrombosis secondary prophylaxis (12 percent). Indications for reversal included supratherapeutic INR (45 percent), major bleeding as described in ROCKET-AF (30 percent), surgery (24 percent), and one patient had no identifiable indication (1 percent). For the primary outcome, vitamin K administration was considered appropriate per guidelines in 16 patients (22 percent). Of the 58 inappropriate administrations, 31 (53 percent) were not indicated, 2 (3 percent) used an incorrect dose, 20 (35 percent) used an inappropriate route, and 5 (9 percent) used an incorrect dose and route. Of the 74 doses of vitamin K administered, 51 (69 percent) were given intravenous, 21 (28 percent) were given by mouth, and 2 (3 percent) were given subcutaneously. The median dose was 7.5 mg. Of the 28 patients who received concomitant blood products, 7 received 4-factor prothrombin complex concentrate, 21 received fresh frozen plasma, and no patients received 3-factor prothrombin complex concentrate or factor VIIa. There were no recorded incidents of stroke or systemic embolism.

Conclusion: Despite well-established guidelines detailing the management for warfarin reversal, vitamin K is often used inappropriately. One limitation to our study is the incomplete assessment of vitamin K utilization. Since our evaluation included only patients who received vitamin K, patients who would be appropriate candidates for reversal with vitamin K but did not receive it were excluded. Given the significant deviations in practice from guideline recommendations, a protocol will be developed and implemented to promote evidence-based utilization of vitamin K for warfarin reversal at our institution.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 3-259

Poster Title: Medication bags provided at hospital discharge increase the number of patients that bring medication bottles to follow-up clinic appointments

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Purpose: Reviewing medication bottles aids in the detection of medication discrepancies. A 1-week pre-implementation review of all clinic encounters at the University of North Carolina (UNC) Cardiology Clinic indicated that only 14 percent of patients brought medications to their clinic appointment. This quality initiative aimed to determine the feasibility of distributing a cloth medication bag to patients discharged from inpatient cardiology services to increase the number of patients bringing medication bottles to hospital follow-up visits. For patients with follow up at UNC's Cardiology Clinic, we also aimed to determine patient satisfaction with the bag and assess medication discrepancies.

Methods: UNC's institutional review board approved this prospective, cohort study as a quality improvement project. Therefore, informed consent was not obtained from patients followed in the study. Patients discharged from UNC Hospitals' inpatient cardiology services (Cardiology (MDC), Heart Failure (MDD), Cards Procedures (MDS)) were included in the study. UNC's inpatient cardiology nurses provided a high quality cloth bag to patients in the cohort from October 26th, 2015 through February 6th, 2016. The inpatient nurses recorded the name and MRN of patients who received a bag at discharge. The bags were labeled with directions to bring all medication bottles to the hospital follow up visit. Outpatient clinic nurses at UNC's Cardiology Clinic documented in the electronic health record (EHR) if patients brought the medication bag with their medication bottles to clinic. If patients used the bag, clinic nurses provided a brief questionnaire to assess patient satisfaction with the bag and recorded the response in the EHR. Additionally, clinic pharmacists recorded and categorized all identified

medication discrepancies. The primary outcome was the percentage of patients who received a medication bag and brought medication bottles to the first visit at UNC's Cardiology Clinic after discharge. Secondary outcomes included patient satisfaction with the provided bag, the number and type of medication discrepancies found, time to clinic visit (7-14 days), and 30-day readmission rate.

Results: We distributed bags to 314 of 512 unique patients discharged (61 percent) from the inpatient cardiology services. Forty-three percent of patients were female, 58 percent were Caucasian, and the average patient was 62 years old. Of the 117 patients with follow-up at UNC's Cardiology Clinic (37 percent of total cohort), 66 patients (44 percent) brought their bag to clinic, of which 86 percent brought their medications. Notably, 41 patients received the satisfaction survey and 90 percent reported the bag helped them remember to bring their medications, 98 percent plan to continue to use the bag, and 98 percent highly or somewhat agree that bringing medications to clinic is important to their care. Clinical pharmacists saw 14 patients (27 percent) with medication bags. Clinical pharmacists identified medication discrepancies in 67 percent of these 14 patients. Eighty-nine percent of medication discrepancies were categorized as having a probable or possible clinical impact. Patients who used the bag were associated with a 4 percent 30-day readmission rate, as compared to 12 percent in patients who did not use the bag.

Conclusion: Providing medication bags to patients at hospital discharge was feasible and increased the percent of patients who brought medication bottles to clinic visits. Additionally, the medication bags helped patients to remember to bring their medications to clinic appointments. Although our results indicate a positive finding, a large number of patients in the initial cohort had follow-up appointments at other locations and could not be analyzed. Future studies may consider following patients discharged to a broader range of clinics to further analyze the benefit of providing medication bags at discharge, including identifying medication discrepancies and the impact on readmissions.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 3-260

Poster Title: Evaluation of carbapenem utilization in a community hospital.

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Purpose: Carbapenems are the antimicrobial treatment of choice for extended-spectrum beta-lactamase producing Enterobacteriaceae (ESBL) infections. It is important to preserve these agents for complicated infections requiring broad spectrum coverage as greater exposure contributes to increasing numbers of resistant pathogens, most notably carbapenem resistant Enterobacteriaceae (CRE). Currently at our institution only ertapenem has restrictions in place for utilization. With reported pseudomonal resistance increasing over the last 3 years, the purpose of this retrospective review was to evaluate meropenem utilization in an institution with no restrictions.

Methods: The institutional review board approved this retrospective single center observational study. All adult patients who had an active order for meropenem at the site from January to June 2016 were included in the study. Patients who were not administered a dose or not admitted to the hospital were excluded. The primary outcome was to evaluate prescribing trends for indication and provider. A secondary outcome was to identify potential initiatives to optimize and reduce meropenem usage. This was determined by the percentage of patients on meropenem when an alternative beta-lactam agent could have been utilized. Alternative beta-lactam therapy was determined for the following scenarios: a non-type 1 penicillin allergy (rash or no reported allergy), no documented history of ESBL infection, and no current ESBL infection. Data analysis was completed with descriptive statistics.

Results: 108 were included in the study and consisted of mainly female (56 percent) patients with no reported PCN allergy (76 percent), and no history of ESBL infections (90 percent). The majority of patients were receiving meropenem for intra-abdominal infections (35 percent) and urinary tract infections (UTI) (32 percent). Predominant prescribers included hospitalists (41

percent) and surgeons (26 percent). The mean duration of meropenem therapy was 6 days (range 1 to 22 days). Of those with positive cultures (n equals 50), only 21 (19 percent) patients had a reported ESBL positive organism. The potential for alternative beta-lactam therapy to reduce carbapenem exposure was identified in 62 (75 percent) patients.

Conclusion: Patients were predominantly on meropenem therapy with no documented ESBL infection (81 percent) for coverage of intra-abdominal infections and UTIs. 75 percent of patients, not on the infectious disease service, could have potentially been on a non-carbapenem treatment regimen. Restrictions are needed to preserve the utilization of this broad spectrum agent and prevent future resistance.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 3-261

Poster Title: Prescriber adherence to guideline recommendations for ACE Inhibitors, ARBs, and aldosterone antagonists in patients with reduced ejection fraction heart failure

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Purpose: The 2013 ACCF/AHA guidelines recommend certain first-line agents for patients with reduced ejection fraction (≤40%) heart failure (HFrEF), including angiotensin receptor converting enzyme inhibitors (ACEI), angiotensin II receptor blockers (ARB), and aldosterone antagonists. The 2016 QUALIFY trial showed that these agents are often under-prescribed or under-dosed in outpatient adults with recent heart failure hospitalizations. One third of patients in QUALIFY were not prescribed their theoretical guideline recommended regimen. Furthermore, most medications were at target dose less than half the time. Our study assessed the prescriber adherence to evidence-based pharmacotherapy for patients with HFrEF in a general internal medicine clinic.

Methods: The Institutional Review Board approved this study. This is a descriptive, retrospective observational study of outpatients from a single academic based internal medicine clinic at the University of North Carolina Medical Center. Participants were included if they were: 1) ≥18 years old; 2) Established UNC internal medicine clinic patient with a provider visit from January 2015-July 2016; and 3) Had a diagnosis of HFrEF. Patients who were pregnant, in hospice, or in palliative care were excluded. The primary measure of this study was a composite of the following two points: 1) Proportion of patients prescribed to target doses of guideline recommended medications and 2) Proportion of patients not prescribed to target doses of a guideline recommended medication due to contraindication to initiation or titration of an agent. Secondary measures looked at the prescribing patterns of individual drug classes and contraindications to initiation or titration of each class. Contraindications investigated

included co-morbidities, intolerable side effects, high serum potassium levels, high serum creatinine levels, and hypotension. Data was collected from the electronic medical record and analyzed utilizing descriptive statistics.

Results: 157 patients were included with a mean age of 63 years, a mean ejection fraction of 29.7%, and an average of 3.9 visits to the internal medicine clinic in the preceding 12 months. 38 patients (24.2%) met the definition for the primary measure. Of these 38 patients, 10 patients were at target doses of both a guideline recommended ACEI or ARB and aldosterone antagonist. 5 patients were only at target dose of an ACEI or ARB, but were not indicated for an aldosterone antagonist. The other 23 patients had contraindications to initiation or titration of either the ACEI, ARB, or aldosterone antagonist. The reasons for contraindication to an ACEI or ARB included high serum creatinine and allergy history. The reasons for contraindication to an aldosterone antagonist included high serum creatinine, hyperkalemia, low GFR, and allergy history. 17.2% (27/157) of patients were not prescribed any ACEI, ARB, or aldosterone antagonist. 25.5% (40/157) of patients were prescribed both an ACEI/ARB and aldosterone antagonist any dose.

Conclusion: The percentage of patients who met the definition for the primary measure was low and similar to percentages seen in previous studies. Furthermore, the majority of patients who met the definition did so due to a contraindication to one or more drug classes. Although a majority of the patients were on some dosage of at least one agent, this gap in prescriber adherence to guideline recommended therapy suggests an opportunity for optimizing medication use.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 3-262

Poster Title: Projected impact of genotype-guided optimization of medication use: an opportunity for preemptive genotyping in cardiac catheterization laboratory patients

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Purpose: Preemptive genotyping is a strategy that tests for multiple pharmacogenomic variants before a drug is prescribed. Although pharmacogenomic information currently appears in 165 FDA-approved drug labels, the clinical utility of preemptive genotyping remains uncertain. Many medications have an FDA boxed warning and/or available Clinical Pharmacogenetics Implementation Consortium (CPIC) guideline that recommend action, such as selecting a different drug or dose, in patients with certain genotypes if the genetic test result was available. This study assessed the projected number of actionable genotype-guided interventions that could have been made to optimize medication use through preemptive genotyping in cardiac catheterization laboratory patients.

Methods: This single-center, retrospective study of an established cohort included patients referred for coronary angiography between September 2012 and February 2014 who consented to participation in a biorepository. An institutional review board approved this study. Patient demographics, clinical information, and medication use were abstracted from the electronic medical record. A list of 20 drugs with genetically actionable FDA boxed warnings and/or CPIC guidelines was established a priori to guide medication collection. Oncology and immunomodulatory drugs were not considered. Medication information was collected at discharge and at the first follow-up clinic visit or hospitalization after the catheterization procedure. The analysis included 122 patients that had their first follow-up within 180 days. Drug prevalence at discharge or first follow-up was calculated using descriptive statistics. Projected genotype frequencies for 7 genes with actionable pharmacogenetic

recommendations (HLA-B, CYP2C19, CYP2D6, CYP2C9, SLCO1B1, VKORC1/CYP2C9, and DYPD) were estimated based on published literature for Caucasian-dominated populations. The primary endpoint was the projected number of genotype-guided interventions at discharge or first follow-up that could have occurred if genotype information was available at the time of patient encounter. The projected number of interventions for each drug was calculated by multiplying the observed drug frequency, projected at risk genotype frequency, and number of patients in the study population. The overall number of interventions was summed. The secondary endpoint was the distribution of total interventions by gene.

Results: The study population was on average 63 years old, 57 percent male, and 73 percent Caucasian. Approximately 14 percent had a history of depression and 38 percent underwent a percutaneous coronary intervention during the catheterization procedure. The most prevalent genetically actionable drugs at discharge or first follow-up were clopidogrel (48.4 percent), antidepressants (20.5 percent), simvastatin (13.9 percent), and warfarin (9.0 percent). Corresponding at-risk genotypes of interest and projected frequencies were CYP2C19 intermediate or poor metabolizers (28.9 percent) for clopidogrel, CYP2C19 ultra-rapid or poor metabolizers (32.5 percent) for antidepressants, SLCO1B1 C allele carriers (23.6 percent) for simvastatin, and VKORC1/CYP2C9 sensitive or highly sensitive responders (38.3 percent) for warfarin. The total projected number of genotype-guided interventions at discharge or first follow-up in the study population was 32. The distribution of total interventions by gene was as follows: 71.9 percent CYP2C19, 12.5 percent SLCO1B1, 12.5 percent VKORC1/CYP2C9, and 3.1 percent CYP2C9. There were no projected interventions involving drugs actionable for CYP2D6, HLA-B, and DYPD. Assuming each intervention is unique to one patient, a genotype-guided medication intervention could have been made in 26.2 percent (32 of 122) of the study population within 6 months of their presentation to the cardiac catheterization laboratory.

Conclusion: A preemptive genotyping strategy in cardiac catheterization laboratory patients would result in an immediate genotype-guided intervention in approximately 1 out of every 4 patients, which could optimize medication use in accordance with FDA boxed warnings and CPIC guideline recommendations. Almost 30 percent of interventions involved non-CYP2C19 drugs, suggesting the potential benefit of a multiplexed genotyping approach that extends beyond CYP2C19 testing. The study's limitations include its small sample size, short follow-up, assumption of Caucasian-dominated population, and exclusion of actionable oncology and immunomodulatory drugs. Additional studies are required to determine whether preemptive genotyping in this population improves outcomes and lowers cost.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 3-263

Poster Title: Risk factors associated with first incidence of hospital acquired Clostridium difficile infection in non-critically ill patients

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Purpose: Clostridium difficile is one of the most common causes of healthcare associated diarrhea, resulting in increased patient morbidity and hospital length of stay. The continued problem of C. difficile emphasizes the need for astute infection prevention and improved antibiotic management. A better understanding of the risk factors associated with C. difficile is needed to facilitate further interventions of disease reduction. The primary purpose of this retrospective review was to evaluate the risk factors associated with first incidence of hospital acquired Clostridium difficile infection (CDI) at a large tertiary academic medical center.

Methods: This study was an institutional review board approved retrospective chart review. All patients aged 18 or older upon admission with a confirmed diagnosis of CDI who were not directly admitted to an intensive care unit were included in the study. Hospital acquired CDI as defined by the presence of diarrhea and a positive stool C. difficile cytotoxin assay greater than or equal to 48 hours after hospital admission was also required for inclusion. Patients with recurrent CDI or diagnosis of CDI less than 48 hours after hospital admission were excluded. Patient data was collected via hospital electronic medical records from January 1, 2015 to December 31, 2015. The primary objective of this evaluation was to identify risk factors that predispose patients at high risk for acquiring CDI in the hospital setting. Data was analyzed through use of descriptive statistics.

Results: The analysis included 53 patients, of which 40 patients met inclusion criteria. Six patients were excluded due to recurrent CDI and seven patients were excluded due to symptom onset occurring less than 48 hours after inpatient admission. The median age was 60 years (range: 18-88) and 53 percent of patients were female. The majority of patients (95 percent) were on at least one antibiotic before developing CDI with 56 percent of patients taking a beta-lactam antibiotic. The average duration of antibiotic use prior to CDI diagnosis was five days and the mean length of hospital stay was 36.55 days. It was found that 65 percent of patients were immunocompromised with 93 percent of those patients receiving antibiotics before a confirmed diagnosis of CDI.

Conclusion: The results from this study demonstrate that the use of antibiotics trend towards the development of CDI in the hospital setting. Patients who are immunocompromised may also be at an increased risk for developing CDI. This risk may be further increased when immunocompromised patients receive antibiotics during their hospitalization. Patients who present with these risk factors during their hospital stay should be provided with antimicrobial stewardship and carefully monitored for the development of CDI.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 3-264

Poster Title: Assessment of Four-Factor Prothrombin Complex Concentrate Dosing Practices within Neurocritical Care

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Purpose: Four-factor prothrombin complex concentrates are used to urgently reverse vitamin K antagonists in adult patients with major bleeds. The recommended dosing of four-factor prothrombin complex concentrates is based on Factor IX units, which can range from 20 to 31 units/ml in each vial. This variability in potency has led to differences in how four-factor prothrombin complex concentrates are dispensed. This study was designed to examine the current dosing practices of four-factor prothrombin complex concentrates in neurocritical care unit patients across the United States and evaluate the effect these practices have on patient response and safety.

Methods: This was a multi-center, retrospective, observational study of patients, aged 18 and older, receiving four-factor prothrombin complex concentrates for reversal of warfarin-related, intracranial bleeding between January 1, 2014 and December 31, 2015. A total of 10 centers collected patient data from each center's patient information database or paper medical record. Collected data was categorized into basic demographics, labs, hospital stay and medications. Data collected included age, gender, height, weight and past medical history of each patient. Baseline labs as well as up to eight repeat INR values were collected. Hospital stay information included patient's length of stay in the hospital, length of stay in the ICU, intracranial hemorrhage characteristics and patient discharge information. Patient's reason for vitamin K antagonist use, other reversal agents administered, antiplatelets taken prior to admission and NSAIDs taken prior to admission were collected from medication information. The initial four-factor prothrombin complex concentrate dose given in units, repeat doses and adverse effects experienced were also collected and included in the medication category. The

patient data gathered from each center was then compiled into an online data collection form (operated by REDCap). Each center obtained approval from their local institutional review board (IRB) and was subject to the regulation of the primary governing IRB at the University of North Carolina at Chapel Hill.

Results: A total of 217 patients were entered into the database. Average age was 70.6 years (standard deviation equals 14). Males comprised 56% of the patient population (number equals 121). The majority of patients, 62%, were taking warfarin for atrial fibrillation (number equals 126). In terms of intracranial hemorrhage location, 34% of patients had a subdural hematoma (number equals 63), 14% had an intracranial hemorrhage with intraventricular hemorrhage (number equals 27) and 12% had a supratentorial intracranial hemorrhage (number equals 23). The mean dose of the four-factor prothrombin complex concentrate administered to patients was 2303 units (standard deviation equals 802). The mean dose in units/kg was 28 (standard deviation equals 9). After receiving the four-factor prothrombin complex concentrate, 93% of patients achieved an INR less than 1.4 (number equals 202) and 99% of patients achieved an INR less than or equal to 1.5 (number equals 214). The time from baseline INR to INR less than 1.4 was 7 hours (interquartile range equals 4 to 14 hours). Adverse events included DVT in 4% of patients (number equals 8), stroke in 1% of patients (number equals 3) and hypersensitivity reactions in 1% of patients (number equals 2).

Conclusion: This study was a real-life evaluation of how four-factor prothrombin complex concentrates are used in intracranial bleeding. The majority of patients normalized their INR after treatment with a four-factor prothrombin complex concentrate and few patients experienced adverse reactions associated with dosing.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 3-265

Poster Title: Impact of a pre-discharge pharmacy concierge service on 30-day hospital readmissions

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Purpose: Primary non-adherence, defined as the rate at which patients fail to fill new prescriptions, is associated with increased mortality. A pharmacy concierge service provided to patients prior to discharge eliminates primary non-adherence as patients leave the hospital with newly prescribed medications in-hand. A reduction in primary non-adherence rates should theoretically correlate with decreased readmission rates. The purpose of this study is to evaluate the impact of a pre-discharge pharmacy concierge service on unplanned readmissions within 30 days.

Methods: The institutional review board approved this retrospective chart review. An informed consent waiver and HIPAA authorization waiver was obtained from the institutional review board. This study was completed through retrospective chart review and compared patients enrolled in a pre-discharge pharmacy concierge service to patients not enrolled in a pre-discharge pharmacy concierge service over a period of one year. The primary endpoint was the 30 day unplanned hospital readmission rate. Patients were matched 1:2, enrolled versus not enrolled, based on date of admission, UNC hospital-defined “transitions of care” status, hospital service upon discharge, and insurance status. Patients had to be discharged within the same month to be matched. “Transitions of care” status was defined as “low-risk”, “moderate-risk”, or “high-risk” of readmission. Additional patient information collected included 90-day unplanned readmissions, age at admission, and patient race.

Results: Chart review of a preliminary 2,883 patients resulted in identification of 183 patients (61 enrolled, 122 not enrolled). Of the 61 patients enrolled in the pre-discharge pharmacy concierge service, 11 (18%) were readmitted within 30 days compared to 44 (36%) for non-enrolled patients. A similar trend was seen for 90 day readmission rates with 20 (32%) enrolled patients and 62 (50%) non-enrolled patients readmitted.

Conclusion: Preliminary results suggest that patients enrolled in a pre-discharge pharmacy concierge service have lower rates of readmission compared to patients not enrolled, both at 30 and 90 days.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 3-266

Poster Title: Impact of a multi-modal antimicrobial stewardship program on outcomes in patients with Clostridium difficile infections

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Purpose: Clostridium difficile infection (CDI) is the most common cause of infectious diarrhea in hospitalized patients. Management of active CDI needs to be optimized to decrease morbidity, mortality, and health care costs. Existing literature indicates that therapy selection for CDI is suboptimal and exacerbating medications such as concurrent antibiotics and acid-suppressing agents increase the risk of CDI recurrence or complications. Outside of primary CDI treatment, there is no current literature on antimicrobial stewardship programs (ASP) optimizing CDI therapy from a multi-modal approach. The objective of this retrospective study is to evaluate the impact of an ASP CDI initiative in CDI patients.

Methods: This is an IRB-approved retrospective cohort study conducted at a large community hospital. In March 2013, the ASP launched a CDI initiative to optimize the management of CDI. Each patient with a newly documented CDI was reviewed utilizing a site-specific checklist, which includes assessment of appropriate CDI treatment based on disease severity, concurrent antibiotic therapy, pro-motility agents, acid suppression therapy, and anti-diarrheal therapy. If areas for optimization were identified, a standard CDI recommendation form that included supporting literature was placed in the medical record. Written recommendations not accepted within 48 hours prompted verbal communication with the provider. To evaluate the impact of this initiative, all adult patients treated for active CDI between March 2011 and February 2015 were included in the study. Patients were excluded for CDI diagnosis prior to admission or CDI documented in the previous 90 days. Patients were randomly selected to include 200 from each of the control (March 2011-February 2013) and post ASP initiative (March 2013-February 2015) groups. The primary endpoint was a composite of unfavorable outcomes, defined as treatment failure or documented CDI recurrence within 90 days after the index infection. Secondary

endpoints were severe CDI treated with vancomycin within 72 hours after onset, acid suppression therapy discontinued within 72hrs after onset, concurrent antibiotics discontinued within 72 hours after onset, 30-day readmission rate, and inpatient mortality.

Results: During the ASP CDI initiative, 225 recommendations were made to improve CDI management with the predominant interventions on discontinue acid suppressive therapy (n equals 57), optimize treatment based on CDI severity (n equals 47), and discontinue concurrent antibiotic therapy (n equals 40). The ASP CDI initiative was associated with a significant decrease in unfavorable outcomes (30 versus 17, p equals 0.043). The largest impact was seen in documented CDI recurrence with 23 events in the control group and 11 in the post ASP group (p equals 0.03). There was no significant difference seen in 30 day readmission (17 percent versus 15 percent) or all-cause inpatient mortality (9 percent in both groups). Appropriate therapy for severe CDI increased from 33 percent to 60 percent. Concurrent acid suppression therapy after onset decreased from 81 percent to 60 percent. The post ASP group had a higher number of patients on concurrent antibiotics for more than 72 hours after onset (48 percent versus 61 percent) as well as increased infection length of stay (mean 9 days versus 12 days).

Conclusion: An ASP CDI stewardship initiative was successfully implemented at a large community hospital with over 200 recommendations targeting both CDI therapy and exacerbating medications. This resulted in a significant decrease in unfavorable outcomes. In the future, this standardized process will be expanded to all decentralized pharmacists in an effort to decrease time to optimization of therapy.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 3-267

Poster Title: Evaluation of statin medication therapy for the prevention and treatment of cardiovascular disease within an accountable care organization

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Purpose: The primary objective is to evaluate the impact of pharmacists' intervention on the use of statin medication therapy in patients for prevention and treatment of cardiovascular disease within an accountable care organization (ACO) and to evaluate the impact of the ACO's fulfillment of the quality metric. Secondary objectives include evaluating cost savings and the number of pharmacists' recommendations that are approved by providers.

Methods: Patients within the ACO who fall into any of the quality measure's three defined categories will be identified from the ACO database. Each patient will be reviewed to assess if the quality metric was met. The five Triad HealthCare Network (THN) practices with the lowest quality metric scores will be targeted for on-site education by a pharmacist. The pharmacist will contact the THN provider and visit the practice to share recommendations for initiation or change of therapy. The quality metric will be evaluated pre- and post- physician practice education, and the metric for the first quarter of 2016 will be compared to the metric for the final quarter of 2016. This study was approved by the Institutional Review Board at our institution.

Results: Out of 22,256 patients identified by a targeted medication review from the first quarter of 2016, 1,752 (7.9%) patients in the ACO have an indication for statin therapy but are not on it. The five THN practices with the lowest quality metric scores have scores of 68.75%, 73.26%, 75.68%, 75.74%, and 78.95%. The pharmacist educated these practices on the quality metric and made recommendations to providers to consider initiating statin therapy or switching to a generic statin therapy. Practice A resulted in a quality metric score of 85%, a

6.05% increase, after the pharmacist appropriately documented patients who met exclusion criteria. The pharmacist recommended initiating a statin for treatment for 39 patients and for prevention for six patients. Practice B resulted in a quality metric score of 81.53%, an 8.27% increase, after the pharmacist appropriately documented patients who met exclusion criteria. The pharmacist recommended initiating a statin for treatment for 12 patients and for prevention for five patients. Research is ongoing to assess data following additional on-site practice education.

Conclusion: The medication review highlighted areas where pharmacists can help guide THN providers in the prescribing of statin therapy in order to help minimize cost to the patient and insurance plan and to optimize patient care. Pharmacists' intervention on the use of statin medication therapy for prevention and treatment of cardiovascular disease made a positive impact on the ACO's quality metric.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 3-268

Poster Title: Process of Chemotherapy Administration - A Quality Improvement Project

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Purpose: Prompt administration of chemotherapy to patients who require inpatient treatment is imperative to ensure that patients receive medication during the day shift when the most highly trained pharmacy, nursing and physician staff are readily available. This quality improvement project aims to identify areas for improvement of chemotherapy administration for adults admitted to Vidant Medical Center (VMC).

Methods: The VMC Cancer Committee approved this quality improvement project and the VMC institutional review board was notified of this approval. Researchers analyzed the chemotherapy ordering process for patients receiving inpatient treatment. The primary endpoints were the time from patient admission to time of first dose (for elective chemotherapy admissions) and the time from order written to time of first dose (for prolonged admissions requiring continuation of therapy). Data were collected for six weeks. Most data collected were obtained from the electronic health record. Two additional data points collected were time the pharmacy notified nursing that chemotherapy was ready for pick up and time that chemotherapy was picked up by nursing staff. Data were evaluated to determine the percentage of patients that received chemotherapy between 5 am to 5 pm vs 5 pm to 5 am. Time of discharge was utilized to calculate length of stay (LOS).

Results: Thirty-six patients were evaluated for a total of 52 treatments. Six of 11 (54.5 percent) orders for elective chemotherapy were written by a physician prior to admission and the average time from admission to first dose for these patients was 16.96 hours. The average time from time of admission to doctor signed orders was 4.8 hours. The average time from time attending ordered medication to time nurse released order was 3.11 hours. The average time from time nurse released order to time first pharmacist checked the order was 6 minutes (0.1

hours). Thirty-one of 52 (59.6 percent) orders were first-checked by a pharmacist prior to the nurse releasing the order. The average time from time pharmacy called to notify nursing staff that chemotherapy is ready to time nurse picked up the compounded chemotherapy was 0.51 hours. The average time from time nurse pick up of medication to time chemotherapy was hung was 3.22 hours. Orders administered during the hours of 5 am to 5 pm represented 32.69 percent of treatments compared to 67.3 percent administered during the hours of 5 pm to 5 am. Of the 11 admissions for elective chemotherapy, LOS was prolonged in six patients (54.5 percent).

Conclusion: The research suggests that improving time from nurse pick up of medication to time chemotherapy hung could decrease LOS for adults admitted for chemotherapy. The data also suggests that the pharmacy often completes the first check before the nurse releases the order. Improving time from attending signing the order to time nurse releases the order could further streamline the ordering process. Additional evaluation of the ordering process for inpatient chemotherapy will help identify other areas for improvement. These opportunities for advancement will be implemented at a later date and help to improve the process of care for these patients.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 3-269

Poster Title: Optimal dosing of unfractionated heparin and low molecular weight heparin for the treatment of venous thromboembolism in the morbidly obese

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Purpose: Approximately 15.5 million people in the United States have a body mass index (BMI) greater than or equal to 40 kg/m2, classifying them as morbidly obese. Obesity can present a problem when dosing drugs that are dependent on pharmacokinetic parameters, such as volume of distribution or creatinine clearance. Two such drugs are the heparin anticoagulants, unfractionated heparin and low molecular weight heparin. The purpose of this study is to identify and evaluate current dosing strategies in non-critically ill morbidly obese patients who are being treated with unfractionated heparin or low molecular weight heparin for a venous thromboembolism (VTE).

Methods: This retrospective chart review was approved by the institutional review board and conducted at The University of North Carolina Medical Center in Chapel Hill, NC (UNCMC). The data search targeted patients greater than or equal to 18 years of age with a BMI greater than or equal to 40 kg/m2 who were admitted to UNCMC with a diagnosis of VTE and treated with unfractionated heparin or low molecular weight heparin between January 2015-May 2016. The electronic medical records of the 31 eligible patients were searched for information on unfractionated heparin and low molecular weight heparin dosing, heparin and low molecular weight heparin monitoring, and incidences of bleeding. The primary objective of this study was to identify a weight-based dosing strategy that achieved a therapeutic level of drug. The secondary objectives included the time to therapeutic level and major and minor bleeding events.

Results: The initial search returned 65 possible patients, 34 patients were excluded. The eligible patient population was 42 percent male, averaged 57 years in age, and had an average BMI of 44.6 kg/m2. 74 percent of patients received unfractionated heparin and the mean duration of treatment was 74 hours. Enoxaparin was used in 26 percent of patients and the mean duration of treatment was 61 hours. The majority of patients were dosed based on actual body weight (86.96 percent in the unfractionated heparin group, and 75 percent in the low molecular weight heparin group). Dosing unfractionated heparin based on actual body weight led to non-therapeutic initial heparin correlations in 52.4 percent of these patients, with 42 percent being supratherapeutic. The mean final dose in this group was 15.1 units/kg/hr. 62.5 percent of patients in the enoxaparin group had a documented Anti-Xa level, with all 5 having a therapeutic level. The median initial dose for this group was 120 mg and the final median dose was 120 mg. There were no occurrences of bleeding in the low molecular weight heparin group and two occurrences of minor bleeding in the unfractionated heparin group.

Conclusion: This data demonstrates that most patients will require dose-reduction when initiated on actual body weight unfractionated heparin dosing. Actual body weight dosing may be appropriate for low molecular weight heparin, but several patients did not receive Anti-Xa monitoring. With the small number of patients receiving low molecular weight heparin and a lack of patients dosed on adjusted body weight, we cannot conclude whether adjusted body weight dosing decreases time to a therapeutic level. Further study is needed to determine an optimum dosing weight for the administration of unfractionated heparin and low molecular weight heparin for VTE in morbidly obese patients.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-270

Poster Title: Impact of clinical, unit-specific guidelines on dornase alfa use in critically ill pediatric patients without cystic fibrosis

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Purpose: While compelling evidence exists for improved outcomes with the use of dornase alfa in pediatric patients with cystic fibrosis, the evidence in patients without cystic fibrosis is lacking. Because dornase alfa has a large pharmacoeconomic impact on the health system, replacing it with other mucolytic agents, such as hypertonic saline or acetylcysteine, in patients without cystic fibrosis may help to decrease the impact.
The purpose of this study was to evaluate the impact of unit-specific, evidence based guidelines on dornase alfa in the pediatric intensive care unit and pediatric cardiac intensive care unit.

Methods: This single center retrospective review was approved by the Institutional Review Board. The use of dornase alfa in critically ill pediatric patients without cystic fibrosis was evaluated. Subjects were included if they were admitted to the PICU or PCICU and had received at least one dose of dornase alfa during the data collection period. Potential subjects were excluded if they had a medical history of cystic fibrosis. All data was collected retrospectively via electronic medical record review and hospital purchasing reports. Data was evaluated using descriptive statistics to determine the percentage change in number of dornase alfa doses administered and related expenditure during the nine-month period before and after guideline implementation. The Mann-Whitney U test was used to compare the median number of days subjects from the pre- and post-guideline implementation groups stayed on the ventilator.

Results: Between February 1, 2015 and October 31, 2015, 1074 doses of dornase alfa were administered to 53 patients located in the PICU or PCICU. In November 2015, dornase alfa guidelines were implemented, placing significant restrictions on the use of dornase alfa in these units. Post-guideline implementation data collection began on December 1, 2015 and ended

August 31, 2016. During this time period, 239 doses of dornase alfa were administered to 23 patients in these units. Across the nine month data collection periods before and after guideline implementation, there was a 77.7% reduction in the use of dornase alfa in the PICU and PCICU. The reduction of the use of 835 doses of dornase alfa over a nine month period had a profound pharmacoeconomic impact on the health system. With the Wholesale Acquisition Cost of dornase alfa at $96.46 a dose, the implementation of these guidelines generated a $80,544 decrease in expenditure.

Conclusion: The implementation of evidence-based, unit-specific dornase alfa guidelines significantly reduced the number of dornase alfa doses administered in the PICU and PCICU. The reduction in dornase alfa doses administered in the PICU and PCICU had a considerable pharmacoeconomic impact on the health system over the course of nine months. It is predicted that the future implementation of these guidelines across health system could substantially impact the number of dornase alfa doses administered in other units, having an even more profound pharmacoeconomic impact on the health system.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 3-271

Poster Title: Evaluation of thromboxane A2 as a biomarker for predicting adverse cardiovascular outcomes in patients with stable coronary artery disease

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Purpose: In patients with stable coronary artery disease (CAD), low-dose aspirin is indicated to suppress cyclooxygenase-mediated thromboxane (TxA2) biosynthesis in platelets and reduce risk of major adverse cardiovascular events (MACE). However, approximately 30 percent of TxA2 is produced by extraplatelet sources, which may contribute to CAD progression. Preclinical studies have demonstrated that TxA2 has pro-inflammatory effects in the cardiovascular system that promote the development, growth and destabilization of atherosclerotic plaques. The clinical implications, however, remain unclear. The purpose of this study is to investigate whether there is an association between elevated TxA2 levels and MACE outcomes in patients with stable CAD.

Methods: A cohort of angiographically confirmed stable CAD patients, defined as at least 50 percent stenosis in one or more major coronary arteries, were identified in the Cardiac Catheterization Laboratory from 2007-2011. The study protocol was approved by the institutional review board. Informed consent was obtained in all participants, and a spot urine sample was collected. Urinary 11-dehydro-TxB2 concentrations, the stable metabolite of TxA2 (TxA2-M), were quantified by ELISA in 112 participants, normalized to urinary creatinine, and expressed as pg per mg Cr. The incidence of major adverse cardiovascular events (MACE) was ascertained by retrospective review of electronic medical records. MACE was defined as a composite of death from any cause, hospitalization for a non-fatal acute coronary syndrome event (defined as unstable angina, non-ST segment elevation myocardial infarction [NSTEMI], or ST segment elevation myocardial infarction [STEMI]), or hospitalization for a non-fatal cerebrovascular event (defined as ischemic stroke or transient ischemic attack). TxA2-M levels

were log-transformed and compared across patients with and without MACE by one-way analysis of variance. Baseline TxA2-M levels were grouped into tertiles, and the frequency of MACE was compared across tertiles by chi-square. The relationship between TxA2-M tertiles and time to occurrence of first MACE was evaluated using proportional hazard regression. Secondary stratified and multivariable adjusted analyses were conducted to account for potential confounders. A P-value less than 0.05 was considered statistically significant.

Results: The study population was, on average, 60 years old, 28 percent female, 17 percent African American, 23 percent had comorbid diabetes, and 64 percent exhibited multivessel CAD. During a median follow-up of 5.7 years, 33 patients (29.5 percent) experienced MACE. Urinary TxA2-M levels at baseline appeared to be higher in those experiencing a future MACE compared to those without a future event (median [IQR] 792 [438] versus 579 [469]); however, these differences were not statistically significant (p equals 0.098). When baseline TxA2-M levels were grouped into tertiles, a significantly higher rate of MACE was observed across the lowest (18 percent), middle (33 percent) and highest (48 percent) TxA2-M tertiles (p equals 0.0386). Compared to the lowest TxA2-M tertile, the highest tertile was associated with a significantly higher risk of MACE (hazard ratio 2.65, 95 percent CI 1.09 to 7.39, p equals 0.031); the middle tertile, however, did not exhibit a significantly higher risk of MACE (hazard ratio 1.61, 95 percent CI 0.61 to 4.68, p equals 0.338). Similar results were observed after adjusting for covariates (age over 65, sex, race, diabetes, multivessel disease, aspirin dose), and after excluding three patients not on aspirin therapy (who had the highest TxA2-M levels).

Conclusion: Elevated TxA2-M levels were associated with worse cardiovascular prognosis in patients with stable CAD, and this association was independent of aspirin use and dose at baseline. This suggests that extraplatelet sources of TxA2 may be an important driver of CAD progression and poor cardiovascular outcomes. Limitations of this study include its retrospective design and limited sample size. Future studies in a larger population are needed to validate these results, investigate the causes of increased extraplatelet TxA2 biosynthesis in certain individuals, and develop therapeutic interventions that mitigate the risk of elevated TxA2 levels in CAD patients on aspirin therapy.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-272

Poster Title: Characterization and usage evaluation of long-acting injectable antipsychotics within a large academic medical center

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Purpose: Schizophrenia is a chronic, often progressive disease with recurrent episodes of relapse. A major contributor to relapse is medication non-adherence, which has led to the development of long-acting injectable formulations. A class review and formulary recommendations of long-acting injectable (LAI) antipsychotics were approved by the Pharmacy and Medication Management Committee (PMMC) in June 2014. This quality improvement project was designed to assess how the health system currently utilize LAI antipsychotics in order to have a better understanding of the prescribing patterns and patient population with the end goal to improve the system's quality of care and adherence to the formulary.

Methods: A retrospective chart review for patients who received LAI antipsychotics at the primary medical center or affiliate hospital from January 1, 2015 to December 31, 2015 was performed. Included patients were 18 years or older and received at least one dose of a LAI antipsychotic while at the primary medical center or affiliate hospital within the specified one year period. An electronic medical record database identified 146 eligible patients. Of the 146 total patients, 100 were randomly selected to be included in the analysis. A retrospective chart review was conducted on the selected 100 patients with the first administration of a LAI antipsychotic between January 1, 2015 and December 31, 2015 serving as the admission date where the primary data was collected. A review 6 months pre-LAI administration and 6 months post-LAI administration was performed to capture prior and re-admissions. In the case of multiple admissions during the year timeframe, the first admission of the calendar year was captured as the primary encounter and subsequent admissions were counted up until 6 months post primary discharge date.
Patient information regarding gender, age, diagnosis, prior hospitalizations, psychiatric co-morbidities, and concurrent psychiatric medications were collected. Length of stay and time to

readmission were calculated using date of admission and discharge dates. The data was analyzed using descriptive statistics.

Results: 100 patients were included in the analysis. Mean overall age was 38.8 years with 62 percent males, 65 percent African American, and 39 percent with at least one prior hospitalization in the previous 6 months. Of the 100 patients, 69 were diagnosed with schizophrenia, 18 with schizoaffective disorder and 13 with bipolar disorder. The majority of patients were initiated on a LAI while admitted (57 percent initiated vs 43 percent continuation of therapy). Paliperidone palmitate was prescribed most frequently and olanzapine least frequently (39 percent vs 5 percent respectively). While admitted, the mean number of concurrent psychiatric medications administered was approximately 4. The average length of stay was 15.53 days with a standard deviation of 14.32. 25 percent of patients had at least 1 readmission within 6 months post-LAI administration. The median time to readmission was 48 with a range of 2 to 222 days.

Conclusion: Based on the LAI antipsychotic usage evaluation, the health system was able to gain insight into the patient population as well as determine adherence to the formulary. Data collection was limited to the retrospective aspect of the project and results might be health system specific.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 3-273

Poster Title: Association of the Medication Regimen Complexity Index (MRCI) with readmission rate and time to readmission in a high-utilizer, adult psychiatric population

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Purpose: In recent years, increased attention has been brought to hospital readmissions, leading to nationwide efforts to reduce their incidence. Few studies have examined psychiatric readmissions and the role that medication-related factors may play, specifically the complexity of the medication regimen. The objective of this retrospective study is to assess the impact of the Medication Regimen Complexity Index (MRCI) on psychiatric readmission rate and time to readmission in a high-utilization cohort. The findings of this study will aid in informing avenues for future research and the development of targeted interventions to reduce the risk of readmissions and associated costs.

Methods: The Institutional Review Board approved this retrospective study. Patient data was collected through the use of the electronic hospital and pharmacy databases and the electronic medical record system. Patients admitted between July 2012 and March 2014 were identified if they were age 18 years or older and had been discharged from an adult inpatient psychiatry service with greater than or equal to five psychiatric readmissions or at least one 30-day readmission in this time frame. Demographics, number and time to readmissions, length of stay, and number and type of medications on each discharge and readmission were collected. Dosage form, frequency of dosing, and additional usage directions for each medication on each discharge were collected from the electronic pharmacy database, and complexity of the medication regimen was determined using the Microsoft Access Medication Regimen Complexity Index (MRCI) tool by Libby, et al. Separate MRCI scores were computed for psychotropic medications, other prescription medications, and over-the-counter medications. The three scores were combined to calculate the total MRCI score. Statistical analysis was

conducted using statistical software R, version 3.2.2, and Pearson's correlation was used to calculate correlations. The primary objective of this study was to determine if an association exists between the MRCI score and time to readmission as well as readmission rate.

Results: A total of 168 patients were identified. MRCI score for psychotropic medications and total MRCI score at first discharge were both found to be unrelated to the days between first discharge and first readmission (r=0.065, p=0.40 and r=0.0054, p=0.94, respectively). In addition, average total MRCI score was unrelated to average days between each readmission (r=0.064, p=0.41), but a statistically significant association was found between average MRCI score for psychotropic medications and average days between each readmission (r=0.16, p=0.044). Both average MRCI score for psychotropic medications and average total MRCI score were found to be unrelated to readmission rate (r=0.11, p=0.16 and r=0.14, p=0.07, respectively). Average psychotropic medication count was found to be unrelated to readmission rate (r=0.11, p=0.17) but had a statistically significant association with average time to readmission (r=0.18, p=0.019).

Conclusion: Although the total MRCI score was found to be unrelated to time to readmission or readmission rate, statistically significant correlations were found between average time to readmission and average MRCI score for psychotropic medications as well as average psychotropic medication count. These results suggest that a more complex psychotropic medication regimen and a higher psychotropic medication count at discharge may result in a shorter time to readmission in a high-utilizer, adult psychiatric population. The impact of other medication-related factors and the clinical significance of the use of the MRCI score must be determined in larger, long-term clinical trials.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 3-274

Poster Title: Vancomycin pharmacokinetic parameters in critically ill patients with central nervous system infection

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Purpose: Critically ill patients with central nervous system (CNS) infections are of significant concern as these patients often display altered pharmacokinetic parameters that provide challenges in achieving therapeutic vancomycin serum concentrations. Use of vancomycin as empiric therapy should be dosed at 15 to 20 milligrams per kilogram every 8 to 12 hours with a goal trough concentration of 15 to 20 micrograms per milliliter. The hypothesis is that vancomycin dosing utilizing population pharmacokinetics would be suboptimal for treating CNS infections. The primary objective of this study was to determine the pharmacokinetic parameters of vancomycin in critically ill patients with CNS infections.

Methods: The institutional review board approved this single-center, retrospective chart review of critically ill patients with acute brain injury and CNS infections who were at least 18 years of age and between May 1, 2010 and June 1, 2016. Patients who were on vancomycin as empiric therapy or for specified CNS infections were included. Patients who were on vancomycin for non-CNS related infections, whose troughs were not recorded, or whose vancomycin data was missing, were excluded. Data collected included patient demographics, severity of injury, infection sources and organisms, concomitant medications, pertinent laboratory values, and vancomycin regimen and serum concentration information. The primary outcome measure was the difference in the measured trough concentrations, half-life, and elimination rate constant of vancomycin compared to the predicted values using population pharmacokinetics. The difference was assessed using a two-sample Wilcoxon rank-sum test where p less than 0.05 was considered statistically significant.

Results: A total of 30 patients with a median age of 56 years old were included in this analysis. The majority (67 percent) of patients were being treated for meningitis or ventriculitis. The median calculated creatinine clearance was 119 milliliters per minute at the time the vancomycin trough was drawn. For the first vancomycin level, the median dose was 16.6 milligrams per kilogram every 8 hours, with a predicted median serum vancomycin concentration of 13.2 micrograms per milliliter compared to the measured serum vancomycin concentration of 13.3 micrograms per milliliter (p equals 0.535). The measured elimination rate constant, 0.12 inverse hours, led to a half-life of 5.7 hours, compared to a predicted half-life of 6.7 hours (p equals 0.544). The second vancomycin level was drawn in 67 percent of patients with a median dose of 21.3 milligrams per kilogram every 8 hours. The predicted median serum vancomycin concentration was 17.6 micrograms per milliliter compared to the measured serum vancomycin concentration of 19.2 micrograms per milliliter (p equals 0.534). The measured elimination rate constant, 0.11 inverse hours, led to a half-life of 6.2 hours, compared to a predicted half-life of 6.5 hours (p equals 0.935).

Conclusion: Using population pharmacokinetics to calculate the initial vancomycin dose for critically ill patients with CNS infections led to subtherapeutic levels, although the predicted vancomycin serum trough concentrations were not statistically different than the actual measured concentrations. The low vancomycin levels could be due to altered clearance evidenced by the shorter half-life in these critically ill patients. Future vancomycin studies need to be conducted to ensure the most appropriate initial dosing is done in patients with CNS infections.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 3-275

Poster Title: Novel genetic marker of diarrhea in metastatic renal cell carcinoma patients treated with sorafenib

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Purpose: Sorafenib, the first oral anti-angiogenic multikinase inhibitor, is primarily used in the treatment of advanced renal cell carcinoma, hepatocellular carcinoma, and thyroid cancer. Common toxicities experienced by patients treated with sorafenib include diarrhea, hand-foot skin reaction, hypertension, and rash. These toxicities limit sorafenib's use and affect adherence to treatment, reducing sorafenib efficacy. The purpose of this study was to identify, for the first time, genetic markers of sorafenib toxicity in order to optimize its efficacy and minimize toxicity. No novel genetic biomarkers are currently available to identify patients at risk of sorafenib-induced toxicity.

Methods: Metastatic renal cell carcinoma (mRCC) patients (N=153) treated with sorafenib, as part of the TARGET study (Escudier B et al. N Engl J Med. 2007;356(2):125-34), were genotyped for common germline genetic variants in 50 candidate genes. Associations between 5846 variants and sorafenib-induced grade 2-4 toxicities were analyzed. Patients treated for less than or equal to 28 days were excluded from the analysis. Toxicities analyzed included diarrhea, hypertension, hand-foot skin reaction, and/or rash or desquamation. For each toxicity, the worst grade event for each patient was used in the analysis. After linkage disequilibrium-based pruning, 685 variants were utilized in case/control association testing for analysis of each toxicity via a chi-squared test to compare allele frequencies between cases (patients with toxicity) and controls (patients without toxicity).

Results: Of the 153 patients, 28 (18 percent) experienced grade 2 or greater diarrhea. The A allele of rs917881 (G/A), an intronic variant (17 percent allele frequency) in the epidermal growth factor receptor (EGFR) gene, was associated with an increased risk of grade 2 or greater diarrhea (P=0.00006; P=0.04 after Bonferroni's correction; odds ratio 3.6). The frequency of grade 2 or greater diarrhea was 50 percent (3/6) in AA, 33 percent (15/45) in AG, and 10 percent (10/102) in GG patients. The frequency of grade 3 diarrhea was 8 percent (4/51) in patients with the A allele (AA+AG) versus 2 percent (2/102) in patients with the GG genotype. No other variants were significantly associated with sorafenib toxicity after Bonferroni correction.

Conclusion: To our knowledge, this is the first reported study of a genetic basis of sorafenib toxicity. rs917881 is a common intronic variant in EGFR. RAF kinase, a critical component of the EGFR signaling pathway, is a known target of sorafenib. Patients with the rs917881 A allele treated with sorafenib may be at an increased risk for diarrhea as a result of decreased EGFR expression potentiated by sorafenib-induced inhibition of the RAF/MEK/Erk pathway, which regulates chloride secretion on colonic epithelial cells (Keely SJ et al. J Biol Chem. 1998;273(42):27111-7). Replication analyses in additional patient cohorts and functional studies are ongoing.

Submission Category: Pain Management

Submission Type: Evaluative Study

Session-Board Number: 3-276

Poster Title: Retrospective analysis of the effect of liposomal bupivacaine on postsurgical pain scores and opioid use at a community women's hospital

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Purpose: Postsurgical patients commonly receive a pain regimen containing an opioid. Although opioids are effective, they pose concerns for patients and healthcare providers, including those related to adverse events and their high potential for misuse and diversion. Liposomal bupivacaine is injected into a surgical site to produce postsurgical analgesia. Compared to standard bupivacaine, liposomal bupivacaine is designed to extend the time of pain control and therefore possibly reduce the need for opioids. The purpose of this study was to determine whether liposomal bupivacaine was associated with a decrease in postsurgical pain scores and opioid use at a community women's hospital.

Methods: The institutional review board approved this retrospective chart review. A search of the community women's hospital electronic medical record system was used to identify all female patients that underwent surgery from 11/1/2015 to 3/31/2016 and received injections of liposomal bupivacaine into the surgical site as part of their postsurgical pain control regimen. Each case was age- and surgery-matched 1:1 to control surgical patients that did not receive liposomal bupivacaine. The data collected from each patient's medical chart included: whether or not the patient had an active prescription for an opioid on admission, daily median pain scores during admission (pain scores ranged from 0 to 10, with a score of 10 signifying the worst pain), daily total opioid use during admission (calculated in oral morphine equivalents), length of hospital stay following the surgery, and whether or not the patient received an opioid prescription at discharge. Primary analyses included median pain scores and total daily opioid use at 0 to 24 hours, 25 to 48 hours, and 49 to 72 hours after surgery in patients receiving liposomal bupivacaine versus control. Secondary analyses included length of hospital stay after

surgery and the percentage of patients receiving an opioid prescription at discharge versus control. A subgroup analysis looked at the same outcomes for patients undergoing cesarean section or hysterectomy.

Results: A total of 98 women undergoing surgery at a community women's hospital were matched to 98 controls. Patients were an average age of 36 years old. A total of 52 cesarean section patients, 27 hysterectomy patients, and 19 miscellaneous surgery patients were included in both the treatment and control groups. The median postsurgical pain scores were 3 versus 3 at 0 to 24 hours, 4 versus 3 at 25 to 48 hours, and 4 versus 3.75 at 49 to 75 hours for patients given liposomal bupivacaine versus control. The median total postsurgical opioid use in oral morphine equivalents were 30 versus 24.8 mg at 0 to 24 hours, 22.5 versus 22.5 mg at 25 to 48 hours, and 11.3 versus 15 mg at 49 to 72 hours for patients given liposomal bupivacaine versus control. The length of hospital stay was an average of 61 versus 66 hours for cesarean patients, and 44.6 versus 42 hours for hysterectomy patients given liposomal bupivacaine versus control. At discharge, 94 percent versus 88 percent of patients given liposomal bupivacaine versus control were given an opioid prescription.

Conclusion: Liposomal bupivicaine was not associated with a decrease in postsurgical median pain scores and total daily opioid use in women undergoing surgery at a community women's hospital. When cesarean section or hysterectomy patients were analyzed separately, the data still did not produce any clinical difference in outcome between the treatment and control groups. These results do not support the use of liposomal bupivacaine in women's surgeries for postsurgical pain control to reduce the need for opioids. However, prospective studies are needed to confirm these results and rule out the potential for bias in this retrospective review.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 3-277

Poster Title: Assessment of pharmacist-driven diabetes care in severely uncontrolled populations

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Purpose: Many people with type 2 diabetes struggle with disease control and can benefit from additional interventions to help them manage their care burden. Some patients with diabetes have been referred to ambulatory care pharmacists, who can help manage medications, counsel on lifestyle modifications, and resolve medication access issues. Several published studies show that pharmacist-directed care has a significant positive impact on patients' hemoglobin A1c and other disease markers. The purpose of this study was to characterize the impact of an ambulatory care pharmacist on severely uncontrolled diabetes patients at select primary care clinics within the WakeMed Health and Hospitals network.

Methods: WakeMed's institutional review board approved this single-center, retrospective chart review. Data was collected from patients seen at 5 WakeMed primary care practice sites between January 1, 2014 and September 1, 2016. Patients were included if they were 18 years of age or older, had type 2 diabetes, had an A1c greater than or equal to 9 percent up to 3 months before the time of their first pharmacy visit, and had at least two pharmacy visits within the specified time frame. Primary outcomes included changes from baseline A1c and BMI. Secondary outcomes included change in rate of optimal statin use, change in rate of optimal angiotensin converting enzyme inhibitor (ACEi) or angiotensin II receptor blocker (ARB) use, and change in rate of optimal aspirin use.

Results: Fifty-one patients were included in the study. The average starting A1c was 10.9 percent before pharmacy intervention and 8.5 after pharmacy intervention. Forty-three percent of patients had met the general WakeMed A1c goal of less than 8 percent. The average BMI was 35.8 before pharmacy intervention and 35.9 after pharmacy intervention. Forty-three

patients were diagnosed with hypertension. Of those 43 patients, 83.7 percent were correctly prescribed an ACEi or ARB before pharmacy intervention and 83.7 percent were correctly prescribed an ACEi or ARB after pharmacy intervention. Of the 7 patients who were not on an ACEi or ARB after pharmacy intervention, 85.7 percent had a documented reason for no therapy. Forty-eight patients were 40 years or older and met the requirement for statin therapy. Of those 48 patients, 75 percent were on statin therapy before pharmacy intervention and 83.3 percent were on statin therapy after pharmacy intervention. Of the 8 patients who were not on a statin, 37.5 percent had a documented reason against using statin therapy. Fifty percent of patients with an ASCVD 10-year risk score greater than 10 were on aspirin before pharmacy intervention and sixty-four percent after pharmacy intervention.

Conclusion: Pharmacist intervention is linked to a decline in A1c values over time. Patient BMI remained unchanged. Pharmacist intervention increased the likelihood of identification of patients who would benefit from taking a statin or aspirin, but had no effect on ACEi or ARB usage rates in this population.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 3-278

Poster Title: Use of an interprofessional student team to address quality improvement measures in a primary care practice

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Purpose: This project was intended to analyze the needs of a primary care practice office in North Carolina. Faculty members worked closely with the practice to identify specific Quality Improvement (QI) needs based on benchmark data. The practice had been consistently below benchmark data (thirty-five percent) for HMG-CoA reductase inhibitor (or statin) and aspirin prescribing patterns for patients with diabetes, and aimed to increase their goal to sixty-five percent compliance. Based on this data, an interprofessional team of students conducted a needs assessment to identify interventions to address this practice gap.

Methods: The interprofessional team consisted of students from a range of disciplines including medicine, pharmacy, nursing, public health, and dietetics. The team began by conducting a needs assessment on site at the primary care practice. This involved shadowing various professionals (physicians, physician assistants, registered nurses, a registered dietitian, and front office staff) in the clinic to gain an understanding of workflow and potential areas for improvement. A needs assessment, using the Ottawa Decision Making Framework, was also completed through interviews with the healthcare professionals in the primary care office. Following the needs assessment, the student team presented a series of tailored interventions to the primary care practice for implementation. Interventions were based on the characteristics of the population, the population served, and the identified barriers to increasing use of statins and aspirin in this population. Interventions were designed and implemented over a period of 2 months, and outcomes measured.

Results: There were a number of areas of opportunity discovered within the clinic setting. The four selected for addressing were provider education, support staff education, patient education, and utilization of electronic medical records (EMR). Provider education was targeted toward doctors and physician assistants and involved reviewing new American Diabetes Association 2016 guidelines, detailing aspects of the metrics that the clinic was supposed to meet, introducing new educational materials for patients, and proposing a new system of analyzing patient records to see who should be targeted. Support staff education focused on nurses and medical assistants and addressed basic information about statins and aspirin and how to identify patients who may need them, and the best way to document this information in the medical record. The third intervention was patient education, in which posters and flyers were developed to inform patients about these medications, and to dispel myths or preconceptions that patients may have. The final intervention was development of a new filter reporting system in the EMR that more easily allowed providers and staff to identify patients with diabetes who are not on aspirin or a statin. After one month of implementation, statin and aspirin use amongst diabetic patients increased nine percent.

Conclusion: The formation of a team involving students from various health-related disciplines fostered the generation of a multifaceted plan to address the needs of a primary care practice. The use of multidisciplinary student teams may be an effective approach to identifying and implementing quality improvement interventions in other healthcare settings as well.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 3-279

Poster Title: Administration adherence rate of ordered pharmacologic venous thromboembolism prophylaxis

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Purpose: Venous thromboembolism (VTE), including deep vein thrombosis (DVT) and pulmonary embolism (PE), are known causes of morbidity and mortality among hospitalized patients. VTE deaths are preventable with appropriate administration of thromboprophylaxis, however numerous studies have shown high rates of non-administration among hospitalized patients. The purpose of this study was to retrospectively quantify the administration adherence rate of pharmacologic VTE prophylaxis doses ordered at UNC Medical Center and categorize reasons for non-administration

Methods: This retrospective, institutional review board approved study reviewed electronic health record data for patients admitted to UNC Medical Center from May 1, 2016 - July 31, 2016. Patients were included if they had an order for prophylactic doses of unfractionated heparin, enoxparin, or fondaparinux during the study period. Patients were excluded if they were less than 18 years of age, less than 50kg, or receiving medications listed above for other indications. The primary outcome of this study was to quantify administration adherence of ordered VTE prophylaxis doses and categorize reasons for non-administration. Patient demographic information and medication administration documentation were collected to determine administration adherence and identify documented reasons for non-administration. Identification of barriers for non-administration of VTE prophylaxis will guide targeted quality improvement efforts to increase administration adherence rates at our institution.

Results: A total of 58,498 VTE prophylaxis doses for 4,410 patients were included. Overall, 11,578 of ordered doses were not administered, which represented a non-administration rate of 19.8%. Heparin doses made up the majority of ordered VTE prophylaxis (76.6%), followed by enoxaparin (21.9%), and fondaparinux (0.39%). The most common reason for non-administration was patient refusal (41.9%). Of note, it was found that 20% of the patients represented 70.6% of the overall non-administered doses. Among the total prophylaxis doses ordered, 28,646 (48.9%) were for patients admitted to medicine floors, which accounted for the majority of non-administered doses, with an overall non-administration rate of 22.5%. In comparison, the surgical floors were comprised of 29,130 (49.7%) ordered VTE prophylaxis doses, with slightly lower rates of non-administration (19.2%).

Conclusion: Analysis of ordered VTE prophylaxis doses was proven helpful in quantifying administration adherence rate and identifying barriers of non-administration across our institution.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 3-280

Poster Title: Review of MyCarolinas Tracker application in diabetes care management

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Purpose: Technology utilization for the management of chronic disease states, such as diabetes, has increased significantly over recent years. MyCarolinas Tracker is an application that allows patients to input their blood glucose readings which gives providers real-time access to evaluate therapy. This application was designed to decrease the amount of time taken out of patient's and physician's work day by allowing physicians to have a preliminary plan ready before contacting the patient. The primary objective of this study is to evaluate MyCarolinas Tracker technology in providing real-time patient measurements to Care Management pharmacist providers and the associated patient outcomes.

Methods: This Carolinas HealthCare System Institutional Review Board approved quality assurance analysis is designed to review information obtained from MyCarolinas Tracker and evaluate if its use leads to improved patient care outcomes. Data was gathered via the MyCarolinas Tracker application which allows providers to view their patient population using the application, along with patient specifics entered by patients or synced through their technology devices. Cerner was used to acquire patient demographics, specific diabetes related outcomes, and observe patient and provider communication. This data was collected and de-identified using RedCap, then complied to express the benefits and limitations to using MyCarolinas Tracker application within care management programs.

Results: The majority of patients studied were non-Hispanic Caucasian females with a variety of ages (25-63). 11 patients were evaluated for diabetes related outcomes. Hemoglobin A1c was shown to decrease in 6 patients, increase in 2 patients, and 3 patients are still pending follow up A1c results. The majority of patients interacted with their pharmacist provider every 1-2

weeks at the beginning of a 3-month evaluation and an average of every 3-4 weeks by the end of the 3 months. Most of the pharmacist's interventions occurred within the first month of interaction. Opinions from pharmacist providers and patients were gathered and evaluated with varying results.

Conclusion: The use of MyCarolinas Tracker was found to produce beneficial results in managing patients' diabetes. These results correlate with improved diabetes specific laboratory values as well as increased patient motivation. The use of MyCarolinas Tracker is most beneficial in younger populations who frequently use technology, have the means to afford advanced technology, and have motivation to control their disease states.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 3-281

Poster Title: Implementation and evaluation of patient education related to mosquito-transmitted illnesses by pharmacy students in a developing country.

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Purpose: To determine current knowledge of rural Honduran citizens in regards to mosquito-transmitted illnesses (chickungunya, zika, and dengue), educate about their prevention and treatment, and evaluate the benefit of the education provided.

Methods: Research took place during a week long medical mission in Honduras. Participants included patients 18 years and older. Research consisted of a questionnaire administered pre- and post-education pertaining to prevention and treatment of mosquito-transmitted illnesses. Interpreters were utilized for questionnaire administration and education.

Results: Thirty-seven participants received education and completed both pre and post questionnaires. Prior to education, the majority of participants knew about the ability of mosquitoes to transmit diseases (97%) and identified one appropriate method to prevent mosquito presence (89%). Approximately half of the participants reported receiving prior mosquito-related education. Ten of the participants reported previous diagnosis with one of the mosquito-transmitted diseases (27%). Following education, all participants answered that mosquitoes can transmit illnesses and most (97%) identified appropriate methods to prevent mosquitos from being near. In addition, the majority of patients (73%) correctly listed all four steps of treatment if a mosquito-transmitted illness is suspected. Regression studies revealed no significant models. No correlation was identified with regards to post-survey responses and demographic factors, age, level of education or frequency of mosquito bites.

Conclusion: Based on the results, members of the community seen during the medical mission had prior knowledge regarding diseases mosquitoes can transmit, how to prevent them, and what to do if such an illness is suspected. Given previous education, most participants correctly answered pre-education questions. In addition, the majority of patients were able to correctly answer post-education questions, which likely reflects the education previously received and the education we provided.

Student Poster Abstracts

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-282

Poster Title: Retrospective review of stress ulcer prophylaxis utilization in post-surgical units

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Purpose: The purpose of this study is to assess the current prescribing practices for stress ulcer prophylaxis (SUP) in post-surgical patients and to evaluate the discontinuation of SUP therapy in patients without risk factors. The results of this study will help identify prescribing practice areas that may need improvement. This could also provide cost-saving strategies by identifying the incidence of SUP use without risk factors in the inpatient setting and non-warranted continuation of medications in the outpatient setting. This information may be used to develop guidelines on SUP use in non-intensive care unit patients at Carolinas Healthcare System Northeast.

Methods: This Institutional Review Board-approved study is a retrospective review with data collection taking place from November 1, 2015 to November 30, 2015. 288 charts of patients admitted to a post-surgical care unit of Carolinas Healthcare System Northeast were reviewed during the study period. Patients were included if they were 18 years or older and admitted to a post-surgical care unit during the study period at Carolinas Healthcare System Northeast with an order for a proton pump inhibitor (PPI) or histamine-2 receptor antagonist (H2RA). Patients were excluded if they were pregnant or in the intensive care unit at any point during the hospital admission. The primary objective was the percentage of post-surgical patients at Carolinas Healthcare System Northeast prescribed SUP without an indication. Secondary objectives included the choice of agent, duplication of therapy, elective versus emergent surgery, origin of order, time between nothing by mouth (NPO) and PPI or H2RA medication order, duration of therapy, and the percentage of post-surgical patients continued on a PPI or H2RA at hospital discharge without an indication. Descriptive statistics were used to evaluate the data.

Results: Of the 288 patient charts reviewed, 142 patients (49.3 percent) were found to have risk factors driving the appropriate use of SUP. Of these patients, 62 percent were prescribed PPIs and 38 percent were prescribed H2RAs. The remaining 146 patients did not have an indication for the use of SUP. 17.4 percent of the orders for SUP were found to be a duplication of therapy. The use of appropriate SUP therapy was found more often in emergent surgeries versus elective surgeries (62.5 percent versus 43.9 percent, respectively). SUP ordered via a physician order set was prescribed without risk factors more often than individually generated orders (67.9 percent versus 17.3 percent, respectively). Time between NPO and the SUP medication order was found to be 0.08 days for patients with risk factors for the development of stress ulcers versus 0.12 days for those without. Average duration of therapy was found to be 4.01 days for patients with risk factors for the development of stress ulcers versus 4.53 days for those without. There were 5 patients (1.74 percent) who were continued on SUP without an indication at discharge.

Conclusion: There is a high amount of SUP being administered without an indication among post-surgical units. SUP prescribing was more appropriate with emergent versus elective surgeries. A larger proportion of orders originated from physician order sets and were more often found to be ordered for patients without risk factors for SUP. There was a small number of patients continued on a PPI or H2RA without an indication at hospital discharge. This data will be shared with the surgical department in order to improve the appropriate use of SUP.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-283

Poster Title: Reduction of low-density lipoprotein cholesterol in patients with atherosclerotic cardiovascular disease or familial hyperlipidemia: a retrospective analysis of PCSK9 inhibitors and other lipid lowering therapies

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Purpose: The recent approval of proprotein convertase subtilisin kexin type 9 inhibitors (PCSK9i) could create a paradigm shift, changing the management of hyperlipidemia, particularly in the statin-intolerant population. The purpose of this study was to compare the efficacy of PCSK9i versus other lipid lowering therapies in the reduction of low-density lipoprotein cholesterol (LDL-C) in patients with atherosclerotic cardiovascular disease (ASCVD) or familial hyperlipidemia (FH).

Methods: This retrospective, non-randomized, single-site cohort study was conducted via electronic chart review, in patients 18 years and older, with clinical ASCVD or FH requiring additional LDL-C lowering. All patients were referred to the clinical pharmacist practitioner (CPP) at a large cardiology clinic for PCSK9i evaluation between October 2015 and June 2016. Patients not seen by the CPP or referred for reasons other than hyperlipidemia management were excluded. Office visits were scheduled with the CPP to conduct patient interviews, review lipid panels, and collect medication histories to ensure guideline-directed medical therapy had been implemented or considered prior to initiation of PCSK9i therapy. Patients were prescribed PCSK9i if they met the FDA labeled indications, were currently on a statin, or were statin-intolerant and on ezetimibe or other lipid lowering therapy (LLT). Patients not meeting these criteria were rechallenged with statins or prescribed other LLT. Lipid panels were collected at baseline and repeated in 1-6 months to evaluate reductions in LDL-C. Considerations for additional lipid lowering therapies were made for patients not at goal. The primary endpoint was the percentage of patients with ASCVD or FH that achieved an LDL goal < 70mg/dL.

Additional lipid parameters and adverse effects were reported and evaluated. All data was analyzed using descriptive statistics and independent t-tests as appropriate.

Results: Of the 85 patients screened, 57 met inclusion criteria (age 68 ± 8.4 years; baseline LDL-C 157 ± 43.3mg/dL). Of these, 35 patients (61%) were initiated on PCSK9i while 22 (39%) were started on other LLT. 3 patients in the PCSK9i group and 8 patients in the other LLT group discontinued therapy prior to obtaining results and were not included in the primary outcome analysis. Of the 46 patients included, 22 (47.8%) achieved an LDL goal of < 70mg/dL, with the majority of patients belonging to the PCSK9i group (n=20, 90.9%). The mean LDL-C reduction overall was 51.5% ± 23.7 with 62.1% ± 15.4 in the PCSK9i arm and 26.4% ± 21.1 in the other LLT arm ($p < 0.05$). Mean LDL-C at follow-up was 58mg/dL ± 25.3 for the PCSK9i group and 105mg/dL ± 28.7 for other LLT group. The mean percent reductions in total cholesterol for the PCSK9i group and the other LLT group were 42.38% ± 14.63 and 19.23% ± 12.79, respectively. Myalgias, the most common adverse event, were reported by 4 patients in each treatment group. Overall, patients in the PCSK9i arm experienced a greater number of adverse events; however discontinuation rates were greater in the other LLT arm.

Conclusion: This study served as a quality improvement measure, analyzing efficacy and safety while streamlining the initiation process of PCSK9i in a large cardiology practice. Dramatic reductions in LDL-C were seen in the PCSK9i group, with a very low discontinuation rate. The patients in the other LLT group who achieved LDL-C goal were rechallenged on statins. Statins still remain the cornerstone of therapy, but PCSK9i offer a viable alternative to LDL-C reduction, however, studies are needed to establish mortality benefit of PCSK9i.

Submission Category: I.V. Therapy/ Infusion Devices/ Home Care

Submission Type: Evaluative Study

Session-Board Number: 3-284

Poster Title: Assessment of vancomycin administration location in a children's hospital

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Purpose: Vancomycin remains one of the most frequently utilized antibiotics. As an intravenously administered agent, vascular access needs to be established prior to its administration. As a vesicant drug with a pH below 5, some clinical guiding bodies recommend it should be administered through a central line, as a means to minimize complications. In clinical practice, however, vancomycin is often administered through a peripheral line. The purpose of this project was to determine whether peripheral line administration of vancomycin is associated with a higher incidence of complications in a pediatric patient population.

Methods: This study was a retrospective chart review of electronic medical records of vancomycin orders for pediatric patients between January 2014 and May 2015. Vancomycin orders were excluded if the medication was not administered, if the medication was not administered intravenously, or if data was missing related to the order. Data collected included the type of vascular access, infusion time in minutes, dose in milligrams per kilogram, infiltration score or phlebitis, administration of diphenhydramine, and, central line indication, if noted. Categorical endpoints were evaluated using the Chi-square test and two-sample t-tests were used for analysis of continuous data. P values of less than 0.05 were considered as statistically significant.

Results: A total of 339 vancomycin orders were included in the retrospective review. Forty two percent of orders were administered via central line with 58 percent administered via a peripheral line. Documented reasons for use of a central line included the need for reliable access, anticipated long-term antibiotic therapy, presence of permanent central access on admission, and administration of multiple medications and antibiotics. In total, 19 complications were noted, including infiltration, clotting, and Red Man's syndrome. While a higher number of complications occurred in peripherally administered infusions, no statistically significant difference was noted between line placement and adverse events (p=0.062). Diphenhydramine was administered with 12 percent of the infusions. A statistically significant

difference was not found between the two groups for diphenhydramine use (p=0.828). The mean infusion time was lower in administrations via peripheral access (72.55 plus/minus 29.13 minutes. vs. 77.23 plus/minus 30.48 minutes; p=0.136) with the majority of orders being infused over 60 minutes. There was no statistically significant difference in the number of extended infusion times (p=0.057) between the two groups. A statistically significant difference was noted in the mean milligram per kilogram dose of peripherally placed lines (17.97 plus/minus 4.3 mg/kg vs. 19.62 plus/minus 5.27 mg/kg; p=0.002).

Conclusion: Administration of vancomycin via peripheral venous accesses was not associated with a significantly higher incidence of complications compared to central venous access. Given the small sample size of this retrospective review, further studies are needed to further explicate these findings.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-285

Poster Title: Medication use evaluation of parenteral ketorolac in hospitalized patients

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Purpose: The purpose of this study is to assess prescribing patterns and incidence of adverse drug reactions of parenteral ketorolac in the acute care setting. Information obtained may be used to improve current ketorolac prescribing through the development of tools for improved clinical decision support for providers and pharmacists.

Methods: This Institutional Review Board approved retrospective study was conducted by the use of electronic chart review in adults, ages 18 and older, admitted to Carolina HealthCare System Northeast (CHS NE) who were prescribed parenteral ketorolac during January 2016 to May 2016. 150 patient charts were randomly selected for review, assuming 100 patients received at least one dose of ketorolac. Patients were excluded if ketorolac was prescribed in the outpatient or procedural setting. One time dose orders were also excluded. The primary endpoint was the incidence of parenteral ketorolac prescribed to a patient with a contraindication, as defined by the prescribing information. The secondary endpoint was the incidence and types of adverse drug reactions following ketorolac exposure. Demographic data collected included age at admission, length of hospital stay, sex, ethnicity, weight, serum creatinine, and creatinine clearance. Therapy regimen data collected included dose of ketorolac, number of doses received, how many days ketorolac was administered over, if ketorolac was prescribed as needed or scheduled, whether or not ketorolac was prescribed using a power plan, and if the patient had any contraindication to ketorolac. Safety monitoring data included incidence of the following: increase in serum creatinine as defined by the Acute Kidney Injury Network criteria, gastrointestinal bleed, non-gastrointestinal bleed, peptic ulcers, cardiovascular events, and hypersensitivity reactions. All data was analyzed using descriptive statistics.

Results: Of the 150 patient charts reviewed, 23 patients were excluded based on predefined inclusion and exclusion criteria. Of the 127 remaining patients, 32 (25.1%) had at least one contraindication to receiving parenteral ketorolac. In total, there were 42 known contraindications. The most prevalent contraindication was concomitant use of ketorolac with aspirin or other NSAIDs (14 patients, 33.3%), followed by administration of ketorolac in patients at a high risk for bleed (12 patients, 28.6%). Of the 127 patient included in the analysis, 116 received at least one dose of ketorolac. Of the patients that received at least one dose, 8 (6.9%) had a documented adverse drug reaction. The most common adverse reaction was the development of an acute kidney injury during or within 48 hours of the administration of ketorolac. However, the majority of these patients were on other medications known to effect renal function. Of the 8 patients that experienced an adverse event, 5 had a contraindication to ketorolac administration.

Conclusion: This medication-use evaluation demonstrates that CHS NE has processes in place to ensure the appropriate dose and duration of ketorolac. Opportunity exists to improve the screening of package insert contraindications prior to administration of ketorolac. The drug information alerts provided during the ordering process, do not optimally screen for all of the contraindications, such as high risk for bleeding and potential risk of AKI. This information will be used to create tools for providers and pharmacists to enhance the safe prescribing of ketorolac at CHS NE.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 3-286

Poster Title: Evaluating the safety and efficacy of the standardized urine alkalinization process in acute leukemia and Burkitt's lymphoma patients receiving high dose methotrexate

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Purpose: High-dose methotrexate (HD MTX) is associated with toxicities such as renal dysfunction, myelosuppression, and mucositis in patients with impaired MTX clearance. Adjunct treatment with aggressive hydration and urine alkalinization, with a goal urine pH of 7 or greater, can increase MTX solubility and aid in MTX clearance. The acute leukemia and Burkitt's lymphoma urine alkalinization protocols at our institution were recently standardized to decrease confusion for staff and to update these protocols in BEACON. This study aims to evaluate the safety and efficacy of the standardized urine alkalinization process in acute leukemia and Burkitt's lymphoma patients receiving HD MTX.

Methods: This is a single-center retrospective chart review study. We reviewed the available electronic medical records (EMR) of patients who have received one of the following chemotherapy regimens: CALGB10102 – Module C; HyperCVAD – Part B; CODOX-M; CALGB10002 – Course 3, 5, 7; CALGB10701 – Course 4 (CNS prophylaxis). The study included acute leukemia and Burkitt's lymphoma patients who received MTX as part of one of the previously mentioned regimens from December 1, 2015 to September 14, 2016 at Wake Forest Baptist Medical Center (WFBMC). Patients less than 18 years old and those with a CrCl less than or equal to 30 mL/minute were excluded. The primary objective of this study was to assess the time to MTX clearance. The secondary objectives included safety of the standardized urine alkalinization process (renal function and alkalinization-induced toxicities), time to achieve goal urine pH, time to discharge, and compliance with obtaining the goal pH prior to MTX infusion. Results were analyzed using descriptive statistics.

Results: The study included 26 patients, 13 acute lymphoblastic leukemia (ALL) patients in the post-standardization and 13 ALL patients in the pre-standardization group. The post-standardization and pre-standardization group had an average age of 53.69 years and 45.08 years, and 77 percent and 46 percent were male, respectively. The median time to MTX clearance was 48 hours (IQR 24 – 72) for both groups. There were no cases of renal dysfunction. Fluid overload was slightly more common in the post-standardization group occurring in 15 percent of patients, compared to 8 percent of the pre-standardization group. There were no cases of elevated bicarbonate. Two patients in each group were excluded from the urine pH endpoints due to missing urine pH data prior to MTX infusion. All but one patient in the pre-standardization group had a goal urine pH of 6. The median time to achieve goal urine pH was 4.22 hours (IQR 3.38 hours – 6.17 hours) versus 3.83 hours (IQR 2.57 hours – 4.32 hours) in the post-standardization and pre-standardization groups, respectively. The goal urine pH was achieved in 91 percent and 100 percent of the post-standardization and pre-standardization groups, respectively. The median time to discharge was 96 hours in both groups.

Conclusion: MTX clearance remained adequate following implementation of a standardized urine alkalinization protocol without negatively impacting time to goal urine pH or time to discharge. Most patients in both groups achieved a urine pH of 7 or greater regardless of their goal, occurring in 91 percent and 73 percent of the post-standardization and pre-standardization groups, respectively. Alkalinization related toxicities were rare in both groups. These findings are limited due to the small sample size. The standardized urine alkalinization protocol minimizes staff confusion and prevents MTX administration errors. These findings will promote future standardization of other HD MTX regimens.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 3-287

Poster Title: Effects of chronic opioid use on chronic obstructive pulmonary disease (COPD) exacerbations

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Purpose: Chronic obstructive pulmonary disease (COPD) is a progressive lung disease characterized by chronic obstruction of pulmonary air flow and increasing breathlessness that is not fully reversible with treatment. Older adults with COPD are more likely to experience chronic musculoskeletal pain, insomnia symptoms, and refractory dyspnea. A recent study of patients with advanced COPD evaluated patients' perception of the addition of an opioid to optimize conventional therapy for the treatment of these problems. Although patient perception was positive, limited data exists on the effects chronic opioid use has on hospital readmission rates and length of stay for COPD exacerbations.

Methods: This was a single-center, retrospective cohort study approved by the Institutional Review Board at the tertiary acute-care center where the data were collected. We identified 750 patients who were admitted with a primary diagnosis of COPD exacerbation (International Classification of Diseases, Ninth and Tenth Revisions, [ICD-9] codes: 491.21, 491.22 and [ICD-10] codes: J44.0, J44.1). Patients were included in the analysis if they were at least 18 years of age and had a complete medical record. Readmissions were characterized as 30-day and 90-day readmissions. If a patient had a readmission within 30 days of hospital discharge, they were counted as having a 30-day readmission and a 90-day readmission. Patients were placed into groups of 0 chronic opioids, 1 chronic opioid, and 2 or more chronic opioids. Baseline patient characteristics included age, gender, ethnicity, number of cardinal symptoms at time of admission, home oxygen use, and chronic medical conditions. Baseline characteristics between groups regarding demographics and comorbidities were compared using a chi-square or Fisher's exact test for categorical data and a Student's t-test for continuous measures.

Readmission rates and hospital length of stay were compared using a Fisher's exact test and Student's t-test, respectively.

Results: Of the 750 patients identified, 736 met inclusion criteria. Of these, 433 patients were on 0 chronic opioids, 233 were on 1 chronic opioid, and 70 were on 2 or more chronic opioids. Readmission rates at 30-days were significantly higher in the 2 or more opioid group compared to the 0 opioid group (14.3 percent versus 4.6 percent, P equals 0.004). When comparing the 2 or more opioid group to 1 or less opioid group, there were higher 30-day readmissions seen in the 2 opioid group (14.3 percent versus 5.6 percent, P equals 0.009). Readmission rates at 90 days were higher in the 2 or more opioid group compared to the 0 opioid group (22.9 percent versus 12 percent, P equals 0.022) and the composite of the 1 and 0 opioid groups (22.9 percent versus 13.7 percent, P equals 0.04). There was no difference in the average length of stay between groups (3.32 days, 3.37 days, and 3.78 days for groups 0, 1, and 2, respectively). There were no differences in readmission rates at 30 or 90 days when comparing the 0 to 1 or 1 to 2 opioid groups.

Conclusion: Patients treated with 2 or more chronic opioids admitted to the hospital for a COPD exacerbation are 2.5 to 3 times more likely to be readmitted to the hospital within 30 and 90 days, respectively compared to those receiving 1 or less opioid chronically. Chronic opioid use did not affect the average length of hospital stay.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 3-288

Poster Title: Assessing the value of pharmacists within a care management team model through use of a medication-related problem intervention tracking tool (MrPITT)

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Purpose: Pharmacist integration into a care management team is a novel approach to help high-risk patients maximize their medications, improve their disease state, and reduce the use of acute healthcare resources. As pharmacists extend their abilities to new practice areas, it is essential to demonstrate their impact on patient care within those settings. A Medication-Related Problem Intervention Tracking Tool (MrPITT) was created for pharmacist use to identify and resolve medication-related problems (MRPs) for patients managed by the care team. The study aimed to assess the value of pharmacists within a multidisciplinary care management team using the interventions recorded in MrPITT.

Methods: This quality assurance analysis was a 3-month, retrospective, and observational study approved by the local Institutional Review Board to assess the value of pharmacists based on interventions recorded in the MrPITT. The program enrolled adults with uncontrolled diabetes or patients with complex chronic conditions and 1 or more acute care utilizations within the past year. Patients were referred to a care management team facilitated by clinical pharmacists, nurses, and non-clinical health advocates. Each patient enrolled received comprehensive medication therapy management from the pharmacist at baseline and via telephone weekly for a minimum of 3 months. MRPs were assessed as part of routine clinical care and pharmacist interventions were reported via the MrPITT. Pharmacists implemented medication recommendations in patients with diabetes per a physician agreement protocol and notified providers of recommendations concerning other disease states. The primary endpoint was the prevalence of specific MRPs in 3 months, based on pharmacist interventions documented in the MrPITT. Exploratory endpoints included the frequency of acute care

utilizations 12 months prior to and while actively enrolled, change in baseline hemoglobin A1c, body mass index, low-density lipoprotein, systolic blood pressure, and diastolic blood pressure after 3 months of enrollment.

Results: The MrPITT recorded an average of 707 MRPs per month during 3 months of data collection. The MrPITT interventions revealed pharmacists identified approximately 1 MRP (on average) per patient. Suboptimal doses (48 percent) and undertreatment (35 percent) were the most commonly identified MRPs. The majority (80 percent) of patient interactions were conducted by clinical pharmacists in a non-face-to-face interaction via telephone. Practicing within a physician agreement protocol, clinical pharmacists implemented 76 percent of the MRP recommendations, half of which were dose adjustments. Of pharmacist recommendations made to a physician, less than 1 percent were not accepted. Patients managed by the care team experienced overall improvements in clinical markers of health, as evidence by changes in hemoglobin A1c, body mass index, low-density lipoprotein, and blood pressure.

Conclusion: Pharmacists function as effective physician extenders to identify and resolve MRPs within a care management team. The MrPITT adequately captures MRPs and is useful for recording what medication interventions pharmacists perform. Within population health, a more robust tool integrating pertinent physical and lab findings may better associate medication-related interventions with patient outcomes.

Submission Category: Pediatrics

Submission Type: Descriptive Report

Session-Board Number: 3-289

Poster Title: Assessment of a pharmacist-managed warfarin service in pediatric cardiology patients

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Purpose: Pharmacist-led anticoagulation management has previously been shown efficacious in adult warfarin patients; however, pharmacist-led warfarin management in the pediatric setting has not been studied to date. This project was designed to compare the efficacy of a pharmacist-managed warfarin service to a physician-managed warfarin service (usual care) in an outpatient pediatric population. The goal of this project was to demonstrate non-inferiority of pharmacist-managed to physician-managed warfarin therapy.

Methods: This is a descriptive report detailing pediatric cardiology patients managed on warfarin therapy at Wake Forest Baptist Health Brenner Children's Hospital Pediatric Cardiology Clinic. Fourteen patients with an international normalized ratio (INR) goal determined by a cardiologist were included. Prior to the transition to a pharmacist-led service in September 2014, cardiologists managed the majority of the included patients' anticoagulation. For the physician-managed group, INR values were recorded from March 1, 2013 to August 31, 2014. Following a washout period from September 1, 2014 to December 31, 2014, INR values were obtained for the pharmacist-managed group from January 1, 2015 to June 30, 2016. Patients were included in each analysis if they were followed for more than 3 months. An established collaborative practice agreement allowed for pharmacist-led warfarin management. Dose adjustments and monitoring were guided by an approved protocol. The number of INR measurements, percentage of INR values in therapeutic range (traditional method), percentage of time in therapeutic range (%TTR; Rosendaal method), and reported adverse effects were obtained.

Results: The average number of INR tests was lower in the usual care group compared to the pharmacist-managed group (17.9 tests compared to 33.8 tests). The percentage of time in therapeutic range using the Rosendaal method was higher in the pharmacist-managed group (52.3% versus 47.6%). The percentage of values in therapeutic range using the traditional method was also higher in the pharmacist-managed group compared to usual care (41.1% versus 30.8%). A similar rate of minor adverse effects such as epistaxis, minor bruising, gum bleeding, and delayed cessation of bleeding after lacerations was reported in both groups. In terms of major adverse effects, there was one report of active bleeding requiring vitamin K in the physician-managed group. In the pharmacist-managed group, there was one episode of thrombosis and one episode of infarction reported.

Conclusion: Pharmacist-managed warfarin anticoagulation was non-inferior to usual care in the pediatric outpatient setting in terms of the percentage of time in therapeutic range and the percentage of values in therapeutic range. Usual care demonstrated a decreased frequency of INR testing. Adverse effects were similar in the pharmacist-managed and physician-managed warfarin groups. These results emphasize the value of clinical services provided by pharmacists and expand the correlation of positive outcomes with pharmacist-managed warfarin therapy to the pediatric population.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 3-290

Poster Title: Psychotropic medications and their effect on chronic obstructive pulmonary disease exacerbations

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Purpose: Acetylcholine is involved in the autonomic regulation of the airways, resulting in bronchoconstriction and inflammation. In addition, serotonin has been shown to inhibit cell membrane acetylcholinesterase activity. A recent study concluded there may be a clinically significant link between acetylcholinesterase inhibitor (AChEI) use and exacerbations of chronic obstructive pulmonary disease (COPD). The study, however did not evaluate the need for hospitalization in that patient population. The primary purpose of this study was to determine the effect of chronic psychotropic medication use (AChEI, and serotonergic antidepressants) on hospital length of stay and readmissions for COPD exacerbations.

Methods: This was a single center, retrospective cohort study approved by the Institutional Review Board at the tertiary acute-care center where the data were collected. We identified 750 patients who were admitted with a primary diagnosis of COPD exacerbation (International Classification of Diseases, Ninth Revision, Clinical Modification [ICD-9-CM] code 491.21, and 491.22, ICD-10 code j44.0 and j44.1). Patients were included in the analysis if they were 18 years of age or older, and had a complete medical record. Readmissions were characterized as 90-day readmissions. Patients were placed into groups of chronic acetylcholinesterase inhibitor (AChEI) use, serotonergic antidepressant use, combination therapy (receiving both an AChEI and a serotonergic antidepressant), or neither psychotropic medication. Baseline patient characteristics included age, gender, ethnicity, psychiatric history, other chronic medical conditions, and chronic use of inhaled anticholinergics. Baseline characteristics between groups regarding demographics and comorbidities were compared using a chi-square or Fisher exact

test for categorical data and a Student t test for continuous measures. Readmission rates and hospital length of stay were compared using a Fisher exact test and student t test respectively.

Results: Of the 750 patients identified, 736 met inclusion criteria. Of these, 6 patients were on chronic AChEI alone, 275 were on serotonergic antidepressants alone, 15 were on combination therapy (both AChEI and serotonergic antidepressant), and 440 were on neither psychotropic medication. There were no statistically significant differences in 90-day readmission rates between groups. The average length of hospital stay was 5.67 days, 3.37 days, 4.27 days, and 3.3 days respectively. There was a significantly longer hospital length of stay in patients receiving AChEI alone compared to those on neither psychotropic medication (5.67 days versus 3.3 days, P equals 0.036). When comparing all patients receiving AChEI (alone and in combination) to those receiving neither psychotropic medication, there was a significantly longer hospital length of stay (4.67 days versus 3.3 days respectively, P equals 0.02). In addition, when comparing patients receiving an AChEI (alone and in combination) to those not receiving an AChEI (serotonergic group plus neither) the hospital length of stay was 4.67 days and 3.35 days respectively (P equals 0.03). There was no difference seen when comparing the serotonergic antidepressant group to those receiving neither psychotropic medication.

Conclusion: There is no difference seen in 90-day readmission rates for COPD exacerbation in patients on chronic AChEI, serotonergic antidepressants, or neither psychotropic medication. Hospital length of stay was significantly longer in all groups receiving an AChEI compared to groups not receiving an AChEI. Serotonergic antidepressants had no effect on hospital length of stay.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 3-291

Poster Title: Effect of fluoroquinolone use versus other antibiotics on hospital readmissions and length of stay for chronic obstructive pulmonary disease (COPD) exacerbations

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Purpose: Antibiotic use in patients with chronic obstructive pulmonary disease (COPD) has been reported to be as high as 79 percent. Approximately 60 percent of these patients receive fluoroquinolones. In July 2016, the Food and Drug Administration issued a safety announcement recommending limitations in fluoroquinolone use for acute bacterial exacerbations of chronic bronchitis when other therapies are available. The primary objective of this study was to determine if there was a difference in hospital 90-day readmission rates and length of stay for COPD exacerbations in patients who received fluoroquinolone, macrolide, or tetracycline antibiotics.

Methods: This was a single-center, retrospective cohort study involving 750 patients hospitalized from January 1, 2012 to December 31, 2015, with a primary diagnosis of COPD exacerbation (International Classification of Diseases, Ninth and Tenth Revisions, [ICD-9] codes: 491.21, 491.22 and [ICD-10] codes: J44.0, J44.1). Patients were included in the evaluation if they were at least 18 years of age or older and had a complete medical record. Patients were assigned to groups based on the antibiotic or combination of antibiotics received (fluoroquinolone, macrolide, tetracycline, or no/other antibiotics). Patients were excluded if they received all three of the study antibiotics. Background characteristics collected include age, gender, ethnicity, number of cardinal symptoms at time of admission, history of noxious exposure, home oxygen use, and history of heart failure or obstructive sleep apnea. All continuous data were analyzed using a Student's t-test. Categorical data were analyzed using either a chi-squared or Fisher's exact test. This study was approved by the Institutional Review Board at the tertiary acute-care center where the data were collected.

Results: Of the 750 patients identified, exclusion occurred in 14 patients for having an incomplete medical record and 3 patients for receiving a fluoroquinolone, macrolide, and tetracycline antibiotic combination. Thus, 733 patients met inclusion criteria. Of these patients, 424 were treated with fluoroquinolone, 60 were treated with macrolide, and 116 were treated with tetracycline antibiotic monotherapy. In addition, 16 patients received combination therapy with fluoroquinolone plus macrolide, 37 received fluoroquinolone plus tetracycline, 6 received macrolide plus tetracycline, and 74 were categorized as no/other antibiotics. There were no statistically significant differences in baseline characteristics, with the exception of higher home oxygen use in the fluoroquinolone plus tetracycline group (p-value equals 0.025). When comparing the monotherapy groups, 90-day readmission rates were 14.4 percent for fluoroquinolones, 15 percent for macrolides, and 20.2 percent for tetracyclines (p-value not significant). Average length of stay was 3.36 days, 3.62 days, and 3.13 days, respectively (p-value not significant). When comparing combination therapy, 90-day readmission rates were 12.5 percent for the fluoroquinolone plus macrolide group, 13.5 percent for the fluoroquinolone plus tetracycline group, and no readmissions in the macrolide plus tetracycline group (0/6). There were also no differences seen in average length of stay between the combination therapy groups.

Conclusion: When comparing fluoroquinolone use to other commonly used antibiotics in patients admitted to the hospital with a COPD exacerbation, there is no difference in hospital 90-day readmission rates or length of stay. These results support the recent Food and Drug Administration safety update, suggesting macrolides and tetracyclines may be valid alternatives when antibiotics are needed, allowing institutions to reserve fluoroquinolones for when no alternative is available.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Evaluative Study

Session-Board Number: 3-292

Poster Title: Cost Benefit of LAI Antipsychotics in an Acute Hospital Setting

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Purpose: Long-acting injectable (LAI) antipsychotics have been introduced in efforts to improve medication compliance among those patients with schizophrenia6. To date, conflicting data exists regarding the clinical benefit of LAIs8,9. These agents are routinely more expensive than oral therapy, but have the potential to reduce long-term costs to the healthcare systems and patients8,10. One study of a pharmacy-managed LAI clinic estimated an annual cost savings of $37,00011. The purpose of this study is to determine if transitioning patients to LAI therapy is associated with reduced institutional costs at Wake Forest Baptist Health (WFBH); a teaching hospital without a dedicated psychiatric unit.

Methods: This retrospective study reviewed patients who received a long-acting injectable antipsychotic (LAI) during an inpatient admission at an academic medical center between July 2015 and December 2015. Patients were included if they were at least 18 years old, had a diagnosis of schizophrenia, schizoaffective disorder, or schizophreniform disorder, and received a LAI during admission. The index hospitalization was the first hospitalization during the study period in which the patient received a LAI. Patients were excluded if they received electroconvulsive therapy or LAI within the past year. Data was collected by retrospective chart review. The primary outcome was the percentage increase in medication acquisition cost for LAIs compared with an oral antipsychotic during each admission within the study period. Secondary outcomes included days of hospitalization covered by the LAI, total antipsychotic medication costs during admission, and per day antipsychotic medication costs during admission.

Results: This study gathered results from a total of 16 patients. Patients were most commonly started on Invega Sustenna (paliperidone); other LAIs included Abilify Maintena (aripiprazole), Risperdal Consta (risperidone) and haloperidol decanoate. On average, the institutional acquisition cost of LAIs were 1188% more expensive than oral antipsychotic therapy. The mean number of days covered by LAI per hospitalization was 7.15 (median 6 days).

Conclusion: LAI therapy is significantly more costly than oral therapy. Institutions have the potential to reduce both purchasing and reimbursement costs by redirecting LAI therapy management to an outpatient setting.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Descriptive Report

Session-Board Number: 3-293

Poster Title: Disposition of Patients Receiving Long-term Daptomycin Therapy

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Purpose: Discharge planning is one of the key factors related to the quality of inpatient care and unnecessary hospital readmission. Determining the most appropriate inpatient setting of care for ongoing treatment such as long-term intravenous antibiotics, involves determining the patients' needs and corresponding their needs with the capabilities of potential sites of care. Hospitals caring for patients with long-term intravenous antibiotics such as daptomycin face formidable financial barriers. The aim of this study is to determine if patients required prolonged admissions to receive daptomycin and identify why the patients were unable to be discharged to home or a long-term care facility.

Methods: A retrospective chart review was performed to assess patients receiving long-term daptomycin therapy in inpatient setting. A list of patients names whose medication profile included daptomycin was generated from March 2016 – August 2016. The data collected included the indication, duration therapy, hospital length of stay and the discharge disposition in addition to the source payer. Data was analyzed descriptively.

Results: A total of 78 patients were included in the data analysis of this study. The indications included osteomyelitis 30% (n = 24), prosthetic joint infection 11% (n=9), endocarditis 10% (n=8), abscess/wound 10% (n=8), UTI 7.5% (n= 6), cellulitis 5% (n=4) and 2.5% (n=2) intraabdominal infections. The mean treatment duration was 5 weeks. Out of the 79 total patients, (n =2) remained hospitalized to finish the total treatment course. Both of these patients were intravenous drug users with a total treatment course of 6 weeks. Also, one patient's discharge was delayed due the lack of health care facilities within his insurance network. 64% (n= 51) were successfully discharged to either home with home health services or other health care facilities to complete their daptomycin treatment course..

Conclusion: The study demonstrate that 51/78 patients requiring long-term daptomycin therapy were successfully discharged to home and other healthcare facilities with the exception of 2 Intravenous drug users, though one patient did experience a delayed discharge due to the lack of insurance coverage. Though only three patients in six months remained hospitalized to receive daptomycin, this represent a significant cost due to the medication cost. Our next steps are to investigate solutions that would allow these patients to receive long term daptomycin therapy in a more appropriate setting, while preserving the quality of their care.

Submission Category: Clinical Services Management

Submission Type: Descriptive Report

Session-Board Number: 3-294

Poster Title: Implementation of a pharmacist driven hepatitis C treatment program for uninsured patients in a free clinic

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Purpose: The U.S. Centers for Disease Control and Prevention estimates that there are between 2.7 and 3.9 million people in the United States infected with chronic hepatitis C and over 150,000 of those people are North Carolinians. There have been advances in hepatitis C medications; however, high cost is a major barrier for patients when it comes to receiving treatment. This project's purpose is to outline how a pharmacist-run hepatitis C treatment program, that utilizes prescription assistance programs, can identify, enroll and provide treatment to patients who have no insurance and are unable to pay for the necessary medication.

Methods: A stepwise approach was taken to identify, evaluate and treat patients. First, the pharmacist coordinated with the physician to identify patients within the clinic who were diagnosed with Hepatitis C. Once these patients were identified, the physician evaluated the patients and then referred them to the pharmacist. The pharmacist then reviewed the patients' medical records to determine what labs were needed to help select the proper therapy. The patients were then contacted by phone by the pharmacist to gauge treatment interest and schedule an appointment. At the appointment the pharmacist gave the patient orders for the labs they still needed and once that lab work was completed and reviewed, the pharmacist and patient worked together to choose the best treatment option using the AASLD and IDSA Recommendations for Testing, Managing, and Treating Hepatitis C. At the meeting the pharmacist explained the benefits and risks of treatment and the importance of medication adherence and after the meeting was complete the pharmacist filled out paperwork for the prescription assistance program. Four to six weeks after the paperwork was submitted the medication arrived at the pharmacy free of charge and the medication was then dispensed on a

monthly basis to the patient. Weekly phone calls were made to assess adherence and to monitor for any adverse effects. Follow-up labs were ordered and evaluated to assess efficacy.

Results: The program has identified eighteen patients thus far. Six patients have either started treatment or have been approved for a prescription assistance program. Five patients are in the process of getting treated and seven were not candidates for treatment for various reasons. The program continues to identify and serve patients within its community.

Conclusion: The pharmacist-run hepatitis C treatment program successfully identifies, enrolls and provides treatment to patients who are eligible.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 3-295

Poster Title: Use of antimicrobial prophylaxis for the duration of a drain following spinal surgery: Does it impact infection rates?

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Purpose: Postoperative drains are widely used following spinal surgery to prevent accumulation of fluid in and around the spinal cord. The use of drains is commonly believed to increase the risk of postoperative infections. Despite lack of supporting evidence, prophylactic antibiotic therapy is often continued for the duration these drains are in place. Given the lack of supporting data and rising healthcare costs associated with Clostridium difficile infections, this practice should be re-evaluated. The purpose of this study was to determine whether antimicrobial prophylaxis for the duration of a drain following spinal surgery impacts surgical site infection and Clostridium difficile rates.

Methods: The institutional review board approved this retrospective cohort study. Electronic medical records were reviewed for adults presenting to Wake Forest Baptist Medical Center for spinal surgery with drain placement from July 1, 2014 to June 30, 2015. One hundred and thirty-four men and women aged 18 and older who underwent spinal surgery and received drain placement following the surgery were included in the study. Patients who received antibiotics within 72 hours prior to spinal surgery were excluded. Variables collected for each patient included age, weight, height, gender, antibiotic and duration of therapy, reason for surgery, duration of surgery, location of surgery, duration of drain, chronic steroid use, presence of diabetes, smoking status, and date of infection (if one occurred). A Fisher's exact test was used for categorical data, and a Wilcoxon rank sum was used for continuous data to compare the proportion of patients in each group.The primary outcome measure was rate of surgical site infections within 30 days following surgery.

Results: One hundred and thirty-four patients were included in this study. Of those, one hundred and thirty patients received prophylactic antibiotics, while four did not. For baseline characteristics, no statistically significant differences were found between the groups for age (p=0.48), weight (p=0.18), duration of drains (p=0.54), gender (p=0.62), obesity (p=0.12), chronic steroid use (p=1), diabetes (p=1), or smoking (p=0.32). A statistically significant difference was observed between the two groups for duration of procedure with a mean duration of 238 minutes (+/- 96) in the antibiotic group versus mean duration of 150 minutes (+/- 53) in the no antibiotic group (p=0.04). This suggests a major difference in the level of difficulty of procedure between the two groups. For the primary outcome, no statistically significant difference was observed between the two groups for surgical site infections. Of the one hundred and thirty patients that received prophylactic antibiotics, 8.46% developed a surgical site infection, while 0% of the four patients that did not receive antibiotics developed an infection (p=1). Two patients included in this study developed Clostridium difficile infections within 30 days of their procedure, both of which received prophylactic antibiotics for the duration of their drains.

Conclusion: Due to limited number of patients in the control group and major confounding factor of procedure duration, no definitive conclusions can be made from this study. Reducing unnecessary antibiotic use may be beneficial to reduce the rates of Clostridium difficile infection, reduce costs, and protect against antimicrobial resistance, but in order to allow for more meaningful results to be obtained, further studies should be conducted with a larger and more similar control group to the treatment group.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 3-296

Poster Title: Utilization of non-high-density lipoprotein cholesterol and apolipoprotein B monitoring in patients at an increased risk for atherosclerotic cardiovascular disease

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Purpose: The importance of monitoring non-high-density lipoprotein cholesterol (non-HDL-C) and apolipoprotein B (apo-B) is inadequately delineated in the 2013 American College of Cardiology/American Heart Association Guideline on the Treatment of Blood Cholesterol to Reduce Atherosclerotic Cardiovascular Risk in Adults (2013 ACC/AHA). Their usefulness, however, includes indicating the cholesterol content of all atherogenic lipoproteins (i.e., low-density, very-low-density, and intermediate-density lipoproteins), as well as retaining accurate capability when predicting atherosclerotic cardiovascular disease (ASCVD) events. The purpose of this descriptive report was to determine if monitoring non-HDL-C and apo-B in patients at an increased risk for ASCVD can improve therapeutic outcomes.

Methods: A literature search conducted in PubMed, utilizing "hypercholesterolemia" and "monitoring" terms, limited to 2013 forward, English language, and humans, yielded 63 articles. There were 25 relevant articles involving patients with either mismanaged or resistant dyslipidemia. The following groups were related to clinical worsening secondary to nonattainment of commonly employed treatment goals: cardiovascular disease, type 2 diabetes mellitus (T2DM), familial hypercholesterolemia (FH), and metabolic syndrome. Targets of therapy included atherogenic cholesterol [i.e., non-HDL-C and low-density lipoprotein cholesterol (LDL-C)], apo-B, low-density lipoprotein particle (LDL-P), and triglyceride (TG) levels as defined per the 2015 National Lipid Association Recommendations for Patient-Centered Management of Dyslipidemia (2015 NLA).

Results: Treatment of dyslipidemia was previously guided by targeting LDL-C goals. Yet, evidence from randomized controlled trials indicates this method does not reduce ASCVD risk. In explaining this discrepancy, clinicians have found that normal LDL-C levels paired with elevated non-HDL-C levels identify dyslipidemic subpopulations with elevated levels of apo-B, LDL-P, and low-density lipoproteins of especially pathologic morphology. Current guidelines do not emphasize utilization of comprehensive lipid panel monitoring; however, this literature review identified patient groups who would benefit from non-HDL-C and apo-B monitoring. These include patients with FH, ASCVD, heart transplant, unmanaged T2DM, stage 3 or 4 chronic kidney disease (CKD), elevated serum TGs, fasting glucose, inflammatory markers and/or oxidative stress levels, and elevated non-HDL, apo-B and/or microparticles, e.g., LDL-P. Additionally, those at risk for stroke or who are unresponsive to statins and/or on proprotein convertase subtilisin/kexin type 9 (PCSK9) inhibitor or plasmapheresis/low-density apolipoprotein apheresis therapy would benefit from non-HDL-C and apo-B monitoring. Utilization of these lipid parameters provides stronger ASCVD risk correlation because non-HDL-C is representative of every type of cholesterol with atherogenic potential and apo-B, which serves as the main lipid transporter of all atherogenic subparticles, is indicative of true atherogenic particle count.

Conclusion: Providing evidence-based care is a mainstay of modern healthcare. Nevertheless, particular clinical scenarios merit dependence on professional judgment. While past LDL-C targets have been used almost exclusively in substantiating heart disease and stroke risk, evidence points toward implementation of non-HDL-C and apo-B monitoring, considering their comprehensiveness, accuracy, predictive capability, and relative feasibility, despite their current underutilization due to lack of practitioner knowledge and availability/cost, respectively. And even though apo-B directly indicates atherogenic particle count, its limited accessibility and increased expense preclude widespread use. Therefore, non-HDL-C monitoring may gain prominence as it remains less expensive, more standardized, and globally available.

Submission Category: Automation/ Informatics

Submission Type: Evaluative Study

Session-Board Number: 3-297

Poster Title: Evaluation of optimization and cost analysis for automated dispensing cabinets in a comprehensive cancer center

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Purpose: Automated dispensing cabinets (ADCs) have impacted health care institutions since the 1980's. ADCs provide many benefits to patient care including accessibility secondary to the decentralized model, relief of pharmacists' time spent checking, accountability through documentation, billing efficiency, and improved accuracy. Various optimization strategies exist, however determining the goals and objectives of each individual institution can greatly impact the preferred strategy. This study describes how Wake Forest Baptist Medical Center optimized the use of ADCs in a specific area in an academic teaching hospital. The objective of this initiative was to demonstrate improved efficiency of restocking and decreased cost.

Methods: Seventeen automatic dispensing cabinets were included in this analysis involving the Comprehensive Cancer Center at Wake Forest Baptist Medical Center. These cabinets serve a diverse patient population including oncology, bone marrow transplant (BMT), and intensive care units. ADCs utilization was evaluated from March 1, 2016 through April 30, 2016 with data available from the ADCs server and institution electronic medical record. An optimization algorithm was established based on guidelines determined within the department. Changes to the ADCs included minimum and maximum level adjustments, bin allocation, the addition of medications in high demand, and removal of uncommonly used medications. Various measures including count days, low days, zero days, and cost were analyzed to determine efficiency and financial benefit. The cabinets were reconfigured over a six-week period. A predetermined two-month washout period was incorporated from May 1, 2016 to June 30, 2016. A post-analysis from July 1, 2016 to August 30, 2016 was completed in order to determine the effectiveness of the implemented optimization algorithm. Two months after implementation, a cost-benefit

analysis was conducted to determine the financial impact associated with the modifications conducted.

Results: After implementing the ADCs algorithm to the seventeen cabinets, increased efficiency was indicated by a decrease in count days, low days, and zero days. The average count day decreased from 10.9 to 9.8 (10.21 percent-change). Similarly, the median change decreased from 4.8 to 3.6 (22.92 percent-change). The average low days decreased from 1.29 to 0.26 (80.23 percent-change). The average zero days were reduced from 0.12 to 0.022 (81.03 percent-change). Prior to implementation there were a total of 1012 utilized bins, which accounted for 52,964 dollars worth of various medications. After implementation, there were 883 utilized bins indicating a 13 percent decrease. Lastly, the cost decreased to 47,108 dollars which represents a 11.06 percent decrease.

Conclusion: Wake Forest Baptist Medical Center noticed a significant increase in efficiency and decrease in cost in the Comprehensive Cancer Center after implementing the ADCs algorithm to seventeen ADCs.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Evaluative Study

Session-Board Number: 3-298

Poster Title: Esmolol medication use evaluation in the emergency department setting

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Purpose: Beta-blockers are commonly used in emergency settings. Intravenous esmolol has a quick onset and a short duration of action, making it ideal for rapid lowering of heart rate and/or blood pressure in emergency situations. For example, esmolol is the drug of choice in aortic dissection, and may be used in atrial fibrillation and thyrotoxicosis. Alternative agents are more suitable for less-critical states, such as hypertensive urgencies. The goal of this medication use evaluation is to determine the appropriateness of esmolol use in the emergency department setting with regard to guideline-recommended indication, dose, and cost-effectiveness (approximate wholesale acquisition cost $260/premix-bag).

Methods: A retrospective study of esmolol utilization from September 2015 through September 2016 at Wake Forest Baptist Medical Center was conducted. Electronic health record reporting functionality was employed to identify adult patients treated with esmolol in the emergency department setting. For inclusion, patients were required to have received at least one dose of esmolol while in the emergency department, either a bolus injection, continuous infusion, or both. A total of 144 esmolol doses were identified with 41 patients meeting inclusion criteria of esmolol administration. Data points collected for each patient receiving esmolol included the indication and dosing strategy. Descriptive analyses were utilized to illustrate appropriate medication use.

Results: Esmolol was administered to a total of 41 patients in the emergency department for the following indications: aortic dissection or aneurysm (19 patients; 46.3%), atrial fibrillation (18 patients; 43.9%), thyrotoxicosis (3 patients; 7.3%), and descending aortitis (1 patient; 2.4%). While 39 patients (95.1%) received a continuous esmolol infusion, 2 patients (4.9%) received an

esmolol bolus only. The average bolus dose was 455.88 mcg/kg, and infusions were ordered as titratable to achieve patient-specific heart rate and blood pressure parameters. The maximum recommended infusion rate of 300 mcg/kg/min was not exceeded in any patient. Based on the retrospective utilization data, the approximate annual cost to the medical center was $10,660.

Conclusion: All patients receiving intravenous esmolol in the emergency department setting were found to have a guideline-recommended indication for administration. In addition, bolus and infusion rate dosing was deemed appropriate for all patients and indications. Based on low annual order volumes and appropriate utilization, esmolol use is considered cost effective in the Emergency Department of Wake Forest Baptist Medical Center. Further investigation of place in therapy and patient outcomes is warranted to determine if medical center guideline optimization is needed.

Submission Category: Pharmacokinetics

Submission Type: Evaluative Study

Session-Board Number: 3-299

Poster Title: Interpatient variability in tacrolimus steady-state concentrations and implications on clinical outcomes in patients receiving an allogeneic hematopoietic stem cell transplant (HSCT)

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Purpose: Tacrolimus is commonly used to mitigate the risk of graft-versus-host disease (GVHD) in allogeneic HSCT patients. High interpatient variability in tacrolimus concentrations exist, which may be attributed to pharmacogenetics and clinical factors. In fact, the Clinical Pharmacogenetics Implementation Consortium (CPIC) recommends increasing tacrolimus dose by 1.5-2 times in CYP3A5 normal and intermediate metabolizers; however, these recommendations were based on studies conducted in solid organ transplant patients. We aim to investigate the interpatient variability in tacrolimus steady-state concentrations and impact on clinical outcomes in allogeneic HSCT patients, and determine if the CPIC dosing recommendations can be applied to this patient population.

Methods: Buccal swabs for DNA extraction and genotyping were collected on patients admitted for an allogeneic HSCT and who provided consent to the study. All patients initiated intravenous tacrolimus 0.03 mg/kg/day on day +5 post-transplant. Tacrolimus levels were drawn every two days (+/- 1) after starting therapy. Steady-state was expected to be reached by the fourth day after starting tacrolimus (i.e. second tacrolimus level). Subsequent dosing was based on therapeutic drug monitoring targeting a therapeutic range of 5-15 ng/mL. A systematic retrospective chart review was completed on patients receiving an allogeneic HSCT from 07/03/14 - 09/20/16 at the Levine Cancer Institute's Bone Marrow Transplant Unit. Plasma concentrations and drug-related adverse events (AEs), including tremors, rash, renal toxicity and headaches, were collected from day +5 to +35, and rates of acute grade II-IV GVHD

(aGVHD) were collected from day +5 to day +150. Descriptive analyses were used to describe tacrolimus levels, and unpaired students t-tests were used to compare steady-state tacrolimus levels between Caucasians and African Americans, between patients who did and did not experience aGVHD, and between patients who did and did not experience tacrolimus-related AEs. All patients are currently undergoing genotyping using a custom next-generation sequencing Ion AmpliSeq™ PGx Panel (Life Technologies) to interrogate single nucleotide polymorphisms (SNPs) in CYP3A5 (*3, *6, *7), CYP3A4 (*1B, *22) and ABCB1 (3435C>T, 1236C>T, 2677A>T) (data not shown).

Results: Of 47 patients analyzed, 74% were male, mean age was 51 (25-77) years, 66% were Caucasian and 30% were African American. Approximately 56% of patients had either acute or chronic myeloid leukemia, while the remaining had other forms of leukemia, lymphoma or myelodysplastic syndromes. Preparative regimens included primarily fludarabine/cyclophosphamide/total body irradiation (81%) or busulfan/cyclophosphamide (15%). The mean tacrolimus steady-state concentration at day 4 ± 1 was 14.1 ± 4.6 ng/mL (< 2.0-21.5). Approximately 6%, 47%, and 47% of patients were below, within and above the target therapeutic range at steady-state. The mean steady-state level in Caucasians and Africans Americans was 14.9 ± 3.7 and 12.9 ± 5.1 ng/mL (p=0.072), respectively. The average steady-state level during the first week in patients that experienced (n=13, 27.7%) and did not experience aGVHD was 9.2 ± 3.5 and 12.0 ± 3.2 ng/mL (p=0.012), respectively. Of patients who did not experience aGVHD, 29% had an average tacrolimus level >12 ng/mL over the first month versus 17% of patients who did experience aGVHD. About 19% (n=9) of patients experienced drug-related AEs, and the mean tacrolimus level at AE was 13.7 ± 4.5 versus 9.5 ± 2.0 ng/mL (p < 0.0001) in patients who did not experience drug-related AEs.

Conclusion: High interpatient variability in initial tacrolimus steady-state concentrations was observed. Nearly half of all patients were supra-therapeutic and 6% were sub-therapeutic at initial steady-state concentrations. Given that CPIC only addresses those who are sub-therapeutic, these dosing recommendations may not be applicable for our HSCT population. The disparity observed in tacrolimus concentrations between Caucasians and African Americans further supports a genetic implication. Importantly, we identified a significant association between tacrolimus concentration and rates of grade II-IV aGVHD and incidence of AEs. Genotyping results may further elucidate the role and importance of pharmacogenetics on tacrolimus concentrations in allogeneic HSCT patients.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 3-300

Poster Title: Evaluation of pharmacy services on blood pressure control and adherence to antihypertensive medications in patients with diabetes and uncontrolled hypertension

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Purpose: Patients with hypertension are at risk of adherence issues due to a lack of presentation of specific signs and symptoms of this disease state. Non-adherence is of particular concern in patients taking multiple chronic medications, such as patients with hypertension and another comorbid condition. Cardiovascular disease is a major cause of morbidity and mortality in patients with diabetes, and hypertension is a common comorbid condition in this patient population. This project aimed to identify patients with diabetes and uncontrolled hypertension at risk for non-adherence and measure the impact of a pharmacist-led intervention with the goal of improving adherence.

Methods: Patients at a small, rural family medicine clinic in Vermont with an ICD-9 Diagnosis code of 250* (Diabetes Mellitus) and most recent blood pressure greater than 140/90 mmHg were identified using an EMR report for this quality improvement project. This blood pressure cutoff was utilized to categorize patients as having uncontrolled hypertension because it is the goal used by the American Diabetes Association. After exclusion criteria, a total of 50 patients were assessed for adherence at baseline. Assessment of adherence was performed at baseline and after three months using both medication refill data and through direct patient contact to compare these methods. Medication possession ratios (MPRs) were calculated using SureScripts data or refill history from the patient's pharmacy. Patients were contacted via phone or while in the clinic to assess adherence using the Morisky Medication Adherence Scale 8-question survey (MMAS-8), a validated questionnaire specifically studied and used in patients with hypertension. Identification of potential adherence barriers allowed for the pharmacy team to make interventions with the goal of improving adherence. Blood pressure measurements at 3 months were collected to quantify changes from baseline. MPRs and the

MMAS-8 questionnaire were utilized at the 3-month follow-up to assess the impact of the adherence discussion and pharmacy-led intervention.

Results: Patients who were contacted for adherence assessment had a lower average systolic and diastolic blood pressure at 3 months follow-up compared to baseline. Average systolic blood pressure was 151 mmHg at baseline, and 144 mmHg at follow-up; average diastolic blood pressure was 84 mmHg at baseline, and 78 mmHg at follow-up (n equals 32; p equals 0.02, p equals 0.004 respectively). At baseline, 89 percent of patients (n equals 47) were considered to be highly adherent to antihypertensive medication regimen based on MPR calculations compared to 43 percent (n equals 39) when adherence was assessed with the MMAS-8 questionnaire. Three months following the initial contact to assess adherence, average MPR increased from 94.2 percent at baseline to 98.1 percent (n equals 20, p equals 0.05). For patients who had adherence assessed at the 3 month follow up period with the MMAS-8 questionnaire, the number of patients classified as being highly adherent increased from 33 percent to 41 percent (n equals 12).

Conclusion: A discussion of medication adherence resulted in a lower number of patients classified as highly or moderately adherent to their prescribed antihypertensive medication regimen than when adherence was based on a medication possession ratio calculation. The pharmacy team-led intervention was associated with improved blood pressure measurements at 3-month follow up. These findings support the importance of discussing adherence to medication therapy in patients with diabetes and uncontrolled hypertension with use of the MMAS-8 questionnaire as a tool to uncover potential adherence barriers.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Evaluative Study

Session-Board Number: 3-301

Poster Title: Medication use evaluation of anticoagulants for venous thromboembolism in the emergency department

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Purpose: As outlined in the 2016 Antithrombotic Therapy for VTE Disease: CHEST Guideline and Expert Panel Report, many patients who present with venous thromboembolism do not require admission to the hospital. The purpose of this retrospective medication use evaluation was to identify the number of patients with venous thromboembolism who were admitted to the hospital unnecessarily and/or received suboptimal therapy.

Methods: This evaluation qualified as exempt from review by the Institutional Review Board as it was retrospective and all patient information was de-identified. Electronic medical records from patients who received anticoagulation in the emergency department between January 2016 and May 2016 for the indication of deep vein thrombosis or pulmonary embolism were evaluated. Data collected included anticoagulant used, anticoagulant dose, type of venous thromboembolism, ordering provider, and disposition. These data points were evaluated for appropriateness based on guidelines from the American College of Chest Physicians, clinical judgement, and any extenuating circumstances such as the presence of a hypercoagulability syndrome. Each patient's scenario was recorded as either appropriately admitted, appropriately discharged, inappropriately admitted, or inappropriately discharged. Each scenario was also separately recorded as receiving either appropriate therapy or inappropriate therapy. This information was used to develop a venous thromboembolism treatment decision tree to assist emergency department clinicians with the decision making process.

Results: During the five-month period analyzed, sixty-three patients were diagnosed with deep vein thrombosis. Of those, eleven were admitted inappropriately, thirty-seven were admitted appropriately, fifteen were discharged appropriately, and zero inappropriate discharges occurred. Forty-seven patients received appropriate therapy while sixteen patients received

inappropriate therapy. Documentation in patient charts revealed common themes of failure to follow-up when patients were given an injection of low molecular weight heparin in the emergency department and instructed to return the next day for ultrasound, physician discomfort with the idea of discharging patients with an active venous thromboembolism, and a tendency to contact the patient's primary care provider to ask the primary care provider's preferred course of treatment. Often, primary care providers instructed emergency department physicians to admit the patient until the primary care provider could personally evaluate the patient the following day. The most frequent inappropriate admission resulted from admitting the patient, starting a heparin drip, and discharging the patient on an oral direct factor Xa inhibitor the following day.

Conclusion: Results from this medication use evaluation reflect the need for increased awareness regarding the recommendations made by the 2016 Antithrombotic Therapy for VTE Disease: CHEST Guideline and Expert Panel Report. An emergency department venous thromboembolism treatment decision tree which includes considerations for admission versus discharge as well as patient-specific considerations for selecting the most appropriate therapy could assist with this process. Institution-specific factors such as cost of anticoagulants, physician preferences, and availability of manufacturer coupon cards should be incorporated into the decision tree.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Evaluative Study

Session-Board Number: 3-302

Poster Title: Review of discharge prescriptions to treat uncomplicated urinary tract infection from a hospital emergency department in order to assess appropriate duration of therapy for antibiotics

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Purpose: Uncomplicated urinary tract infection (cystitis) is one of the most commonly treated ailments in emergency departments. Inappropriate antibiotic therapy can result in development of resistant bacteria or increased risk of side effects for patients. This study sought to analyze discharge prescriptions for patients treated for uncomplicated UTIs between January and August of 2016 in an urban hospital emergency department. Antibiotic dose, frequency, duration of therapy, and culture sensitivity were compared to current uncomplicated cystitis treatment guidelines. The findings of this study could aid in improvement of proper antimicrobial stewardship practices within the emergency department setting.

Methods: This study was a retrospective chart review between January –August 2016. A urine culture and sensitivity report generated by the microbiology department was reviewed daily for patients with urine cultured from the emergency department. The patient's discharge summary was assessed to gather the antibiotic drug, dose, frequency, and duration prescribed. Sensitivity of the cultured bacteria to the antibiotic prescribed was recorded. The number of times each antibiotic was prescribed was quantified, as well as the number of times a dose, frequency, and duration was used. The rate of culture sensitivities to antibiotics prescribed was calculated. The severity was determined through review of clinical notes. Uncomplicated infections included non-pregnant females with no known urological abnormalities or uncontrolled comorbidities. Patients were excluded if they were male, experienced systemic effects of infection, had pyelonephritis or urinary obstruction, such as kidney stones or bladder abnormalities, were immunocompromised, had renal failure, had an indwelling catheter, asymptomatic bacteriuria, or were pregnant. This data was recorded and stored in a

computerized spreadsheet on a hospital computer where only investigators could access the data. This study was approved by the institutional review board.
The primary endpoint in this study includes appropriateness of antibiotic drug, dose, frequency, and duration prescribed at discharge based on guidelines for treatment of uncomplicated cystitis. The secondary endpoint evaluated was sensitivity of the urine culture to the antibiotic chosen.

Results: 156 discharge prescriptions to treat uncomplicated UTI were written between January-August 2016 in the ED. Of these, 23 sulfamethoxazole-trimethoprim, 31 ciprofloxacin, 71 cephalexin, 24 nitrofurantoin, 1 amoxicillin, 1 amoxicillin-clavulanate, 1 cefdinir, 1 doxycycline, and 3 levofloxacin were prescribed. Bactrim DS twice daily durations ranged from 3-10 days with a resistance rate of 17.4%. Ciprofloxacin 500 mg twice daily durations ranged from 3-12 days, while ciprofloxacin 500 four times daily was written for once with a duration of 10 days. Ciprofloxacin showed a resistance rate of 13.9%. Cephalexin was written for 250 mg twice daily, 250 mg three times daily, 500 mg twice daily, 500 mg three times daily, and 500 mg four times daily; all durations of therapy ranged from 5-10 days. The cephalexin resistance rate was 12.7%. Nitrofurantoin 100 mg twice daily durations ranged from 5-14 days with a resistance rate of 25%. Amoxicillin-clavulanate 875-125 mg twice daily for 14 days was not effective. Cultures were sensitive to both cefdinir 300 mg twice daily and doxycycline 100 mg twice daily for 10 days. Levofloxacin 500 mg daily for 10 days was prescribed twice and levofloxacin 750 mg daily for 7 days was prescribed once; all cultures were sensitive.

Conclusion: Guidelines for treatment of uncomplicated UTI recommend a sulfamethoxazole-trimethoprim therapy duration of 3 days, nitrofurantoin for 5 days, cephalexin for 7-14 days, ciprofloxacin or levofloxacin for 3 days, and amoxicillin-clavulanate for 3-7 days. Amoxicillin, doxycycline, and cefdinir are not currently recommended. Most treatment durations observed on discharge prescriptions from the ED for uncomplicated UTI are several days longer than the recommendations, putting patients at risk of side effects and unnecessary pill burden. With a 12.7% resistance, cephalexin is the most effective antibiotic to treat uncomplicated UTI in this ED.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 3-303

Poster Title: Are there gender related differences in infants born with neonatal abstinence syndrome in Cabell County, West Virginia

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Purpose: Neonatal abstinence syndrome (NAS) is a group of problems experienced as a result of withdrawal from substances used or abused by a mother during her pregnancy. Cabell County, West Virginia has the worst opioid drug use per capita in the United States. At Cabell Huntington Hospital, 10.3 percent of babies have been exposed to drugs or alcohol while the national average is 0.5 percent. This study is to determine whether there are differences between male and female neonates born at Cabell Huntington Hospital in treatment of NAS, Finnegan scores, and birth sizes.

Methods: A retrospective cohort study was performed in which maternal and infant data were collected for 26 male and 36 female infants born at Cabell Huntington Hospital (CHH) between January 01 and December 31, 2015. The Cerner Millennium system used at CHH did not easily allow for the extraction of patient data. Therefore, a survey was built using Qualtric's Survey Software to collect and analyze data. Collected data included admission, discharge assessments, mother demographics, self-reported substance abuse, NAS Finnegan scores, methadone dosing's, and urinary and umbilical cord drug screens. Also reviewed were History and Physical reports, nursing and social work progress notes, and general charts for pertinent information. A survey was designed allowing for standardized data collection methods, a built-in system of data validation. All data was analyzed using Microsoft Excel and GraphPad® Prism. All infants born after 28 weeks gestation, diagnosed with NAS and received methadone were included in this study. If infants did not meet the preceding criteria, lacked a completed worksheet containing the mother's demographic information, including information about the

mother's substance use, or were transferred out of CHH or discharged before 168 hours post-birth they were excluded. The Marshall University, Institutional Review Board (IRB) committee approved this study.

Results: Of the 62 infants included in this study, 26 (42 percent) were female and 36 (58 percent) were male. Male infants had a higher average Finnegan score compared to females (8.20 vs 7.78) and experienced more severe tremors (2.16 vs 1.90). Males were started on methadone approximately 8 hours before females (53.72 vs 61.85 hours after birth). Also male infants were treated for NAS longer (32.39 vs 27.62 days) at a higher average dose (1.3 vs 1.01 mg/kg). Male infants also received more doses of methadone within the first 168 hours of birth compared to females (27.09 vs 22.96 doses).

Conclusion: These data indicate that male infants suffer from more severe withdrawal syndrome. The more severe withdrawal calls for a more intense methadone regimen. Therefore, male infants receive methadone sooner, longer, and more doses.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 3-304

Poster Title: Is there differences in Finnegans scores between buprenorphine and polydrug exposed infants born with neonatal abstinence syndrome in Cabell County, West Virginia?

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Purpose: Clinical diagnosis of neonates suffering from opioid withdrawal is known as neonatal abstinence syndrome (NAS). The Finnegan scoring system is used to assess the severity of NAS. Cabell County, West Virginia is the epicenter for opioid abuse in the US per capita; 103:1000 babies born at Cabell Huntington Hospital (CHH) are born with NAS (national average is 5:1000). The objective of this study is to determine the differences in Finnegans scores between infants exposed to buprenorphine compared to polydrugs (i.e. cannabinoids, cocaine, heroine) and how that could be used improve treatment protocols and outcomes of this vulnerable population.

Methods: Data was obtained from patient charts at Cabell Huntington Hospital (CHH) in Huntington, WV. Using the secure Cerner Millennium patient data system information was collected (2015-2014) using a survey built through Qualtrics Survey Software, provided by Marshall University. Data collected included admission/discharge assessments, the mother's demographic information and admitted substance abuse, NAS Finnegan score's, methadone dosing, urinary and umbilical cord drug screens. History and physical reports, nursing and social work progress notes, and the general charts were also reviewed for pertinent information. A survey design was utilized to standardize data collection methods. This provided a built-in system of data validation and efficient data analysis using Microsoft Excel and Graphpad(R) Prism. Inclusion criteria was: birth at CHH between January 1 and December 31, 2015; born after 28 weeks gestation; and diagnosed with NAS and/or received methadone as treatment for NAS. Exclusion criteria was: not meeting the preceding criteria, lacked information regarding

the mother's demographic information and admitted substance use, or were transferred out of CHH or discharged before 168 hours post-birth. The Marshall Univ., Institutional Review Board (IRB) committee approved this study.

Results: Of 62 infants in this study, 31 (54 percent) were infants born to polydrug-using mothers and 26 (46 percent) infants were identified as being born to mothers who were taking only buprenorphine. Of the mothers in the polyabuse group, 19 (59 percent) used Subutex, 10 (31 percent) used Suboxone and 11 (34 percent) used heroin. Additionally, 12 (37 percent) infants were born to mothers that tested positive for hydrocodone, codeine, or oxycodone and 4 (13 percent) used gabapentin or benzodiazepines. There was an 18 percent difference in mean methadone received (1.36 mg/kg vs.1.15 mg/kg) between polyabuse and buprenorphine groups, suggesting that patients in the polyabuse group required more intense methadone therapy. Infants of polydrug-using mothers had higher mean Finnegan Score values (8.31 vs. 7.65), higher tremor scores (1.93 vs. 1.72). The polydrug exposed infants also had a greater occurrence of hyperactive moro reflex (55.8 percent vs 39.0 percent), myoclonic jerking (4.1 percent vs 2.2 percent), sleep disturbances (20.5 percent vs 16.6 percent), and diarrhea (19.8 percent vs. 14.0 percent). The buprenorphine group had higher rates of excessive high pitched crying (5.1 percent vs. 7.2 percent), fever (23.2 percent vs 26.5 percent), and vomiting (4.6 percent vs. 5.4 percent).

Conclusion: This data suggests that differences in NAS score among the two drug use groups may be caused by differences in symptom presentation related to the specific substances involved. Further extensive data are currently being collected to determine if recommendations to develop an independent protocol to treatment NAS infants that have been exposed to multiple drugs compared to a single drug should be utilized to improve patient outcomes.

Submission Category: Ambulatory Care

Submission Type: Case Report

Session-Board Number: 3-305

Poster Title: Mood disturbances induced by hepatitis therapy: a case report

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Purpose: This case report describes mood disturbances concurrent with hepatitis C treatment in two middle aged males with psychiatric illnesses. The first patient is a 41-year-old male with a 16-year psychiatric history significant for bipolar disorder, recurrent major depression, and substance abuse disorder, including opioid dependence. Other medical history includes gastroesophageal reflux disease, hypertension, and hepatitis C with abnormal liver function tests. Prior to ledipasvir/sofosbuvir therapy the patient had attempted interferon therapy, but was unable to complete treatment due to unknown side effects. The patient had been psychologically stable for the preceding three years. Ledipasvir/sofosbuvir therapy was initiated for treatment of hepatitis C in addition to the patient's ongoing therapy (suboxone, gabapentin, quetiapine, dexlansoprazole, and hydrochlorothiazide). Approximately 6 weeks after initiation of ledipasvir/sofosbuvir treatment, the patient began to report uncharacteristic symptoms of anger and aggression along with documented outbursts seen in group substance abuse therapy. The second patient is a 57-year-old male with a psychiatric history significant for opioid dependence. Comorbid conditions include benign prostatic hyperplasia, hypothyroidism, and allergic rhinitis. Prior to sofosbuvir treatment the patient had no comorbid psychiatric conditions. Sofosbuvir therapy was initiated for treatment of hepatitis C in addition to the patient's ongoing therapy (suboxone, gabapentin, clonidine, levothyroxine, tamsulosin, and loratadine.) Four weeks after initiation of sofosbuvir treatment the patient began to report weakness, tiredness, decreased appetite, nausea, and depressed mood. Patient symptoms escalated coinciding with significant weight loss and he was initiated on escitalopram therapy for dysthymia. The patient reported escitalopram therapy had a mild impact but continued to experience trouble sleeping and a general lack of motivation. Both patients reported side effects continued to persist throughout hepatitis treatment, and for 12 and 15 weeks following completion of treatment respectively. After the completion of therapy, the patients reported a return to baseline mental status, and have remained at baseline for a minimum of nine months.

These cases demonstrate that mood disturbances are one of many factors that should be monitored in patients being initiated on ledipasvir/sofosbuvir or sofosbuvir therapy.

Methods:

Results:

Conclusion:

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 3-306

Poster Title: Implications of overfill in commercially premixed intravenous admixtures used in pediatric medication preparation

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Purpose: The antibiotic admixtures used for neonatal and pediatric patients generally require dilution and manipulation due to the lack of commercially available premixed, ready-to-use intravenous (IV) formulations due to weight based doses used in this population. Standard dose adult IV premixed bags are currently available for certain medications, but concerns for potential overfill with resulting concentration difference, particularly for small doses, has limited this practice. The purpose of this study was to evaluate the stated concentrations against the standards for two commercially available antibiotic premixed products, cefazolin and levofloxacin, in order to assess the effect of overfill in these products.

Methods: Standards and samples were analyzed using reversed-phase chromatography with a Shimadzu C-18 column (3 micrometers, 50 x 4.6 mm) and a 50:50 mixture of acetonitrile and phosphate buffer (pH 6) mobile phase on a Shimadzu LC20AT/SPD-M10A high-pressured liquid chromatography (HPLC) instrument. Detection wavelengths for cefazolin and levofloxacin were 260 and 280 nm, respectively. Standard curves were created from five dilutions, from 0.33 to 33 mg/mL for cefazolin and 2.5 to 500 mg/mL for levofloxacin. Similarly, two commercially available premixed intravenous admixtures, cefazolin sodium 1 g/50 mL in dextrose (B. Braun Medical, DUPLEX) and levofloxacin 250 mg/50 mL in dextrose (Claris Lifesciences) were sampled in triplicate. Samples were diluted to create five analysis concentrations from 0.2 to 20 mg/mL for cefazolin and from 2.5 mg/mL to 500 mg/mL for levofloxacin. Retention times and area under the curve (AUC) were recorded for standards and samples intended for analyses.

Independent samples t-tests evaluated the AUC for the samples against standard curves. An alpha level of 0.05 was used to assess statistical significance.

Results: The cefazolin sodium Duplex system samples were, on average, 0.9 plus or minus 0.11 percent lower for each of the five sampled concentrations but did not demonstrate statistical significant differences (p=0.64). Retention times for cefazolin standards and samples were consistent at 0.65 plus or minus 0.05 minutes. Similarly, the levofloxacin premixed admixture samples averaged 0.78 plus or minus 0.18 percent lower for each concentration but did not demonstrate statistical significant differences (p=0.89). Retention times for levofloxacin were constant at 0.74 plus or minus 0.07 minutes.

Conclusion: The results suggest that drawing doses from premixed, standard dose IV admixture products to the recommended pediatric dosage according to the stated drug concentration on the bag will result in appropriate pediatric concentrations even with the manufacturer overfill. In addition, this evidence suggests that hospitals should feel comfortable using these products as an additional measure to potentially reduce compounding errors in pediatric IV medication preparation.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 3-307

Poster Title: Evaluation of a pharmacy-driven neonatal aminoglycoside dosing protocol: before and after

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Purpose: Aminoglycoside antibiotics have limited tissue distribution, are dependent on renal elimination, and have a narrow therapeutic index. Ensuring the selection of appropriate dosing regimens, alongside the observance of therapeutic serum levels are needed to establish safe and effective treatment. This is especially the case in the neonatal population. The primary objective of the study was to compare the number of supratherapeutic trough values for aminoglycosides following implementation of a pharmacy-driven neonatal aminoglycoside dosing protocol.

Methods: The institutional review board approved this retrospective cohort study. Patient's date of birth, height, weight, gestational age, aminoglycoside dose, levels, dates and times of levels drawn were recorded. All neonates treated with aminoglycosides admitted to the Neonatal Intensive Care Unit (NICU), Neonatal Therapeutic Unit (NTU), or the Newborn Nursery from December 2012 to May 2013 (pre-protocol), and September 2015 to February 2016 (post-protocol) were included. Patients with Cystic Fibrosis were excluded. Prior to the protocol, Neofax, 5mg/kg/dose every 24 hours, and/or prescriber preference were used for dosing. The protocol established is based on patient's corrected gestational age, renal function and indication. After protocol implementation, neonates of corrected gestational age (cGA) 29 weeks or younger received 5 mg/kg every 48 hours. Additionally, neonates of cGA 30–34 weeks, and 35 weeks or older, received 4 mg/kg and 5 mg/kg every 24 hours respectively. Data was analyzed to establish if safety parameters improved after protocol implementation.

Results: Overall there were 162 infants included in the pre-protocol group and 278 infants in the post-protocol group. There were 33 trough values (20 percent) versus 84 trough values (30 percent) drawn in the pre- and post- protocol groups respectively. Among infants with trough levels in the post-protocol group, 7 infants were treated with gentamicin doses which did not follow the protocol, and 3 of these trough values were greater than 2 mcg/ml (42.8 percent). Comparing the trough values of pre-protocol dosing strategies with infants treated using the protocol, of the infants less than 30 weeks cGA, 27 percent (n=3) pre-protocol versus 0 percent (n=0) per-protocol trough levels were greater than 2 mcg/ml. In the infants between 30-34 weeks cGA, neither group had any reported trough values greater than 2 mcg/ml. In infants with cGA 35 weeks or older, 13 percent (n=2) versus 6 percent (n=3) pre-protocol compared with per-protocol dosed infants had trough values above goal.

Conclusion: After the implementation of a pharmacy-driven neonatal aminoglycoside dosing protocol, a higher overall percentage of trough values were within the goal range. Infants less than 30 weeks cGA, and 35 weeks or greater cGA, had a higher percentage of troughs within the goal range in the protocol group compared with the pre-protocol findings. Further study is warranted to assess nephrotoxicity and ototoxicity outcomes and appropriateness of current trough goal value.

Submission Category: Geriatrics

Submission Type: Evaluative Study

Session-Board Number: 3-308

Poster Title: Influenza and pneumonia vaccination requirements, and infection rates in nursing homes and assisted living facilities in West Virginia.

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Purpose: In 2014, West Virginia reported 19.6 deaths per 100,000 people due to influenza and pneumonia, but in adults ≥ 65 years only 69.8 percent and 67.7 percent received the annual flu and pneumonia vaccines, respectively. According to the Centers for Disease Control and Prevention, vaccination is the best way to prevent contraction of illness with a vaccination rate of >90 percent in high-risk individuals, such as ≥ 65 years, being necessary. This study is looking to determine if a correlation exists between influenza and pneumonia vaccine requirements and infection rates in nursing homes and assisted living facilities in West Virginia.

Methods: The institutional review board approved this evaluative study with data collected via paper survey. Surveys were mailed through United States Postal Service to nursing homes and assisted living facilities in West Virginia that qualified through pre-determined inclusion criteria. Envelopes and informational letters were personalized with the name of the director of nursing or equivalent at each facility. A second round of surveys were generically addressed and sent to the facilities that did not respond to the personalized packet. Facilities who returned the survey were entered into a drawing to win supplies for their activities department, such as books and board games. A pilot survey was sent to 20 facilities in Kanawha County, West Virginia. In a continuation of the study, surveys were sent to qualifying facilities in the 54 remaining counties of West Virginia. Survey questions asked the number of facility residents, age of residents, vaccination requirements and recommendations for residents and employees, and documentation of influenza and pneumonia cases from 2013 to 2016. The surveys did not consist of any personal information of the survey taker or facility residents. All participating facilities were de-identified for data analysis and publication. Descriptive statistics will

determine if vaccine requirements and offering vaccines onsite appear to decrease infection rates among facility residents and employees.

Results: The pilot survey of Kanawha County resulted in a 50 percent response rate, with 7 facilities reporting >80 percent of their residents over the age of 65. Of the 10 facilities, 50 percent state vaccines are required of the residents, but influenza and pneumococcal vaccines are not included in those requirements. Ninety percent of the facilities said they require a medical history intake form prior to the residents moving in, with only 60 percent inquiring about vaccine history on this form. Eighty percent stated they recommend the annual influenza vaccine to its residents, but only 60 percent of facilities offer the vaccine on site. Sixty percent of facilities recommend the pneumococcal vaccine, but only 50 percent offer the vaccine on site. The data from the remaining 54 counties are still being collected.

Conclusion: The lack of influenza and pneumococcal vaccine recommendations and requirements in nursing homes and assisted living facilities included in the pilot study show there is a deficit in the number of residents ≥ 65 years of age receiving the vaccines appropriately. An increase in vaccinations is needed in these facilities to reach the >90 percent vaccination rate necessary for immunity in this high-risk age group. It is postulated that the remaining counties will offer similar results, indicating room for improvement in influenza and pneumococcal vaccination processes in nursing homes and assisted living facilities throughout West Virginia.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Descriptive Report

Session-Board Number: 3-309

Poster Title: Drug shortages: Beating the odds

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Purpose: Over the past decade, the United States has experienced a fluctuating number of drug shortages. There are many explanations for these shortages, which include, but are not limited to, manufacturing decisions, the inability to obtain necessary materials, and varying supply and demand. Hospitals must have plans in place to quantify and mitigate the drug shortages that will inevitably occur. These strategies may differ based on hospital size, formulary size, typical number of shortages experienced at the location, or other hospital specific variables.

Methods: West Virginia University (WVU) Medicine's flagship hospital, Ruby Memorial Hospital, uses numerous strategies to mitigate drug shortages. Weekly, in-person meetings are held twice weekly. The initial meeting is held with the inventory team, while the second meeting consists of all the key stakeholders. These meetings help bring the staff up-to-date and assist in the discussion of ideas to help keep care optimal during drug shortages. A weekly online newsletter and tracking spreadsheet are continuously maintained to outline and update the plan for drug shortages. The tracking spreadsheet includes the product, manufacturer, tentative shortage release dates, comments surrounding the shortage, a list of alternative drugs being used, and a color categorization. This color categorization includes red (on hand supply is less than the 30 day estimated usage), yellow (on hand supply is equal to the 30 day estimated usage), and green (on hand supply will last at least two months or that the shortage has a plan). Lastly, manufacturer relationships are also used to help mitigate drug shortages by enabling additional amounts of drug to be acquired. In addition, medications that are on shortage are clearly labeled in the pharmacy to make all staff aware there is a shortage and to help prevent these drugs from being loaned out. Ruby Memorial has one person dedicated to drug shortages that coordinates drug shortage plans and drug supplies.

Results: By using weekly data from shortage meetings, we compared the number of shortages at Ruby Memorial Hospital in 2015 to 2016. We did this for the first two quarters of 2015 and the first two quarters of 2016. Upon comparison, the number of shortages on the final day of quarter one in 2016 was nearly the same as quarter one in 2015. However, the number of shortages on the final day of quarter two in 2016 is about 40 percent of the number from quarter two in 2015. The decrease in the amount of active shortages at Ruby Memorial Hospital can be attributed to various factors. Within the 12 months between quarter two of 2015 and quarter two of 2016, the pharmacy department implemented the various methods listed above. We believe this attributed mainly to the decrease in active shortages because there was only a slight change in national data. Data via the University of Utah Drug Information Service showed a decrease from 219 active shortages to 191 nationwide. This shows only a 13 percent decrease compared to Ruby Memorial Hospital's nearly 40 percent decrease.

Conclusion: While data suggest drug shortages have improved across the country, the burden continues to be an issue for health-systems. WVU Medicine's flagship hospital, Ruby Memorial Hospital, has implemented numerous strategies to relieve the pressure drug shortages place on patient care. Over the past two years, Ruby Memorial Hospital has implemented twice weekly meetings, a weekly online newsletter, a color-coded tracking sheet, improved manufacturer relations, and full-time equivalent (FTE) support. These strategies have greatly improved the volume and inconvenience of drug shortages.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 3-310

Poster Title: Duration of antibiotic treatment in community-acquired pneumonia in the outpatient setting

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Purpose: Recent updates to IDSA guidelines have continued to encourage a shorter course of antibiotic therapy. The current community-acquired pneumonia (CAP) guidelines recommend a minimum of five days of antibiotics for patients who respond to treatment. The purpose of this project was to assess the overall treatment patients diagnosed with CAP in an outpatient setting are receiving.

Methods: Adults 18 years of age or older who had a CAP diagnosis within the years of 2015 to 2016 were identified. Exclusion criteria included diagnoses classified as health-care associated pneumonia (hospitalized for 2 or more consecutive days in the last 90 days), more than 24 hours hospitalized for CAP treatment, and any patient who received at least one dose of IV antibiotic in the ED. The EMR was abstracted for the following data: patient's demographics, comorbidities, recent antibiotic use, and antibiotic use for current episode. The primary outcome of this project was the average days of antibiotics prescribed for CAP. Secondary outcomes included appropriate antibiotic based off the IDSA guidelines, imaging to confirm diagnosis, and a recurrent diagnosis of CAP within 30 days of completing treatment.

Results: 100 patients treated for CAP were studied. 71 of these patients underwent imaging and 48 patients had positive results on chest imaging. Of the 23 patients whose imaging was negative, 1 patient had antibiotics stopped. The average days of antibiotics prescribed was 8.3 days. The most prevalent antibiotics prescribed were Doxycycline (n=62) and Azithromycin (n=23) as monotherapy. 48 percent received the appropriate medication based off of the IDSA guidelines. Most patients with a comorbidity received inappropriate antibiotics. 16 percent had recurrence of pneumonia in 30 days after stopping treatment. 10 of these 16 patients were not prescribed the appropriate antibiotic on first diagnosis.

Conclusion: Overall, treatment exceeded the recommended days. The findings of this project also identify issues imaging patients to confirm a pneumonia diagnosis. Most of the time, the treatment plan did not change even with negative imaging. The findings of this project strengthen the argument that antibiotic stewardship is still in need of great improvement.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 3-311

Poster Title: Ceftriaxone utilization before and after a change in community-acquired pneumonia recommended regimen at an academic medical center

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Purpose: Our large academic medical center has recently implemented hospital-wide efforts to reduce the use of third-generation cephalosporins. One of these efforts was a change in the recommended community-acquired pneumonia (CAP) empiric regimen from ceftriaxone plus doxycycline to ampicillin-sulbactam plus doxycycline, which was communicated by an alert in the electronic medical record. The primary objective of this study was to compare the ceftriaxone Days of Therapy (DOT) per 1000 Patient Days before and after the change in our recommended CAP regimen. Secondary objectives were to evaluate the indications for ceftriaxone use, if therapy was empiric or culture driven, and microbiological data.

Methods: This was an IRB-approved retrospective review of electronic medical records of all hospitalized patients who were prescribed ceftriaxone during March 2015 and March 2016. Patients who received one dose of ceftriaxone in the Emergency Department and then discharged were excluded from this study. Electronic medical records were reviewed for age, gender, length of stay, ordering service, indication for ceftriaxone use, location of first administration (Emergency Department or inpatient), days of therapy, empiric or culture driven therapy, and microbiological data. Descriptive statistics were utilized to describe data collected. Ceftriaxone DOT per 1000 patient days was used to evaluate the difference in utilization before and after the change in our recommended CAP regimen.

Results: The total number of patients meeting inclusion criteria in the March 2015 and March 2016 groups were 247 and 208, respectively. The overall ceftriaxone utilization rate was 53 DOT per 1000 patient days in March 2015 and 43 DOT per 1000 patient days in March 2016. The use of ceftriaxone for patients specifically with pneumonia decreased from 17 DOT per 1000 patient days to 7 DOT per 1000 patient days. The overall utilization rate for ceftriaxone specifically for

urinary tract infections decreased from 20 DOT per 1000 patient days to 16 DOT per 1000 patient days. The top two indications for ceftriaxone use in both groups were urinary tract infections (41% March 2015 and 40% in March 2016) and pneumonia (29% in March 2015 and 27% in March 2016). 94% of the ceftriaxone use was empirically driven in the March 2015 group and 97% in the March 2016 group. Of the ceftriaxone use that was culture driven, Escherichia coli was the most common pathogen targeted in microbiological data for both groups. 16% of patients in March 2015 and 13% of patients in March 2016 received their first dose of ceftriaxone in the Emergency Department.

Conclusion: After the implementation of the change in our recommended regimen for CAP, there was a reduction in overall ceftriaxone DOT per 1000 patient days. In addition, there was a decrease in the disease-specific DOT per 1000 patient days for pneumonia and urinary tract infections, the two most common indications observed. This study has demonstrated that electronic medical records may be used as a form of communication to implement therapeutic changes and impact antibiotic utilization rates.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-312

Poster Title: Ertapenem use before and after the implementation of a Best Practice Advisory (BPA) de-escalation reminder for meropenem

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Purpose: Our institution recently implemented a Best Practice Advisory (BPA) de-escalation alert for patients receiving 72 hours of broad-spectrum antimicrobials that cover Pseudomonas aeruginosa, including meropenem. This alert prompts providers that enter the electronic medical record to consider de-escalating therapy if Pseudomonas aeruginosa has not been isolated. For meropenem, the alert-recommended de-escalation antibiotic is ertapenem. The primary objective of this study was to determine ertapenem indications for use before and after implementation of the BPA de-escalation reminder. Secondary objectives included comparing ertapenem days of therapy per 1000 patient days and frequency of de-escalation therapy from meropenem to ertapenem.

Methods: This was an Institutional Review Board-approved retrospective chart review of electronic medical records. Patients receiving at least 1 dose of ertapenem between July 2014-December 2014 (pre-BPA implementation) and July 2015-December 2015 (post-BPA implementation) were included and evaluated for the following: age, gender, indication for use, Days of Therapy for ertapenem, length of hospital stay, location of first dose administration, Infectious Diseases consult, and initial ordering service.

Results: The total number of patients meeting inclusion criteria was 414 in the pre-BPA group and 531 in the post-BPA group. The most common indications for ertapenem use in both groups were intra-abdominal infections (pre-BPA 25%, post-BPA 30%), pneumonia (pre-BPA 24%, post-BPA 18%), and surgical prophylaxis (pre-BPA 18%, post-BPA 18%). Ertapenem Days of Therapy per 1000 patient days were 22 in the pre-BPA group and 28 in the post-BPA group. Seventy-four patients (18%) in the pre-BPA group were de-escalated from meropenem and 71 patients (13%) in the post-BPA group were de-escalated from meropenem.

Conclusion: The most common ertapenem indications for use were intra-abdominal infections, pneumonia, and surgical prophylaxis. The rate of overall ertapenem use increased in the post-BPA implementation timeframe, however, the rate of those de-escalated from meropenem therapy decreased.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 3-313

Poster Title: Readmission Rates Due to Adverse Drug Reactions Associated with Inappropriate Antipsychotic Continuation upon Discharge from the ICU

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Purpose: Continuation of antipsychotics post intensive care unit (ICU) admission could increase the chance of harm and unnecessary adverse drug reactions to patients in whom these medications are not required. Few studies describe outcomes in patients continuing antipsychotics on an outpatient status after discharge from the ICU. The primary objective of this study was to determine whether patients discharged from the ICU on antipsychotic therapy without an identified indication for extended treatment experienced adverse events related to therapy that resulted in hospital readmission.

Methods: This was an Institutional Review Board-approved retrospective chart review of electronic medical records. Patients ≥ 18 were included from 2012 - 2016 if they were admitted to the ICU at anytime during their index admission and received an antipsychotic while in the ICU. Patients who had a documented indication for antipsychotic therapy or who were receiving them prior to admission were excluded. Additional reasons for exclusion included treatment for alcohol or benzodiazepine withdrawal. Data collected for analysis of potential antipsychotic-related readmissions included serum creatinine, electrocardiogram results, and CNS changes from baseline. The primary outcome was 90 readmission rates from the index admission. The secondary outcome was the number of these patients continued on antipsychotic therapy after discharge.

Results: A total of 432 patients were identified by inclusion and exclusion criteria for analysis of the primary outcome. Of these patients, 94 (22%) were identified as having continued antipsychotic therapy as outpatients. A total of 39 patients (9%) were readmitted within 90 days of index admission. Of these, 9 (23%) had potential antipsychotic-related adverse effects reported on admission.

Conclusion: Nearly a quarter of patients who spent time in the ICU and received an antipsychotic during their index hospitalization were continued on antipsychotics after discharge. While a small number of patients had readmissions potentially related to antipsychotic adverse effects (2% of the total population), this studied identified a potential significant medication reconciliation issue that needs to be addressed.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-314

Poster Title: Management of positive tracheal aspirate cultures in neonates at an academic medical center

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Purpose: Antibiotics are often overused, which can cause bacterial resistance. One example of this overuse is treatment of positive tracheal aspirate(TA) cultures in neonates. TA cultures are poor indicators of infection because they are not specific or sensitive. This study will show us how positive TAs are being managed in neonates at our institution. The primary objective of this study is to see how often antibiotics are prescribed to neonates with positive TAs. Secondary objectives include evaluation of oxygen requirement for the neonates in the 72-hour period prior to culture, presence of tracheostomy tube, and whether other positive cultures were present.

Methods: This study was an Institutional Review Board-approved retrospective chart review of electronic medical records. Patients admitted to the neonatal unit between January 2012 and December 2015 who had a positive tracheal aspirate culture were evaluated for the following: age, gender, tracheal aspirate culture bacteria, antibiotics, empiric or targeted antibiotic therapy, route and duration of therapy, length of admission, days from admission of patient to when cultures were drawn, number of white blood cells in the culture, oxygen requirement, and what other cultures were drawn on the same day and bacteria. Descriptive statistics were utilized to analyze the collected data.

Results: The total number of patients meeting inclusion criteria was 69 with a total of 180 positive tracheal aspirate cultures. The median gestational age was 27 weeks. The median time to positive tracheal aspirate from admission was 27 days. 53% of all positive cultures received empiric antibiotics; 23% of all positive cultures received targeted antibiotics. The mean duration of treatment with antibiotics was 13 days. Of the positive tracheal aspirate cultures treated

with empiric antibiotics, approximately 14% had other positive cultures present (e.g. – blood, wound). The mean duration of treatment with antibiotics was 13 days. 66% of the patients had a less than 10% change in oxygen requirement from 72 hours prior to culture draw. Only 12% of patients had a greater than 20% change in oxygen requirement. 13% of patients had a tracheostomy tube present at the time of culture.

Conclusion: Over the 3-year study period, over half of the positive tracheal aspirate cultures were treated with empiric antibiotics. The majority of these cultures were isolated positive cultures, with no identified organisms in blood or other areas. Most patients did not have a significant change in their oxygen requirement from 72 hours prior to culture draw and did not have a tracheostomy tube present.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 3-315

Poster Title: Correlation between documentation of screening for diabetic retinopathy and whether diabetic patients met goal Hemoglobin A1c

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Purpose: Keeping up with diabetic patients and ensuring they receive recommended screenings for long-term complications, and managing their diabetes is a challenging task. The purpose of this study was to determine if there was a correlation between providers documenting screenings for diabetic retinopathy in their diabetic patients, and if the patients were at goal hemoglobin A1c. The rate of patients receiving diabetes management education at the clinic from an ambulatory care pharmacist that had documentation of screening was also evaluated.

Methods: A registry of all diabetic patients at a family medicine clinic in Harpers Ferry, West Virginia through January 1st, 2015 was identified. The registry included 1213 patients. Exclusion criteria included patients without documentation of ever being seen at the clinic, patients with gestational diabetes, and those with newborn diabetes. A retrospective chart review was conducted to find documentation of screening for diabetic retinopathy. Upon finding documentation, a hemoglobin A1c was recorded that was on or closest to the date of documentation. Other data collected included date of screening, history of diabetes management education at the clinic, method of screening, and prescribing of diabetes medications. The primary outcome was to evaluate a correlation between patients who had documentation of screening, and their diabetes control as defined by hemoglobin A1c less than or equal to 7.0%. The secondary outcomes were the rate of documentation of screening in patients receiving diabetes management education at the clinic, and the screening result, if obtainable.

Results: In the past eight years, 75% of the cohort had documentation of at least one screening. Of these 890 patients, 49.8% were at goal A1c, therefore there was no correlation. Of those with a screening, 70% had screening results documented. In total, 15.6% of these patients had evidence of diabetic retinopathy in varying presentations. . Only 18.2% of the cohort received diabetes management education, however 90.2% of these patients received a screening.

Conclusion: Although there was no correlation between documentation of screening and diabetes control, the results demonstrated the important role of the ambulatory care pharmacist providing diabetes management education in the clinic setting. Improving diabetic retinopathy screening rates in patients can lead to earlier treatment if needed, resulting in better long-term quality of life for diabetic patients.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 3-316

Poster Title: Evaluating safety of continuous labetalol infusions at a large academic tertiary care hospital

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Purpose: Continuous labetalol (Cl) infusions are often used to urgently treat severe hypertension resistant to boluses of intravenous (IV) labetalol or other IV antihypertensive agents. Current FDA approved labeling suggests starting a Cl infusion at 2 milligrams per minute (mg/min), titrated per physician discretion, and continued until adequate blood pressure response is achieved. Few reports exist on the safety of exceeding 300 mg of a Cl infusion during a 24-hour period. The purpose of this study was to assess the safety of current practices at our institution with regards to adhering to the manufacturer's suggested maximum dose of 300 mg.

Methods: The West Virginia University institutional review board approved this retrospective drug-utilization evaluation. Women and men aged 18-90 were included in the study if they received a continuous infusion of IV labetalol for at least 2 hours. Patients concurrently receiving continuous IV infusions of propofol or dexmedetomidine were excluded from the study. A retrospective chart review from June 2014 to June 2016 was completed. The primary outcome measure was to assess the number of patients that exceeded the suggested max dose of 300 mg. Secondary outcome measures included percentage of patients that experienced significant hypotension or bradycardia and treatment of the adverse events. Significant hypotension was defined as a systolic blood pressure of less than 90 and/or a diastolic blood pressure of less than 60 while bradycardia was defined as a heart rate less than 50 beats per minute lasting longer than 2 hours.

Results: A total of 118 patients' charts were reviewed and 48 patients met the inclusion criteria. Sixty patients were excluded from the analysis because they did not meet the 2-hour infusion requirement and another 10 patients were excluded because they were concurrently receiving continuous infusions of IV propofol or dexmedetomidine. More than half (58.3% n = 28) of the patients received greater than the recommended maximum dose of 300 mg. Patients that exceeded the 300 mg dose on average received 913 mg per 24 hours (range of 302 mg to 2100 mg). No patients experienced significant bradycardia. Nearly 20% (n = 9) of patients experienced significant hypotension while on the continuous infusion. Of the patients that experienced significant hypotension, nearly 45% (n = 4) received greater than the recommended dose of 300 mg. All labetalol infusions administered to patients that experienced significant hypotension were discontinued and 33.3% (n = 3) of these patients received bolus infusions of normal saline to treat hypotension.

Conclusion: While continuous intravenous labetalol infusions can be used safely to treat severe hypertension in the acute setting, monitoring of the cumulative administered dose is essential. Education regarding the appropriate use and recommended maximum daily dose of CI infusions at our institution is warranted. Furthermore, adding alerts in the electronic medical record that warn the prescriber of the recommended cumulative dose of 300 mg of the CI infusion may help prevent adverse drug events in the future.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 3-317

Poster Title: Vitamin K as a reversal agent for warfarin at Jefferson Medical Center

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Purpose: Warfarin dosing poses an obstacle for health care practitioners in trying to keep up with patients diet, medications, and changing lifestyle. A change in any one of these factors can alter patients INR and increase their risk of bleeding. The use of Vitamin K can be used to decrease patient's INR, but it poses the risk of altering the stability of Warfarin dosing going forward. The purpose of this study was to evaluate how well Jefferson Medical Center was using Vitamin K as a reversal agent in accordance with the CHEST guidelines.

Methods: This was a retrospective, chart-review analysis of patients who received vitamin K at Jefferson Medical Center in the past two years. Exclusion criteria were newborns receiving a Vitamin K injection. Baseline patient characteristics were collected and included age, gender, weekly warfarin dose, and the three previous INR levels, if applicable. When evaluating the use of Vitamin K, evaluation was based on dose, route, patients current INR, emergent bleeding, and timing of follow up of INR. Data was analyzed using descriptive statistics.

Results: In total, 115 people were included in the study. The average weekly warfarin dose 31.1mg and the average INR that triggered Vitamin K therapy was 8.82. Only 37.4% of people had an active bleed upon administration of warfarin. The average follow up INR time was 25.91 hours. The preferred method of administration was oral; followed by intravenous, intramuscular, and subcutaneous. In total, 60.9% of Vitamin K administration met the correct INR, route, dose, and bleeding status per the CHEST guideline. Factoring in follow-up INR time, the appropriateness drops to 12.3%.

Conclusion: Use of Vitamin K, as a reversal agent, is being over utilized at Jefferson Medical Center. The clinical significance of this impacts the patient's warfarin stability long-term for outpatient doctors and ambulatory care pharmacist trying to stabilize a patient's warfarin dose.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 3-318

Poster Title: Interpretation of urinalyses at Jefferson Medical Center

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Purpose: It is widely accepted that the first step in diagnosing a urinary tract infection (UTI) is to order a urinalysis. The urinalyses may not always be interpreted correctly. The purpose of this study was to determine if the urinalyses being ordered in the emergency department at Jefferson Medical Center were being interpreted correctly, based on a predetermined set of criteria.

Methods: Patient data was collected from past emergency department visits over a period of seven days. Patients were included if they received a urinalysis test and were over the age of 18. Patients were excluded if they were pregnant or had recurrent UTI's, defined as three or more UTI's in the last year. Each urinalysis was determined to be "positive" or "negative" based on a predetermined set of criteria. These criteria included UTI-associated symptoms and the amount of leukocyte esterase, nitrites, and white blood cells in the urine. Each patient chart was also examined to see if there was a positive or negative urine culture associated with the urinalysis, and also whether the patient had been treated or not.

Results: Out of 100 patients that were included in the study, it was found that 28 patients were treated for UTI. Eleven (39.3%) of those patients had urinalyses that met our previously stated "positive" criteria. Eighty-six patients had urinalyses that were considered "negative" and 5 (5.8%) produced positive cultures. Of the 14 remaining urinalyses that were considered "positive", 5 (35.7%) produced a positive culture. Out of 19 patients who received a urinalysis without presenting with UTI-associated symptoms, only 3 (15.7%) had positive cultures.

Conclusion: Less than half of the patients who were treated for a UTI were treated based on a "positive" urinalysis as determined by the specific criteria. This clearly shows that we are not following, what has been determined from previous studies to be, good predictors of a positive urinalysis and furthermore an accurate UTI diagnosis. This study can be used to make an argument for setting a predetermined criteria for all urinalyses ordered on patients who present with UTI-associated symptoms.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 3-319

Poster Title: Rate of hospital admissions in patients receiving oral chemotherapy at a large academic medical center

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Purpose: Chemotherapy administration is a complex process with significant potential for complications and toxicity. Oral chemotherapy agents are becoming increasingly more common, with estimates suggesting that they comprise approximately 25 percent of all new antineoplastic agents in development. The American Society of Clinical Oncology has set forth safety and quality standards, known as the Quality Oncology Practice Initiative, for the assessment, monitoring, and improvement of oncology practice. The objective of this study was to provide a benchmark to evaluate the rates of hospital admissions in ambulatory patients receiving oral chemotherapy and to assess compliance with the Quality Oncology Practice Initiative guidelines.

Methods: The institutional review board approved this retrospective chart review. This study included men and women age 18 and older with a prescription for an oral chemotherapy agent written from January 1, 2014 to December 31, 2014. Patients who began the medication prior to January 1, 2014, were enrolled in a clinical trial, or were being treated for a non-oncology diagnosis were excluded. Descriptive statistics were used to analyze the data collected during the chart review. The primary outcome measure was to evaluate the rate of hospital admissions in these patients within 30, 60, and 90 days of initiating an oral chemotherapy agent. Secondary outcome measures included rate of documentation of dose, schedule, a lab and toxicity monitoring plan, a follow up plan, and medication education during the visit the prescription was written as well as the rate of documentation of prescription start date, symptom and toxicity assessment, and medication adherence at the following visit.

Results: One hundred and eighty-nine men and women age 18 and older with a prescription for an oral chemotherapy agent written in 2014 were enrolled in the study. The admission rates 30, 60, and 90 days after initiating oral chemotherapy were 28/189 (15 percent), 30/189 (16 percent) and 11/189 (6 percent), respectively. A higher percentage of patients were admitted within the first two months of therapy than in the third month. On the day of the initial prescription, 72 percent of the patients had documentation of dose, 65 percent had documentation of schedule, 53 percent had documentation of a lab and toxicity monitoring plan, 79 percent had documentation of a follow-up plan, and 54 percent had documentation of medication education. During the follow up visit, 66 percent of patients had documentation of the prescription start date, 79 percent had documentation of symptom and toxicity assessment, and 16 percent had documentation of assessment of medication adherence. Goal of treatment was documented 19 percent of the time.

Conclusion: Without any formal intervention, the rates of hospital admission in patients receiving oral chemotherapy ranged from 6 to 16 percent within the first 90 days of treatment. Many of the secondary endpoints require improvement to meet current guidelines. These results indicate the need for formal monitoring practices to enhance patient outcomes and safety and that these interventions may be most important within the first two months of oral chemotherapy use. While oral chemotherapy treatment was not evaluated as the cause for admission, it can be hypothesized that advancement in monitoring and documentation practices will reduce hospital admissions in these patients.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 3-320

Poster Title: Retrospective analysis of dexamethasone utilization and outcomes in preterm infants experiencing moderate or severe respiratory distress syndrome

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Purpose: Respiratory distress syndrome (RDS) is a precursor of bronchopulmonary dysplasia (BPD), a disease consisting of pulmonary fibrosis, inflammation, edema, and destruction of alveoli. Controversy surrounds the use of dexamethasone to treat RDS and/or prevent BPD, as this practice has been associated with adverse neurodevelopmental outcomes. Therefore, the purpose of this study is to retrospectively assess the usage and short- and long-term effects of dexamethasone therapy in preterm infants experiencing moderate or severe RDS in order to better understand the utilization and outcomes at a large academic medical center.

Methods: This retrospective, observational study was approved by the institutional review board. Subjects included were patients in the neonatal intensive care unit who received at least one dose of dexamethasone for the treatment of moderate or severe respiratory distress syndrome at WVU Medicine between 2009 and 2015. Patients were excluded if dexamethasone was administered at 0.25 mg/kg once or for three doses for facilitation of extubation. A total of thirty patients were included in the study. Collected demographic data includes gestational age at birth, birth weight, sex, BPD diagnosis, history of surfactant and prenatal steroid use, and maternal diagnoses. Data collected regarding dexamethasone therapy includes age at initiation, initial dosing, average daily doses, number of titrations, average days per titration, total exposures, and overall duration of therapy. Courses of therapy will be considered separate if ten or more days elapse between doses of dexamethasone. To determine the outcomes of therapy, collected data will include details of ventilation, growth velocity, and neurodevelopmental delay. Descriptive statistics will be used to analyze the data.

Results: Thirty patients met inclusion criteria. Two-thirds of patients were males, and 90 percent of patients had severe BPD. Mean gestational age at birth and birth weight were 26 2/3 weeks and 0.88 kg. A mean of 2.54 surfactant doses were received. Dexamethasone was initiated at a mean postnatal age of 6 1/7 weeks and a median dose of 0.2 mg/kg/day for a median duration of 10 days. Eleven patients received a second course of therapy. For the first course, 19 patients (63.3 percent) were supported with high frequency oscillatory ventilation (HFOV) on initiation day and 3 (10 percent) and 2 (6.9 percent) patients were on HFOV on the last day of therapy and one-week post-dexamethasone, respectively. Growth velocity (GV) was 13.3 g/kg/day the week prior to initial treatment but fell to 0.89 g/kg/day during treatment. The week following therapy, GV was 14.3 g/kg/day. Thirteen patients (43.3 percent) were confirmed to have neurodevelopmental delay at a mean age of 19.8 months. Six patients were without delays, while the developmental status of 11 patients was undetermined.

Conclusion: Dexamethasone effectively aids in weaning infants with RDS from HFOV to other forms of ventilation while only temporarily restricting growth velocity. However, the possibility of long-term neurodevelopmental delays warrants careful utilization of dexamethasone in this population. Overall, more research is necessary to determine whether dexamethasone may also assist in further stepdown ventilation support and to assess the details of long-term deleterious outcomes.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 3-321

Poster Title: Comparative analysis of students' and clinicians' evaluations of interprofessional collaborative practice simulations

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Purpose: Interprofessional education (IPE) plays an important role in training health professionals in both the classroom and clinical practice. Students frequently participate in interprofessional education scenarios including standardized-patient simulations. Through curriculum-based interprofessional education, faculty and practicing clinicians are continually assessing students. Although frequently assessed, students often do not have the opportunity to assess interprofessional education and interprofessional collaborative practice (IPCP). Furthermore, clinicians and students rarely discuss their perceptions of interprofessional collaborative practice with one another. The purpose of this study was to analyze the difference between students' assessments of interprofessional collaborative practice versus practicing clinicians' assessments of interprofessional collaborative practice.

Methods: The institutional review board approved this investigative study. Sixty-two nurses employed by West Virginia University (WVU) Medicine were enrolled in an interprofessional education program consisting of a standardized patient simulation sponsored by a Health Resources and Services Administration (HRSA Grant NO: UD7HP28543) through the WVU School of Nursing. Following preliminary nursing assessment, a physician and a pharmacist joined to provide patient care. The simulations were recorded and later reviewed by the research team. Three students (two pharmacy and one nurse practitioner) and three clinicians (one pharmacist, one physician, and one nurse) were assigned to evaluate the simulation videos with each video being reviewed by three individuals, including at least one clinician and one student. The encounter was evaluated using a modified version of the Interprofessional

Socialization and Valuing Scale (ISVS) with 24 selected questions assessing partnership, cooperation, coordination, and shared-decision making. Each question was scored as “Never,” “Rarely,” “Occasionally,” “Most of the time,” or “Always.” For comparative purposes, answers were converted to a numerical value between 1 and 5 (Never = 1, Always = 5). Student evaluations were compared to clinician evaluations for the videos as a whole, for each individual video, and for each individual question.

Results: Student evaluations were compared to clinician evaluations and differences greater than 10% were considered significant and less likely due to chance. The average overall score for all videos was 3.64 for clinicians and 3.57 for students, which did not exceed the pre-defined threshold of 10%. However, a difference greater than 10% between student and clinician evaluations was observed for 21/37 videos. Student ratings were lower than clinician ratings in 13 videos and clinicians’ ratings were lower in 8 videos. When comparing the average score for each individual question a difference greater than 10% was observed for 8 questions. Student ratings were lower than clinician for 6 questions and clinician ratings were lower than students’ for 2 questions. The largest difference between clinician and student evaluations was observed for the question “Team members considered alternative approaches to achieve shared goals,” with an average clinician score of 3.59 and an average student score of 2.47.

Conclusion: Overall, evaluations of the videos were consistently different between clinicians and students, with the majority of student ratings being lower than clinicians’. The difference observed in clinicians’ and students’ evaluation of interprofessional collaborative practice may be due to students receiving a substantial amount of curriculum-based interprofessional education and having a thorough understanding of how it should work when done effectively. It is possible upcoming practitioners place a higher priority on interprofessional collaborative practice when caring for patients, making them more likely to assign lower ratings when using standardized scales to evaluate others completing an interprofessional collaborative practice experience.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 3-322

Poster Title: Assessment of prophylactic antibiotics for surgical site infections in elective colorectal surgeries after adoption of hospital-wide surgical site infection prevention bundle

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Purpose: Post-operative surgical site infections are a common problem associated with elective colorectal surgeries. Guidelines recommend redosing prophylactic antibiotics if surgery exceeds two half-lives of the drug. Antibiotics were not being redosed at our facility during these surgeries, and a rise in surgical site infections was observed. A new antibiotic bundle consisting of ceftriaxone and metronidazole was adopted to minimize the incidence of infections since these antibiotics do not require redosing. The purpose of this study was to determine the rate of surgical site infections and the appropriateness of antibiotics administered for elective colorectal surgeries after adoption of this bundle.

Methods: The institutional review board approved this single-center, retrospective chart review of elective colorectal surgeries. Men and women were enrolled if they were 21 years or older and undergoing elective colorectal surgery. Patients undergoing emergent surgery and those who were pregnant were excluded. A surgical site infection prevention antibiotic bundle consisting of ceftriaxone 2 g and metronidazole 500 mg was adopted on March 2, 2016. Data was collected between March 3, 2016 and August 31, 2016. Antibiotics administered pre-operatively were assessed for appropriate selection, dose, and timing based on our facility's antibiogram and guideline recommendations. Pre-operative antibiotics also were assessed to determine if the newly adopted antibiotic bundle was used. Data was collected to determine the incidence of post-operative surgical site infections, causative organisms of infection, length of stay, 30-day readmission, and demographic information. The primary endpoints of this study were the rate of post-operative surgical site infections and the appropriateness of pre-operative antibiotic regimens.

Results: Fifty-five patients were identified as having undergone a colorectal procedure, and 9 were excluded for undergoing emergent surgery or for being younger than 21 years of age. The incidence of surgical site infections after adoption of the ceftriaxone and metronidazole bundle was 8.7 percent versus 22.6 percent before adoption of the bundle. The frequency of the ceftriaxone and metronidazole bundle being used was 78.3 percent. The incidence of no antibiotics being documented or antibiotics other than a combination of ceftriaxone and metronidazole being used was 21.7 percent. Of those patients with a surgical site infection, only 25 percent were identified as having received appropriate pre-operative antibiotics. Prior to the adoption of the antibiotic bundle, between January 1, 2014 and July 31, 2015, 16.5 percent of patients received appropriate pre-operative antibiotics. After adoption of the bundle, between March 2, 2016 and August 31, 2016, 93.4 percent of patients received appropriate pre-operative antibiotics.

Conclusion: Adoption of the ceftriaxone and metronidazole bundle eliminated the need for redosing during elective colorectal surgeries. Adoption of the bundle also appeared to reduce the incidence of surgical site infections secondary to elective colorectal surgery. Compliance with the appropriate selection of pre-operative antibiotics was improved. More long-term data collection is needed to determine whether or not adoption of the ceftriaxone and metronidazole bundle is sustainable and can maintain a reduction in post-operative surgical site infections.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Descriptive Report

Session-Board Number: 3-323

Poster Title: Evaluation of the centralized production of intracameral moxifloxacin for cataract surgery and its impact on cost reduction

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Purpose: There is extensive evidence-based literature supporting the use of intracameral (IC) moxifloxacin as a new method for preventing postoperative endopthalmitis after cataract surgery. The Aurora Pharmacy Packaging Center (APPC) has started a new process for aseptically drawing up IC moxifloxacin for three ophthalmic surgeons. The purpose of this study was to evaluate APPC's centralized IC moxifloxacin production for quality assurance and quantify reduction in costs.

Methods: APPC's compounding procedure of IC moxifloxacin was evaluated using United States Pharmacopeia (USP) Convention 797 guidelines and compared with evidence based literature. Patients who received IC moxifloxacin intraoperatively from one of three ophthalmologists during cataract surgery performed during the first 7 months of APPC IC moxifloxacin production were identified using electronic health records. After patients were identified, cost savings were calculated by reviewing costs associated with drug and production supplies used by APPC.

Results: APPC's current process was validated as compliant with USP 797's sterile compounding guidelines, including specific guidelines for ophthalmic medications. USP 797 validation criteria included proper sterile technique, equipment, room sterility and pressure, beyond use dating, and storage. Before APPC's current process of preparing IC moxifloxacin, 1 vial of moxifloxacin was used per surgery and cost 140 dollars. Since implementing centralized production of moxifloxacin, 1 vial of moxifloxacin produced 9 IC injections and reduced cost to 20 dollars per surgery. The cost savings to the organization was 120 dollars per case. There were 459 cataract

surgeries among the 3 ophthalmologists during the study time resulting in a savings of over 55,000 dollars and a projected annual savings of over 100,000 dollars due to the new centralized production of IC moxifloxacin.

Conclusion: APPCs compounding procedure was found to be compliant with industry quality standards with significant cost savings. This study may impact hospital administrators to consider use of centralized moxifloxacin production to provide quality care at a reduced cost.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Evaluative Study

Session-Board Number: 3-324

Poster Title: Pharmacist Initiated Culture Follow-up in the Emergency Department Reduces Time to Treatment Optimization

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Purpose: Urinary tract infections (UTI) and sexually transmitted infections (STI) are frequently encountered medical conditions in the emergency department (ED). Antimicrobial therapy prescribed for treatment is empiric due to the delay between obtaining a culture and growth of an organism to direct definitive therapy. A culture review and call-back process is paramount to ensuring appropriate therapy and preventing complications of inadequately treated infections for patients not requiring hospital admission. This project investigates if pharmacist driven culture follow-up in the ED results in a reduction in time from final culture results to patient contact, when compared to the previous nurse driven process.

Methods: This retrospective pre- and post-intervention analysis occurred in a 40 bed ED that has 70,000 annual visits and is part of a 550 bed academic medical center. All patients with cultures drawn in the ED for UTI or STI in whom a change in therapy was indicated after final cultures resulted were included. Pre-intervention, all cultures were reviewed by the third-shift charge nurse and forwarded to the designated advanced practice provider (APP). Pharmacist involvement was obtained at the discretion of the APP. Post-intervention, all cultures were first reviewed by an ED pharmacist who then forwarded results as well as treatment recommendations to the designated APP. Data was collected via electronic health record (EHR) from September 15, 2015 to February 15, 2016 for the pre-pharmacist intervention group and April 1, 2016 to September 30, 2016 for the post-intervention group. A short workflow adjustment period was allowed between data sets. The primary outcome measured was time from final culture result to patient contact by the APP documented in the EHR. Secondary

outcomes included prevalence of treatment failure defined as patient return to the ED within 72 hours for the same medical problem, 30 day admission for related conditions (UTI, pyelonephritis, urosepsis), and percentage of accepted pharmacist recommendations. Statistical analysis was completed with Mann-Whitney U test.

Results: A total of 240 patients were included; 143 patients were in the pre-intervention group and 97 patients were in the post-intervention group. There were 103 patients in the pre-UTI group, 79 patients in the post-UTI group, 40 patients in the pre-STI group, and 18 patients in the post-STI group. In the overall study population, patient ages ranged from 18 to 98 years old, 80% female, 12.5% pregnant, 13.75% catheter related infections. In the post-intervention group, patients were contacted a median of 19.83 hours earlier than in the pre-intervention group (CI 95%, 17.15-22.5; $p < 0.001$). Post-intervention, median contact time for patients with a UTI was 15.06 hours earlier (CI 95%, 8.35-19.03; $p < 0.001$) and the median contact time for patients with an STI was 47.31 hours earlier (CI 95%, 29.1-67.41; $p < 0.001$) than the pre-intervention group. Post-intervention, fewer patients returned to the ED within 72hrs for the same medical problem (1 post- vs. 7 pre-), fewer patients were admitted for related conditions within 30days (3 post- vs. 6 pre-), and more recommendations were appropriately documented (87.4% post- vs. 60.9% pre-).

Conclusion: Pharmacist initiated culture review in the ED culture-call back process reduces time from final culture results to initiation of optimal antibiotic treatment. This intervention holds promise for reducing subsequent ED visits, hospitalizations, unnecessary healthcare utilization, and healthcare costs. Routine pharmacist involvement in the culture review process appears to have great value.

Submission Category: Pediatrics

Submission Type: Descriptive Report

Session-Board Number: 3-325

Poster Title: Pharmacist led medication history pilot in a pediatric hospital: Evaluation of barriers

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Purpose: Improvement in medication reconciliation has been on the forefront of changes in hospital practice in recent years. With nurses and other staff demonstrating varying practices for medication reconciliation, it is important to standardize a process to ensure best patient care. Studies have shown when an accurate medication history is obtained the potential for medication errors during the admission and post discharge subsequently decreases. Pharmacist involvement in medication history processes could potentially reduce medication related errors. This project was designed to create a process and identify barriers which prevent pharmacists from obtaining medication histories in a high risk patient population: pediatrics.

Methods: A goal of the pharmacy team at HSHS St. Vincent Children's Hospital has been to increase pharmacist involvement in patient care to prevent medication errors. Pharmacist led medication reconciliation has been identified as one area of opportunity to accomplish this goal. A pharmacy student in collaboration with the hospital pediatric service, clinical colleagues, and pharmacy staff created a protocol for pharmacy involvement in obtaining medication histories within the newly designated children's hospital. The protocol includes a process of how to contact the pharmacy for a medication history, specifically outlines the information that should be obtained during each encounter, and designates where to document the information. Corrections based on the patient and family interview were made to the medication list in the electronic medical record. All pharmacist interventions were also tracked on a data sheet. Within a six week period, a limited number of medication histories were completed by pharmacy. Limitations to obtaining medication histories were identified and

process improvements were made throughout the trial in an attempt to overcome barriers encountered.

Results: A total of twelve medication histories were obtained during the six week period. The pharmacy student was not contacted for any histories within the first two weeks of the pilot. Due to inadequate referrals from the nursing staff the process was re-evaluated, barriers were assessed, and changes to the process were made. Opportunities identified included the pharmacy student attending morning huddles on the pediatric floor, reminding nursing daily to contact the pharmacy with any new admissions, and monitoring for new admissions throughout the day. With the changes made, nine medication histories were obtained during the following two weeks. Lastly, within the last two weeks of the pilot only three medication histories were obtained. Barriers were again reassessed with pharmacy and nursing staff to identify changes that would need to be made in order to expand and sustain this pharmacy service within the children's hospital. As a team we identified that the biggest hurdles for pharmacy completion of admission histories are due to the nursing workflow and availability of pharmacy staff at the time of admissions.

Conclusion: Medication reconciliation completed by pharmacy staff has proven to be best practice. Continuing barriers preventing implementation are lack of pharmacy notification when there is an admission and having inadequate staff available to complete the histories. Solutions to these barriers include: improvements in nursing workflow during admission, automatic consult to pharmacy when admissions occur, and having trained pharmacy staff available during all shifts. These improvements may aid in a higher success rate of obtaining medication histories and reaching the pharmacy's goal to prevent medication errors.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 3-326

Poster Title: A national survey evaluating pharmacist completion of daily bedside patient evaluations.

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Purpose: The level of pharmacist participation in direct patient interaction is often dependent on the institute of practice. With advancement of the profession, pharmacists have become more involved in medical teams and direct patient care. Previous studies have shown that by increasing pharmacist participation in multidisciplinary rounds, preventable adverse drug events were decreased by as much as 78 percent. However, no data is available discussing the impact of the pharmacist seeing and communicating with patients daily in the inpatient setting. The purpose of this study was to determine pharmacists' current practice and viewpoints regarding pharmacists performing daily bedside patient evaluations.

Methods: An electronic survey was distributed to the American College of Clinical Pharmacy's (ACCP) critical care Practice and Research Network (PRN) list serve, a national database of self-identified critical care practitioners. The survey evaluated pharmacist demographics, completion of daily bedside patient evaluations (DBPEs), factors influencing and prohibiting DBPEs, and overall pharmacist opinion of the value of DBPEs. We defined DBPEs as physically entering each patient's room to observe and/or communicate with the patient in order to better understand how the patient is responding to therapy.

Results: A total of 122 pharmacists responded to the survey. Of these responses, the majority of pharmacists, 69 percent, indicated that most of their time was spent in a critical care unit. 85 percent of respondents participated in daily rounds as a part of their current practice and 89 percent of the respondents completed DBPEs on at least one patient on a daily basis. According to 68 percent of respondents, the main factor that influenced completion of DBPEs by pharmacists was having the principle being instilled early in their career. The primary factors

that influenced pharmacists not to complete DBPEs were time constraints and patient load, 84 percent and 68 percent, respectively. The majority of DBPEs, 84 percent, were completed during patient care rounds with an interdisciplinary team. 65 percent of pharmacists stated that they either agree or strongly agree with the statement that DBPEs are an important part of inpatient pharmacy practice for high acuity or critical care patients.

Conclusion: The survey data obtained from the ACCP critical care PRN list serve demonstrated that the majority of critical care pharmacists believe that the completion of DBPEs by inpatient pharmacists is an important part of practice. However, it is not always plausible due to common barriers to pharmacy practice such as time limitations and the number of patients that they are overseeing. By instilling this critical aspect of pharmacy practice early in a young pharmacist's career, critical care pharmacists may find ways to prioritize DBPEs above other less important aspects of practice.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 3-327

Poster Title: Using various extemporaneous pharmaceutical compounding procedures, equipment and quality assurance techniques to enhance CUW SOP student knowledge of emulsions as a pharmaceutical dosage form

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Purpose: Pharmacists are the only profession trained in extemporaneous compounding of pharmaceutical products. Without compounding pharmacists, patients who need specialty medications would not be able to receive proper treatment. The required curriculum of the Concordia University Wisconsin School of Pharmacy (CUW SOP) program provides first year pharmacy students the opportunity for exposure to and practice with non-sterile extemporaneous pharmaceutical compounding. One week during the semester, the students practice compounding an emulsion dosage form. As this is an inherently unstable preparation, stability awareness and quality assurance is of particular concern.

Methods: Objective: To demonstrate the degree to which first year CUW SOP students enhance their knowledge and appreciation for the emulsion dosage form with regard to stability and equipment utilized.
Methods: First year CUW SOP students compared four different types of emulsions: a manufactured emulsion, an emulsion compounded with mortar and pestle, an emulsion compounded with a handheld homogenizer, and an improperly compounded emulsion. Prior to an emulsion compounding lab, the students completed a survey demonstrating their knowledge of the various emulsion compounding techniques and concepts. The students also described and drew anticipated results of microscopic evaluation of these four emulsions. The survey and drawings of microscopic evaluations of the emulsions were repeated after the emulsion compounding experience. During the emulsion compounding lab, each student prepared an emulsion using a mortar and pestle. Students worked as a team to also prepare an emulsion using a handheld homogenizer. Emulsions were visualized under a microscope for differences and signs of instability.

Results: Results were gathered and analyzed using the answers the students record in their pre- and post-lab surveys, as well as their drawing of anticipated and resulted microscopic images. The results were similar to our expected results. Those results were that students will know that the technique involving the handheld homogenizer will prepare a more stable product however; the degree to which it forms a stable product was underestimated prior to lab. After lab they had an advanced appreciation for the equipment utilized as well as the instability and delicacy of preparation of the emulsion dosage form. The globules of the emulsion prepared with a handheld homogenizer were much smaller than the globules in the emulsions prepared with a mortar and pestle as visualized under the microscope.

Conclusion: After completion of this lab the students demonstrated advanced knowledge in compounding extemporaneous emulsion pharmaceutical dosage forms. Prior to lab the students expected the handheld homogenizer to make a more stable emulsion. However, after comparing the responses from the post-lab knowledge assessment to the pre-lab one, it was apparent that they left the lab with a deeper comprehension about extemporaneously compounded emulsions than before lab. Without the knowledge students gain in this course they would not be able to appropriately serve patients requiring compounded emulsion dosage forms. This confirms how important non-sterile compounding courses are to pharmacy school curriculums.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 3-328

Poster Title: I AM FULL: A mnemonic for pharmacists to ensure optimal monitoring and safety of Total Parenteral Nutrition

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Purpose: Total parenteral nutrition (TPN) involves the intravenous delivery of nutrients to patients who cannot tolerate food enterally. Due to the inherent complexity and limited use of TPN, the monitoring parameters for these patients can be cumbersome for pharmacists to properly implement, resulting in possible safety issues. Checklists have been recommended to improve the safety and efficacy of complicated healthcare interventions. In this study, a guideline-derived mnemonic was developed and implemented to systematically and safely manage TPN therapy. Pharmacist feedback was gathered to investigate the safety and efficiency of TPN monitoring via the use of this novel mnemonic.

Methods: The institutional review board approved this survey-based study, which used the mnemonic, I AM FULL, to standardize TPN monitoring. This tool was developed through the review of guidelines and peer-reviewed journal articles. The mnemonic combines seven essential components of TPN use and monitoring: Indications, Allergies, Macro/Micro nutrients, Fluid, Underlying comorbidities, Labs, and Line type. Pharmacists are encouraged to use the mnemonic for initiation and daily monitoring of TPN. The mnemonic was piloted via a group of 46 pharmacists from Aurora St. Luke's Milwaukee, WI. Prior to implementation of the mnemonic, pharmacists were educated on how to use the tool at a department meeting, during which a PowerPoint was presented and pocket reference cards were distributed. The effectiveness of this mnemonic was assessed through pre- and post-implementation surveys. The pre-implementation survey, consisting of six questions, was distributed as a paper copy at the time of training. The post-implementation survey, consisting of seven questions, was completed via surveymonkey two weeks after the mnemonic education. Descriptive analysis was conducted to measure the quality of the mnemonic, ease of use, time for monitoring, and confidence in safety and efficacy.

Results: Forty-six pre-implementation and nineteen post-implementation surveys were returned and analyzed. The pre-implementation survey demonstrated 26% percent of pharmacists monitor TPN daily, 50% weekly to monthly, and 24% greater than monthly. Additionally, 98% of responders felt a mnemonic would improve safety and efficacy of TPN monitoring. The post-implementation survey showed 100% of pharmacists felt that the mnemonic provided a methodical process to monitor TPN, and 94% of pharmacists were satisfied or very satisfied with the mnemonic. With 1-10 minutes considered the ideal time frame for efficient TPN monitoring, the pre-implementation survey showed 80% of responders taking between 1-10 minutes to monitor a TPN. In contrast, the post-implementation showed an improvement in the percentage of pharmacists achieving this ideal, with 94% of surveyed pharmacists taking between 1-10 minutes for TPN monitoring. Furthermore, comparison of the pre- and post-implementation surveys revealed a marked increase in the percentage of pharmacists confident in their ability to safely monitor the use of TPN. The pre-implementation survey showed that 59% of pharmacists were confident or very confident in the safety and efficacy their own monitoring process. However, following implementation of the mnemonic I AM FULL, 88% of pharmacists were confident or very confident in the monitoring process.

Conclusion: TPN is a high alert medication requiring special attention by pharmacists. A mnemonic providing a systematic monitoring process may increase pharmacist's confidence in TPN monitoring and improve safety and efficacy of TPN use. Evaluation of pre- and post-implementation surveys revealed a desire for a systematic TPN monitoring tool, as well as a positive perception of the mnemonic I AM FULL. The majority of pharmacists felt the mnemonic improved their confidence and safety in monitoring TPN, and the average time for monitoring was slightly decreased following implementation of the mnemonic. The survey was limited by the low number of post-implementation responders.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 3-329

Poster Title: Iron sucrose administration and risk of hypersensitivity in an outpatient setting

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Purpose: Intravenous (IV) iron sucrose is used for the treatment of iron deficiency anemia (IDA) from many causes. Compared to first generation IV iron preparations, iron sucrose has a lower incidence of hypersensitivity reaction. Labeling recommends iron sucrose doses less than or equal to 200 mg be administered IV by slow injection or infusion. This medication use evaluation was completed to describe the incidence of iron sucrose-associated hypersensitivity and adverse drug reactions (ADRs) following implementation of an outpatient administration guideline recommending IV injection for administration of iron sucrose doses less than or equal to 200 mg.

Methods: This retrospective chart review included outpatients from two hospital-based infusion clinics (oncology and non-oncology) who received a dose of iron sucrose 200 mg between August 1, 2013 and April 30, 2014 and August 1, 2015 and April 30, 2016. The different time periods were selected to account for modifications made to the outpatient administration guidelines in April 2014 that recommended IV injection for administration of iron sucrose doses less than or equal to 200 mg. Patients with any indication for iron sucrose were included. The following data points were collected for each patient: demographic information, indication for iron sucrose, number of iron sucrose doses and type of administration (IV injection or infusion), past allergy or intolerance to any IV iron product, baseline hemoglobin and iron indices, and details regarding any hypersensitivity or ADR (type, timing, intervention, outcome). Hypersensitivity was defined as any undesirable immune response (Immunoglobulin E (IgE) mediated or non-IgE mediated) resulting from free iron in circulation. Signs or symptoms included dizziness, hypotension, nausea, vomiting, and diarrhea. An ADR was defined as phlebitis, gastrointestinal (GI)/nausea/diarrhea, lethargy, dizziness, and other ADRs. The primary descriptive outcome was difference in hypersensitivity or ADR when iron sucrose 200 mg was administered as an IV injection or infusion.

Results: Of the 148 pre- and 87 post-guideline modification patients who received iron sucrose 200 mg, a random sampling of 26 patients was evaluated from each time period. There were no apparent differences in baseline characteristics between groups, with the exception of ferritin level. The most common indication for iron sucrose was IDA due to chronic blood loss. Of the total 226 doses of iron sucrose, there were no hypersensitivity reactions. ADRs were noted in 3.5 percent of IV injection and 3.1 percent of infusion administrations. After a total of 105 doses of iron sucrose in the pre-guideline modification group and 121 doses in the post-guideline modification group, nine and six ADRs, respectively, were documented. The most common ADRs were GI/nausea/diarrhea, dizziness, and other ADRs (headache and myalgia/arthralgia). There were no drug-related deaths, serious adverse events, or ADR-related discontinuation of therapy. Sixty percent of reactions, in both pre- and post-guideline modification groups, were delayed reactions. Onset of reaction occurred after the second infusion and after the first infusion in the pre- and post-guideline modification group, respectively.

Conclusion: In the present population, administration of iron sucrose 200 mg as IV injection is safe, resulting in no incidents of hypersensitivity and demonstrating a similar rate of ADR when compared to infusion. IV injection administration is a convenient option in the outpatient setting and may increase patient satisfaction, increase nurse efficiency and optimize chair time.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 3-330

Poster Title: Comparison of doctorate of pharmacy dual degrees and pharmacy residencies utilizing economic data

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Purpose: Creating ways to become more competitive without increasing financial burden is a synergistic goal between the pharmacy profession and students. Two ways in which students may achieve this goal are pharmacy residencies and dual or joint degrees. Opportunity costs of completing a post graduate year one (PGY1) pharmacy residency were compared to the direct costs of different dual/joint degrees, including Masters of Business Administration (MBA), Public Health (MPH), and various Sciences (MS) with a doctorate of pharmacy. The results of this research will be useful in guiding the profession and pharmacy students in their continuing education.

Methods: Approval from the Institutional Review Board was not necessary prior to completing this research due to primary data being obtained through open source databases. Data was obtained from pertinent nation databases such as ASPH, AACP, and other organizations as well as from an extensive online review involving pharmacy, pharmacy residencies, and Master's Degree programs throughout the United States. Dual/joint degree programs included any Doctorate of Pharmacy combined with a Masters program with any credit overlap between programs that was acknowledged via American Association of Colleges of Pharmacy (AACP) "Dual-Degree Programs Anticipated for 2015-2016." Pharmacy residency programs included PGY1 programs with information available from the American Society of Health-System Pharmacists (ASHP). Arkansas, California, South Carolina, and Wisconsin have been evaluated because they provide an adequate sample size, minimize regional difference, and include a range of average pharmacists' salaries. Our economic model compared dual/joint degrees to residencies via a calculation of mean hours per week at mean pharmacist salary, plus total extra

tuition, needed to match mean residency salary. California and Citidel of South Carolina are the exceptions to this model due to both degrees being awarded simultaneously.

Results: While completing a dual/joint degree, 17-23 hours per week at average pharmacist salary is what would be required in order to match a PGY1 residency salary in all circumstances but California and Citadel. More specifically, in Arkansas, 17-23 hours per week is required. In South Carolina, 18-23 hours per week is required, not including Citadel. In Wisconsin, 18-23 hours per week is required. These values all take tuition and duration of the respective dual/joint degree programs into account. California could not be included in this calculation because all programs require both degrees to be rewarded simultaneously which forces the student to postpone working as a pharmacist. Duration of doctorate of pharmacy dual degrees in California also range from no extra time to one extra year required. This forces a direct comparison of financial costs between PGY1 residencies and dual/joint degrees. This cost ranged from $54,375 less cost to $129,805 more cost when choosing a dual/joint degree over a PGY1 residency. This situation is also seen with regards to Citadel as their program requires no additional time than the doctorate in pharmacy which leads to the dual degree program being $43,004-$29,468 less costly than a PGY1 residency.

Conclusion: Dual/joint degree and residency programs both vary, but the immediate costs of each are very similar. With regards to the 10 dual/joint degree programs that the “hours per week” could not be calculated, half of the programs had less costs than the residencies in the respective state. With regards to the 5 dual/joint degrees that the “hours per week” could be calculated, they ranged from 17-23 “hours per week.” This amount of time commitment is very reasonable for a student. Lastly, there are many factors to consider when choosing post doctorate of pharmacy opportunities in order to become more competitive.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 3-331

Poster Title: Evaluation of patients receiving lung transplant with additional dose of basiliximab post-operatively due to excessive blood loss

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Purpose: Successful lung transplantation is dependent upon adequate immunosuppression. Currently, most lung transplants use immunosuppressing induction agents, including polyclonal antibodies or interleukin-2 receptor antagonists. Basiliximab is a monoclonal antibody that antagonizes interleukin-2 receptors on T-lymphocytes. Surgeons at our institution are concerned that patients may not be maintaining optimal immunosuppression due to loss of basiliximab secondary to perioperative blood loss. As such, patients have received an additional dose of basiliximab to account for drug loss based largely on surgeon discretion. The primary goal of this study is to determine patient characteristics and outcomes associated with higher dosing of basiliximab.

Methods: Froedtert Hospital is a 550 bed academic medical center and level one trauma center located in Milwaukee, Wisconsin; completing approximately 15 lung transplants per year. A retrospective analysis of patients admitted to Froedtert Hospital who had a lung transplant from June 2015 through July 2016 was completed. Inclusion criteria included adult lung transplant recipients admitted to Froedtert Hospital who had basiliximab administered for induction immunosuppressive therapy. Patients less than 18 years of age, receiving a re-transplant or multi-organ transplant were excluded. Patients were classified into two groups: traditional dosing of basiliximab (defined as 20mg intravenously (IV) on the day of transplantation and a single dose of 20mg IV on post-operative day four) and higher dosing of basiliximab (defined as 20mg IV on the day of transplantation and two post-operative doses of basiliximab). The primary objective of this study was to compare the number of infections

within 90 days of transplant between the standard dosing group of basiliximab to the group who received an additional dose. Infection was further defined as the use of antibiotics within 90 days after the transplant procedure, excluding prophylactic antibiotic use. Secondary objectives included length of hospital stay, length of intensive care unit (ICU) stay, in-hospital mortality, length of surgery, and estimated intraoperative blood loss.

Results: A total of 10 double-lung transplant patients were analyzed, four of whom received a higher dose of basiliximab and six a traditional dose. Three of the four patients in the higher dose basiliximab group developed an infection postoperatively, compared to all six in the traditional dose group. Secondary outcome results showed the median ICU length of stay in the higher dose group was 14.1 days (mean SD = 13.1 plus/minus 4.7 days) and 5.4 (mean SD = 29.6 plus/minus 31.8 days) in the traditional dose group. Median estimated intra-operative blood loss in the higher dose group was 1700ml (mean SD = 1952.5 plus/minus 1055 mL) compared to 450mL (mean SD = 916.67 plus/minus 842.4 mL) in the traditional dose group. Length of hospital stay and in-hospital mortality rate were unable to be assessed at the time of this analysis as two patients had not yet discharged from the hospital.

Conclusion: The primary outcome of this study demonstrated overall no difference in 90-day post-operative infection rates between patients receiving an additional dose of basiliximab compared to those receiving traditional dosing. Results showed that patients receiving an additional dose of basiliximab had more intra-operative blood loss than those in the traditional dosing group, and, interestingly, a shorter ICU length of stay. Based on these results, it appears that an additional dose of basiliximab in patients with a proportionally greater amount of blood loss is safe. However, further investigation with a larger patient sample size is necessary to draw conclusions.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 3-332

Poster Title: Appropriate initial empiric therapy in the surgical intensive care unit for methicillin-resistant Staphylococcus aureus (MRSA) pneumonia and non-MRSA pneumonia

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Purpose: The Infectious Disease Society of America (IDSA) 2016 hospital acquired pneumonia (HAP) guidelines state to initiate MRSA pneumonia therapy when the hospital local antibiogram has greater than ten to twenty percent of Staph aureus isolates that are methicillin resistant The surgical population at Froedtert Medical Lutheran Hospital (FMLH) historically has a MRSA rate of _____ percent. The goal of this evaluation was to determine if appropriate initial empiric therapy was achieved and what changes could be made to the initial empiric therapy.

Methods: A retrospective analysis of trauma patients in FMLH's surgical intensive care unit was completed by a pharmacy student and resident. A list of patients with laboratory confirmed MRSA HAP and confirmed non-MRSA bacterial HAP between July 1, 2007 - January 17, 2016 was analyzed. The MRSA HAP and non-MRSA HAP arms are reused from a previous data set. Both arms were collected differently from one another. The MRSA HAP arm was all the incidents of MRSA HAP from July 1, 2007 - January 17, 2016. The non-MRSA HAP arm utilized a random number generator to randomly pick non-MRSA HAP patients within the time period of July 1, 2007 - January 17, 2016. An excel spread sheet with specific criteria was made by the resident to help identify risk factors associated with MRSA PNA and appropriate empiric antibiotic coverage some criteria includes, but not limited to: organisms cultured, date of culture, empiric antibiotics used, appropriate empiric coverage for sensitives, final antibiotic used for de-escalation, age, gender, in the past 90 days from when culture drawn greater than 2 days in a nursing home or long term facility, chest tubes prior to culture and date of

placement. Patients who were under 18 years of age, pregnant, had cystic fibrosis, had chronic tracheotomies, or had cultured organisms deemed to be colonization alone were excluded.

Results: The top bugs seen in the FMLH surgical intensive care unit for non-MRSA HAP were MSSA, H influenza beta lactamase positive and negative, and E Coli. For the 55 patients analyzed for non-MRSA HAP, 49 percent of patients had a multi-organism infection. As for the MRSA HAP, 40 percent of the total 27 patients analyzed had a multi-organism infection. The top bugs seen in a MRSA HAP multi-organism infection were Psedomonas aeruginosa, Enterobacter cloacae, Proteus mirabilis, and H influenza beta lactamase positive. For those with non-MRSA HAP 92.7 percent of patients were started on appropriate total empiric coverage while for the MRSA HAP 92.6 percent of patients were started on appropriate total empiric coverage.

Conclusion: If patients in the non-MRSA HAP arm were empirically started on monotherapy Cefepime or Zosyn then 98.2 percent, and 98.2 percent of patients respectively would be appropriately covered. This would mean that five and a half percent more patients would be appropriately covered if on Cefepime or Zosyn monotherapy for initial empiric therapy. As for the MRSA arm, these patients received 92.6 percent of appropriate initial total empiric coverage. If the initial therapy was changed to monotherapy Ceftriaxone, Cefepime, or Zosyn then the MRSA patients would be inadequately covered by 70.4 percent, 59.3 percent and 59.3 percent respectively.

Submission Category: Pharmacokinetics

Submission Type: Evaluative Study

Session-Board Number: 3-333

Poster Title: Pharmacokinetics of psilocybin in normal, healthy adults

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Purpose: Psilocybin is a naturally occurring tryptamine known for its hallucinogenic effects. Although it was classified as a Schedule I drug in 1970, emerging research has found that psilocybin may be useful for the treatment of anxiety and depression associated with advanced cancer and substance abuse disorders. Collaboration among multiple universities is seeking to develop psilocybin into an FDA approved drug. The goal of this project was to characterize the safety and pharmacokinetics (PK) of escalating oral doses of psilocybin in a population of healthy adults.

Methods: After obtaining regulatory approvals, twelve healthy adults with prior hallucinogenic experience were recruited from the southern Wisconsin area. Subjects were screened for psychiatric illness and other excluding factors. Eligible subjects received six to eight hours of preparatory counseling and trust-building with two trained guides prior to their eight hour treatment session. Oral psilocybin doses were administered at least four weeks apart at 0.3, 0.45, and 0.60 mg/kg. Venous blood samples were collected at the following times: pre-dose, 15, 30, 45, 60, 90, 120 min, 3, 4, 6, 8, 12, 18, 24 hours. Urine was collected over 24 hours after each dose. Subjects were kept in the UW Clinical Research Unit overnight for blood sampling and received debriefing with their study guides the following day. Ascorbic acid was added to plasma and urine to stabilize the active metabolite, psilocin. Psilocybin and psilocin concentrations in the plasma and urine were analyzed by Covance Laboratories (Madison, WI). Population PK modeling was performed using a nonlinear mixed effect modeling program (NONMEM) with exploration for significant covariates predicting clearance and volume of

distribution. The final model was selected based upon minimization of the objective function and visual inspection of residual and VPC plots.

Results: Thirteen subjects were recruited to the study. Blood samples could not be obtained from one subject after the first dose was administered and the subject was replaced. Two of the twelve evaluable subjects were women, and the median age was 43 years (range 24 to 61). One subject was removed from the study after the first dose due to white-coat hypertension, and another subject declined the third dose due to scheduling difficulties. All doses of psilocybin were well-tolerated. Mild, temporary elevations of blood pressure and heart rate were common, as were mild headaches that responded well to acetaminophen. No serious adverse events occurred. Psilocin PK could be accurately described using a modified one-compartment model with linear absorption and a bidirectional compartment for the formation of psilocin glucuronide, the major metabolite. No parent psilocybin was detectable in any urine or plasma sample. Renal clearance accounted for less than 4% of the elimination of psilocin. Weight was not found to be a significant covariate for clearance or volume of distribution. The following parameters were identified (mean [SE%]): clearance (CL/F) of 164 L/hr [23.2%], volume of distribution (V/F) of 298 L [20.2%], and absorption rate constant (ka) 0.367 hr-1 [9.3%].

Conclusion: When administered in an appropriate environment with adequate preparation, even high doses of psilocybin are well-tolerated. The resulting concentration vs. time data were best fit by a one compartment model with reversible formation of the glucuronide metabolite. None of the tested demographic or laboratory covariates were found to have a significant impact on the model. Dose modification of psilocybin for renal dysfunction does not appear to be necessary.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 3-334

Poster Title: Updating a pneumonia decision support tool based on the 2016 hospital-acquired and ventilator-associated pneumonia clinical practice guidelines

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Purpose: The Infectious Diseases Society of America and the American Thoracic Society released new guidelines this year on the treatment of hospital-acquired pneumonia (HAP) and ventilator-associated pneumonia (VAP). This necessitated a comparison of the hospital's current pneumonia decision support tool and the 2016 guidelines to identify and remedy discrepancies to ensure appropriate and optimal use of antibiotics.

Methods: The "Management of Adults With Hospital-acquired and Ventilator-associated Pneumonia: 2016 Clinical Practice Guidelines by the Infectious Diseases Society of America and the American Thoracic Society" was analyzed. Differences between the recommendations from the guidelines and the hospital's pneumonia decision support tool were identified. Interpretation of the guidelines and identified inconsistencies were discussed with pharmacists and physicians. Hospital antibiogram and methicillin-resistant Staphylococcus aureus (MRSA) rates were used to develop facility-specific recommendations. A presentation was created highlighting proposed updates to the pneumonia decision support tool to facilitate discussion at the antimicrobial stewardship meeting and feedback was recorded. Mock-up of the updated decision support tool to be created and presented for further discussion and eventual review for approval by the antimicrobial stewardship committee.

Results: Discrepancies identified included changes in recommended use of lab markers, therapy, and duration. One key change from the existing pneumonia decision support tool from the 2016 guidelines was the delineation of patients that required double versus single pseudomonas coverage based on risk factors. Qualitative feedback from the antimicrobial

stewardship committee on the proposed recommendations was also obtained. Sample of feedback included commentary on reinforcing seven day duration of treatment and removing the restricted drug consult for meropenem if ordered through the decision support tool.

Conclusion: Update of the existing decision support tool for HAP and VAP was necessary given discordances from the 2016 guidelines. Review of hospital antibiogram and MRSA rates is vital to ensure recommendations are tailored to the practice site.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 3-335

Poster Title: Antimicrobial stewardship and Clostridium difficile infection: evaluation of fluoroquinolone restriction adherence and clinical outcomes associated with alternative antibiotics

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Purpose: Clostridium difficile infection (CDI) occurs due to a multitude of factors and significantly affects patient and hospital outcomes. One contributing factor to CDI development is the administration of fluoroquinolones. In response to high CDI rates, our institution restricted fluoroquinolone antibiotic use on units deemed to be of highest risk of poor outcomes from CDI; the solid organ transplant and medical/surgical intensive care units. The objective of this project was to measure compliance with a unit based fluoroquinolone restriction policy while assessing drug-class restriction safety and efficacy.

Methods: A multi-disciplinary workgroup was formed and created unit-specific, indication based tables listing empiric and step-down fluoroquinolone interchanges. These tables served as the backbone of the institutional restriction policy. The policy was displayed electronically at the time of order entry and clinical pharmacists upheld compliance with the policy during order verification. Use of fluoroquinolones required preauthorization by an infectious disease physician or pharmacist. Prospective tracking of all patients receiving treatment courses of antimicrobials occurred on the target units from July 5, 2016 to August 5, 2016. Indications for antimicrobials were collected via chart review and were considered policy compliant if selection was consistent with the interchange tables. The primary outcome was policy compliance. Secondary outcomes were rate of acute kidney injury (AKI) and efficacy of antimicrobial interchange. Acute kidney injury, as defined by the 2012 Kidney Disease Improving Global Outcomes guidelines, was collected and reported overall and for the subgroup of aminoglycoside-based treatment courses. Additional risk factors for nephrotoxicity were

collected for all patients who developed AKI. Efficacy was measured by treatment success, defined as lack of readmission for the same infection within one month, and mortality rate. The rate of hospital-acquired CDI, defined as the diagnosis of CDI more than 48 hours after admission, was also collected during the study time period.

Results: One hundred and twenty-four patients received 138 treatment courses and were included. Composite compliance was 75.4 percent with the fluoroquinolone restriction policy (79.7 percent and 71.6 percent on the transplant and intensive care units, respectively). The most common scenario resulting in policy violation was avoidance of aminoglycoside use. Acute kidney injury developed in 15.2 percent of courses overall. A total of seven treatment courses included an aminoglycoside; two of these resulted in AKI. When specifically reviewed, the patients undergoing these treatment courses had multiple risk factors for AKI development including age, co-morbid conditions, sepsis, and concurrent nephrotoxic medications. Overall treatment was successful in 95.6 percent of courses. Mortality rate during the study period was 8.1 percent. Hospital-acquired CDI during the study period was 0.72 percent.

Conclusion: Fluoroquinolone restriction and use of alternative antibiotic therapies on high-risk units was successful, safe, and effective. Overall compliance with the restriction policy was satisfactory, but adherence can be increased further by revising the unit-specific tables to include missing indications. One month after the implementation of the pilot, the rates of hospital-acquired CDI within the institution are continuing to trend downwards.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Evaluative Study

Session-Board Number: 3-336

Poster Title: Discharge delay root causes and controlled substance prescribing satisfaction at an academic medical center

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Purpose: Hospitals functioning near capacity risk their ability to admit patients through transfers or between units, leading to treatment delays. UW Health formed a capacity management group to address this problem, with discharges prior to noon as the primary metric. Currently, 20.4 percent of discharges meet this metric, 4.6 percentage points below the goal. Pharmacists previously reported dissatisfaction and delays resulting from the controlled substance prescribing process; however, other barriers could be identified with workflow analysis. The purpose of this project was to assess the root causes of discharge delays at an academic medical center.

Methods: All inpatient pharmacists were trained to create intervention documentation in the electronic health record whenever patient education was completed after noon during a predefined fourteen-day period, from May 16 through June 1, 2016. Discharge delay root causes previously identified were available for selection, including: awaiting controlled substance prescription signature, awaiting provider medication reconciliation/changes/clarifications, medical factor, post-discharge factors, pharmacist workload, and discharge medication orders not complete by noon. Interventions were done at the patient level and tied to demographic and discharge time information.
An intervention report then complied the time of completed discharge medication orders, discharge education, and actual discharge for all discharged inpatients during the time period. Patients without pharmacist documented education, and duplicate entries were excluded. When documentation was not completed, the subtype was assigned as “discharge medication orders not complete by noon”, or “unknown”.
An online survey of medical resident perceptions of controlled substance prescription signing was created and then distributed to second through fourth year residents by the director of

graduate medical education. Questions included: respondent's demographic information (post-graduate year, department, DEA registration); estimation of interruptions and discharge delays with current system; satisfaction; perception of impact of expanding provider registration; priority of morning discharges; and a free text comment field.

Results: During the two-week period, 1600 inpatient discharges were reported with 24 percent discharged before noon. In cases where patients were discharged after noon, discharge medication education was completed at or after noon 72 percent of the time. Discharge medication orders not completed by noon, accounted for the primary cause in 50 percent of discharge delays. Additional reasons included patient factors (9.2 percent), medical factors (6.6 percent), pharmacist workload (4.5 percent), controlled substance prescription signing (4.1 percent), amongst others.
The medical resident perceptions survey had 51 respondents, with the most common programs being surgery, medicine, and anesthesiology. They reported disagreeing (slightly to strongly) with controlled substance signing satisfaction 75 percent of the time. Ninety-six percent agreed that expanding medical resident controlled substance signing would reduce discharge delays.

Conclusion: Although a small percentage of primary causes attributed to discharge delays, controlled substance prescription signing is an issue identified by both pharmacy and medical residents causing needless delays in patient discharges. A majority of discharge delays resulted from pharmacists not receiving timely discharge medication orders. This strongly supported a separate project. A limitation of this workflow analysis is that root causes of discharge delays are dependent on medication orders. With this root cause addressed, additional downstream causes may be identified. Expansion of resident controlled substance prescribing may improve discharge workflow, and improve pharmacist and physician satisfaction.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 3-337

Poster Title: Use of adjunct beta-lactams to prevent the in vitro development of daptomycin resistance in vancomycin-resistant enterococci

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Purpose: Daptomycin (DAP) is a critical component in the treatment of vancomycin-resistant enterococci (VRE) infections. Development of DAP resistance (DAP-R) within the course of DAP treatment in previously DAP susceptible VRE poses a significant clinical challenge. Prevention of DAP-R is necessary to salvage DAP effectiveness as antibiotic treatment options for VRE are limited. The purpose of this study was to determine if adjunct use of beta-lactams added to DAP prevents the long-term, in vitro development of DAP-R in VRE.

Methods: Two DAP susceptible VRE strains isolated from patients known to develop DAP-R within the course of DAP treatment were examined in a 28-day in vitro serial passage. Minimum inhibitory concentrations (MICs) for VRE isolates (2267 and 8019) were determined by broth microdilution for DAP and the following beta-lactams: ampicillin, ceftriaxone, ampicillin plus ceftriaxone and ertapenem. Isolates were grown in triplicate and exposed to increasing concentrations of DAP with or without static concentrations of ampicillin, ampicillin plus ceftriaxone, ceftriaxone or ertapenem. Starting concentrations of DAP were based on 25% the initial DAP MIC and sub-inhibitory concentrations of beta-lactams were based on the free serum concentration average for each beta-lactam. Cultures were shaken overnight at 37°C at 160 rpm. Cultures showing growth at 24-hours were diluted 1:100 in fresh broth with increasing DAP concentrations while maintaining the same beta-lactam concentration. DAP concentrations were steadily increased until overnight growth was observed using the following increments: 0.25 mg/L until growth at 1.0 mg/L, 0.5 mg/L until growth at 5 mg/L, 1 mg/L until growth at 15 mg/L and finally, 5 mg/L until the end of the experiment. Serial passages were performed over a 28-day period and DAP MICs were obtained on days 0, 7, 14, 21 and 28.

Results: Exposure to different beta-lactams produced variant effects on DAP MICs throughout the 28-day experiment. In both VRE strains, the addition of ampicillin and ampicillin plus ceftriaxone to DAP tended to produce lower DAP MICs as compared to DAP alone over a 28-day period. In strain 2267, DAP plus ceftriaxone had a lower DAP MIC compared to DAP alone; however, in strain 8019, the MIC for DAP plus ceftriaxone was higher compared to DAP alone. Interestingly, ertapenem hastened the rate of DAP MIC increase compared to DAP alone in both strains. Despite the lower DAP MICs with these combinations compared to DAP alone, all MIC values obtained at the end of the 28-day experiment were considered non-susceptible (DAP MIC > 4 mg/L) and not clinically significant.

Conclusion: Use of adjunct a beta-lactam added to DAP did not prevent the long-term development of resistance in a 28-day in vitro serial passage. Although ampicillin and ampicillin plus ceftriaxone tended to result in lower MIC values for both VRE strains, MIC values at the end of day 28 were not within the DAP susceptibility range as tested in the clinic. Combination therapy with DAP plus beta-lactams appears to have distinct effects for synergy and resistance prevention. Further in vitro experiments using different antibiotics is warranted to salvage DAP utility.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 3-338

Poster Title: Vasopressin in the intensive care unit (ICU): An initial evaluation of a usage reduction initiative

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Purpose: The cost of vasopressin has increased from less than three dollars to greater than 100 dollars per vial in the past two years. The previously recommended rate of administration for vasopressin at UW Health – University Hospital was 0.04 units/minute. The Surviving Sepsis Campaign dosage recommendation was cited as justification for a rate decrease to 0.03 units/minute. Physician leaders also recommended reserving vasopressin for patients who were receiving an escalating dose of norepinephrine. The purpose of this study was to determine the effects of the recommended changes in vasopressin administration on clinical outcomes.

Methods: This study was a single center retrospective analysis. The first fifty patients identified from a random number generator who received vasopressin at a rate of 0.04 units/minute in the ICU between January 2015 and June 2016 and did not meet exclusion criteria were the control group. The first fifteen patients to receive vasopressin at a rate of 0.03 units/minute from January 2015 to September 2016 and did not meet exclusion criteria served as the intervention group. Exclusion criteria were an ICU length-of-stay (LOS) of less than 24 hours or missing ICU LOS data. The primary endpoints were patient mortality and the standardized mortality ratio (SMR). The SMR was calculated using the overall group mortality divided by the median predicted mortality based on APACHE IV scores. Secondary endpoints included ICU LOS and the ratio between actual and predicted ICU LOS based on APACHE IV scores. Fisher's exact test was used to compare mortality, and the Mann-Whitney U test was used to compare ICU LOS.

Results: The median baseline APACHE IV score was 117 for the control group, and 130 for the intervention group. The control group was 54 percent (27/50) male versus 47 percent (7/17) in the intervention. The median age in both groups was 62 years. Median weight was 80.0 kg for the control versus 76.8 kg for the intervention. The actual mortality was 52 percent (26/50) in the control group vs 60 percent (9/15) in the intervention group (p equals 0.77). The median predicted ICU mortality for the control group was 43.1 percent and for the intervention group was 58.2 percent. The SMR for the control group was 1.21 versus 1.03 for the intervention group. The median length-of-stay in the ICU was 4.9 days in the control group vs 7.0 days in the intervention group (p equals 0.93). The ICU LOS ratio was 0.56 for the control vs 0.74 for the intervention.

Conclusion: Reducing vasopressin usage did not significantly affect mortality or ICU LOS. There appears to be a clinically significant change in ICU LOS, though both groups reported a lower LOS than predicted. SMR was lower for the intervention group, but both groups were high compared to predicted mortality based on median APACHE IV scores. This initial analysis is auspicious of vasopressin usage reduction at UW Health-University Hospital. The actual mortality in both groups and the actual difference in ICU LOS favoring the control group warrants further analysis with a larger group of patients to evaluate the effect on clinical outcomes.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 3-339

Poster Title: Pediatric enoxaparin treatment: impact of a pharmacist dosing, titration and monitoring delegation protocol

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Purpose: Treatment dosing of enoxaparin in pediatric patients is based on actual body weight with the goal to achieve a therapeutic anti-Xa level 4-6 hours post dose. An internal review identified variable practices with monitoring the anti-Xa and a dosing strategy that failed to produce therapeutic anti-Xa levels in a reasonable time. A modified age-based dosing scheme for enoxaparin was developed and incorporated into a delegation protocol allowing pharmacists to dose adjust and monitor enoxaparin. The purpose of this study was to evaluate the new dosing strategy and protocol by examining the impact on time to therapeutic anti-Xa level.

Methods: A retrospective chart review of patients receiving enoxaparin in treatment doses was conducted following implementation of the delegation protocol from March 2016 to July 2016. Results were compared with those of a previous internal medication use evaluation conducted prior to the implementation of the delegation protocol from September 2011 to November 2015. Patients ≤18 years old who received enoxaparin for treatment of thrombosis and had anti-Xa monitoring while inpatient were included. Patients were excluded if they received prophylactic enoxaparin doses, did not have anti-Xa levels drawn, or had orders for enoxaparin that were never administered. The primary outcome was time to first therapeutic anti-Xa level.

Results: A total of 98 patients met the inclusion criteria during the study time periods. Seventy-eight patients were included pre-protocol and 20 patients were included post-protocol implementation. Mean time to therapeutic anti-Xa level was 69.8 hours pre-protocol and 12.3 hours post-protocol ($p < 0.001$). Patients who achieved a therapeutic anti-Xa after the first dose of enoxaparin was 2 (2.5%) pre-protocol compared to 11 (55%) post protocol ($p < 0.001$). Pharmacists intervened on initial ordered doses of enoxaparin on 25% of orders post-protocol.

Conclusion: A modified age-based enoxaparin dosing strategy and implementation of a pharmacist-led enoxaparin dosing and monitoring delegation protocol decreased time to therapeutic anticoagulation in pediatric patients being treated for thrombosis.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 3-340

Poster Title: Diabetes education and wellness program for patients suffering from mental illness: Quality improvement through pharmacy intervention

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Purpose: People suffering from a mental illness are at an increased risk to develop diabetes. Risk factors for diabetes including, poor diet, physical inactivity, poor self-care and lack of access to care are often also associated with behavioral illnesses. Journey Health and Wellness sought to improve the quality of care of its diabetic clients by developing an education and wellness program with pharmacist intervention. The program was developed to increase disease state knowledge, assess and overcome barriers participants face from living with diabetes and mental illness, and improve the quality of diabetes care participants receive.

Methods: The education and wellness program was developed and organized by a committee that consisted of a pharmacy intern and two registered nurses. The program consisted of four, one hour, weekly sessions. Each session focused on a different topic of diabetes care, general pathology, diet and physical activity, medication management and coping with diabetes and mental health. Each session included weekly goal setting and review, education and a discussion utilizing the health belief model and motivational interviewing. Medication profile review was conducted to ensure adequate therapy. Patients were recruited to be included in the program if they were over the age of 18 years old, had a diagnosis of diabetes as well as a diagnosis for a mental health disorder and received care by Journey Health and Wellness providers. Baseline demographic and quality of care data was collected during session one. Additional measures included a perceived barriers survey and pre- and post-session medication knowledge survey. Evaluation for quality improvement was completed through administration of a survey using a 10-point likert scale as well as subjective observation by the program's committee.

Results: Seven patients completed the four-week program. All participants suffered from type two diabetes, with mental health diagnoses ranging from generalized anxiety disorder to schizophrenia. Baseline data resulted in participants rating their perceived quality of care from

providers as an average of 5.6 out of 10. All patients rated their diet and physical activity habits as poor and rated that their mental health negatively impacts their self-care as an average of 6.7 on the 10-point scale. The barriers that participants most commonly perceived were the feelings of being overwhelmed when attempting to eat healthy and a dislike for taking medications. Motivational interviewing techniques were positively used to provide patients with strategies to overcome common barriers. Medication knowledge survey showed an improvement in anti-psychotic medication knowledge. At the end of the fourth session 71% had made changes to their diet and 28% had made changes in their physical activity routines. There was also a 100% improvement in knowledge regarding diabetes pathogenesis and antidiabetic medications. Finally, the overall number of perceived barriers decreased following session four.

Conclusion: Participants were provided education and support in order to improve the quality of care they were receiving and improve the participant's self-care. Medication management and providing strategies to overcome mental health barriers was an integral part that resulted in an improvement of how the participants perceived their care. Patients also benefited from the use of weekly goal setting, the health belief model and motivational interviewing to change lifestyle habits. Pharmacists play an important role in managing chronic disease states and are able to provide a unique point of view to improve the quality of care mentally ill patients receive.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 3-341

Poster Title: Granulocyte colony-stimulating factor utilization post-autologous hematopoietic stem cell transplant in multiple myeloma patients: does one size fit all?

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Purpose: Use of granulocyte colony-stimulating factor (GCSF) after autologous hematopoietic stem cell transplant (HSCT) is recommended by the American Society of Clinical Oncology for all patients to reduce the duration of severe neutropenia. Currently at UW Health, standard operating procedure is to not utilize GCSF post-transplant in multiple myeloma patients, however, it is occasionally administered after autologous HSCT based on patient specific risk factors. The purpose of this project was to evaluate a single institution's experience with GCSF after autologous HSCT in myeloma patients.

Methods: Retrospective chart reviews were conducted on patients 18 years and older with multiple myeloma that underwent autologous HSCT at UW Health from January 2015 to May 2016. Data was collected on demographics, length of stay post-transplant, doses of GCSF given, time to engraftment, Eastern Cooperative Oncology Group (ECOG) performance status, and intravenous antibiotic use and duration.

Results: In total, 100 patients were reviewed. Five were excluded from analysis due to death and 44 were excluded from primary analysis due to discharge prior to engraftment. Of the 56 patients included, 25 received one or more doses of GCSF with an average of 5.7 doses per patient. The average age for the GCSF group was 64.6 years versus 63.7 years for the non-GCSF group, and the median ECOG performance score for each group was 1. The average time to engraftment for the GCSF group was 12.6 days compared to 14.3 days for the non-GCSF group. Average inpatient length of stay post-transplant for the GCSF group was 17.6 days versus 16.6

days for the non-GCSF group. The average duration of intravenous antibiotics administered was 5.2 days in the GCSF group compared to 5.5 days in the non-GCSF group. A subgroup analysis of patients 65 years and older showed that the average time to engraftment for the GCSF group was 12.2 days compared to 14.5 days in the non-GCSF group. The average length of stay post-transplant for the GCSF group was 17.9 days versus 16.3 days in the non-GCSF group. The median ECOG performance score for each group was 1.

Conclusion: Although GCSF decreased time to engraftment, administration did not appear to be correlated with decreased length of stay post-transplant and duration of intravenous antibiotics remained similar between the two groups.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 3-342

Poster Title: Hemolysis and anticoagulation in mechanical circulatory devices: a comparison of heparin and bivalirudin

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Purpose: Treatment of hemolysis and suspected pump thrombosis in patients with mechanical circulatory devices (MCD) traditionally includes intravenous unfractionated heparin (UFH). Direct thrombin inhibitors, such as bivalirudin, may also be considered as a treatment option; however, little evidence is available to support their use in this patient population. At the University of Wisconsin Hospital in Madison, heparin or bivalirudin may be used to treat patients with suspected pump thrombosis based on laboratory indicators of hemolysis. The purpose of this study was to retrospectively compare the efficacy of heparin versus bivalirudin in treating hemolysis.

Methods: Adult MCD patients with episodes of hemolysis, occurring between July 2011 and June 2016, were identified for retrospective chart review as part of a quality improvement project. Hemolysis was defined as a lactate dehydrogenase (LDH) level greater than three times the upper limit of normal. Patients were evaluated for anticoagulation treatment with heparin, bivalirudin, or both. Data was extracted from the electronic health record and included: patient demographics, LDH level at time of anticoagulation, anticoagulants used, dose of anticoagulation, anticoagulation monitoring parameters, time spent within therapeutic range, duration of anticoagulation therapy, time to LDH normalization, antiplatelet therapies administered, incidence of infections, incidence of abnormal heart rhythms, and bleeding events. The primary outcome was resolution of hemolysis as indicated by normalization of LDH levels.

Results: Twenty-one unique hemolysis events occurring in fifteen MCD patients were evaluated. Of the 21 events, 20 were initially treated with UFH, eight were switched from initial treatment with UFH to treatment with bivalirudin, and one was treated with bivalirudin only. The average LDH level at UFH initiation was 1359 U/L (range 344 to 4637). In the events where treatment was switched from UFH to bivalirudin, the average LDH level at bivalirudin initiation was 1580 U/L (range 663 to 2414). In the event treated with bivalirudin only, the LDH level at bivalirudin initiation was 1838 U/L. LDH normalization occurred in six (30%) of the 20 events treated with UFH and five (62.5%) of the eight events switched from UFH to bivalirudin. LDH normalization did not occur during the event treated with bivalirudin only.

Conclusion: Both heparin and bivalirudin showed resolution of hemolysis in MCD patients, with bivalirudin showing a trend towards being more effective, although the study was not powered to show significance. Further investigations are needed to determine which agent is more effective in the treatment of pump thrombosis and hemolysis.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 3-343

Poster Title: Barriers to annual influenza vaccination in heart failure and cardiac transplant patients

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Purpose: Patients with heart failure and/or cardiac transplant are at an increased risk of influenza infection and subsequent influenza-associated morbidity and mortality. In heart failure and/or cardiac transplant patients, receiving an annual influenza vaccination is safe and effectiveand reduces cardiac-associated or influenza-associated hospitalizations and overall mortality. The percent of patients with cardiovascular conditions receiving annual influenza vaccinations is underwhelming. Several barriers to influenza vaccination have been reported in patients without non-high risk conditions, but there are limited data on barriers in heart failure and/or heart transplant patients.

Methods: Individuals adults over the age of 18 diagnosed with heart failure and/or recipients of a cardiac transplant and followed at the University of Wisconsin – Madison Advanced Heart Disease Clinic were invited to participate. During routine clinic appointments consenting patients were asked to complete a questionnaire on attitudes and beliefs towards the influenza vaccine. In addition to baseline characteristics, participants were surveyed on adherence to annual influenza vaccination and barriers to annual influenza vaccination, which were assessed on a likert scale. The primary objective was to describe adoption of and barriers to annual influenza vaccination among this high risk population. The secondary objective was to explore potential predictors of annual vaccination in this study sample. All participants provided written informed consent in accordance with established guidelines for the protection of human subjects.

Results: Participants (N=31) were more commonly white (93.5%), male (77.4%), and over 60 years of age (58.1%). When asked if their pharmacy provided vaccinations, 64.5% stated their pharmacy did with 22.6% stating they didn't know. Majority of patients (74.2%), regardless of belief concerning the effectiveness of the vaccine and having personal beliefs against the vaccine, received the influenza vaccine within the past year. A small minority of patients (9.7%) stated they had a previous reaction to the vaccine. Barriers prevalent during this survey included access to vaccination, perceived lack of benefit to vaccination, and low appreciation of the health risks associated with influenza infection. Among patients who stated they have not been vaccinated for over one year, the most commonly reported barrier was the belief that the influenza vaccine caused influenza infection. Barriers such as perception of infection from the vaccine, lack of knowledge regarding potential benefits from vaccination, and not enough information from health care providers were common for patients who do not believe the influenza vaccine is effective, with 37.5% stating that their health care provider does not offer information about the influenza vaccine.

Conclusion: Although there are many barriers to influenza vaccination among heart failure and/or cardiac transplant patients, common themes included perception of infection from the vaccine, lack of appreciation for potential benefits to vaccination, and not enough information from health care providers. These barriers may be mitigated with education from health care providers on the increased risk of influenza infection in this population and further explanation of why influenza vaccination is necessary.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 3-344

Poster Title: Statin use in adults with diabetes: a gap analysis of EQuIPP versus health system data from 14 community pharmacies

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Purpose: The Affordable Care Act shifted health care models to define, measure, and reward quality. The Centers for Medicare & Medicaid Services (CMS) implemented a five-star quality rating system for Medicare prescription drug plans including medication-use quality metrics extending to community pharmacies. The Electronic Quality Improvement Platform for Plans and Pharmacies (EQuIPP) is an information management platform pharmacies use to evaluate performance on quality metrics. Information comes from insurers enrolled in the program, so there are plans not captured. This study compared compliance rates for one quality measure in EQuIPP versus that across 14 community pharmacies in a health-system.

Methods: Dispensing data for patients between the ages of 40-75 filling any anti-diabetes medication from December 2015 through May 2016 was collected from the 14 UW Health community pharmacies. Patients were included if they had two fills of any anti-diabetes medication during the observation period. Patients meeting criteria were assessed for a single statin fill during the time period to determine statin use. Data collected included age, earliest fill of statin or anti-diabetes medication if no statin filled, prescription insurance, and specific pharmacy location. Statin use was also evaluated by prescription insurance. Data for the same metric was available through EQuIPP and was collected into a single report to be compared to the health-system data.

Results: According to EQuIPP, 71 percent of patients across all UW Health community pharmacies on any anti-diabetic medication also filled a statin medication. In the health-system specific analysis, 703 of 1153 patients (61 percent) had a statin filled during the observation period. The average age of the patients was 58.2 years old. Store 3 had the best percentage of

statin use at 78.5 percent (n equals 107). Conversely, store 13 had the worst percentage at 35.7 percent (n equals 14). Store 1 had the second lowest percentage at 44 percent (n equals 145). The largest insurer of patients included in this evaluation had 66.2 percent statin use (n equals 225).

Conclusion: There was a ten percent lower report of statin use in patients age 40-75 on any anti-diabetic medication when comparing EQuIPP reports and the entire health-system data. Available tools that provide community pharmacies visibility on CMS five-star measure performance have limitations such as providing feedback on only a portion the patient population. Regardless, UW Health community pharmacies are not performing on this metric. Processes are underway to prepare and implement a targeted intervention with the intent of improving compliance with this measure across the UW Health community pharmacies. Post-implementation data will be collected.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 3-345

Poster Title: Development and evaluation of potential impact of an anti-factor Xa guideline for unfractionated heparin

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Purpose: Monitoring unfractionated heparin (UFH) with anti-factor Xa (anti-Xa) results in shorter time to achieve therapeutic anticoagulation and higher number of individuals able to achieve therapeutic anticoagulation compared to monitoring with activated partial thromboplastin time (aPTT). Due to the growing need for anti-Xa monitoring and provider requests, an UFH guideline monitored with anti-Xa was developed. Due to cost of anti-Xa (15 times aPTT cost) and limited accessibility (send-out lab), criteria for monitoring with anti-Xa was determined. Additionally, the current institution-specific UFH guideline monitored with aPTT was evaluated to determine patients per year that would be transitioned to monitoring with anti-Xa.

Methods: To develop the institution-specific UFH guideline monitored with anti-Xa, an extensive literature review was completed. A draft guideline for low/medium intensity (goal anti-Xa 0.1-0.3 units/ml) and high intensity (goal anti-Xa 0.3-0.7 units/ml) was developed based on the current UFH guideline monitored with aPTT and literature review. The guideline was reviewed and approved by the Anticoagulation Committee, and Pharmacy and Therapeutics Committee. To evaluate the impact of the draft guideline, a report was generated for all patients admitted to the William S. Middleton Veterans Hospital who received UFH from March 13, 2015 to March 13, 2016. Patients who received UFH for less than 24 hours were excluded. A random sample of patients was selected for retrospective chart review and baseline international normalized ratio (INR) and aPTT, indication for heparin infusion, and whether the patient achieved goal therapeutic aPTT range after three consecutive heparin adjustments were documented.

Results: Criteria for anti-Xa monitoring included 1) patients with elevated baseline aPTT greater than 40 seconds (with INR less than 2.0, if on warfarin), 2) failure to achieve therapeutic aPTT range with three consecutive UFH adjustments in active thrombosis, 3) heparin resistance, and 4) select indications (eg- LVAD). The retrospective chart review was IRB exempt. Total UFH instances administered were 270 and a random sample of 80 instances was selected. An elevated baseline aPTT was documented in 7/80 (9%) patients. However, 2/7 (29%) patients with elevated baseline aPTT had an INR greater than 2.0. This would result in 5/80 (6.25%) patients in the sample and 17 patients per year to be transitioned to anti-Xa monitoring. The majority of patients sampled were receiving UFH for non-active thrombosis indications (55/80, 69%), while 25/80 (31%) patients were receiving UFH for active thrombosis. After three consecutive heparin adjustments, 9/25 (36%) patients receiving UFH for active thrombosis were not within therapeutic goal aPTT range. This would result in 9/80 (11.25%) patients in the sample and 30 patients per year to be transitioned to monitoring with anti-Xa. Overall, an anticipated 47/270 (17%) patients per year could be expected to utilize anti-Xa monitoring. Heparin resistance was not evaluated.

Conclusion: An UFH guideline monitored with anti-Xa for select populations was developed and approved by institutional committees. Overall, approximately 17% of patients requiring UFH can be estimated to be transitioned from aPTT to anti-Xa monitoring.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 3-346

Poster Title: Vancomycin prophylaxis for prevention of Clostridium difficile recurrence in renal transplant patients

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Purpose: The prevalence of Clostridium difficile infection (CDI) in solid organ transplant (SOT) recipients is higher than in the average hospitalized patient due to multiple risk factors. Clinical data supporting secondary prophylaxis of CDI with oral vancomycin is limited. The primary objective of this study was to describe the use of prophylactic vancomycin for prevention of recurrent CDI in renal transplant recipients (RTX) on broad-spectrum antibiotic (BSA) therapy.

Methods: This was a retrospective review of adult RTX patients receiving oral vancomycin prophylaxis, 125 mg twice daily, during a unit specific CDI outbreak window from 1/1/2013–12/31/2015. Data collection included patient demographics, transplant specific demographics, date of primary CDI and treatment, concomitant BSAs received during prophylaxis and their associated CDI risk as defined in previous literature, indication for BSAs, concomitant acid suppression therapy proceeding and during BSA therapy, probiotic therapy proceeding and during BSA therapy, and CDI breakthrough; defined as confirmed CDI recurrence after greater than or equal to 48 hours of oral vancomycin prophylactic therapy.

Results: Ten renal transplant recipients met study inclusion criteria; sixty percent (n equals 6) were female, eighty percent (n equals 8) were recipients of their primary transplant patients. The average age at transplant was 63 years plus or minus 14.9 years. The majority of patients developed their primary CDI greater than or equal to one year post-transplant (70 percent, n equals 7). Only thirty percent (n equals 3) developed their primary infection within the first year post-transplant, all occurred within the first three months. There was only one case of NAP1+

associated CDI. The primary case of CDI was treated with oral vancomycin in the majority of cases (80 percent, n equals 8), one patient received combination therapy with metronidazole and oral vancomycin. The mean associated CDI risk hazard ratio of BSA received concomitantly during oral vancomycin prophylaxis was 3.4. Eighty percent (n equals 8) of patients were receiving acid suppression therapy prior to and throughout admission. Forty percent (n equals 4) were using a probiotic prior to admission. There were no documented cases of CDI breakthrough while on oral vancomycin prophylaxis. Duration of oral prophylactic vancomycin ranged from 2-47 days.

Conclusion: In a small case series of renal transplant patients during a unit specific CDI outbreak, oral vancomycin prophylaxis appeared to be successful in CDI prevention. Further research is necessary to investigate this potential CDI reduction strategy.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 3-347

Poster Title: Potential Cost Savings From a Stepwise Daptomycin Dosing Regimen in Patients With Renal Insufficiency

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Purpose: Daptomycin is a concentration-dependent antibiotic with a key pharmacokinetic/pharmacodynamic measure of area-under-the-curve (AUC)/minimum inhibitory concentration (MIC). According to manufacturer labeling, the daptomycin dosing interval should be changed from daily to every 48 hours in patients with a creatinine clearance < 30 mL/min. However, pharmacokinetic data in the labeling shows the AUC of daptomycin increases in a stepwise fashion as kidney function declines below 80 mL/min. This study utilizes published pharmacokinetics of daptomycin in patients with varying degrees of renal dysfunction to devise an alternate dosing regimen using a gradual dose reduction scheme and analyzes the cost savings.

Methods: We obtained retrospective data records from patients treated with daptomycin at UnityPoint Health-Meriter Hospital from January 1st, 2016 to August 31st, 2016. Patients were included if they received a dose of daptomycin within this time period in the hospital or clinic setting. Patients were excluded if their creatinine clearance was < 30 mL/min (Cockcroft-Gault) since daptomycin doses were already adjusted, or if their creatinine clearance was >80 mL/min since no dose adjustment was indicated. An alternate daptomycin dose was calculated based on the patient's renal function; mild impairment (50-80 mL/min) to receive 83% of the normal daily dose and moderate impairment (30-50 mL/min) to receive 66% of the normal daily dose. These percent reductions in dose were calculated based on the ratio of the published daptomycin AUC in patients with normal renal function to those with impaired renal function. Doses calculated by the new method were compared with doses actually received. A cost of $420 for each 500 mg vial of daptomycin was used to calculate potential cost savings.

Results: Over the eight month trial period, 23 patients who had received 222 doses of daptomycin were identified as eligible for the alternate dosing method. Use of the stepwise approach would have resulted in a cost savings of $14,000 in this eight month period, projected to $21,000 in savings per year. This dose reduction would not be expected to reduce the efficacy of daptomycin and may in fact reduce side effects.

Conclusion: A new daptomycin dosing regimen based on stepwise creatinine clearance adjustments for patients with a creatinine clearance of 30-80 mL/min appears reasonable in patients with renal dysfunction and can reduce the cost of daptomycin use in healthcare systems. Pharmacokinetic data released by the manufacturer support this method. Post-implementation studies should be completed to ensure adequate efficacy in treating serious skin and soft tissue infections and bacteremia with this new dose adjustment method.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 3-348

Poster Title: Patient satisfaction after six months of an extended interval of INR follow-up protocol

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Purpose: The feasibility, safety, and patient satisfaction of an extended International Normalized Ratio (INR) follow-up interval up to 12 weeks is currently being evaluated through an ongoing prospective cohort study at the William S. Middleton Memorial Veterans Hospital. To assess patient satisfaction, the Duke Anticoagulation Satisfaction Scale (DASS), a validated 25-item scale addressing positive and negative aspects of anticoagulation, is being used. The purpose of this project was to determine the relationship between patient satisfaction regarding anticoagulation therapy and the extended INR follow-up interval six months into the cohort.

Methods: The DASS was distributed to all study participants at enrollment and six months after enrollment. The DASS is a seven-point Likert scale ranging from "not at all" to "very much." Patients completed the survey in person or it was mailed to them. If the mailed surveys were not returned in a timely manner, patients were contacted via telephone and the survey was sent again. The analysis was conducted on participants who completed both the enrollment and six month DASS surveys. Statistical significance for the difference in each question was calculated using the Wilcoxon Signed Rank test using a significance level of 0.05. This project was approved by the University of Wisconsin – Madison Health Sciences Institutional Review Board and by the William S. Middleton Memorial Veterans Hospital Research and Development Committee.

Results: A total of 47 patients completed the DASS survey at enrollment and six months. Of the 25 questions, six demonstrated a statistically significant difference. Of these six questions, only one showed an improvement in quality of life (impact of bleeding or bruising limits ability to work for pay: -0.34, p=0.04). The other five questions demonstrated a decrease in quality of life (affect on daily life: 0.11, p=0.02; inconvenience of anti-clot treatment: 0.32, p=0.02; time burden: 0.42, p=0.049; negative impact on life: 0.59, p=0.03; difficulty with anti-clot management: 0.59, p=0.0013).

Conclusion: Patient satisfaction did not increase after six months of involvement in a protocol to extend the INR follow-up interval. However, the items with statistically significant changes were less than a 0.6 difference on a seven-point scale and therefore, may not be clinically significant. Possible explanations for the results include decreased patient comfort due to decreased feedback from fewer INR results and less frequent provider interaction. Further research is needed to identify specific patient characteristics that could correlate to higher patient satisfaction with an extended interval of INR follow-up.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 3-349

Poster Title: Evaluation of local versus send-out trizole antifungal serum drug concentration monitoring in a large academic institution: A retrospective analysis

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Purpose: Serum drug concentration (SDC) is used as a tool to guide accurate dosing, appropriate toxicity monitoring, and optimal therapy selection for triazole antifungals. SDC is frequently completed as a 'send-out' test. This limited availability extends the time between sample collection and laboratory results for antifungal SDC. The purpose of this project was to evaluate the effect of performing local triazole SDC monitoring on antifungal drug costs and patient clinical outcomes, and determine the need for development of specialized in-house laboratory with antifungal drug assay availability.

Methods: Patients who received triazole antifungal (itraconazole, posaconazole, or voriconazole) therapies between 8/2013 and 8/2015 were included. Patients without SDC were excluded. Data collection included demographic information, indication requiring antifungal therapy, location of SDC processing (local or send-out), time to notification of SDC result, number of antifungal dose adjustments, number of days of overlapping antifungal therapies, days to goal SDC, antifungal drug utilization, hospital length of stay, intensive care unit length of stay, and mortality. The average wholesale price as of September 2016 was used to calculate cost savings. The primary outcome was aggregate antifungal drug costs, including the cost of monitoring. Secondary outcomes included hospital length of stay, intensive care unit length of stay, and mortality.

Results: Of the 135 included patients, antifungal SDCs were available in 74 patients, with 30 patients on treatment therapies and 44 patients on prophylaxis therapies. The median turn-around-time for lab results was 53.5 (range 25-254) hours for send-out testing and 11 (range 3-36) hours for local testing. Local testing reduced the cost of overlapping, -azole-alternative therapy by $3098 and $587 for treatment and prophylaxis, respectively. There was a statistically significant difference in the mean hospital length of stay 10.3 days (s = 7.2 days) vs. 21.4 days (s = 13.9 days) (p=0.03), intensive care unit length of stay 1.7 (s = 2.9 days) vs. 3 days (s = 4.7 days) (p=0.45), and the rate of mortality 14% vs. 30% (RR=0.48; p=NS) between in-house and send-out group within treatment group.

Conclusion: Local SDC monitoring of triazole antifungal medications results in faster turn-around- times, lower antifungal drug costs and may improve patient clinical outcomes for patients receiving treatment courses at our institution. Patients receiving triazoles for prophylaxis indications do not see improved outcomes. Further study is warranted to evaluate the contribution of send-out testing policies and sources to the improvement in patient care at other institutions.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 3-350

Poster Title: High-dose mycophenolate following pancreas transplantation: evaluation of a hospital protocol

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Purpose: Mycophenolate is an antiproliferative agent that is a mainstay of maintenance immunosuppression following solid organ transplant. Pancreas allografts (PTX) are thought to convey increased immunologic risk over renal transplants, and may require aggressive maintenance immunosuppression to prevent rejection. Per our institutional protocol, PTX recipients are initiated on intensified dosing of mycophenolate, defined as 2160 mg per day of mycophenolate sodium (MYF) or 3000 mg per day of mycophenolate mofetil (MMF) immediately post-transplant. The purpose of this study was to evaluate compliance with the protocol and determine the etiology of protocol violation.

Methods: A retrospective review of electronic medical records of adults who underwent PTX transplantation at UW Hospital from January 1, 2011 through July 1, 2015 was conducted. Subjects were included if they were discharged from their transplant encounter with an immunosuppression regimen containing mycophenolate. Baseline demographic data were collected for all patients. The mycophenolate dose on discharge along with all dose reductions that occurred within the first year following transplantation were recorded. When available, the indication for the reduction was noted. The percentages of subjects who required a dose reduction from intensified therapy, as well as the corresponding indication for the reduction, were calculated to determine common indications for protocol deviation.

Results: A total of 197 PTX transplants occurred during the study period. Four of these PTX recipients were not discharged on mycophenolate and were excluded from the analysis. Of note, 5 PTX recipients were transplanted twice during the study period with each transplant counted as a separate opportunity for protocol compliance. The majority of patients (n equals 113, 59 percent) were discharged on mycophenolate intensified dosing per our institutional protocol. Within 30 days of transplantation, 33 percent (n equals 37) required a dose reduction. An additional 34 percent (n equals 38) required a dose reduction within 3 months. The most common indications for dose reduction were diarrhea (n equals 41, 40 percent) and neutropenia (n equals 16, 16 percent). The most common discharge regimen that deviated from institutional protocol was a total daily dose of 1440 mg of MYF or 2000 mg of MMF (n equals 70, 36 percent). In comparison with protocol regimens, only 5 percent (n equals 4) of patients discharged on non-protocol mycophenolate required a dose reduction within 30 days and an additional 28 percent (n equals 22) of these patient required a dose reduction within 3 months.

Conclusion: Our study indicates historical compliance with an institutional protocol of intensified dose maintenance mycophenolate following PTX is not high. Of the patients who received protocol dosing upon discharge, a majority required dose reductions within 3 months as a result of adverse events. These findings suggest that intensified dosing of mycophenolate is not well tolerated after PTX in our patient population. A review of outcomes should be conducted to determine if the potential benefits of this protocol outweigh risks associated with poor tolerance.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 3-351

Poster Title: Evaluation of multi-dose tamper evident packaging at an academic medical center

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Purpose: The FDA only has requirements for prescription drug packaging sufficient to protect stability of the drug, not tamper resistance. ISMP Quarterly Action Agenda identified a situation where a used oxymetazoline was restocked and almost administered to a second patient until the doctor noticed there was blood on the nozzle. The purpose of this project was to identify types of packaging for non-injectable, multi-dose medications and assess whether they comply with OTC tamper resistance standards. Secondly, to develop recommendations for optimization of packaging and dispensing of non-injectable, multi-dose medications.

Methods: ● Performed a literature search of tamper evident packaging best practices for non-injectable, multi-dose products
● Evaluated non-injectable, multi-dose medications dispensed in an inpatient pharmacy and categorized the type of tamper evidence packaging
● Assessed compliance with best practice standards for tamper evidence
● Developed recommendations to improve non-injectable multi-dose medication tamper evident packaging practices

Results: A total of 252 non-injectable, multi-dose products were evaluated for tamper evident packaging. The fraction of non-injectable, multi-dose medications for which packaging aligned with OTC tamper resistance standards was 140/252 (56%). The fraction of non-injectable, multi-dose medications that are packaged in a manufacturer box was 159/252 (63%). Of these medications that were packaged in a box, 52 (21%) had the box sealed shut, serving as the visible form of tamper evident packaging.

Conclusion: A majority (56%) of non-injectable, multi-dose medications dispensed from the UW Health inpatient pharmacy aligned with tamper resistance best practices. Yet, there is opportunity to improve packaging and dispensing of non-injectable, multi-dose medications to ensure tamper evident packaging due to inconsistencies of manufacturing packaging.
The following recommendations were developed:

Removal of products from manufacturer boxes for dispensing.
Standardization of tamper evident seals for multi-dose items in which the manufacturer supplied product doesn't comply with best practices.
Purchase products based on optimal tamper evident packaging.
Educate pharmacy staff about evaluating tamper evident packing during medication dispensing and returns to the pharmacy.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 3-352

Poster Title: Pharmacist-driven multidisciplinary order set intervention to streamline organ donor medication orders in an academic level one trauma/surgical intensive care unit.

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Purpose: Successful organ donation depends on the proper management of cardiovascular, endocrine, and hemodynamic management, to optimize the condition of the organ(s). A delay in supportive medication turnaround time was noted by the Wisconsin Donor Network (WDN) coordinators and hospital nursing staff. Manual medication order entry and “non-stat” priority dispense processing were noted to be contributing factors. To address this delay, a multidisciplinary quality improvement effort was undertaken, in collaboration with the WDN, to simplify how donor medications were ordered, verified, distributed, and administered. The objective of this study was to streamline the medication use process and improve medication turnaround time.

Methods: This was a single-center, quasi-experimental, retrospective chart review of organ donor medication orders at Froedtert Hospital. All patients who had WDN orders initiated and subsequent WDN medications administered were included. The pre-intervention data was collected from September 1, 2014 – February 28, 2015, while the post-intervention data was collected from August 1, 2015 – September 13, 2016. The intervention included the implementation of an organ donation medication order set. Froedtert hospital standard stock formulations and distribution processes were matched with the products included in the order set. The WDN along with nursing staff were encouraged to communicate with pharmacists regarding upcoming WDN orders to increase vigilance and improve time to order verification. Finally, the order set was ordered as “stat” which electronically flags pharmacy and nursing staff in real time. The primary outcome was the average turnaround time (defined as the total

time from medication order to administration) for all medications studied within the pre-intervention versus post-intervention groups. The secondary outcome was the total turnaround time for each individual medication in the pre-intervention versus post-intervention groups. Medications that were analyzed included: hydrocortisone, methylprednisolone, insulin, levothyroxine bolus, and levothyroxine continuous infusion.

Results: A total of 15 patients representing 65 orders were identified pre-intervention and 13 patients representing 64 orders were identified post-intervention. The intervention was utilized in all post-intervention medication orders. The average turnaround time for all medications was significantly longer in the pre-intervention group compared to the post-intervention group, 105.8 vs. 85.3 minutes, $p < 0.007$. When each medication was analyzed individually, only the turnaround time for levothyroxine continuous infusion showed a statistical improvement between pre- and post-intervention groups (106.4 vs. 78.4, $p < 0.029$). The other medications included in this analysis were: hydrocortisone (110.7 vs. 92.3, $p=0.208$), methylprednisolone (122.4 vs. 86, $p=0.157$), insulin (86.3 vs. 82.2, $p=0.801$), and levothyroxine bolus (103.1 vs. 87.2, $p=0.220$).

Conclusion: The use of the organ donation order set intervention significantly shortened mean medication turnaround time and has improved customer service to patients, nurses, and WDN coordinators.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 3-353

Poster Title: Risk of venous thromboembolism after lung transplant before and after implementation of the Lung Allocation Score

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Purpose: Venous thromboembolism (VTE) is a significant cause of morbidity and mortality following surgery, and the incidence following lung transplantation is particularly high. On May 4, 2005 the United Network of Organ Sharing (UNOS) switched from time-on-list prioritization to the new Lung Allocation Score (LAS) for lung allocation. The LAS was developed to allocate lungs to those with both the most urgent need as well as those predicted to have the best outcomes after transplant. The purpose of this study was to describe the incidence of VTE within the first year of transplant before and after the implementation of the LAS.

Methods: Manual chart review was performed on patients receiving primary lung transplant at University of Wisconsin Hospital from January 1, 2000 to May 31, 2014 with data collected through July 31, 2014. Data collected included established VTE risk factors at time of transplant as well as at the time of VTE, as applicable. Clinical information regarding primary transplant and VTE events was also collected. This study received approval by the University of Wisconsin institutional review board.
This material is the result of work supported with resources and the use of facilities at the William S. Middleton Memorial Veterans Hospital, Madison, WI. The contents do not represent views of the Department of Veterans Affairs or the United States Government.

Results: Four hundred thirty-eight patients were included in the study. Among patients who had a VTE in the first year, those transplanted after LAS implementation had higher BMI (26.5 plus or minus 5.0 vs. 22.1 plus or minus 3.1; p equals 0.03); all other demographics between groups were comparable. The overall incidence of VTE following lung transplant during the study period was 19.4 percent. The incidence of VTE in the first year and the first 90 days post-

transplant was 14.3 percent and 10.5 percent, respectively. There was a increased risk of VTE in the first year for those transplanted post-LAS implementation (OR 3.61; 95 percent CI, 1.67 to 7.80; p equals 0.001) as well as an increased risk of VTE in the first 90 days after surgery post-LAS (OR 3.35; 95 percent CI 1.38 to 8.09; p equals 0.005). Overall, risk of VTE was higher in the first 90 days versus days 91 to 365 (OR 2.59; 95 percent CI 1.46 to 4.60; p equals 0.001). While overall presence of VTE did not affect survival (p equals 0.6), there was decreased survival among patients who had their VTE in the first year versus patients who did not (p less than 0.0001).

Conclusion: After the implementation of the LAS by UNOS, University of Wisconsin Hospital has seen an increased incidence of VTE in the first year after lung transplantation. This may be associated with the prioritization of sicker patients on the waiting list. The increased risk of VTE in the first year after transplant and accompanying increase in mortality may warrant increasing the length of post-surgical prophylaxis to cover a greater period of the increased risk. The highest incidence of VTE occurred in the first 90 days, which may represent a more manageable period for prophylaxis than the entire first year.

Submission Category: Pediatrics

Submission Type: Descriptive Report

Session-Board Number: 5a-001

Poster Title: Assessing pediatric medication use experiences and patient counseling in community pharmacies: perspectives of children

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Purpose: There has been a substantial increase of children diagnosed with chronic conditions, with over 6 million children in the United States requiring management with medications. Children with chronic conditions have a higher risk of improper administration, dosing errors, and nonadherence. To improve adherence, disease-management, and health outcomes, pediatric patients need to be directly educated about the safe and effective use of medicines. This study aimed to explore the perspectives of children regarding: (1) pediatric patients' knowledge and medication use experiences for chronic conditions; (2) how they want to learn about medicines; and (3) perceptions of community pharmacist-provided counseling.

Methods: Patients were recruited from three community pharmacies; one located in rural Western North Carolina, and two located in an urban region of Western Pennsylvania. Semi-structured interviews (n=20) were conducted with children aged 7 to 17 years of age taking a medication for at least one chronic illness such as asthma, diabetes, depression and attention deficit hyperactivity disorder. Informed consent was obtained from all participants before the interview was initiated. The Institutional Review Boards of the University of Pittsburgh and the University of North Carolina approved this qualitative study. Data was collected from July 2015 to December 2015. The interview guide was developed and piloted to elicit children's perspectives of their knowledge and medication use experiences, facilitators of patient counseling, and perceptions of community pharmacists. Interviews were face-to-face for Pennsylvania participants and via telephone for North Carolina participants. Interviews lasted approximately 20 minutes, were audio-recorded, and professionally transcribed. Transcripts were reviewed for accuracy and a codebook was developed for data analysis. NVivo 10: QSR International data analysis program was used for assessing content and thematic analysis to

identify relevant codes and themes. In order to increase inter-rater reliability, four researchers met to review all codes, their definitions, and refine the codebook. Inter-rate reliability was acceptable (kappa=0.79). Coding discrepancies were discussed and resolved by the research team.

Results: All participants were non-Hispanic White and most were female (60%), aged aged 12 to 14 (45%) and in the ninth grade or above (50%). Six themes emerged from participant responses: (1) child's knowledge, self-management, and medication use experiences; (2) essential medication information and sources; (3) child's frequent absence from the pharmacy; (4) patient counseling needs and recommendations; (5) use of interactive technologies to facilitate learning about medicines; and (6) perceptions of pharmacists. Children were confident in their ability to self-manage their medications without parental supervision, but also stated they had occasional difficulty in remembering to take their medicines. Most children expressed that they are comfortable and receptive to pharmacists educating them about their medications, particularly how medications affect the human body, how they were manufactured, and related research studies. Children reported that their absence during medication pick-up at community pharmacies was a barrier to receiving counseling by pharmacists. Even if the children said they were present in the pharmacy, they were often elsewhere in the store while their parents picked up the prescription and interacted with pharmacy staff. Children recommended the use of interactive and educational technologies such as TV kiosks and tablets to facilitate pediatric counseling.

Conclusion: Findings suggest that children are frequently not present at pharmacies during prescription pickup; however, children are comfortable and open to pediatric medication counseling by pharmacists. Direct pediatric medication counseling by pharmacists in community pharmacies can improve pharmacy practice by creating accessible clinical-based medication services in the community for children. Educational interventions incorporating interactive technologies need to be developed to facilitate clinical pediatric medication counseling in the community. Further research is warranted to examine the effects of interactive technology use by pharmacists to increase pediatric medication counseling and improve children's knowledge and safe use of their medicines.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5a-002

Poster Title: Evaluating the utility of the "STOPP" criteria as a tool for clinicians working in transitions of care in elderly patients.

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Purpose: The healthcare system, as it stands, offers countless opportunities in which miscommunication, lack of understanding, and a lack of resources can lead to sub-optimal care for the patient. One such area is the period of transition that occurs following the discharge from inpatient care. This study is intended to evaluate the utility of the STOPP (Screening Tool of Older Persons' potentially inappropriate Prescriptions) portion of the STOPP and START (Screening Tool to Alert doctors to Right Treatment) criteria in the determination if discharge medications for the elderly are appropriate.

Methods: This retrospective/prospective study focused strictly on the STOPP criteria for cardiovascular and CNS drugs. This project was initiated and completed during an introductory hospital rotation in June, 2016, with limitations placed to ensure completion of the project: only STOPP criteria was utilized for each patient and only cardiovascular and CNS "STOPP" medications were analyzed.
Retrospectively, the hospital's electronic health record software was utilized to generate a list of 25 discharged patients, greater than or equal to 65 years old in the month of May, 2016. This was done to establish a baseline of the patient population. Each patient's admission and discharge medication list was evaluated using specific aspects of the "STOPP" criteria. Prospectively, patient's marked for discharge that were greater than or equal to 65 years old were analyzed in the same manner on a daily basis until a similar sample size was reached. For both sections of the study, "STOPP" criteria was used to determine the total number of potentially inappropriate medications. The percentage of patients in the prospective sample being discharged with "STOPP" medications was assessed. The percentage of patients being discharged on "STOPP" medications in the retrospective portion was then compared to the

percentage of patients in the prospective portion following interventions and recommendations made to the discharging physician.

Results: Retrospective data reveals a total of 12, out of 25, patients with "STOPP" medications listed on their profile at discharge. Fifteen (15) medications meeting "STOPP" criteria were found ordered for these 12 patients at discharge; fourteen (14) "STOPP" medications were listed on their pre-admission inpatient profile. A total of 12 interventions would have been possible in this patient population with 48% of patients being discharged on "STOPP" medications.
Prospectively, a total of 11, out of 22, patients were identified with "STOPP" medications on their profile at discharge. A total of 14 "STOPP" medications were found ordered for these patients at discharge and 12 "STOPP" meds at inpatient admission. We identified 11 interventions that were possible, and, of these 11 possibilities, 5 interventions were made. The remaining 6 possible interventions were categorized as "Intervention not needed/recommended". Before interventions were made, 50% of patients in this sample were being discharged on "STOPP" medications; this percentage decreased to 36.36% after interventions.

Conclusion: Using "STOPP" criteria to prospectively analyze discharge medications by the pharmacist led to a reduced number of patients discharged on "STOPP" medications. Additionally, the retrospective data showed similar intervention possibilities. Note, the "START/STOPP" criteria is not intended to replace clinical judgement and sound decision making. Contrastingly, "START/STOPP" criteria is designed to provide a reference and/or starting point in evaluating the suitability of elderly patient's medications, which this study supports. However, further research utilizing the full "START/STOPP" criteria is needed to determine if this should be routine monitoring by clinical pharmacist at transitions of care.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5a-003

Poster Title: Medication use evaluation of aztreonam in a community hospital

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Purpose: Self-reported penicillin allergies play a major role in antibiotic selection. Approximately five percent of the general population of hospitalized patients report a penicillin allergy. In patients with a penicillin allergy, aztreonam is an alternative broad spectrum antibiotic for suspected and/or confirmed Gram-negative infections. Using alternative antibiotics such as aztreonam for non-IgE mediated penicillin allergy has been linked to unfavorable clinical outcomes. The purpose of this study was to evaluate the utilization of aztreonam in a community hospital.

Methods: This was a single center, retrospective medication use evaluation of all patients, aged 18 years or older who received at least one dose of aztreonam from January 1-March 31, 2016 at Kingman Regional Medical Center in Kingman, Arizona. Patients who received multiple course of aztreonam were included only once. The data were obtained from electronic medical records and included: age, gender, duration of treatment, documented penicillin allergy, type of allergic reaction, dose, duration, receipt of other beta-lactams and microbiological data. The primary endpoint was to evaluate the utilization of aztreonam. Data were analyzed and reported as descriptive statistics.

Results: A total of 42 patients received aztreonam during the study period. Sixty-four percent of patients were female and the median age was 64 years. Fifty-two percent of aztreonam use was for the treatment of pneumonia. The mean duration of treatment was 1.3 days (standard deviation of 1.5 days). Thirty-six patients reported a penicillin allergy. Out of these patients, a total of 19 (53 percent) reported an “unknown” reaction to penicillin. Three patients (8 percent) reported an IgE mediated reaction to penicillin (anaphylaxis). Most of the patients who reported a penicillin allergy either received a beta-lactam antibiotic during a previous hospital admission (16 patients, 44 percent) or during or after the study period (14 patients, 39

percent). Two patients who reported anaphylaxis to penicillin were safely administered other beta-lactams after documentation of penicillin allergy.

Conclusion: Most people who received aztreonam had non-IgE mediated reactions to penicillin and received other beta-lactams prior to and/or after aztreonam. This represents an opportunity for better assessment of penicillin allergy to ensure appropriate utilization of aztreonam. Criteria will be established to help guide aztreonam prescribing for patients with true, IgE mediated penicillin allergy.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 5a-004

Poster Title: Impact of student pharmacist-led motivational interviewing on antibiotic adherence in an ambulatory care outpatient pharmacy setting

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Purpose: Antibiotic resistance is a growing concern worldwide, which is perpetuated by the inappropriate use of antibiotics. Inappropriate antibiotic uses include antibiotic non-adherence as well as incorrect drug choice, dose, or duration. To combat resistance, techniques to improve antibiotic adherence, such as motivational interviewing (MI), have potential to aid antimicrobial stewardship efforts in the outpatient setting. The purpose of this study was to assess the impact of a student pharmacist-led MI on antibiotic adherence rates in outpatients who were prescribed an oral antibiotic.

Methods: The institutional review board approved this prospective, cohort study. Patients at least 18 years old who were prescribed an oral antibiotic for at least three days in duration were included from June through July 2016. Patients unable to speak English, on concurrent use of antibiotics for another etiology, without electronic health record documentation, lost to follow-up, or switched off the antibiotic were excluded. A student pharmacist trained in motivational interviewing (MI) conducted the counseling sessions from Monday to Friday between 8:00am – 4:30pm. Patients without a MI were the comparator group. Data collection included demographics, antibiotic therapy, duration, and disease state. All patients were offered a follow-up phone call on the anticipated antibiotic completion date, which included systematic assessment of adherence and satisfaction. During the calls, four survey questions were asked to both groups to evaluate adherence and five survey questions were asked to assess patient satisfaction for the MI group. The primary outcome was adherence rate defined as completion of antibiotic on the anticipated completion date, assuming the first dose was

taken the day the medication was obtained. Secondary outcomes included patient satisfaction to the MI and evaluation of prescribing patterns and appropriateness.

Results: We enrolled 176 patients who were prescribed an oral antibiotic for at least 3 days. Of the 176 patients, 55 were identified as motivational interviewed (MI), while 121 had no MI. Adherence rate to antibiotic regimens was 87% (46/55) in the MI group, while the control group had an adherence rate of 57% (69/121); ($p < 0.01$). Satisfaction for the MI was assessed on a 5 point scale, with 1 being very unsatisfied and 5 being very satisfied. 3.6% rated the MI as a 3, 1.8% as a 4 and 94.5% as a 5. The mean satisfaction rate for the MI was 98% (4.9/5; SD=0.39). Prescribing patterns were analyzed in those who were diagnosed with bronchitis and streptococcal pharyngitis. According to institutional bronchitis guidelines, 82% (14/17) of medications were unecessary and 41% (7/17) had the incorrect therapy duration ($p < 0.05$). Additionally, according to pharyngitis guidelines, 84% (16/19) of medications were unnecessary and 6% (1/19) had the incorrect therapy duration ($p < 0.01$).

Conclusion: Use of motivational interviewing in patients who were prescribed an oral antibiotic for at least 3 days improved adherence rates and was associated with high satisfaction rates. Further studies would be needed to validate the impact of student pharmacist-led interviewing on antibiotic adherence and subsequent patient outcomes. In addition, evaluation of antibiotic prescribing patterns identified several important areas for outpatient antimicrobial stewardship intervention.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 5a-005

Poster Title: Role of pharmacy students and residents in smoking cessation intervention at a safety net clinic in Skid Row, Los Angeles

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Purpose: The Center for Community Health (CCH) is an urban safety net clinic located in the heart of downtown Los Angeles that serves patients with a variety of chronic illnesses, a significant proportion with co-occurring mental illness and substance use disorders. Safety net clinic providers describe barriers to offering smoking cessation interventions such as lack of time, perceived lack of patient readiness to change, and inadequate provider and patient resources. In 2011, student pharmacists from the University of Southern California (USC) School of Pharmacy launched a smoking cessation program at CCH in an effort to reduce barriers to smoking cessation interventions.

Methods: Several changes were instituted to the USC School of Pharmacy smoking cessation program during the 2015-2016 academic year. First, student pharmacists were required to attend a training session at the beginning of each semester on counseling points for weight and stress management, behavioral modifications, motivational interviewing, and nicotine replacement therapy (NRT) to improve quality of patient counseling. While NRT was previously the main focus, strategies to avoid a slip, how to deal with cravings through the DEADS (delay, escape, avoid, distract, substitute) strategy, and setting SMART (specific, measurable, attainable/achievable, relevant, timely) goals were incorporated to help participants deal with triggers or cravings. Furthermore, a monthly check-in session through summer was initiated to ensure continuity of care. The role of resident pharmacists expanded to include more extensive discussion with students and under a newly developed collaborative practice agreement, the

resident pharmacist prescribed nicotine gum, lozenges, and patches. Funds for nicotine patches were donated by USC Graduate Student Government.

Results: Since late 2015, the smoking cessation program has had 13 participants. Because of the nature of the population, many have been lost in follow-up. To date, 3 participants have been smoke free for at least 1 month. The presentation on healthcare related topics, NRT counseling, cessation management strategies, motivational interviewing, and writing SOAP notes reinforced learning from the classroom. Participants benefited from learning about their disease state and how it relates to smoking, having a social support group, one-on-one counseling, and pharmacist access. With the combination of all these services there was an increase in the success of the participants and check-in sessions ensure they remain smoke-free for life.

Conclusion: Since 2011, the USC School of Pharmacy has offered pharmacological tools and social support to a vulnerable population in the heart of downtown Los Angeles in an attempt to reduce barriers to smoking cessation interventions. Changes made in the 2015-2016 academic year allowed all individuals involved in this program to benefit: student pharmacists can apply their knowledge in a clinical setting, patients are provided the appropriate resources to quit smoking, and resident pharmacists can precept students and utilize their clinical expertise.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5a-006

Poster Title: Design and implementation of antibiotic lock therapies for the treatment of catheter-related bloodstream infections.

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Purpose: Antibiotic lock therapy is an important method for sterilizing a catheter lumen in patients with confirmed blood stream infections in order to salvage the long-term catheter. A lack of a current protocol with recipes to guide antibiotic lock therapy as well as a concern for patient safety due to potential exposure to heparin in lock solutions was identified. This project was designed to identify a variety of antibiotic lock recipes from current literature with low amounts of heparin and then create computerized physician order entry sets for these recipes.

Methods: A review of literature was conducted to identify recipes for antibiotic locks and create a protocol to guide which antibiotic solution to use for different organisms (i.e. cefazolin lock for MSSA) and how much heparin was needed for stability of the antibiotic lock. Each antibiotic lock was added to the computerized physician order entry, allowing providers to choose from the variety of recipes constructed in this project. Charge codes were assigned for each recipe and were based off the most expensive drugs costs and the pharmacy's flat compounding fee. Recipes were built to print on labels in the pharmacy with specific instructions for pharmacy staff on how to create the solution along with any specific precautions.

Results: A total of 24 articles were reviewed and 16 antimicrobial lock recipes, 10 for non-hemodialysis catheters and 6 for hemodialysis catheters, were added to computerized physician order entry sets, nearly tripling options for providers. Assessment of the literature was used to guide the creation of a protocol with recommendations for 8 different microbiological culture results. On average the amount of heparin in the lock solution decreased significantly. Only 1 of the 10 non-hemodialysis catheter recipes contains any heparin; at a concentration of 100 units/mL. Also the protocol limited the amount volume of antibiotic lock solution from 5mL to 3mL and included an optional IV consult to determine an

appropriate volume to administer to a patient. Considering the approximate volume of a catheter to be around 2.5mL, the decrease in volume and concentration of heparin in solutions for non-hemodialysis catheters represents a potential decrease heparin exposure of 12,500-25,000 units (if line was inappropriately flushed) to 0-300 units.

Conclusion: Literature is available to guide the creation of both antibiotic lock protocols and lock solutions that contain lower amounts of heparin than presented in current Infectious Disease Society of America (IDSA) guidelines. The expansion of antibiotic lock recipes allows physicians to choose from a larger variety of antibiotics and minimized unnecessary exposure to concentrated heparin solutions.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5a-007

Poster Title: Methylnaltrexone bromide utilization in trauma patients

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Purpose: Methylnaltrexone Bromide is a subcutaneously-administered peripherally-acting mu-opioid receptor antagonist. The FDA approved the use of methylnaltrexone for the treatment of opioid induced constipation in patients with chronic non-cancer pain in September 2014. At Intermountain Medical Center, methylnaltrexone is on formulary with a restriction to only use in patients that have failed laxative therapy. The purpose of this medication use evaluation was to determine if methylnaltrexone was being used appropriately in trauma patients, specifically if patients had tried and failed laxative therapy as instructed by the bowel protocol, and to analyze the most cost effective treatment.

Methods: All trauma patients at Intermountain Medical Center, age 18 and above, who received methylnaltrexone from February 1st, 2016 to June 1st, 2016 were reviewed, totaling 42 patients. Every patient in the sample had previously been treated with opioids, and had tried at least 1 laxative. Patients with a colostomy were excluded from the study. Data were collected for each patient documenting bowel protocol compliance, length of stay, length of time patients were going without a bowel movement, length of time between methylnaltrexone dose and bowel movement, other gastrointestinal agents given at the same time, and if loose stools were present. Cost of methylnaltrexone, and alternative gastrointestinal agents were collected, analyzed and compared.

Results: Methylnaltrexone was effective with the majority of patients having a bowel movement within an average of 0.8 days. Intermountain Health Care's formulary restricts the use of methylnaltrexone to patients who have failed laxative therapy; however the bowel protocol was followed only in 8 of the 42 patients (19%). The average length of time that patients went without a bowel movement was 4.2 days. 88% of patients remained in patient for at least one day after their dose. Thirty seven patients were not discharged for at least one day

after receiving their dose of methylnaltrexone, 23 remained for at least 2 days afterwards, and 16 remained for at least 3 days, giving many of these patients the opportunity to try cheaper alternative agents prior to the use of methylnaltrexone. The manufacturer recommends holding laxatives for at least 3 days after a dose methylnaltrexone is given. This was not the case for most of the patients in this review, 38 out of 42 were still using other gastrointestinal agents within the 3 days. Ten of these patients had loose stools for at least 2 days after receiving their dose of methylnaltrexone.

Conclusion: Allowing methylnaltrexone to be used for patients that have tried laxative therapy for at least 3 days, and are being kept in the hospital for the sole reason that they have not had a bowel movement could save the patient $2,327.96 per day, a total saving of $97,774.32 for the 42 patients during the 4 month period. This was not the case for the majority of patients in the evaluation. Moving forward all alternative agents should be attempted for patients not meeting the above criteria to make sure that we are not giving our patients unneeded and costly medications.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5a-008

Poster Title: Reduction in missing medications by education intervention

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Purpose: Missing medications can lead to duplication of work, delays in workflow, and most importantly, it can delay the administration of medications. Inpatient delays in medication administration can lead to increases in both recovery time and length of hospital admission. The purpose of this study was to assess the effects of educating pharmacy and nursing staff at a Veterans Affairs Health Care System on the number of missing medication requests, and to determine whether the total number of missing medication requests would decrease.

Methods: Baseline data were collected eight days prior to an education intervention. Education sessions were provided to both pharmacy and nursing staff. Due to limited time, only one ward was selected for intervention. Nursing staff on that ward received two education sessions to cover all shifts worked in a twenty-four hour period. Weekend staff who were unable to attend the education session received an email which included the education materials. Nurses were educated on proper procurement, storage, and return of tubes and medications. Additionally, nurses were provided handouts and an email that contained information on the workflow in the pharmacy.
The pharmacy staff was asked to tube medications to patient wards every 30 minutes, send expensive, short dated, patient owned medications before administration time, package out of stock items immediately or ask the pharmacist to change orders, and send all medications, including the emergency department medications, immediately. Pharmacists were advised to verify orders as soon as possible and identify when it was necessary to send a first dose. Post intervention data were collected for eight days following intervention. Additionally, the Bar Code Medication Administration (BCMA) Committee had a meeting prior to the intervention, in which missing medication problems were discussed. To assess whether the BCMA meeting had

an effect on the number of missing medication requests, data were collected post BCMA meeting as well.

Results: There were 137 total missing medication requests during the pre-intervention week. Both 0900 and 2100 administration times had the most missing medication requests along with medications that were scheduled to be administered now, as needed, or once. Furthermore, data showed that some nurses had higher missing medication requests than others. The average time to order verification by a pharmacist was 20 minutes. Post-BCMA meeting, there were 98 total missing medication requests (28 percent reduction). Post-intervention data showed a further reduction to 68 total missing medication requests, which was a 50 percent reduction from baseline. Both 0900 and 2100 continued to have the most missing medication requests; however, there was a 55 percent reduction at 0900 and a 42 percent reduction at 2100. Post intervention average time to order verification by a pharmacist decreased to 16 minutes (20 percent reduction).

Conclusion: The education intervention resulted in a 50 percent total reduction in the number of missing medication requests and a 20 percent improvement in the average time to order verification by a pharmacist. In conclusion, education has an impact on reducing missing medication requests.

Submission Category: Clinical Services Management

Submission Type: Evaluative Study

Session-Board Number: 5a-009

Poster Title: Post- Transplant Monitoring by Community Pharmacists May Increase Early Detection of Complications in Renal Transplant Recipients: A Medicare Claims Analysis

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Purpose: Kidney transplantation is associated with lifelong immunosuppressive treatment, which may cause the recipient to develop further immunologic and endocrine disorders. Several co-morbid disease states, like diabetes, can arise during the post-transplant period and may go undetected due to infrequent screening protocols. The purpose of this study is to determine if community pharmacist monitoring would be a suitable solution to undetected co-morbidities that may occur following a patient's first year post-transplant.

Methods: Tacrolimus and mycophenolate Medicare claims from 2013 were analyzed to determine the average number of claims kidney transplant recipient made for each drug.

Results: Transplant recipients in their second or third year post-transplant and who were over the age of 65 were 5.24 (+/-0.24) times more likely to visit a pharmacy to pick up their medication than they were to visit an outpatient clinic for a transplant follow-up. Patients in their second or third year post- transplant and under the age of 65 were 4.70 (+/-0.0071) times more likely to visit a pharmacy to pick up their medication than an outpatient clinic.

Conclusion: For patients in their second or third year post-transplant, community pharmacist monitoring may be a suitable addition to clinical based transplant pharmacist monitoring for co-morbid disease states.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5a-010

Poster Title: Retrospective Medication Use Evaluation of Naloxone at the Wilmington VA Medical Center

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Purpose: The purpose of this retrospective medication use evaluation was to evaluate naloxone distribution at the Wilmington VA Medical Center.

Methods: All intramuscular and intranasal naloxone prescriptions were reviewed from March 31, 2016 to June 30, 2016. The list included patient name, prescriber name, and location. Data collection included risk factors identified on CPRS note template versus problem list, as well as occurrence of opioid overdose. The charts were reviewed to ensure the requesting provider accurately completed the note template.

Results: There were sixty-four naloxone prescriptions dispensed during the evaluated time period. Of the sixty-four charts reviewed, four requests were not appropriately filled out where the risk factor selected did not correspond with a diagnosis on the patient's problem list. The most common risk factors identified included high opioid dose (31%), current or history of substance use disorder (25%), and opioid use with comorbid mental health disorder (23%). There were four successful overdose reversals reported.

Conclusion: There was approximately a 6% error rate in selecting the correct risk factors for opioid overdose, thus suggesting the template is easy to use and straight forward for providers. Provider education over time increased awareness thus increasing prescriptions in previously lacking locations. Patient education occurs at the time naloxone is ordered by the physician, pharmacist, or nursing staff and is of utmost importance for overdose recognition and correct management.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 5a-011

Poster Title: Comparison of Hepatitis C Medication FDA Indications and Guideline Recommendations vs. Sustained virologic response (SVR) rates in patients with Genotype 2 and 3

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Purpose: To compare package labeling and guideline recommendations to sustained virologic response rates in primary literature in order to determine differences in various reference recommendations for the treatment of patients with chronic viral Hepatitis C infected with genotype 2 and 3.

Methods: Using the AASLD/IDSA guideline recommendations pre and post velpatasvir/sofosbuvir approval, package labeling was reviewed for each medication recommended by the guidelines in the treatment of patients infected with genotype 2 and 3 for FDA approval. The medications reviewed included velpatasvir/sofosbuvir, sofosbuvir plus ribavirin, and sofosbuvir plus daclatasvir for genotype 2 and 3 infected patients. In addition, the AASLD/IDSA guideline recommendations and the strength of the guideline recommendations were compared to the values of sustained virologic response after 12 weeks (SVR-12) .

Results: With the approval of velpatasvir/sofosbuvir came significant changes to the AASLD/IDSA guideline recommendations for the treatment of patients infected with genotype 2 and 3 Hepatitis C. Most notably was the creation of a do not use list which included sofosbuvir plus ribavirin regimens. FDA approved treatment for patients with genotype 2 include velpatasvir/sofosbuvir and sofosbuvir. AASLD/IDSA guidelines recommend use of either velpatasvir/sofosbuvir or sofosbuvir plus daclatasvir in the treatment of this patient population. Daclatasvir is not FDA approved for use in patients infected with genotype 2. Sustained virologic response rates in the treatment of patients infected with genotype 2 are 99-100%, 86-94%, and 89-100% with velpatasvir/sofosbuvir, sofosbuvir plus ribavirin and sofosbuvir plus daclatasvir, respectively. FDA approved treatment options for patients infected with genotype 3 include

velpatasvir/sofosbuvir and sofosbuvir and daclatasvir. AASLD/IDSA guidelines recommend use of either velpatasvir/sofosbuvir or sofosbuvir plus daclatasvir in the treatment of these patients. Sustained virologic response rates in the treatment of patients infected with genotype 3 are 93%, 82-92%, and 58-86% with velpatasvir/sofosbuvir, sofosbuvir plus ribavirin and sofosbuvir plus daclatasvir, respectively.

Conclusion: Many clinicians rely on package labeling and guidelines to make treatment decisions, particularly in the rapidly evolving field of chronic viral Hepatitis C. Based on the available literature it may be important for clinicians to note the sources of information and their relevance to clinical practice. Through a more thorough evaluation of primary literature clinicians may be able to better determine which sources should be used when making effective treatment decisions.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 5a-012

Poster Title: Gene expression changes in induced Pluripotent Stem Cells (iPSC) derived cardiomyocytes following doxorubicin exposure

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Purpose: The use of anthracyclines, such as doxorubicin, in cancer treatment regimens is often associated with progressive and irreversible damage to the heart leading to heart failure. This is particularly a concern for the childhood cancer survivor population, who commonly are treated with anthracycline-based chemotherapy regimens. Although there is a cumulative dose limit of 450mg/m2 to 550mg/m2 for patients receiving doxorubicin, identification of biomarkers leading to anthracycline-induced cardiotoxicity is better understood at the cellular level. induced Pluripotent Stem Cells (iPSC) derived cardiomyocytes is used to display the physiology of the human heart following exposure to anthracyclines, and elucidate the underlying mechanisms.

Methods: In this study, previously generated RNAseq data from iPSC-derived cardiomyocytes following various time- and dose-dependent exposure to doxorubicin were analyzed with a focus on 65 genes in the p53 pathway and 38 genes in doxorubicin's pharmacodynamics/pharmacokinetic (PK/PD) pathway. An analysis was conducted using the GenePattern software to identify differences in gene expression compared to controls for each time point on days 0, 7, 12 at dosages of 50nM, 150nM, and 450nM, and the significant genes were extracted (p less than 0.05).

Results: From the p53 pathway 26 of 65 genes were found to have significant changes in gene expression (p less than 0.05), while 6 of 38 genes were significant in doxorubicin's PK/PD pathway (p less than 0.05). David, a functional enrichment analysis tool revealed that the p53 pathway has a decrease in expression of genes involved with the cell cycle (CDK1, CCNB1, CCNB2, CDK2, CCEN2), an increase in expression of genes involved with apoptosis (BAX, IGF1),

DNA repair and DNA damage prevention (GADD45A, SESN1, SESN2). In the PK/PD pathway, genes involved with mitochondrial function (CYBA) showed a decrease in expression. The functional enrichment analysis suspects CYBA to be a gene directly involved with doxorubicin induced cardiotoxicity.

Conclusion: We can infer that the doxorubicin treatment of cardiomyocytes results in changes in the cell cycle, DNA repair process, apoptosis, and mitochondrial dysfunction. These observed expression changes in gene profiles from the p53 and PK/PD pathways, help to further understand the mechanisms involved leading to doxorubicin-induced cardiotoxicity in the childhood cancer survivor population.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 5a-013

Poster Title: The pharmacist's role in medical marijuana counseling: Patient and pharmacist perspective

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Purpose: Current evidence regarding the use of medical marijuana from the patients' perspective is lacking. Despite the controversy around therapeutic benefits, pharmacists as drug experts might be able to counsel users who feel inadequately informed on medical marijuana and increase safe usage of the medication as well as improved adherence to their therapeutic regimen. The study purposes are to evaluate whether medical marijuana users believe the pharmacist has a role in the education of its usage, and conversely, to gauge pharmacists' perspectives towards the use of medical marijuana and their ability to educate about its use.

Methods: The institutional review board approved the two online surveys that were distributed and completed through an online survey tool. Subjects for the patient perspective survey were recruited from local medical marijuana advocacy group chapters. Subjects for the pharmacist perspective survey were recruited from the pharmacy school volunteer faculty. All participants provided informed consent. The surveys asked about issues such as the patient's want of pharmacist counseling, the difference in effects before and after using medical marijuana, the factors affecting a pharmacist's comfort level in counseling, and the type of education on medical marijuana that the pharmacist has received. For the patient survey, a total of 53 responses were recorded and evaluated by chi-square tests. For the pharmacist survey, a total of 37 responses were recorded and evaluated by Fisher's exact test and by a case-control odds ratio test.

Results: There was no correlation between patient's duration (in years) of medical marijuana use and interest in pharmacist intervention. There was no correlation between patient's experience of medical marijuana side effects and interest in pharmacist intervention. There was no correlation between patient's usage of other medications for the same indication as medical marijuana and interest in pharmacist intervention. There was a significant difference in a pharmacist's confidence to counsel on medical marijuana between pharmacists who have received some type of education (whether it be in pharmacy school or continuing education) on medical marijuana and those who received none. Those who were confident to counsel were 6.1 times more likely to have received education.

Conclusion: No trends have been determined in patient-specific factors and interest in pharmacist intervention for medical marijuana use. Education about medical marijuana is associated with a pharmacist's comfort level in counseling on the medication. Future directions might question patients on perceived barriers to seeking pharmacist intervention, including social factors and popular opinion. Increased exposure to medical marijuana education as part of professional training could position pharmacists to counsel users who feel inadequately informed on medical marijuana and promote safe usage of the medication alone and in polypharmacy.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 5a-014

Poster Title: Impact of a didactic and an experiential public health course on the knowledge and use of public health information by pharmacy students

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Purpose: Previous research at two different colleges of pharmacy studied pharmacy students' attitudes and/or perceptions of public health, but they did not evaluate the pharmacy students on their knowledge and application of public health. The goal of this study is to assess pharmacy students' knowledge and application of public health information prior to a didactic course in public health, after completion of the didactic course, and again after completion of service learning.

Methods: One pre-course survey and two post-course surveys were given to first-year pharmacy students to assess changes in their knowledge and application of public health after completing a didactic public health course and after an experiential public health course. The pre-survey was given to the students as they started the program in June 2015. The first post-survey was given to the students after completion of a didactic public health course at the end of Summer Term in August 2015. The second post-survey was given after the completion of an experiential public health course at the end of either Fall Term in December 2015 or Winter Term in February 2016, depending on which quarter the students completed their experiential public health course. Participants were asked to provide a unique identifier according to a formula in order to match the surveys upon analysis. The knowledge questions were multiple-choice and included who should get the annual flu vaccine, what the most common youth psychiatric disorder is, and what diseases are affected by periodontitis. The application questions were open-ended and included defining public health and stating a community pharmacist's role in public health. An application question asked if the student referred anyone to any of the listed or other public health services.

Results: Of 216 unduplicated survey records, 72 (33%) were unable to be matched. Only 6 respondents had 3 matching surveys. Although only 6 first-year pharmacy students had 3 matching surveys, we were able to assess the pharmacy students' knowledge and application of public health information as a group. Based upon the data that we have, the cohort's knowledge increased from pre- to post-didactic and experiential. The percentage referring to a public health resource also increased. Many understood that public health's focus is beyond just the individual's health. Moreover, many recognized that community pharmacists are accessible and resourceful health professionals who can contribute to public health through preventive and supportive measures such as promoting and administering vaccines or referring patients to resources.

Conclusion: Students demonstrated increased knowledge of public health and the ability to apply their knowledge to patients after completion of both a didactic course and an experiential course in public health.

Submission Category: Pain Management

Submission Type: Evaluative Study

Session-Board Number: 5a-015

Poster Title: Efficacy of topical lidocaine 5% patch for post-thoracotomy and sternotomy pain in cardiothoracic intensive care unit adult patients

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Purpose: Significant perioperative pain related to the surgery, respiratory care, and mobilization remains prevalent in CTICU patients. Post-thoracotomy somatic and neuropathic pain from cardiac surgery is more common than other persistent incisional pain. Although the effectiveness of local infiltrative anesthetic agents and oral neuropathic agents have been published, there is only 1 study to date that evaluated the use of topical 5% lidocaine patch. Potential advantages of lidocaine patch include avoidance of systemic toxicities and excellent safety profile. This project was designed to evaluate the efficacy of lidocaine 5% patch for post-thoracotomy or sternotomy pain in cardiothoracic ICU adults.

Methods: We conducted a retrospective cohort, single-center study in the CTICU from Jan 1st,2015–December 31 st , 2015. Primary outcome is mean numeric pain ratings (0-10) for sternum and thoracotomy sites, 12 hours after 1 st patch is placed based on the drug's time to maximum peak concentration. Secondary outcomes include total opioid administered converted to morphine IV equivalence, CTICU and hospital length of stay (LOS), and total dose of other opioid analgesics (e.g.,tramadol) and non-opioids. Nominal and continuous data were analyzed with chi-square text of independence and two sample t test, respectively. Analysis was performed with Microsoft Excel Tool Pak 2015.

Results: Both the lidocaine and control groups had similar baseline characteristics ($p>0.05$ for all variables, if applicable). There was no statistically significant difference between both the lidocaine and control groups in mean numeric pain ratings for sternum and thoracotomy sites

(2.0 vs 1.9, respectively; p=0.58). No statistically significant differences were detected between both the lidocaine and control groups for mean CTICU LOS, and hospital LOS (mean CTICU LOS were 3.06 vs. 3.11, respectively; p=0.86. Mean hospital LOS were 8.26 vs. 7.61, respectively; p=0.47). No difference in total dose of other opioid analgesics and non-opioids was found (p>0.05 for all variables).

Conclusion: Lidocaine 5% patches did not reduce acute post-operative post-thoracotomy and sternotomy pain, LOS, or reduction in the need of total dose of opioids or non-opioids in the CTICU adult patients.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 5a-016

Poster Title: Evaluating the implementation of interprofessional education in top pharmacy school curriculums in the United States

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Purpose: Healthcare practice has become an increasingly collaborative and multidisciplinary field, and it has become essential for healthcare professionals to communicate effectively with other practitioners to optimize patient care. Pharmacy schools are starting to implement interprofessional education (IPE) into their curriculums to better prepare students to serve on these collaborative healthcare teams. The purpose of this study was to explore publically available information relating to the structure and integration methods of IPE into nationally top-ranked pharmacy curriculums, summarize the IPE core competencies and assessment standards in these schools, and gauge overall student perceptions after program completion.

Methods: Our study involved an extensive website search and evaluation of IPE programs at the top thirty pharmacy schools in the United States (as ranked by U.S. News in 2016) and a literature review of articles analyzing specific IPE experiences. We collected data on overall IPE program structure, timing of incorporation into the pharmacy curriculum, therapeutic areas covered in each session, types of healthcare students included in the program (pharmacy, medical, nursing, etc.), and achievement of core competencies and assessment standards. From the literature review that incorporated evaluation of multiple IPE programs, we gathered information on student experiences and perceptions of their programs, limitations and barriers to IPE, and student views on the impact of IPE participation on their own future clinical performances and overall delivery of patient care.

Results: Fifteen of the top thirty pharmacy schools we evaluated using publically available data (50%) currently have formal IPE programs in place. The majority of these programs integrate IPE early in the curriculum, usually during the first professional year. Medical, nursing, and pharmacy students are most commonly involved; however, universities that are associated with other healthcare programs may also incorporate physician assistant, physical therapy, dentistry, and social work students. While the specific therapeutic areas covered by each program differ, the main topics covered include ethical discussions, simulated patient cases of common disease states such as diabetes, COPD, and cardiovascular disease, and community health issues such as opioid overdose. Core competencies and assessment standards for each program are generally very consistent across programs: the schools aim to have students become more knowledgeable about roles and responsibilities of all practitioners, effectively delegate tasks based on students' academic backgrounds, and apply their clinical knowledge. Based on our literature search, we found that participating students had positive experiences with IPE programs and often felt these sessions confirmed their career choices. However, cost, administrative support, levels of student preparation, and resistance to change were cited as frequent barriers to IPE.

Conclusion: Following the recently released Accreditation Council for Pharmacy Education (ACPE) Standards 2016 requiring students to demonstrate competency in interprofessional teams, we anticipate a strategic integration of IPE into pharmacy schools' curriculums nationwide in the next few years. Medical and nursing students' curriculums have also mandated interprofessional programs to prepare students to function collaboratively. We believe that long-term development of IPE programs will ultimately optimize patient care, increase positive health outcomes, validate the value of pharmacists on healthcare teams, and encourage more frequent and discussion-based collaborations among healthcare professionals. The value of these programs should be studied systematically and communicated broadly.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5a-017

Poster Title: Evaluation of a prescriber-driven prior authorization adjudication process at the Durham Veterans Affairs Medical Center (DVAMC)

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Purpose: The purpose of this study was to evaluate the effectiveness of a provider-driven prior authorization process. To ensure safe and timely processing of formulary restricted testosterone replacement therapy (TRT) and naloxone kit orders, medication use evaluation templates (MUETs) were developed. MUETs, which are completed by providers, are electronic forms that contain monitoring and safety parameters. By completing this form, providers self-adjudicate the orders and determine the appropriateness of the medication. MUETs for TRT and naloxone kits were implemented in 2015 at the DVAMC and are assessed for effectiveness through this post-hoc analysis.

Methods: To perform this post-hoc analysis, a retrospective chart review was conducted from the VA Computerized Patient Record System (CPRS). Veterans were included for initial selection if they had a TRT or naloxone kit prescription filled between 1/1/2016 and 6/1/2016 at the DVAMC. A total of 577 veterans for TRT and 55 veterans for naloxone were identified from the VA Corporate Data Warehouse. Veterans were de-identified and a total of 138 veterans were randomly selected as a convenience sample for TRT analysis and 53 veterans for naloxone were used for analysis. Two veterans were excluded from naloxone kit selection as their prescriptions were not dispensed. Additionally, veterans were excluded from analysis if a completed order MUET was not found in their medical charts. Of the 53 remaining naloxone prescriptions, six order MUETs were missing from veteran progress notes and only 50/138 of the veterans selected for TRT MUET evaluation had an order MUET located within their progress notes. The primary endpoint assessed the occurrence of accurately completed MUETs by reconciling MUET responses with documentation in veteran charts. Additionally, secondary endpoints for TRT

MUET analysis involved assessing the accuracy of completed individual sections in the TRT MUET including indication/symptoms, required baseline labs, and provider-initiated discussion concerning clinical warnings/precautions or contraindications to TRT.

Results: The primary endpoint was reached in 35/50 of the TRT MUETs and 39/47 of the naloxone rescue kit MUETs. Of the 50 TRT MUETs analyzed, 42 contained symptoms listed in the appropriate subsection while nearly all of the veterans had symptoms of testosterone deficiency located in their progress notes. Additionally, 49/50 veterans had indications for TRT listed in both their MUETs as well as their progress notes. After progress note review, only 4/50 veterans prescribed TRT had contraindications to therapy and 100% of these veterans were being closely followed by a provider and had a documented risk/benefit discussion in their medical records. Of the completed MUETs, baseline testosterone levels were found in 45/50; hematocrit levels in 48/50; PSA levels in 46/50; and liver function tests were found within 44/50.

Conclusion: Overall, most providers who completed MUETs were adherent to the process and provided accurate information. Additionally, providers who switched veterans to non-formulary TRT formulations documented consideration of formulary intramuscular TRT. This demonstrates that formulary compliance is also facilitated by using the provider-driven templates. These MUETs provide a reliable process for the prescribing of formulary restricted therapies with uncomplicated criteria without extensive pharmacist review.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5a-018

Poster Title: Evaluation of herbal and nonprescription medication supplement usage in elderly patients

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Purpose: Both patients and providers frequently overlook herbals and other nonprescription medications when creating medication lists. This can lead to various unexplained drug interactions or adverse effects, especially in the elderly population due to polypharmacy. The purpose of this study was to analyze supplement usage in the elderly population, their rationale for usage, whether drug interactions occurred and if they disclosed their nonprescription medication usage to their physicians or pharmacies. A secondary focus was to determine why some patients decided not to take nonprescription medications.

Methods: The institutional review board of MCPHS University approved this survey-based study. Elderly patients (greater than or equal to 65 years old) admitted to select care areas of Milford Regional Medical Center were given a survey to determine herbal and nonprescription medication usage. Pharmacy interns assisted patients in the completion of the surveys. Survey questions gathered information regarding whether or not patients ever used nonprescription medication supplements, the names of the supplements as well as the rationale for taking each. Questions also included whether patients disclosed this information to their physician or pharmacy, as well as where they usually purchase these supplements and approximately how much they spent each month on supplements. If patients did not take supplements, or previously used to and stopped, they were asked as to why. A comprehensive medication list of prescription medication was also obtained for each patient completing a survey. The lists of supplements and medications were then entered into Lexicomp (Lexicomp, Inc: Wolters Kluwer Clinical Drug Information; Hudson, OH) to determine any drug interactions.

Results: Of the 128 patients surveyed, 78 patients currently took supplements, 48 patients did not take supplements, and 2 patients used to take supplements but stopped. A vast majority of supplements being taken were vitamins (61 percent). The second largest group was herbal supplements (27.7 percent). Most supplements were recommended by a health care provider (74.2 percent) but many patients were recommended supplements by a friend or family member, heard about it on television, or did their own research (25.7 percent). For overall efficacy, patients were split between deciding their supplements worked as expected (47.9 percent) or unsure if their supplement was working (46.0 percent). Almost all patients told their physician about supplement usage (94.6 percent), however, fewer patients told their pharmacy (60.0 percent). Several patients did not know to disclose that information to their pharmacy (30.8 percent). A majority of supplements were bought from a pharmacy (72.9 percent) but many supplements were bought from supermarkets, online, or other venues where counseling could not be obtained (30.5 percent). Most patients spent less than 30 dollars a month on supplements (67.2 percent). When analyzing drug interactions, only four patients had significant drug interactions and only one patient had a Category X interaction.

Conclusion: Despite the fear of drug interactions of supplements with long medication lists in the elderly, there does not seem to be many drug interactions in the group studied. Patients tend to disclose their supplement usage with their physician which can prevent these errors from occurring. Many of these supplements are being recommended by health care providers but many patients are also being recommended supplements by friends, family, or the media.

Submission Category: Oncology

Submission Type: Descriptive Report

Session-Board Number: 5a-019

Poster Title: Evaluating compliance to a platinum agent hypersensitivity reaction classification and management algorithm at a large academic medical center

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Purpose: Platinum agents (carboplatin, cisplatin, and oxaliplatin) are capable of causing unpredictable hypersensitivity reaction during any stage of cancer treatment. Definitive treatment recommendations and evidence based literature in management of patients with the hypersensitivity reaction is lacking. Our institution formulated and adopted a detailed policy to classify and manage all platinum related hypersensitivity reaction. This policy was implemented in June 2014. The purpose of this project was to evaluate compliance to the formulated algorithm and to determine opportunities for improvement in compliance to the policy.

Methods: Data from the event reporting system were used to identify patients with a hypersensitivity reaction event to platinum agents from November 2014 to March 2016. Four main categories were evaluated by chart review including: appropriate documentation of the HSR event in the electronic medical record, future desensitization (shortened, standard and prolonged) plan for subsequent chemotherapy cycles, characterization of intensity of hypersensitivity reaction, (mild, moderate-low, moderate-standard and severe) and documentation of the hypersensitivity reaction in the allergy list. Each healthcare professional has a specific responsibility of documentation within the hypersensitivity reaction algorithm. The role of the provider (advanced practice provider or attending physician) is to enter the hypersensitivity reaction event in the problem list, whereas, the responsibility of the registered nurse is to document the event timeline in the progress note. The policy also requires the provider to document the desensitization plan for future cycle(s) in the problem list. According to the policy, all platinum agents' hypersensitivity reaction intensity should be classified and documented. Finally, the policy instructs the nursing staff to document platinum agent in the

allergy list. Through retrospective analysis of patient charts, we identified documentation strengths and weaknesses. These results were presented to pharmacy and therapeutics committee for discussion.

Results: Seventy-three platinum related hypersensitivity reactions were reported from November 2014 to March 2016. Twenty-five hypersensitivity reaction events were randomly selected from four outpatient infusion sites. Twenty-one hypersensitivity reactions were entered in the problem list. Of the four hypersensitivity reactions not added to the problem list, one was undocumented and the other three were documented in the progress note. The event timeline for each patient's hypersensitivity reaction was documented appropriately in the progress notes. The future desensitization plan was entered in the problem list for 13 patients and elsewhere in the chart for two patients. Treatment plan discontinuation, patient death, infusion rate and premedication modification, or completion of the chemotherapy cycles led to a lack of documentation for the remaining 10 patients. The distribution of mild, moderate-low, moderate-standard, and severe intensity were 7, 10, 5 and 3 respectively. Of the three severe hypersensitivity reactions, one received successful subsequent platinum infusion with a prolonged desensitization, whereas the platinum agent was discontinued permanently for the other two patients. The platinum agent was entered in the allergy list for 17 patients. The remaining eight patients had either a mild or moderate-low reaction, therefore the reaction was not added to the allergy list.

Conclusion: Conducting a retrospective audit of the policy was helpful in identifying areas for improvement with respect to compliance to the hypersensitivity reaction policy. It was evident that providers are diligent in entering hypersensitivity reaction in patient's problem list. However, they have room for improvement in future desensitization plan documentation. Nursing staff is thoroughly documenting hypersensitivity reactions in progress notes but they also have room for improvement in updating allergy list for mild and moderate-low intensity hypersensitivity reaction.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5a-020

Poster Title: Prazosin administration for the treatment of nightmares in psychiatric patients

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Amad Din

Purpose: The United States Food and Drug Administration currently indicates prazosin, an alpha-adrenergic antagonist, for the treatment of hypertension. Recently, studies have found that prazosin is beneficial for the treatment of post-traumatic stress disorder (PTSD) and is most commonly used off-label for PTSD nightmares. With the growing use of prazosin for PTSD nightmares, we have seen an increasing trend in prazosin's use for non-PTSD nightmares in clinical settings. This study aimed to evaluate the safety and efficacy of prazosin when it is used to treat nightmares while considering diagnoses and concurrent medications.

Methods: This study was approved by the University of Kansas Medical Center's institutional review board. Potential patients were identified through Healthcare Enterprise Repository for Ontological Narration (HERON), a searchable clinical database of patient records. Adults (18 years of age or older) who experienced at least one psychiatric admission within the last 5 years and had taken prazosin at least once were included in the study. Patients were excluded if they were subsequently found to have not received prazosin or received prazosin for hypertension. Patient charts and medication administration records were reviewed to gather pertinent information, including demographics, histories of substance abuse, current diagnoses (namely post-traumatic stress disorder, other psychiatric disorders, personality disorders, or disorders that impair sleep), documented cause of trauma (if applicable), documented efficacy of prazosin, documented side effects of prazosin, and concurrent medications that effect sleep. Patient chart review was conducted by one researcher while another randomly reviewed five percent of charts to ensure consistency and accuracy. Statistics were assessed using SPSS version 22, and included descriptive statistics for patient demographics and prazosin use.

Results: Of the 80 patients initially identified, only 64 met the inclusion criteria. Prazosin doses ranged from between 1 to 6 mg, with 2 mg being the average. Of these individuals, 48.4 percent were male and 75.0 percent were Caucasian, with a mean age of 39.8 years. Most patients suffered from a substance abuse disorder, most commonly alcohol (37.5 percent), cannabis (40.6 percent), or stimulants (40.6 percent). The majority of patients (81.3 percent) had a diagnosis of post-traumatic stress disorder, while 31.3 percent of patients had diagnosed major depressive disorder, and 26.6 percent of patients had diagnosed anxiety. Some patients (12.5 percent) had an additional diagnosis for a medical condition that affected sleep, such as sleep apnea. There was clinical documentation of at least partial effectiveness for 65.6 percent of patients who received prazosin. The remaining 34.4 percent of patients either did not have documented comments on effectiveness or the physician reported prazosin to be ineffective. Of the patients who did not have a PTSD diagnosis, 57.1 percent of patients had documentation of effectiveness. Only 6.4 percent of patients had documented adverse reactions to prazosin. Most psychiatric patients (92.2 percent) were on at least one additional medication that affected sleep.

Conclusion: Prazosin was frequently documented of reducing nightmares during psychiatric admissions. The low rate of adverse reactions indicates that prazosin, at the very least, may serve as a safe and effective new approach to treating nightmares for psychiatric patients. However, the cessation or reduction of nightmares for patients during psychiatric visits could be attributed to other medications or treatments conducted during their hospital stay. A more widespread, prospective study would better establish prazosin as an applicable treatment for psychiatric patient nightmares nationwide.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5a-021

Poster Title: Evaluation of Counseling Prevalence and Effectiveness on Metered-dose Inhaler Technique

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Purpose: Guidelines suggest healthcare providers assess inhaler technique by having participants demonstrate use of their inhaler. However, there is little guidance on the best assessment method. The aims of this study were: (1) assess the incidence and extent of counseling provided to participants who use a metered-dose inhaler, (2) determine the prevalence of metered-dose inhaler misuse in adults, and (3) determine if any associations exist between the counseling method and the participant's ability to properly use a metered-dose inhaler.

Methods: Adult participants who had a current or previous history of metered-dose inhaler use were recruited from retail pharmacies and physician offices in Laurens County, SC. Exclusion criteria included the use of a metered-dose inhaler spacer, non-English speaking, or a current acute respiratory illness. Participants completed a survey regarding inhaler use and previous counseling, a subjective checklist assessment by demonstrating use of a metered-dose inhaler, and an objective assessment by using the Vitalograph Aerosol Inhalation Monitor. Descriptive statistics were used to analyze demographic information. Fisher's exact tests were used to analyze nominal data. All analyses were completed in 2010 Microsoft Excel or SAS 9.4.

Results: One hundred participants were enrolled in the study, and 99 participants completed all steps. Participants were mostly white females, with an average age of 53 years. The most common methods of counseling received were verbal communication (55%) and demonstration (47%); however, approximately 25% of participants never received counseling on their inhaler.

Of 100 participants, ninety four percent were found to have insufficient metered dose inhaler technique. No association between the method of counseling and successful metered dose inhaler technique with the Vitalograph Aerosol Inhalation Monitor was identified (p=0.313). Participants were less likely to correctly use the Vitalograph Aerosol Inhalation Monitor if they missed more than 3 steps in the subjective assessment. (p=0.032).

Conclusion: No counseling method evaluated achieved optimal results. A participants' ability to follow a checklist may be indicative of proper metered dose inhaler technique.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5a-022

Poster Title: Performing Gap Analysis to assure compliance of the new USP Chapter Standards for Sterile Compounding and safe handling of Hazardous Drugs in Specialty Infusion

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Purpose: The purpose of this project is to ensure that our specialty infusion pharmacy is compliant with the standards and guidelines of the new United States Pharmacopeia (USP) < 800> Chapter as well as to continue to provide world class safety for not only patients, but also the employees (pharmacy staff, nursing, warehouse and delivery staff, etc.).

Methods: The project was broken down into four parts. The first step was to identify a detailed gap analysis tool that could be customized to include all 18 sections of the USP < 800> Chapter. The tool was modified to meet the practice setting of this specialty infusion pharmacy. Areas that were examined included: an introduction list of hazardous drugs, type of exposure, personal handling, facilities/engineering controls, environmental quality/control, personal protective equipment (PPE), communication, personnel training, receiving, labeling, package, transport and disposal, dispensing, compounding, administration, deactivating, decontaminating, cleaning and disinfecting, spill control, documentation/ standard operating procedures (SOPs), and medical surveillance. Each section had various components that were marked as "Met," "Not met," or "Not Applicable," which identified areas in need of improvements. The second step was locating SOPs and required forms (acknowledgement and training) to ensure that they were up-to-date to include content specifying hazardous drug compounding. The third step was inspecting facilities and employee processes, specifically storage, handling, biological safety cabinets, clean room, administration, and PPE utilized by employees. The last step was to develop an action plan for improvements based upon the results of the survey with target dates to make specific completions prior to July 1st, 2018.

Results: This gap analysis resulted in an overall compliance score of 71.6 percent (106/148). This included 106 components in the "Met" category, 42 components in the "Not Met" category and 43 components in the "Not Applicable" category. Not applicable was indicated for procedures, clean room layout and equipment standards that are not yet required as they are new components in USP < 800> Chapter. Sections with the lowest compliance were PPE at 63.3 percent, SOPs at 52.6 percent, medical surveillance (not required) at 18.8 percent and environmental quality and control (not required) at 0 percent. The PPE score reflected changes in use of goggles, respirator, and wearing two pairs of gloves. SOPs score was low due to a lack in specification for hazardous drugs. Medical surveillance and environmental quality/control are currently not required, but rather just recommendations. Moving forward, the areas that need improvement are separate storage and refrigeration for hazardous drugs (hazardous drugs need to be stored together and refrigerated antineoplastic drugs need to be placed in a dedicated refrigerator in a negative pressure room with a minimum of 12 air changes per hour), use of goggles, integration of Closed-System Drug-Transfer Device (CSTD) and proper PPEs when handling hazardous drugs.

Conclusion: Overall, this preliminary internal gap analysis helped to identify areas within the specialty infusion department that required adjustments in order to become compliant with the new USP < 800> Chapter. These results were used to develop a detailed action plan to be finished by the end of December 2017 to allow extra time for any additional training and delays before the official USP < 800> July 1st, 2018 launch date. To review and validate our findings, an external USP < 800> expert will conduct an independent gap analysis prior to finalizing the action plan.

Submission Category: Leadership

Submission Type: Evaluative Study

Session-Board Number: 5a-023

Poster Title: Evaluation of a year-long pharmacy mentorship program: A quality improvement initiative

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Purpose: Mentorship, defined as a mutual professional relationship between at least two individuals that is typically long-term, has largely been correlated with positive outcomes including professional and personal growth and higher proficiency. Evaluating a mentorship program for areas of development can help both interested mentors and mentees gain the most out of their experience. The purpose of this study is to identify the benefits and challenges that mentors and mentees experienced when participating in the Mentorship Program and to determine areas of improvement to develop a successful mentoring relationship.

Methods: A survey was administered to evaluate the quality of the program based on the subjects' overall satisfaction. Subjects were first-year, second-year, and third-year student pharmacists at the Midwestern University Chicago College of Pharmacy and needed to be members of the MWU ICHP Mentorship Program. Subjects completed a survey that was aimed towards their satisfaction and professional improvements as well as the Mentorship Program's quality and efficacy in the matching process. The survey was anonymous, which was indicated on the cover sheet, and included 16 questions for mentors and 15 questions for mentees. The mentees documented their individual mentorship meetings per quarter, through which we tracked the number of times they had met and determined how beneficial the program was at providing guidance.

Results: 33 mentors and 36 mentees participated in the survey. Categories including satisfaction, quality, improvements, and effectiveness were analyzed. Both the mentors and mentees strongly agreed to recommend this program to others at 69.7 percent and 71.4 percent, respectively. Additionally, mentors and mentees found themselves to be more confident networking as a result of participating in the program with 46.9 percent and 57.1 percent, respectively. An analysis for quality and effectiveness was conducted separately for mentors and mentees. Overall, mentors agreed (53.1 percent) that the program prepared them to be a mentor and strongly agreed (56.2 percent) that it helped them build their leadership skills. As for the mentees, 51.4 percent strongly agreed that the program helped them with their academics and 50 percent agreed that it helped them gain information on career opportunities.

Conclusion: Overall, the mentors and mentees were satisfied; mentees felt more confident networking due to this program and mentors developed in their leadership skills. Based on the feedback and results, improvements such as organizing training workshops to set clearer expectations for mentors and mentees and providing more social events will be implemented into the program.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 5a-024

Poster Title: PPROM care process model change

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Purpose: Demonstrate the clinical relevance of updating a current care process model for premature rupture of membranes (PPROM) to include azithromycin as the preferred agent vs. erythromycin. Antibiotics in the setting of PPROM has shown to decrease fetal complications and prolong latency. The American College of Obstetrics and Gynecology recommends treating with ampicillin plus erythromycin then 5 days of oral antibiotics. There is a nationwide erythromycin shortage necessitating the question of whether or not azithromycin could be used in its place. Azithromycin also provides better tolerability, a favorable pharmacokinetics profile, less drug-drug interactions, and significant cost savings.

Methods: A management pharmacist and a pharmacy student wrote a proposed update to the PPROM care process model. This was presented to pharmacy management as well as the OB development committee. The presentation included cost savings benefit, a literature review, current guidelines, examples of other facilities using azithromycin in their protocols, side effect comparison, pharmacokinetic data, interactions, and pregnancy category.

Results: The system wide ob development group accepted our proposal and many physicians will begin utilizing azithromycin instead of erythromycin. Azithromycin is now included on the standard order set for PPROM.The average savings per year based on past delivery per year average and 3% estimated incidence of PPROM is $315,000 reduction in cost billed to patient and a $51,000 reduction in total medication cost.

Conclusion: This Care Process Model update increases visibility of pharmacists' roles in cost savings and patient outcomes.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5a-025

Poster Title: Identifying the impact of BOOST teaching on readmissions at a community hospital

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Purpose: After being discharged from the hospital, up to 20 percent of Medicare patients are readmitted within 30 days. In 2011, there were approximately 3.3 million readmissions in the United States, resulting in 41.3 billion dollars of unnecessary patient charges. Intermountain Healthcare hospitals began implementing a discharge counseling program entitlted BOOST teaching (Better Outcomes for Older Adults by Optimizing Safe Transitions) to identify high risk groups in an attempt to decrease readmission rates in these populations. Riverton Hospital is an Intermountain community hospital with 97 beds. Current BOOST teaching efforts focus on patients in the medical/surgical and intensive care units.

Methods: Patients who qualify for BOOST are identified daily, according to the following 6 criteria: Poly-pharmacy (> 10 prescribed medications), New Anticoagulant, Uncontrolled Diabetes , New Antiplatelet, High Risk Heart Failure Medications, and New Antiarrhythmic Medications. A pharmacist or pharmacy intern will counsel these patients before discharge focusing on simplifying the medication regimen, intervening on duplications of therapy, reviewing drug interactions, and explaining medication indications and appropriate administration techniques.

Results: Of the 155 patients who were identified as BOOST during the study period, 64 were taught by a pharmacist or pharmacy intern. A total of 29 BOOST patients were readmitted to the hospital within 60 days (25 of them within 30 days), leading to an 18.5 percent readmission rater in this specific population. Pharmacists and Pharmacy Interns spent an average of 8.07 minutes preparing to teach each patient, and 14.27 minutes actually teaching the patients.

Conclusion: As cost control and payment models focusing on outcomes become more mainstream for health care systems, pharmacists can participate in improving patient outcomes and decreasing financial burden by empowering and educating patients regarding their

medications. In the future, Riverton Hospital will track readmission rates to determine if BOOST teaching is a significant component of reducing readmissions. Currently, readmission rates of patients who received BOOST teaching are similar to the national average among Medicare patients (20 percent). These preliminary data will be used to track improvement within this hospital as BOOST teaching continues.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5a-026

Poster Title: Expansion of a pharmacy technician based medication reconciliation program to the emergency department: A pilot program

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Purpose: Obtaining and completing an accurate medication history upon hospital admission is necessary for patient safety. Studies have demonstrated that pharmacy technicians can accurately complete medication reconciliation when compared to pharmacists and other health care practitioners. Medication reconciliation prior to inpatient admission can improve appropriate drug therapy and possibly minimize drug related adverse events. A pilot program to expand pharmacy technician driven medication reconciliation to start in the emergency department prior to admission will improve workflow and time to completing an accurate medication history. This initiative will provide the health care team with the most updated and accurate patient medication list.

Methods: A pharmacy technician driven medication reconciliation program was initiated in March 2013 and expanded hospital-wide in October 2015, completing medication reconciliation in approximately 77% of all patients admitted to the hospital. Medication reconciliation is currently completed 50% by the Emergency Department pharmacist and 50% by pharmacy technicians. Pharmacy technicians prioritize medication reconciliation by interviewing patients admitted to the hospital on the prior day. A pharmacy intern pilot program was designed to expand the pharmacy technician service area to initiate patient interviews in the Emergency Department soon after hospital admission orders. The pharmacy intern worked with the Emergency Department pharmacist to learn department specific workflow, triage, and the Emergency Department navigator in the electronic medical record. All medication history information was discussed and reviewed by the Emergency Department pharmacist for

accuracy. Data was collected on the time of admission to medication reconciliation and types of discrepancies reconciled. To support the expansion of pharmacy technician medication reconciliation to start in the Emergency Department, a comprehensive training manual, medication competency, and training checklist was developed to train medication reconciliation pharmacy technicians on the expanded role in the Emergency Department environment.

Results: Data was collected retrospectively for a three-week period, including patients admitted to the hospital through the Emergency Department during the hours of the pilot program. Patients admitted from a long term care facility or who were recently admitted within the past month, were excluded. Ninety-four patients were analyzed and 80 patients met inclusion criteria. New patients admitted were captured through Trigger Sheets (15%), ED Track-board (40%), and Manual Lookup (45%). Over the pilot program, 77.6% of patients had at least one medication discrepancy on the home medication list with each of these patients averaging 3.92 medication discrepancies. In addition, 59.2% had changed or discontinued therapy, 30.6 % had missing or incomplete information, 24.5% had omitted therapy, and 14.3% had duplicate therapy. The pilot program completed medication reconciliation within an average of 2.26 hours following hospital admission versus the Emergency Department Pharmacist within 1.9 hours. Compared to current procedures (outside of the pilot program), 73 patients admitted during the same time period took an average of 25 hours to complete medication reconciliation from the time of admission orders.

Conclusion: Expanding the pharmacy technician driven medication reconciliation program to start in the Emergency Department improved the time from admission to medication reconciliation from 25 hours to 2.26 hours, similar to that of the Emergency Department Pharmacist (1.9 hours). Supplemental material was developed to introduce the pharmacy technician to the Emergency Department environment and workflow. Upon full implementation, the expansion of pharmacy technician workflow is expected to reduce the Emergency Department Pharmacist medication reconciliation related workload to allow focus on other clinically based initiatives while also providing cost-savings to the hospital.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5a-027

Poster Title: Impact of Meds to Beds program on servicing patients with prior authorization or additional medication education needs

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Purpose: Meds to Beds, a complimentary bedside delivery service for discharge medications that includes pharmacist counseling, exists to address gaps in transitions of care. Medications requiring prior authorization and medications classified by the Institute for Safe Medication Practices (ISMP) as high-alert pose unique problems at discharge. These medications can lead to unintentional non-adherence, where resource limitations such as access or sufficient counseling prevent patients from following treatment recommendation. The purpose of this study was to evaluate the impact of Meds to Beds on addressing medication access and adherence issues specifically associated with these problematic discharge medications.

Methods: The Institutional Review Board approved this prospective study. The list of problematic discharge medications to be analyzed was first determined. The list of discharge medications often requiring prior authorization (PA med list) was generated via analysis of outpatient pharmacy's daily sales from January 1, 2016 – June 30, 2016. The list of high alert medications often dispensed at discharge (HA med list) was provided by the Medication Safety Pharmacist. Following the generation of these lists, existing manufacturers' free-trial cards for medications on the PA med list were collected, and personal reference cards containing a list of the available cards were created and distributed to case managers, social workers, and diabetes nurse educators. Counseling guides were created or compiled from ISMP and the health district's resources for medications on the HA med list.
From August 8, 2016 – September 2, 2016 (intervention period), eligible patients discharged on a medication from the PA med list or HA med list were informed via telephone of the free-trial cards or pharmacy counseling resources available to them respectively, and then offered the Meds to Beds service. Prescription capture rates, which served as a surrogate marker for

medication access, were compared between the intervention period and July 11, 2016 – August 5, 2016 (pre-intervention period).

Results: For medications often requiring prior authorization, the prescription capture rate rose from 22.3 percent during the pre-intervention period to 33.8 percent during the intervention period. While increased, the association between informing patients about free trial card information and increased prescription capture rates was not significant (p equals 0.096). For medications classified as high alert, the prescription capture rate rose from 26.2 percent during the pre-intervention period to 50.0 percent during the intervention period. There is a statistically significant association between informing patients about counseling services available for high alert medications and increased prescription capture rates (p equals 0.005). The odds of accepting the Meds to Beds service were 2.82 times higher among patients informed of the counseling resources available to them than among patients uninformed (95 percent CI equals 1.27-6.35). Patient sex, length of stay, and time between ordering the discharge prescription and patient discharge were not confounding factors (adjusted OR equals 2.81, 2.88, 2.62 respectively) on prescription capture rates.

Conclusion: Meds to Beds can be used to address discharge complications related to problematic discharge prescriptions. Informing patients about counseling services available for high alert medications significantly increased the prescription capture rate. Although there was a non-significant increase in the prescription capture rate for medications often requiring prior authorization, the distribution of financial reference cards to varying healthcare professionals promotes future increases in filling these prescriptions. The streamlined Meds to Beds workflow process may prove useful in sustaining high prescription capture rates.

Submission Category: Clinical Services Management

Submission Type: Evaluative Study

Session-Board Number: 5a-028

Poster Title: Assessing pharmacist competency for administrating anticoagulation clinic in a community hospital

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Purpose: The purpose of this clinical management project was to assure that pharmacists in charge of anticoagulation clinic were competent in the information and confident in managing a patients internationalized normalized ratio. For the most part, pharmacists with anticoagulation competency should be in charge adjusting the patient's anticoagulation dose appropriately. They should also be responsible for clinical documentation of the critical aspects in the patient medical record for communication among health care practitioners. It is vital that the pharmacists first show that they are competent with the information of warfarin and familiar with the guidelines on dosing the drug appropriately.

Methods: I have constructed a 1 to 2-day course for registered pharmacists. It was open to those who are interested in the clinical management of patients on anticoagulant therapy, and/or who are looking to expand their practice to involve patient management of outpatient anticoagulation therapy. The program I constructed was broken down into two parts, day one was fixated on pathophysiology of thromboembolic disorders, and the pharmacology of anticoagulation agents. Day 2 was fixated on patient education and program administrative procedures. At the completion of the 2-day traineeship there was an assessment that required a 100% as a passing grade for the course. A certificate of completion will be awarded upon successful completion of the traineeship.

Results: There were 10 pharmacists that took the anticoagulation competency assessment and 9 out of the 10 received a passing grade of 100%. The individual that did not pass had another review session focusing on the areas that he/she answered incorrectly and reassessed the competency assessment. The pharmacist director felt that the examinations were vital in refreshing the minds of pharmacists in anticoagulation treatment. The pharmacists whom took the assessment provided feedback of the 2- day course and felt that the examination was informative, relevant with the most recent updated guidelines, and provided confidence in their anticoagulant therapeutic dosing for patients.

Conclusion: Overall the competency assessment proved to be vital in determining the proficiency of pharmacists and reassurance that patients were being managed and treated on anticoagulation medications properly. The assessment continues to be incorporated in the hospitals guidelines for a pharmacist to become a member of the anticoagulation clinic team. I have also shown the competency assessment to other hospitals where I have received feedback of their interest in incorporating a similar modified assessment to fit there needs.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 5a-029

Poster Title: Impact of bumetanide to torsemide conversion in veterans with heart failure

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Purpose: The three most common loop diuretics, furosemide, bumetanide, and torsemide, are effective in treating the hallmark symptoms of heart failure, peripheral edema, fatigue, and shortness of breath. While previous studies compared the effectiveness of furosemide to either bumetanide or torsemide, no studies have evaluated the comparative effectiveness between bumetanide and torsemide. The purpose of this study is to evaluate the impact of converting heart failure patients on stable oral doses of bumetanide to equipotent oral doses of torsemide.

Methods: The institutional review board approved this single center, retrospective, observational cohort study of 72 veterans with heart failure who were converted from stable doses of bumetanide to equipotent doses of torsemide. All patients prescribed bumetanide with less than a three-month supply remaining during the bumetanide drug shortage in March 2014 were converted to equipotent doses of torsemide. Patient data were collected to determine torsemide failures and outcomes in the 12 months after diuretic conversion. Torsemide failures were defined as discontinuation with in one year and/or torsemide dosage adjustments within the first three months of conversion. Hospital admissions and emergency department visits for heart failure were compared 12 months before and after diuretic conversion. Additional data were collected to explore potential risk factors associated with torsemide failure.

Results: Sixty-eight patients met inclusion criteria and were included in the analysis. The majority of patients was male and had heart failure with preserved ejection fraction. Fifty-seven percent of patients had severe chronic kidney disease (stage III or greater). At the end of one year, 16 (24%) of patients discontinued torsemide and were converted to another loop diuretic.

Six (9%) patients required a dosage adjustment within the first three months following the diuretic conversion. Overall, 22 (32%) of patients met our definition for torsemide failure at the end of the first year. After two years, the overall torsemide failure rate increased to 28 (41%). There were no statistical differences in the proportion of patients hospitalized or presenting to the ED for worsening heart failure one year prior to diuretic conversion compared to one year after diuretic conversion (45% vs. 29%; p=0.52). Additional univariate analysis did not identify any patient characteristics that were significantly associated with torsemide failure.

Conclusion: Findings from this study demonstrate a relatively high discontinuation rate of torsemide when converted from bumetanide. Individual patient factors may explain differences in clinical efficacy between torsemide and bumetanide. Despite high torsemide discontinuation rates, we did not observe any statistically significant differences in hospitalizations or ED visits before and after bumetanide to torsemide conversion. Larger studies are needed to evaluate the clinical significance of these data.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 5a-030

Poster Title: Retrospective review of twice daily vancomycin in place of every 12 hour vancomycin

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Purpose: Vancomycin is an important antibiotic for treating gram positive organisms that are resistant to beta-lactams including MRSA. Patients admitted to the hospital typically receive vancomycin every 12 hours if given twice daily. One out of every 1000 patients in the United States receives outpatient antibiotic therapy every year. Due to dosing convenience, hours of operations, and patient adherence the infusion services at Utah Valley often give patients vancomycin outside of the 12 hour range. This study aims to determine if variation from a strict 12 hour schedule effects patient outcomes or therapeutic drug monitoring.

Methods: Patients who received vancomycin twice daily between July 1, 2014 to July 1, 2016 were included in this analysis. All included patients that received vancomycin were assessed for age, gender, diagnosis, length, trough levels, outcomes, and adverse drug reactions. These data were compared to average outcomes from patients receiving vancomycin every 12 hours.

Results: 69 patients were treated with vancomycin at Utah Valley Infusion Services. 31 of these patients are excluded from this study because they did not receive vancomycin twice daily. Of the 38 patients who received vancomycin twice daily only one was readmitted to the hospital within 90 days. The average trough concentration was 15.07mcg/ml. The highest trough concentration was 22mcg/ml and the lowest trough concentration was 6.5mcg/ml. 32 patients were diagnosed with cellulitus, 2 with endocarditis, 2 with osteomyelitis, 1 with UTI, 1 infected joint, and 1 with parotitis.

Conclusion: Twice daily vancomycin dosing seems to be a viable alternative in an outpatient setting compared to every 12 hour dosing. This flexibility is beneficial to patients and saves outpatient clinics the cost of extending hours.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5a-031

Poster Title: Impact of drug library changes and staff education on infusion pump dose error reduction software compliance

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Purpose: According to a study from 2003, up to 35 percent of medication errors resulting in significant harm were a result of infusion device problems. Smart infusion pumps mitigate the risk of infusion errors with dose error reduction software (DERS). Programming the infusion devices outside of the DERS has been identified as the cause of many infusion errors. Compliance in properly using DERS is paramount to infusion safety. The purpose of this study was to determine if making targeted drug library changes and educating staff on proper use of Guardrails, a type of DERS, would improve compliance.

Methods: This quality improvement study looked at the compliance rate of Guardrails usage before and after drug library changes and staff education on the Guardrails software. Approval from the UC San Diego Investigational Review Board and the Palomar Health Investigational Review Committee was obtained. Infusion data that was transmitted wirelessly from the infusion pumps to Knowledge Portal, a web-based information portal, were analyzed by an interdisciplinary team composed of a student pharmacist, clinical pharmacist, and clinical nurse specialist to determine appropriate modifications to the drug library of the smart pump as well as the Guardrails compliance rates, which was calculated as the percentage of total infusions using Guardrails versus basic infusions. The interventions occurred over the period of July 2016 to August 2016. The pre- and post-intervention compliance rates were analyzed with Stata statistical software, with a p-value of 0.05 determining statistical significance.

Results: Pre-intervention Guardrails compliance was at 83.9 percent and post-intervention Guardrail compliance was at 86.2 percent, resulting in a 2.3 percent increase. A chi-square test showed a significant increase (p less than 0.05) between Guardrails compliance before and

after the drug library update and staff education (chi-square equals 74.6, df equals 1, p equals 0.00).

Conclusion: Pharmacy and nursing oversight in the analysis of infusion data allowed for targeted updates to the drug library and appropriate staff education to be carried out, thus bringing compliance closer to the medical center's goal of having 90 percent infusions run under Guardrails software. Continued reevaluation of the drug library and modifications to meet the practical needs of therapy may be useful in maintaining a high compliance of utilizing dose error reduction software such as Guardrails.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 5a-032

Poster Title: Use of a medication adherence tool in a multicultural and multilingual ambulatory population

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Purpose: Medication adherence is one of the cornerstones of a successful pharmacotherapeutic plan. Non-adherence to medications can cause disease progression and further complications that increase health care costs. The cause of non-adherence is important to identify in order to find a solution. This pilot project was conducted to determine if the Medication Access and Adherence Tool (MAAT) is effective in identifying possible medication adherence issues and their cause in an indigent, multicultural and multilingual ambulatory care population.

Methods: This pilot project was approved by the university and clinic research committee. Informed consent was obtained from all participating patients. On 6 clinic days, all patients over 18 years old with appointments to see the clinical pharmacist were asked if they were willing to answer five questions about their medication adherence. The five questions were about the patients' perceived need for medications to treat their health problems, ability to take the medications every day as prescribed, frequency of missing doses, ability to pay for the medications, and perception regarding medication adverse effects. According to patients' preference, the questionnaire, and informed consent were provided in one of three languages: Portuguese, Spanish, and English. In addition to the questionnaire, demographic data on gender, age, language, and number of daily medications were also documented.

Results: A total of 14 patients participated in the pilot study. Seven percent of the patients were somewhat sure they needed medications to treat their health problems, and fourteen percent were not sure at all. Fifty percent found it somewhat difficult to pay for their medications, and 14 percent found it very difficult. Fourteen percent reported somewhat often experiencing adverse effects from their medications, and 7 percent were very often

experiencing adverse effects. More females than males were very sure that they needed their medications for health problems; however, the difference between males and females was not statistically significant (p equals 0.538). More patients greater than age 40 said they had difficulty paying for medications but the difference was not statistically significant (p equals 0.3). Of note, 92 percent of the reported patients felt they could take their medications as prescribed, but this high percentage may be because patients were being followed by a clinical pharmacist.

Conclusion: The medication access and adherence tool (MAAT) was found to be helpful in identifying reasons for medication non-adherence in an indigent multicultural and multilingual population of ambulatory care patients.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5a-033

Poster Title: Incidence of oropharyngeal candidiasis in renal transplant patients receiving immunosuppresion

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Purpose: Oropharyngeal candidiasis remains to be one of the major causes of complications following kidney transplantation. Oropharyngeal candidiasis is an opportunistic infection most observed in patients with a compromised immune system. The overall incidence differs according to prophylaxis and type of induction therapy given in transplant recipients. The objective of this retrospective analysis was to investigate the prevalence of risk factors and the incidence of oropharyngeal candidiasis in renal transplant recipients within 3 months after transplantation.

Methods: The institutional board review (IRB) approved this single-center cross sectional study. It was completed at Oregon Health and Science University in Portland, Oregon. A retrospective chart review of 517 consecutive renal transplant patients (298 males, 219 females, mean age: 47 [18-77]) was conducted between the dates of January 1st, 2010 and July 13th, 2015. Patients who were included had a clinical diagnosis and prescription for the treatment of oropharyngeal candidiasis within three months post-transplant. Patients were excluded if they received clotrimazole troches for increasing tacrolimus levels, deceased within 30 days of receiving renal allograft, undergoing re-transplantation, lost to follow up (minimum of 3 months), severe, uncontrolled diarrhea or evidence of malabsorption and pregnant patients. The primary outcome was the incidence and time to infection of oropharyngeal candidiasis within 3 months after transplant. The secondary outcomes investigated comorbidities, gender, race, renal disease, type of donor and type of induction immunosuppressant.

Results: Five hundred and seventeen kidney transplant patients were evaluated for the development of oropharyngeal candidiasis. The majority of the patients evaluated were male (57.6%) and white (72.1%). Diabetes mellitus was the most common cause of kidney failure (24.4%). A total of 71 patients (13.7%) developed oropharyngeal candidiasis and were treated with Nystatin while 446 patients (86.3%) did not have any evidence of candidiasis requiring treatment. The median time to oropharyngeal candidiasis was 34 days [5-71 days]. Patients showed a higher propensity to developing oropharyngeal thrush with the following characteristics male gender, Black or Hispanic race, diabetes, hemodialysis, increased episodes of rejection, deceased donor allograft recipient and thymoglobulin induction.

Conclusion: Approximately 13% of the renal transplant recipients experienced oropharyngeal candidiasis and received appropriately treatment. Further research is needed to understand and monitor the prevalence of this infection. This would assist in establishing a protocol to reduce the burden of fungal diseases. Risk factors should be taken into account when determining a patient's risk for developing oropharyngeal candidiasis and other potential invasive fungal diseases after transplant. Patients with higher susceptibility of developing oral candidiasis should be considered for prophylactic therapy especially in the first 30 days after transplantation.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5a-034

Poster Title: Evaluation of varenicline as a smoking cessation aid in a medically underserved population

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Purpose: Approximately fifteen percent of the population in Maryland smoke cigarettes, making it rank the fourth highest among the states for prevalence of tobacco consumption. Smoking rates are even higher on the Eastern Shore of Maryland where one in four adults are cigarette smokers. Varenicline is a first-line Food and Drug Administration approved smoking cessation aid for patients achieving tobacco abstinence. This study aimed to evaluate the usage of varenicline as a smoking cessation aid in a medically under-served population in Maryland.

Methods: A retrospective analysis was conducted on three federally qualified health system clinics managing patients for tobacco dependence. Patients were included if they were cigarette smokers eighteen years of age or older, used varenicline for at least one month, and were titrated to recommended dosage formation of varenicline after seven days. Patients who used chewing tobacco, smokeless tobacco, hookah, and electronic cigarettes were excluded. The primary endpoint was the change in cigarette consumption in packs per day at one month. Secondary endpoints included the change in packs per day at three months and the number of patients achieving 50 percent reduction or abstinence from cigarettes at one month and three months. Subgroup analyses were conducted to analyze the effects varenicline on patient specific factors including race, duration of smoking, number of clinic visits, education level, and mental health status. Statistical analysis was performed using Wilcoxon signed rank test to analyze continuous nonparametric data. McNemar's Chi Squared test was used to analyze nonparametric categorical data. All P values were two-sided and the alpha was set at 0.05. Last observation carried forward was used to account for missing data.

Results: Of the one hundred sixty patients screened, only sixty patients were included in the primary analysis due to loss to follow-up or an insufficient duration of varenicline treatment. For the primary endpoint, patients using varenicline at the end of one month smoked 0.25 ± 0.09 packs per day compared to 0.5 ± 0.076 packs per day at baseline ($P < 0.05$). At three months, the median consumption was 0 ± 0.066 packs per day ($P < 0.05$). Only two patients (0.3 percent) taking varenicline experienced nausea or vomiting. No other significant side effects were reported. The results for the subgroup analysis showed that race ($P = 0.43$), education level ($P = 0.69$), mental health status ($P = 0.93$), quantity of smoking ($P = 0.49$), number of clinic visits ($P = 0.48$), and duration of smoking ($P = 0.93$) did not differ in the efficacy of varenicline at one month compared to baseline.

Conclusion: Varenicline was efficacious in reducing cigarette consumption with minimal side effects in a medically underserved population. Patients with mental disorders, limited education level, and a long duration of smoking did not differ in efficacy outcomes on varenicline. The high number of patients lost to follow up in the study reflects the need for providers to address smoking cessation status at every visit to enhance medical access and prevent further tobacco-related complications.

Submission Category: Clinical Services Management

Submission Type: Descriptive Report

Session-Board Number: 5a-035

Poster Title: Bridging the Vaccination Gap: the disparity between real and ideal adult immunization rates

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Purpose: A healthcare provider's recommendation is a primary factor in patients receiving and staying up-to-date on vaccinations. The purpose of this study is to examine institution protocol and current knowledge status of adult vaccinations. We will be evaluating pneumococcal vaccinations in the adult and high-risk populations to gauge healthcare provider awareness of adult vaccination recommendations. This project will educate providers on the pneumococcal vaccinations available and the CDC's Advisory Committee on Immunization Practices recommendations for pneumococcal vaccination in adults. The goal of educating healthcare providers about this vaccination gap is to increase immunization rates to reduce the incidence of vaccine-preventable disease.

Methods: The study employs a cross sectional, non-experimental design. The survey assesses 1) healthcare provider's patient demographics 2) hospital protocols regarding adult vaccinations 3) knowledge regarding pneumococcal vaccination recommendations. The survey will be distributed to practicing healthcare providers employed by either institution affiliated hospital prior to large-scale distribution of the survey. The finalized electronic Qualtrics survey will be sent out through national organizations (e.g. American Society of Health- System Pharmacists, American Pharmacists Association, American Medical Association). The survey will be preceded by an informational cover letter describing the anonymity of the participants, and that the purpose of this study is to assess knowledge of adult immunizations in clinical settings. Respondents will be given 2 weeks to complete the electronic survey, after which data collection will close for analysis. The closing page of the survey will thank participants for their responses and also provide educational information on the Advisory Committee on Immunization Practices (ACIP) recommendations for pneumococcal vaccination, and links to updated adult immunization guidelines.

Results: Of the 48 healthcare providers who took the survey, representing 12 different states, 89.6% (43) serviced an adult population of 18 years or older. Of the 43 healthcare providers serving adults, 41.9% (18) practiced primarily in the hospital setting, 39.5% (17) practiced primarily in the community setting, and the remaining 18.6% (8) practiced in another setting not classified within hospital or community. The providers were then asked whether clinicians at their institution routinely ask patients about their immunization history. Only 69.8% (30) individuals responded “Yes” to routinely asking patients about immunization history. When asked about a protocol for giving adult pneumococcal vaccinations at their institution, 65.1% (28) providers responded “Yes”. 16.3% (7) responded “No” and 18.6% (8) did not know if their institutions had a protocol utilized for pneumococcal vaccination. 51.2% (22) healthcare providers correctly identified the ACIP recommendations for pneumococcal vaccinations in adults, and 41.9% (18) healthcare providers correctly identified the ACIP recommendations for the vaccine-naive high-risk adult population.

Conclusion: Adult patients rely on their healthcare professionals to have a basic knowledge of immunization practices. This survey was helpful in identifying the lack of protocols for pneumococcal vaccinations, as well as knowledge gaps of healthcare providers regarding adult pneumococcal vaccination recommendations. Through providing the correct ACIP recommendations to providers after the survey, the survey helped to close this knowledge gap in providers. This survey also helped to raise awareness regarding pneumococcal vaccination practices in healthcare providers.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 5a-036

Poster Title: Marine Pharmacology and Pharmaceuticals Pipeline in 2016

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Purpose: Over fifty percent of marketed drugs are extracted from natural sources or produced synthetically from natural products, and a percentage of those FDA-approved medications are derived from marine compounds and have made an impact in our field. These marine-derived medications are widely known and have helped many patients, especially those with cancer. The marine pharmaceutical pipeline has attracted a multitude of people to the website from across the world, and hopefully inspired or aided those with an interest in marine compounds.

Methods: Various databases were utilized to research and analyze new data and approvals of medications derived from marine compounds, which are mostly used for cancer, pain, and hypertriglyceridemia. The databases employed were PubMed, MARINELIT, a database for marine natural products literature at http://pubs.rsc.org/marinlit/, and clinical trials databases which included https://clinicaltrials.gov/, as well as a Chinese and European clinical trials database. As changes in trials, drug development phases I, II, and II, and FDA-approval occurs, the information on the clinical marine pharmaceutical pipeline webpage was regularly updated.

Results: The status of the marine pharmacology and pharmaceutical pipelines was assessed in mid 2016. In early 2014, the clinical marine pharmaceutical pipeline (Mayer et al. TIPS 31:255-265, 2010) consisted of 10 marine-derived compounds in clinical development. Included in the clinical marine pharmaceutical pipeline were three monoclonal antibodies conjugated to monomethyl auristatin E, a synthetic analog of the marine compound dolastatin, which were in either Phase I, Phase II or Phase III clinical trials. However, in September 2016, the clinical marine pharmaceutical pipeline consists of 13 marine-derived compounds and 16 auristatin-containing antibody drug conjugates in different phases (FDA-approved and Phases I, II, and III) of clinical development. The most recent information on the clinical marine pharmaceutical

pipeline is available to the public at large at http://marinepharmacology.midwestern.edu/clinPipeline.htm.

Conclusion: There are six FDA-approved marine-derived drugs in the US market, while one is no longer available. The drugs cytarabine (Cytosar-U®, Depocyt®, FDA-approved 1969), eribulin mesylate (Halaven®, FDA-approved 2010), brentuximab vedotin (Adcetris®, FDA-approved 2011) and trabectedin (Yondelis®, FDA-approved 2015) are for cancer, ziconotide (Prialt®, FDA-approved 2004) for pain, and omega-3-acid ethyl esters (Lovaza®, FDA-approved 2004) for hypertriglyceridemia. The drug that is no longer available is vidarabine (Vira-A®, FDA-approved 1976), an antiviral. Thus in September 2016, the marine clinical pharmaceutical pipeline continues to be very active.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 5a-037

Poster Title: A pharmacist-led hospital discharge follow-up clinic in a primary care health center

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Purpose: Hospitals' readmission rates are a quality metric subject to public reporting and potential financial penalty. A pharmacist-led hospital discharge clinic embedded in a primary care clinic (Gipson Eastside Family Health Center) was created to improve the timeliness of post-discharge follow up and reduce 30-day readmission rates. It was hypothesized that 30-day readmission rates for patients seen in the Eastside Hospital Discharge Clinic (EHDC) would be lower than the baseline readmission rate.

Methods: Established patients discharged between October 1, 2014 and September 30, 2015 were called within 2 business days of discharge and invited to schedule an EHDC appointment with a pharmacist. Eligible patients included any patient discharged from the study hospital. Medication reconciliation and education were the primary foci of the EDHC appointment. A supervising physician reviewed and cosigned each appointment encounter and participated in the appointment if necessary. The primary outcome measure was patient readmission rate to the study hospital only. Secondary outcome measures included time between hospitalization and EDHC appointment and characterization of pharmacist interventions within the EDHC appointment.

Results: A total of 187 patients were identified as eligible for an EHDC appointment and 23 (11%) were enrolled. Patients in the study cohort had a mean age of 61.5 years, 65.2% were male, and 56.5% were African American. Common reasons for initial hospitalization were cardiac- (N=10) or diabetes-related (N=5). The mean length of stay was 2.8 days, time between hospitalization and EHDC appointment was 6.8 days and time between EHDC and PCP appointments was 7.6 days. All patients received at least one pharmacist-led intervention:

medication reconciliation (78.3%), patient education (65.2%), and medication adherence counseling (43.5%). There was a 17.4% 30-day readmission rate. Of the remaining 164 patients who did not attend a follow-up appointment with a pharmacist, 32.3% were re-admitted to the hospital within 30 days of initial hospitalization. The mean length of stay for these patients was 3.3 days and time between initial hospitalization and readmission was 11.8 days. Major reasons for not scheduling an EHDC appointment were that the patient declined the offer to have an appointment with a pharmacist and the inability to reach the patient due to no answer or non-working telephone number.

Conclusion: Patients who attended an EDHC appointment were readmitted at nearly half the rate of those who did not. However, the small sample size and high-risk population likely confounded the results. Not all patients received all components of the EHDC appointment because the appointment was individualized based on each patients' needs. The feasibility of implementing a pharmacist-led hospital discharge service that fits the transitional care management services model has the potential to improve patient care.

Submission Category: Infectious Diseases

Submission Type: Case Report

Session-Board Number: 5a-039

Poster Title: Atypical Presentation of Coccidioidomycosis

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Purpose: Coccidioidomycosis, most commonly known as “valley fever”, is a fungal infection caused by the spores of the Coccidioides species. Most prevalent in the southwestern United States and Central America, Coccidioides may lead to respiratory infections when inhaled. In endemic regions, Coccidioides is estimated to affect approximately 30 to 60% of the population. Following exposure, a majority of patients may be asymptomatic or may experience mild flu-like symptoms; however, one to two percent of the infected population may experience dissemination of spores to the skin, bones, and joints with delayed presentation of symptoms up to several months after initial exposure. Complications from disseminated infection may range from skin inflammation and lesions to meningitis. We report a case of a 48 year-old black male with history of total knee arthroplasty and subsequent recurrent infections of his prosthetic knee. Intraoperative cultures revealed Coccidioides species. Though rare, Coccidioidomycosis infection of the bone and joints is associated with high mortality rates if not appropriately diagnosed and treated

Methods:

Results:

Conclusion:

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Descriptive Report

Session-Board Number: 5a-040

Poster Title: From training wheels to two wheels in half the time: A pharmacy intern training program

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Purpose: At Children's Hospital Colorado (CHCO) pharmacy, we were challenged to train several interns in a short period of time in addition to training other pharmacy staff. Our goal was to create a pharmacy intern training program that prepares trainees to the same level of skill in a shorter period of time. We set to reduce training days for interns by 50 percent.

Methods: A program was created that included didactic as well as hands-on training. It started with a 3-day operational orientation that included topics that were suggested by current pharmacy staff. This orientation was lead by a senior pharmacy intern. Then, trainees spent time hands-on-training for 8 hours a day with an overlap for 4 hours with a dedicated intern trainer. The dedicated intern trainer did not have staffing responsibilities and could focus their attention fully on the trainee. Finally, trainees would take a competency to ensure their ability to independently staff shifts required of them. Training days were measured retrospectively by looking at pharmacy department schedules after the new program (2015-2016) and comparing them to the standard technician training plan that was historically used prior to the implementation of this new program. Days spent training in our Central pharmacy and IV clean room were quantified and used as a comparator as these shifts are required training for all new technicians and interns at CHCO. Training shifts outside of central pharmacy or the IV clean room, interns who were not trained following this new training program, and interns who had previously been technicians at CHCO were excluded. In addition, we surveyed all trainees before and after going through the program to determine if their perceived comfort level with hospital pharmacy was improved.

Results: Eight interns were trained in the 2015 summer break from school and three interns were trained in the 2016 summer break from school using this new training program. Intern training days in the Central Pharmacy were reduced from 10 days per employee in the past to an average of 7 days per intern, a reduction in training days of 30 percent. Intern training days in the IV room were reduced from 15 days per employee in the past to an average of 10.7 days per intern, a reduction in training days by 28.6 percent. On average, the perceived comfort level of the trainee to work in the IV room was improved 3.8 points out of 10 and confidence of the trainee to work in the Central pharmacy was improved 2.27 points out of 10 after going through the program.

Conclusion: CHCO new pharmacy interns trained an average of 17.7 days per intern compared to 25 days in the past. After this program, the trainees were able to independently staff in central pharmacy and IV room. In addition, the trainees overall felt more comfortable with the material they were learning. The key to the success is a trainer free from staffing duties to focus on the trainee. This can be easily accomplished with interns during their summer break. In addition, continuous quality improvement is essential to ensure the program continues to meet the needs of the trainee and the pharmacy department.

Submission Category: General Clinical Practice

Submission Type: Case Report

Session-Board Number: 5a-041

Poster Title: Differential diagnostic considerations for psychotic and substance-induced disorders

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Purpose: Diagnostic criteria for schizophrenia spectrum and other psychotic disorders, substance/medication-induced psychotic disorders, and substance-related disorders (with a separate category for phencyclidine) have features that make presentations similar. These include delusions, hallucinations, and changes in cognition. Diagnostic criteria for schizophrenia also include delusions, hallucinations, as well as disorganized speech and behaviors. Schizoaffective disorder includes specific mood disorder criteria. In the case of substance/medication-induced psychotic disorders, the literature reports that during acute intoxication with a synthetic cannabinoid, psychotic-like symptoms are often present, and acute effects usually last from 30-120 minutes, but the symptoms can last until the next day. Reported symptoms of psychosis are delusional thoughts, hallucinations, disorganized and/or paranoid thought processes, euphoria, anxiety, and suicidal thought. The presentation of phencyclidine, or a similar compound, is different, however. One difference in individuals who use phencyclidine is the duration of effects. While the primary effects may last several hours, these effects generally extend 8 days or longer and in what have been termed ‘vulnerable individuals.’ Symptoms may last for weeks and precipitate a persistent psychotic episode resembling schizophrenia. When first discovered, the neurobiological changes associated with chronic, intermittent low dose phencyclidine use resembled those seen in persons with a diagnosis of schizophrenia. Given the similarities in the presentation of these disorders, use of nonpharmacological and pharmacologic resources aid in the differential diagnostic workup.
An actively psychotic 31-year-old African-American male was involuntarily admitted into an inpatient facility. Psychiatric history was positive for schizoaffective disorder and cannabis use. Baseline functioning included intermittent auditory hallucinations. For this admission, psychotic exacerbation secondary to substance abuse was suspected. The patient had been maintained

as an outpatient with both a long-acting antipsychotic (optimized) and an oral antipsychotic (low dose). In the inpatient setting, both nonpharmacological interventions (seclusion, limited stimulation, time) were used as well as pharmacological interventions to help stabilize the patient. Full inpatient treatment and assessment information were not available for review. Following more than 21 days of inpatient treatment, the patient is still actively psychotic as evidenced by bizarre statements and art works and verbalization of the intent for self-harm. The patient continues on inpatient status with residential care as a placement consideration. Literature retrieval was accessed through OVID, Google Scholar, MEDLINE, and PubMed (1965-September 2016). Research into the relationship between synthetic cannabinoids and psychosis, phencyclidine use and psychosis/schizophrenia, and differential diagnostic measures were reviewed. Included in the review were pathophysiology and treatment options. Identifying a suspected substance is challenging. Problems clinicians may encounter include limited familiarity with or no information on the substance(s) used, the inability of standard urine drug screening products to detect all synthetic compounds (given the variability of product formulations and potency), and the lack of a detectable metabolite. Psychotic symptoms may exceed the anticipated duration of action if a substance is suspected. Based on these factors, patient assessment may be limited to the evaluation of laboratory results and imaging diagnostic screening available in the individual facility and clinical presentation.

Methods:

Results:

Conclusion:

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 5a-042

Poster Title: Meds to beds pharmacy program to improve patient outcome through an interactive survey post discharge.

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Purpose: At WVU Medicine a discharge program was implemented in 2012 to aid in giving the patient a seamless transition of care at time of discharge. The use of an outpatient pharmacy to fill patient's prescriptions prior to discharge has shown to improve patient outcomes and potentially plays a beneficial role in reducing readmissions. A three month study was conducted through follow-up telephone encounters to survey patients using the discharge pharmacy to assess the patients' outcomes and the patients experience with our discharge program.

Methods: In an effort to improve on the patient's outcome and reduce re-admissions after discharge, the Medical Center Pharmacy (MCP) at West Virginia University Hospital has implemented a post discharge program. Patients were selected post discharge past 30 days and based on several disease states were targeted for high readmission by CMS (Centers of Medicare and Medicaid services). These patients were contacted via telephone and asked a 7 question survey to gain more knowledge of the patients experience in relation to the program. Questions included: if the patient know about the service prior to admission, how were they informed of the service, how friendly the staff was, how timely the service was , if counseling was given, and if the patient was readmitted to the hospital 30-90 days after discharge.

Results: Since the launch of the program four years ago, the service has been offered to over 40,000 discharge patients. The capture rate has reached as high as 50% in electing to use the service with an average of around 30%. The role of the discharge pharmacist in the continual care of the patient has also shown an impact on patient compliance and understanding of their

medication. Over 700 patients were attempted to be contacted with over 300 being reached over a 90 day time frame. 95% of medications reached the patient within a timely manner and over 90% of patients received counseling at time of discharge. Readmission data reached over 20% on selected disease states .

Conclusion: Implementation of the discharge program has made a significant impact on the continual care of the patient prior to discharge. Prescriptions filled during the patient's discharge have showed improved compliance and a reduction in readmission. Readmission data reached over 20% on selected disease states showing the need for targeting these disease states with amended services, such as MTM (Medical therapy Management), Medication reconciliation and increased discharge counseling with post discharge follow-up encounters.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 5a-043

Poster Title: Patient satisfaction with medication therapy management services across a large integrated care delivery system

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Purpose: This project was designed to assess the level of patient satisfaction with pharmacist provided comprehensive medication reviews across specialty and primary care sites in a large integrated care delivery system. Results provided insight on patient perceptions of clinical ambulatory care pharmacists and revealed areas of strength and potential areas of improvement for comprehensive medication reviews.

Methods: A satisfaction survey was distributed to patients receiving comprehensive medication reviews at 20 clinics within an integrated care delivery system from May through July of 2016. This study did not meet criteria for institutional review board review. The survey tool was tested and validated in a previous study by the Health-systems Alliance for Integrated Medication Management. Surveys were provided to patients by either desk staff at the time of check in for the pharmacist appointment or by the pharmacist at the start of the pharmacist appointment. Patients received a paper survey along with a postage paid envelope. Surveys were returned by mail to a central location for data collection. Responses were compiled and statistics were performed using Microsoft EXCEL. The brief survey includes thirteen questions, three of which assess demographics. The remaining ten questions are value-based and incorporate three conceptual areas of care provided by the clinical ambulatory care pharmacist, including specific medication-related needs, pharmacist performance, and overall satisfaction. Nine questions ask patients to give an evaluation of their experience on a 4-point scale (strongly agree, agree, disagree, strongly disagree). The last question allows patients to express overall satisfaction with care and service on a 5-point Likert scale (excellent to poor). Lastly, patients could freely write in any comments or concerns in an open text box.

Results: Surveys were distributed to 606 patients and 288 surveys were completed and returned. Incomplete surveys were included for completed questions only. The overall response rate was 48 percent. Seventy percent of returned surveys were from primary care clinic sites. Thirty percent were from specialty clinic sites including cardiology, transplant, pharmacogenomics, and dialysis. Forty-nine percent of respondents were male and 51 percent were female. When examining age, 61 percent of respondents were 65 years of age or older, 30 percent were 45 to 64 years old and 8 percent were 25 to 44 years old. Patients responded positively to value-based questions. Over 90 percent of patients strongly agreed or agreed to positive statements about care and services for seven of the nine value-based questions. Two questions regarding pharmacist helping the patient understand the best way to take medications and finding ways to take medications more easily resulted with 81 percent and 89 percent of patients strongly agreeing or agreeing. When asked about overall satisfaction, 95 percent of patients rated their care as very good or excellent. Responses were consistent across sites with the lowest overall satisfaction being 83 percent and the highest being 100 percent at eleven of the twenty sites.

Conclusion: Patients are highly satisfied with comprehensive medication reviews provided by clinical ambulatory care pharmacists in specialty and primary care settings of an integrated care delivery system, spanning across multiple geographic regions. Consistently, across all sites, 95 percent of patients rated overall satisfaction with quality of care and services received from the clinical pharmacist as excellent or very good. Patient satisfaction surveys can be effectively implemented in ambulatory care pharmacy settings to assess patient perceptions of pharmacists. Results can be used to determine patient satisfaction with care and services provided by the pharmacist and reveal potential areas of improvement.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5a-044

Poster Title: Evaluation of vancomycin-associated nephrotoxic event rates in obese patient populations.

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Purpose: Based on established recommendations, vancomycin is dosed at 15 to 20 milligrams per kilogram every 8 to 12 hours of actual body weight. With more complicated infections, guidelines recommend doses to obtain even higher trough levels than what was once targeted. As doses increase the concern for nephrotoxicity also increases. Obese and morbidly obese patients, requiring higher doses, are then especially at risk. In this analysis, we evaluated obese patients on vancomycin and reported vancomycin doses, troughs levels, and additional nephrotoxic risk factors to determine if there was a link with increased nephrotoxicity in this population.

Methods: This single-centered, multiple campuses, IRB approved, study retrospectively evaluated patients given vancomycin at St. Rose health system between January and September 2014. Patients with a body mass index (BMI) greater than or equal to 30 kilograms per meters squared were evaluated. Patients were excluded if they were less than 18 years old, pregnant, or had a BMI less than 30 kilograms per meters squared. Exclusion criteria also included patients with less than two vancomycin doses administered or having no recorded vancomycin troughs. BMI was further sub-divided into three categories; BMI ranging from 30 to 34, 35 to 39, and greater than or equal to 40. All patients had the following data collected; BMI, vancomycin dose, frequency, trough, indication, renal function, pertinent lab values, concomitant antibiotics, other nephrotoxic agents, ICU admission, and relevant patient demographics. Data collection was then synthesized through an Excel sheet. Beyond assessing acute kidney injury through tracking serum creatinine to identify a nephrotoxic event no clinical

judgment was used; we only reported what was specifically stated by the nephrologist consultations.

Results: 1000 patients were at or above the BMI classification of obesity. Of these patients, 566 patients were also excluded for having less than two vancomycin doses administered or having no recorded vancomycin troughs. The remaining 434 patients were recorded; with 194 females and 240 males, an average patient age of 65 years old, and an average BMI of approximately 37 kilograms per meters squared. 72 out of the 434 patients, or 16.5 percent, were confirmed to have experienced a nephrotoxic event. Of the 72 events, 37 were attributed solely to “factor X” in reference to a multitude of other potential causes of nephrotoxicity as reported primarily by nephrologists such as contrast-induced nephrotoxicity, nephrotoxicity due to diuretics, administration of antibiotics suspected of nephrotoxicity (aminoglycosides or cefepime for example). 28 other events were attributed to both “factor X” and vancomycin. Conversely, only 7 events were attributed to vancomycin exclusively.

Conclusion: Our analysis primarily reveals a synergistic association with vancomycin and nephrotoxicity when in the presence of other nephrotoxic events. Directly and solely attributing vancomycin to increased nephrotoxicity was not a substantial finding in this study. This study provides further insight into clinical considerations regarding the use of vancomycin in obesity.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5a-045

Poster Title: Evaluation of plasma-derived C1 esterase inhibitor use and patient outcomes throughout an academic health system

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Purpose: Hereditary angioedema (HAE) and angiotensin converting enzyme inhibitor (ACEI)-induced angioedema are serious conditions that require medical attention. There are several drugs available to help with acute episodes of HAE, some of which have evidence for additional efficacy in ACEI-induced angioedema. In 2009, C1 esterase inhibitor (C1INH) was added to the institutional formulary restricted to Allergy and Immunology for HAE. In January 2016, its use was expanded to the health system for management of HAE and ACEI-induced angioedema.

Methods: Patients were included if they had a medication order for C1 esterase inhibitors during the period of January 1, 2015 to May 31, 2016. The primary objective was to assess adherence to the health system formulary restriction criteria. The secondary objectives were to evaluate the indication, if it was being used for prophylaxis or treatment, dose, frequency and patient outcomes (defined as time to symptom relief and time to complete resolution of angioedema). This retrospective chart review was submitted to the institutional review board and given exemption status.

Results: There was a total of 11 orders (n=7 patients) for C1INH during the evaluation period. For patient demographics, six patients were female and one patient was male; the age range was 33 to 69 years and five patients were managed at the institution's academic medical center, one patient at an in-state community hospital and one at an out-of-state community hospital. For indication, three patients were administered C1INH for prophylaxis of HAE prior to high risk procedure(s) and four patients were administered C1INH for the treatment of angioedema (n=2 with HAE exacerbations, n=1 for ACEI-induced angioedema, and n=1 for idiopathic angioedema). For the primary objective, 9/11 (82%) of C1INH orders met formulary

restriction criteria. Treatment doses of C1INH ranged from 5.5 units/kg to 40 units/kg. Of the patients managed for an angioedema exacerbation, time to symptom relief was approximately 1 hour (n=2), and time to complete resolution was a mean of 16 hours (n=3). Only one patient required an intervention beyond first-line medications.

Conclusion: The formulary restriction criteria were followed and were determined to be adequate for this medication. Despite nearly all patients obtaining symptom relief, there was a wide range of doses administered. With the conflicting evidence currently available for doses for these conditions, it may be helpful to establish a dosing protocol for the management of HAE and ACEI-induced angioedema.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 5a-046

Poster Title: Resveratrol induces suicide gene therapy vector of early growth response-1 and growth-arrest DNA damage inducible 45 alpha in nonsmall cell lung carcinoma cell line

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Purpose: Purpose: GADD45a gene is a key regulator in G2/M cell cycle transition and apoptosis. In lung cancer such as non-small cell lung carcinoma, the expression of this gene was found to be minimal. Therefore, we hypothesized that exogenous supply of GADD45a can result in increased inhibition of these lung cancer cells. The purpose therefore was to create a novel suicide gene therapy vector of growth arrest DNA damage alpha gene (GADD45a) by combining inducible promoter of early growth response-1 (Egr-1) that is upregulated by non-toxic doses of resveratrol to achieve growth arrest and apoptosis in NSCLC.

Methods: Methods: GADD45a open reading frame (ORF) was PCR amplified from GADD45a cDNA (Origene, MD) using specific primers:
F-5'-GGGCGAATTCGGATCCGCCACCATGACTTTGGAGGAATTCTCG-3';
R-5'-TTGGAATTCGCGGCCGCTCACCGTTCAGGGAGATTAAT-3'; and cloned into pTarget vector (Promega, WI). In addition, further manipulation of this vector was carried out by inserting 460 bp of early growth response-1 (Egr-1) promoter upstream of start site using specific primers:
E460F-5'- ATGGCTCGACAGATCTGCTTGGAACCAGGGAGGAG;
E460R-5'-TCAACGGGGCGGGCGATCGCGGCCTCTATTTGAAGGGTCTGG
to create a switch that is inducible in response to tested dose of resveratrol. The cloned vector was then transfected in A549 lung cancer cells and its expression, cell viability of cancer cells and the rate of apoptosis were measured.

Results: Results: Egr-1 mRNA and protein expressions were quantified by PCR and western blot techniques and showed dose dependent induction after the resveratrol treatment. Egr-1 mRNA was peaked at 2 h that was further confirmed by Fluorescence in situ hybridization (FISH) assay. Furthermore, overexpression of resveratrol induced GADD45α protein through our gene therapy vector delayed the cancer progression and increased cellular apoptosis. The data from cell viability assay and flow cytometric analysis suggested resveratrol alone had marginal suppression in cell growth and negligible induction in apoptosis, but resveratrol plus gene therapy vector exhibited less than 50% cell viability and approximately 20% higher apoptosis as opposed to control. Transfection with gene therapy vector but without resveratrol treatment did not significantly affect cell growth or apoptosis in these cells.

Conclusion: Conclusion: Present study confirmed the potential of Egr-1 promoter as an inducible switch upon resveratrol exposure and was able to selectively control therapeutic gene expression (GADD45a) in the tumor. Furthermore, use of resveratrol as an inducible drug being nontoxic and protective to normal cells offer advantage to highly toxic chemotherapy drugs that is currently used in immune compromised cancer patients. In addition, this therapy may work synergistically with traditional lung cancer treatment and could possibly help in lowering doses of radiotherapy and chemotherapy.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Case Report

Session-Board Number: 5a-047

Poster Title: Evaluating efficacy, safety, and tolerability of proprotein convertase subtilisin/kexin type 9 (PCSK9) inhibitors in a large multi-centered outpatient cardiac group

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Purpose: Purpose: This case series examines the use of proprotein convertase subtilisin/kexin type 9 (PCSK9) inhibitors, a novel class of cholesterol-lowering agents, in patients at a large multi-centered outpatient cardiology practice. The case series focuses on the specific indication for use of PCSK9 inhibitors, efficacy outcomes within six months after initiation, and occurrence of any adverse drug events.
Methods: A review of the Cardiac Solutions electronic medical record (EMR) was performed to identify all patients who had received an order for PCSK9 inhibitor therapy from September 2015 to August 2016. Inclusion criteria included adults (aged 18 years or older) who had an order for a PCSK9 inhibitor. A chart review was performed to gather patient information including age, race, gender, lipid panels before and within six months after PCSK9 inhibitor initiation, history of cholesterol lowering medications, whether the patient had been concurrently treated with a statin medication, any documented intolerances to statin medications, the indication for PCSK9 inhibitor use, and any adverse reactions reported to the therapy. Patients who did not have a lipid panel drawn before or within six months after initiating PCSK9 inhibitor therapy were excluded, as well as those who never initiated therapy. In patients who met the inclusion criteria, pre- and post-PCSK9 inhibitor lipid panels were compared to assess efficacy of therapy.
Results: A total of sixteen patients were identified from the EMR as receiving an order for a PCSK9 inhibitor. Of the sixteen, four patients were never initiated due to lack of insurance coverage or inability to afford the medication. Three patients did not have documented lipid panels pre-PCSK9 inhibitor therapy, so their data was excluded. One patient discontinued therapy after only one dose because she developed a facial rash that resolved within 2-3 days.

A total of eight patients were evaluated for efficacy. The average age was 62 years, 62 percent of patients were female, all patients were Caucasian, 62 percent of patients had clinical atherosclerotic cardiovascular disease, and only 25 percent of patients were receiving concomitant statin therapy. Additionally, two patients in the secondary prevention group and one patient in the primary prevention group had a diagnosis of familial hypercholesterolemia. Total cholesterol (TC) and low-density lipoprotein (LDL) cholesterol were statistically significantly lower after initiation of PCSK9 inhibitor therapy [TC 249 mg/dL vs. 162 mg/dL, LDL 147 mg/dL compared to 67 mg/dL]. Triglycerides and high-density lipoprotein cholesterol both showed nonsignificant decreases.
Conclusion: PCSK9 inhibitors seem to be safe and effective, demonstrating an average LDL reduction of 54 percent within a small sample of patients who have elevated LDL levels despite maximally tolerated statin therapy, including patients who were statin-intolerant. Cost is one of the biggest barriers to initiating PCSK9 inhibitor therapy. Although these agents show significant LDL-lowering, more longitudinal research should be done to evaluate the efficacy of these agents in reducing morbidity and mortality.

Methods:

Results:

Conclusion:

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Descriptive Report

Session-Board Number: 5a-048

Poster Title: Eliminating unnecessary wastage of high-use or high-cost drugs: A cost-savings model

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Purpose: As total U.S. drug expenditure has increased 29% in the last two years (’13-’15), many institutions have had to look for creative ways to control spending. Pharmacists are commonly charged with using their clinical knowledge to identify appropriate opportunities to achieve savings.
The two primary targets for cost-saving initiatives are high-cost and high-use drug products. For example, vasopressin, once commercially available at less than $10 per vial, it is now only available as brand-name at $138 per vial. Whereas, glycopyrrolate, available as a 1 ml and 5 ml vial, is widely used by most anesthesia groups.

Methods: For vasopressin, we identified that our 100 units / 100 mL bag was creating waste and medication safety issues. The primary driver for both was that a 100 unit bag expired in 24 hours but contained around 72 hours of drug based on the most common physiologic dose. We found that a 40 units / 40 mL bag would be more appropriate. Using purchase data and the number of bags compounded over the last four quarters, we calculated a historical total spend per quarter. We then projected a theoretical spend per quarter, had we been using our new bag size. The difference in our historical and projected spend was our projected savings.
For glycopyrrolate, we identified the average dose administered by anesthesia and determined that a 5 ml vial would yield a significant amount of waste on almost every patient. Using purchase data, we totaled the amount spent on 5 ml vials per quarter. Using the average dose administered, we projected how many 1 ml vials we would have used instead and what we would have spent acquiring them. The difference in our total amounts spent was our projected savings.

Results: We projected a potential savings of $312,266 for our vasopressin drip change, and a potential savings of $140,803 for our glycopyrrolate vial exchange. While the data and dollar amounts reflected were calculated using the published average wholesale price of both brand-name vasopressin and glycopyrrolate, the result is still a substantial and significant cost savings amount.

Conclusion: Our analysis and subsequent implementation allowed our institution to achieve a significant cost savings. We believe targeting high cost and high use drugs might yield similar results elsewhere and therefore recommend other facilities replicate our process. While this analysis was focused on two medications that we selected, we would contend that there is abundant opportunity for achieving cost savings with other drugs and in health systems of all sizes.

Submission Category: Clinical Services Management

Submission Type: Evaluative Study

Session-Board Number: 5a-049

Poster Title: Demographic characteristics predicting thirty day readmissions among patients referred to a hospital's pharmacotherapy service

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Purpose: Medication therapy management and pharmacotherapy services, provided by trained pharmacists, are consistently proven to be beneficial to patients, with respect to reducing preventable hospital readmissions. Realizing clinical and financial resources are not always available to provide this service to every patient, efficient identification of patients presenting a high risk for readmission is required. The intent of this study was to determine how differences in patient gender, age, length of hospital stay, and amount of home medications, affect readmission risk within thirty days of discharge.

Methods: Qualification for exemption was determined by the institutional review board for this retrospective study of de-identified patient data, collected over a 6-month time period. Inclusion criteria included patients referred to the service, but declined a pharmacotherapy consultation (n equals 185). Readmission rates among males (n equals 85) and females (n equals 100) was discovered, allowing for comparisons of collected variables between separate genders. The numerical categories were divided into separate value ranges. Patient age was categorized by patients younger than 45 years, patients aged 45 to 54, 55 to 64, 65 to 74, 75 to 84, and patients aged 85 and older. Patient's home medication lists were evaluated by the total number of prescription and over-the-counter medications present at discharge. Patients were sorted by medication lists containing fewer than 10 medications, 10 to 15 medications, 16 to 20 medications, and more than 20 medications. Length of stay was sorted by patients admitted for fewer than 3 days, 3 to 4 days, 5 to 6 days, and more than 6 days. The three numerical categories were evaluated for the entire patient population, and separate genders, allowing for identification of trends between males and females.

Results: Readmission rate of all patients was 19.5 percent. Readmission rate of females and males was 21.0 percent (risk ratio equals 1.1, 95 percent CI equals 0.7 to 1.7, P equals 0.75) and 17.6 percent (risk ratio 0.9, 95 percent CI equals 0.5 to 1.6, P equals 0.72), respectively. No patterns among readmission rates between age groups were discovered. Readmission rates of patients with medication lists containing 16 to 20 medications was 23.4 percent (risk ratio equals 1.2, 95 percent CI equals 0.7 to 2.2, P equals 0.54) and those containing more than 20 medications was 31.8 percent (risk ratio equals 1.6, 95 percent CI equals 0.9 to 3.2, P equals 0.16). Readmission rates based on a length of stay, when separated between genders, produced reciprocating trends. Readmission rates of males admitted fewer than 3 days was 25.0 percent (risk ratio 1.3, 95 percent CI equals 0.7 to 2.4, P equals 0.44). Females staying 5 to 6 days and staying over 6 days had readmission rates of 28.1 percent (risk ratio equals 1.4, 95 percent CI equals 0.8 to 2.7, P equals 0.24) and 33.3 percent (relative risk equals 1.7, 95 percent CI equals 0.7 to 4.0, P equals 0.21), respectively.

Conclusion: Unfortunately, the small sample size of patients produced p-values rendering no significant conclusions about readmission. Differing trends discovered among male and female patients, based on the amount of time spent in the hospital during their initial admission, will require more time and a larger sample to confirm these suspicions. Producing any useful data for predicting patient readmission trends will require a long-term, multi-year study, throughout the entire hospital. Clear understanding of the aforementioned variables, and their role in readmissions, will provide means for development of tools identifying high-risk individuals, creating avenues for pharmacists to help increase patient safety.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 5a-050

Poster Title: Utilizing search engine analytics to identify popular curiosity and regional distribution of medication inquiries

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Purpose: Google Trends is a publicly accessible tool that captures relative data on the volume, geographic location, and common related queries of Internet searches over time compared to total search volume. This study identifies the 2015 top-selling brand medications in the U.S. and the inquiries related to these agents most frequently searched for on Google. Healthcare professionals may be able to use Google Trends data to identify the educational needs by categorizing the information requests.

Methods: The 2015 top 20 global brand medications by dollar amount were identified using IMS Health. Google Trends was utilized to examine the regional distribution of searches of those medications in the U.S. Data obtained was limited to web searches made from January 1, 2015 to December 31, 2015. For each medication, states were ranked by most Google searches related to that agent and the top 3 states were identified. In addition to regional distribution, top related queries in regards to each medication were also recorded. The related queries reflect user's secondary searches following the initial medication inquiry. Only the 3 most popular related queries for each medication were used. After data collection, the frequency of state's appearance in the top 3 rank lists was calculated to determine whether a pattern in regional distribution existed. Next, the top related queries were categorized into the following: side effects, indication, generic, similar/alternative medication, cost or dosage/administration related searches. Frequency was calculated for each of these categories.

Results: The top 20 selling drugs identified were: Abilify, Advair Diskus, Avastin, Copaxone, Crestor, Enbrel, Harvoni, Herceptin, Humira, Januvia, Lantus Solostar, Lyrica, Neulasta, Nexium, Novolog, Remicade, Rituxan, Sovaldi, Spiriva, and Xarelto. States with the highest ranking of medication searches to total Google searches in that state were West Virginia (20 percent), Connecticut (18.3 percent) and Pennsylvania (10 percent). Only 21 states appeared in the top 3 rank listing with the majority of them being located on the east coast of the U.S. The common related queries that most frequently appeared in the secondary searches were side effects (25 percent), similar/alternative medications (18.3 percent), and cost (13.3 percent). Other categories included indication, generic, and dosage/administration. It is interesting to note that some of the related queries were for products in the same or similar class that may have been guided by the paid sponsored results in Google.

Conclusion: Google Trends may be a helpful aid for healthcare professionals in population-based care. Recognizing the limitations of the data is important since the information is relative to the total number of Google searches in that state. Identifying the areas of highest and lowest relative inquiry and relevant Google searches of medications may help tailor educational endeavors. Results show that overall consumers of information, both patients and healthcare providers, are concerned with understanding the possible side effects and cost-reducing methods. Google Trends may be a useful surveillance tool to monitor future patterns in healthcare informational inquiries.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 5a-051

Poster Title: Clinical characteristics and changes, not captured by the Hendrich II Fall Risk Assessment, observed in patients who experienced in-hospital falls

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Purpose: Institutions use assessment tools to identify patients who are at risk of falls during hospitalization. At our institution, the Hendrich II Fall Risk Assessment tool is utilized upon admission, and the assessment is repeated every eight hours until discharge. Patients are then placed on fall precaution interventions according to their perceived risk. Since this tool may not capture all factors that predispose patients to falls, we sought to identify additional clinical characteristics that are not captured by the Hendrich II score in an attempt to improve patient safety.

Methods: A retrospective review was performed on 102 patients who experienced falls during their hospital stay between November 2015 and April 2016. Data collected included patient demographics, admission diagnosis, home and hospital medications, blood pressure, and electrolyte values (sodium and potassium). Past medical history was documented for each patient, and focused on disease states that may contribute to increased fall risk, such as neurological, cardiovascular, and musculoskeletal conditions, diabetes and alcohol and/or drug abuse. Electrolytes and Hendrich II scores were repeated at the time of the fall, and blood pressure measurements were gathered before and after the fall occurred.
The use of universal fall precautions, such as non-skid footwear, securing a patient bed in a low wheel locked position with raised side rails, and placing the phone and call light within reach, are required for all inpatients regardless of Hendrich II Score. However, patients with Hendrich II scores of 5 or greater are deemed “high risk” for falls and required additional fall precautions. These include yellow wristbands and slip-resistant socks, and a yellow sign placed in the

patient's room alerting the staff to the increased falls risk. Patients with a Hendrich II score less than 5 can be placed on additional fall interventions if a staff member believes extra precautions are necessary.

Results: The 102 patients represented 103 falls. The average age was 63.5 years, 50.5 percent were men, with an average of 6 fall-risk diseases recorded per person. The most common were cardiovascular (30.6 percent) and neurological (23.8 percent) conditions. Blood pressure (BP) was measured pre-fall in 100 patients (average 130/73 mmHg), and post-fall in 97 patients (average 128/73 mmHg).
Sodium and potassium levels were reported in 98 patients on admission and 93 at the time of fall. At time of fall, 14 percent and 15 percent of patients had abnormal sodium and potassium levels, respectively, a decrease from 22.5 percent and 16 percent.
Between admission and the inpatient falls, 47 patients had 5 or more total medication changes; of which 21 patients had at least 10 changes. The number of medications increased by 38.4 percent after admission, (average 9.2 home medications compared to 12.8 inpatient per person). Overall, the use of antihypertensives decreased 40.9 percent from the time of admission until falls, however, adrenergic blocker use increased by 3.7 percent. Of the 102 patients, 55 had at least 1 BP medication change, while 29 patients had 2 or more changes.

Conclusion: Clinical characteristics of patients, such as preexisting cardiovascular and neurologic conditions, the number of medications administered, and inpatient medication changes, especially those effecting blood pressure, may be considered to identify patients at increased risk of falls. Electrolytes, as well as BP did not seem to affect the fall risk; however, these characteristics need to be explored further since the time of measurement did not occur consistently at the time of fall.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5a-052

Poster Title: Completing an assessment of risk for hazardous drugs in preparation for United States Pharmacopeia chapter 800 (USP 800) implementation for a health-system outpatient pharmacy setting

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Purpose: United States Pharmacopeia chapter 800 (USP 800) outlines new handling requirements for hazardous drugs in healthcare settings, and will require many procedural changes for pharmacies to become compliant. Certain dosage forms of hazardous drugs can be handled through containment strategies alternate to those outlined in USP 800 if deemed to have a low risk of exposure by the pharmacy. The purpose of this project was to complete an assessment of risk for all hazardous drugs dispensed to determine which can be handled through containment strategies alternate to those outlined in USP 800 for a health-system outpatient pharmacy setting.

Methods: Each dosage form of every hazardous drug currently dispensed by the Johns Hopkins Outpatient Pharmacies was identified using the National Institute of Occupational Safety and Health's (NIOSH) List of Antineoplastic and Other Hazardous Drugs in Healthcare Settings. An assessment of risk was completed for each dosage form of each hazardous drug based on the requirements outlined in USP 800. Information collected included the drug name, dosage form, type of hazard, drug packaging, manipulation during product dispensing, and risk of exposure. Criteria were created to differentiate the risk of exposure for healthcare workers into three levels of risk: low, moderate, or high risk of exposure. Hazardous drugs were then assigned to these levels of risk for exposure based on a scoring system. This scoring system differentiated exposure risk based on the specific dosage form, drug packaging, and manipulation of the hazardous drug. Medications that scored higher on the scoring system were assigned a higher level of risk. Each completed assessment of risk was then documented to help direct implementation of USP 800 in the outpatient pharmacy setting.

Results: 251 individual hazardous drugs and dosage forms were identified as being dispensed by the Johns Hopkins Outpatient Pharmacies. Further classified into the type of hazardous drug (as defined by the NIOSH List of Antineoplastic and Other Hazardous Drugs in Healthcare Settings), 87 were antineoplastic drugs, 84 were non-antineoplastic, and 80 were considered to be of reproductive risk only. After completing an assessment of risk for each dosage form of each hazardous drug, 177 hazardous drugs were determined to exhibit a low risk of exposure, 55 as a moderate risk of exposure, and 19 as a high risk of exposure. Dosage forms commonly assigned a low risk of exposure included film-coated oral tablets, oral capsules, final dosage forms that only require product labeling, and unit-dose packaged products. Moderate risk of exposure drugs included oral solutions, oral suspensions, and dust forming oral tablets. High risk of exposure drugs were exclusively compounded products involving manipulation of an original dosage form (such as pulverizing tablets or opening capsules).

Conclusion: After completing an assessment of risk for all hazardous drugs dispensed in the Johns Hopkins Outpatient Pharmacies, it was identified that the majority (71%) of hazardous drugs dispensed have a low risk of exposure to pharmacy staff. Therefore, the majority of hazardous drugs in the outpatient pharmacies can likely be handled through containment strategies alternate to those outlined in USP 800. This project helped to clearly identify which drugs are considered hazardous and their relative risk of exposure. The completed assessment of risk document can be used as a guiding document throughout the future phases of USP 800 implementation.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 5a-053

Poster Title: Spacing Practice Improves Retention in the Self-paced Learning of Brand/Generics

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Purpose: Learning brand/generic equivalencies is a central task for future pharmacists. Some students will attempt to learn material all in one sitting (a Massed Schedule) whereas other students will study over time (a Spaced Schedule). In addition, some students will study and re-study and not practice retrieving information. The purpose of this study was to experimentally test the impact on learning brand/generic drug information when various schedules of retrieval practice were employed in a self-paced course.

Methods: Students (n=151) completed weekly quizzes during the semester on the-brand/generic for 100 commonly prescribed drugs. Each student completed part of the drug list on a schedule of equal, expanding, or contracting spacing, or just one practice (massed) or study only in a counterbalanced design. The primary outcome was performance on a 50-question, fill-in-the-blank assessment 6 weeks after the course concluded.

Results: On measures of long-term retention, the contracting spacing schedule led to superior retention (67.2%) compared to the massed practice (50.1%, $p < 0.001$) and study only condition (45.6%)($p < 0.001$) but not significantly different than expanding practice (58.3%, $p=0.229$) or equal practice (58.7%, $p=0.283$). The study only condition resulted in lower retention compared to all conditions except massed practice. Overall performance decreased by almost 50% (final exam 95%, long-term retention 55%) over a 6-week period.

Conclusion: Students were able to retrieve a large fraction of name-brand/generic conversions after 6 weeks of not studying or practicing. A contracting spacing schedule was the best schedule of practice. Follow-up studies are needed to determine which schedules will show superiority over longer retention periods.

Submission Category: Automation/ Informatics

Submission Type: Descriptive Report

Session-Board Number: 5a-054

Poster Title: Evaluation of errors and waste with a technology-assisted workflow system at a tertiary care hospital

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Purpose: Technology-assisted workflow (TAWF) systems were developed for use in the intravenous (IV) room to improve patient safety. They minimize the amount of medication errors by creating checkpoints at each stage of IV preparation. Through the use of barcode scanning technology, TAWF systems intercept errors before the pharmacist verifies the final drug product. The technology also prioritizes the production of doses based on administration due time allowing for increased efficiency and reduction in waste volume. This project was designed to evaluate the frequency of errors and waste at a tertiary care hospital using a TAWF system.

Methods: The project evaluated products made in the IV room from November 1st, 2015 to November 30th, 2015. All IV products were included in the analysis except for products that were bypassed through the TAWF system, such as chemotherapy, epidurals, blood products, and total parenteral nutrition (TPN). The primary endpoint was the number of errors in IV product preparation intercepted by the TAWF. The secondary endpoints were types of errors made, number of IV bags wasted, and the cost associated with the waste. Two error reports were generated using the TAWF. The first error report showed the errors that were intercepted through barcode scanning. The second error report documented the errors that were caught during the pharmacist final verification. The errors were classified and the frequency of each error type was calculated. An automated report was generated of all wasted products and grouped based upon drug classification. The cost of waste for each drug category was calculated.

Results: The institution prepared 34,284 doses during the survey period. Two hundred sixty-seven (0.8%) total errors were documented in the automated reports. Barcode scanning technology intercepted 237 (89%) of the errors. One hundred sixty-one (68%) of the intercepted errors were due to a wrong drug or diluent selected. Thirty (11%) of the errors were documented during the pharmacist final verification. The most common type of error during pharmacist final verification was wrong drug concentration. The hospital wasted 441 drug products, which resulted in a cost of $16,669 for the month. The top five drug classes resulting in the most cost were immunosuppressants, vasopressors, anti-hypertensives, and antibiotics. Antibiotics were the most wasted products at the institution, making up 41% of the waste. The most common antibiotic wasted was cefazolin.

Conclusion: TAWF systems improve safety in health care settings through barcode scanning. They also provide benefit to pharmacy departments through documentation of IV errors and waste for ongoing quality assurance evaluations. Although the technology reduces the number of errors, pharmacist judgement is still needed since all errors were not intercepted by the TAWF before reaching the pharmacist. This evaluation identified future projects that need to be implemented, such reducing antibiotic waste, preventing the wrong drug or diluent from being selected to prepare an IV, and optimizing the TAWF system to intercept more errors.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5a-055

Poster Title: Decontamination for disruptive dirt: HPV vs UVC decontamination in the hospital pharmacy setting

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Purpose: IV contaminants put patients at risk for serious infections, yet contamination of pharmacy sterile compounding areas remains an issue in many institutions. A wide variety of cleaning products, procedures and schedules are employed in this setting; however, exceeding counts of microorganisms and organisms of concern are found in biannual ISO area certifications. Not only does required re-certification after an action level finding place a financial burden on pharmacies, but also fines and suspension of operations may follow. The purpose of this study was to evaluate the efficacy of decontamination methods not currently used in the hospital pharmacy setting.

Methods: Two pilot studies were devised, one using hydrogen peroxide vapor technology (HPV) and another using UVC devices. For the duration of each pilot study, environmental control staff (EVC) and pharmacy staff documented daily cleaning on wall logs, and additionally pharmacy staff audited the activity of EVC to ensure consistency. B&V Sampling was contracted for the collection of samples for both studies. On day one of each two week study, B&V took a full set of surface and air samples in the two rooms designated most historically troublesome in The Johns Hopkins Central Pharmacy. These rooms included the hazardous cleanroom and patient specific anteroom. Sampling was followed by the EVC terminal cleaning (most thorough decontamination in current cleaning schedule), followed by the respective study decontamination process, with full sets of B&V samples after each step. On day 7, full sets of B&V samples were again obtained. On day 14, EVC terminal cleaning was completed for a second time with B&V samples before and after. The surface and air samples obtained were

used to evaluate the immediate decontamination effects of the EVC terminal cleaning, each study decontamination process (HPV and UVC), and the effects on bacterial load over time.

Results: Beginning with the HPV pilot study, many organisms of concern were detected, with only one action level finding due to an exceeded count; therefore, numbers of colony forming units (CFUs) of organisms of concern were compared. Interestingly in the anteroom, zero CFUs were detected before day one EVC terminal cleaning and 8 CFUs mold/yeast after terminal cleaning (2 Pseudomonas spp., 4 Alternaria spp., 1 Neisseria spp., 1 Rhodotorula spp.). Day one HPV decontamination brought the count down to 2 CFU mold (2 Alternaria spp.). Levels remained relatively constant through day seven and day fourteen until after the second EVC terminal cleaning, increasing to 19 CFUs coagulase positive staphylococci (CPS). A similar trend appeared in the anteroom during the UVC pilot, with zero CFUs before EVC terminal cleaning, 4 gram negative rods (GNR) after terminal cleaning (2 Pantoea spp., 2 Acinetobacter spp.), and 2 GNRs after UVC decontamination (2 Pectobacterium spp.). The trend was different in the cleanroom, with EVC terminal cleaning generally not affecting the CFU count (one single CFU increase and one single CFU decrease incidents), HPV completely decontaminating the room to zero CFUs, and UVC also not largely affecting the CFU count.

Conclusion: While both studied decontamination processes appeared to decrease room contamination overall, the difference in trends between the anteroom and cleanroom was alarming. In particular, the rise in organisms of concern after EVC terminal cleaning in the anteroom alone and not the cleanroom indicated that there were likely other factors at play. Following an evaluation of facilities, it was determined that the location of the anteroom was a contributing factor to its consistent contamination – especially post-EVC terminal cleaning. After proposed facility alterations, future studies will be required to confirm the effects of facilities and efficacy of HPV and UVC decontamination.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5a-056

Poster Title: Evaluation of daptomycin utilization in a community hospital

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Purpose: Ensuring the appropriate use of antimicrobials is the cornerstone of an antimicrobial stewardship program. These programs can help guide appropriate use of high-cost antimicrobials, such as daptomycin. Daptomycin is approved for several indications for Gram-positive organisms including complicated skin and soft tissue infections (cSSTIs), as well as, bacteremia and right-sided infective endocarditis (IE) from methicillin susceptible Staphylococcus aureus (MSSA) or methicillin-resistant S. aureus (MRSA). The role of the stewardship team is to routinely evaluate the use of antimicrobials and ensure they are being prescribed appropriately. The purpose of this study was to evaluate the utilization of daptomycin.

Methods: This was a single center, retrospective medication use evaluation. Data were collected using electronic medical records for all patients who received daptomycin from January 1st, 2015 through March 30th, 2016 at Kingman Regional Medical Center (KRMC) in Kingman, Arizona. All patients who received at least one dose of daptomycin were included in the study. Patients that were readmitted within or after a 30-day period of initial daptomycin treatment and received daptomycin were considered a new course. Pertinent data were collected including: demographic data, indication for use, medical diagnoses, dose, duration, frequency, creatinine phosphokinase levels (CPK), previous or subsequent vancomycin therapy, microbiological data and 30-day readmission. The primary outcome of this study was to assess the utilization of daptomycin at KRMC. The secondary outcome was 30-day all-cause readmission rates. Data were analyzed and presented as descriptive statistics.

Results: There were a total of 71 daptomycin courses during the study period (53 inpatient and 32 outpatient courses). Thirty-eight percent of patients were female with a median age of 62. The most common indication was SSTIs (87 percent, n=46). The doses administered ranged

from approximately 4 milligram (mg)/kilogram (kg) to 8 mg/kg, rounded using a standardized pharmacy dosing protocol. The median therapy duration for inpatient courses was 5 days (25-75 IQR 2.5-8) while it was 15.5 days (25-75 IQR 7-23) for outpatients. Twenty-three courses (43 percent) received vancomycin treatment prior to daptomycin. Five patients had vancomycin discontinued due to renal function decline. Six patients reported a vancomycin allergy. Twenty-six courses (49 percent) had positive microbiological cultures, and of these, 20 (77 percent) had Gram-positive organisms. Sixteen courses had discrepancies between ordering indication and the medical diagnoses. Fourteen courses had a discrepancy between the dose given and the medical diagnoses. Osteomyelitis was confirmed in fourteen patients but only 6 of these patients received recommended doses of 6 or 8 mg/kg. The number of courses discharged on daptomycin from the hospital was 19 and 34 received their full course while in the hospital. Nineteen courses (36 percent) were readmitted within 30 days.

Conclusion: Opportunities for improving daptomycin use were identified through this study. The current daptomycin dosing protocol will be updated to include an indication for osteomyelitis. Following current guidelines, vancomycin should be used first line in Gram-positive SSTIs, MRSA bacteremia and right-sided IE. Criteria for daptomycin use will be established to help guide appropriate use to include: true vancomycin allergy, vancomycin failure, confirmed vancomycin resistant infection and outpatient use for patient compliance.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 5a-057

Poster Title: Effect of discharge medication delivery and counseling on hospital readmission

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Purpose: Appropriate counseling about medications and their use are an important part of the patient discharge process and important for smooth transition of care. It has been argued that this education can reduce medication non-adherence, reduce adverse events, reduce medication errors and reduce re-hospitalizations. The purpose of this study was to develop an interdisciplinary procedure to provide this service, identify obstacles to long-term implementation, and determine if re-admissions within 30 days were reduced in patients receiving discharge medication delivery and counseling by a pharmacy intern.

Methods: One floor was selected to participate in this limited, three-week trial. In coordination with the nursing staff, patients with the potential to discharge to home were identified each day. Patients being discharged to a Skilled Nursing Facility were excluded. The program coordinator met with each patient to explain the program and give them the opportunity to opt-in. If he or she provided informed consent to participate in the program, all information required to process the prescription was collected, including prescription insurance information. The hospital outpatient pharmacy, medical intern, resident, and attending were informed of the patient's participation. Patient information and discharge prescriptions were sent electronically and/or delivered to the pharmacy. These prescriptions were processed using the current Standard Process. Upon completion of the order, the program coordinator delivered the medications and counseled the patient at his or her beside. Patients were also given a survey to rate the program.

Results: For the primary outcome, 1 of 11 patients (9%) in the treatment group were readmitted to the hospital within 30 days, and 4 of 22 patients (18%) not receiving treatment were readmitted (p = 0.62).
Of the patients eligible for participation, 58 percent signed up for the program. Differences between the group that received discharge medication delivery and counseling (n = 11) and the group that did not (n = 22) were not significant. Categories examined were sex, ethnicity, age, weight, number of discharge medications, number of home medications, hospital stays within the previous 30 days, and hospital re-admittance within the subsequent 30 days. The only statistically significant finding was mean length of stay of 11 days for those who opted-in to the program, compared to 4 days for those who did not (p = 0.038).
Every patient gave the program the maximum rating, finding the service very valuable and helpful. It also received high reviews from medical staff and pharmacists.

Conclusion: Patients who received bedside delivery of discharge medications were less likely to be re-admitted to the hospital within 30 days. Although this finding is not statistically significant, it is clinically significant. One limitation of this study is the small sample size. The program was well-received by patients and healthcare providers. Improvement opportunities include consistent staffing, coordinator availability, timely discharge medication reconciliation, delivery hours, storage of delivered medications and payment method. This trial demonstrated that a discharge medication delivery and counseling program can contribute to the reduction of re-admissions and provide a positive patient experience.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 5a-058

Poster Title: Use of Antiviral Agents for Chronic Hepatitis B Virus Infection in Pregnant Women: Review of Clinical Evidence

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Purpose: The purpose of this systematic literature review is to assess the safety and efficacy of antiviral therapy in pregnant women chronically infected with hepatitis B virus (HBV) and to collect data on cesarean section rates, mother to child vertical transmission rates, and rates of any teratogenicity with the use of antiviral therapy.

Methods: For this systematic review, two databases, PubMed and Web of Science, were used. Two investigators independently screened articles found by these databases, using predetermined inclusion and exclusion criteria. The inclusion criteria for the screening were: 1) studies among pregnant women with chronic HBV infection, 2) studies which measured at least one outcome of interest listed below, and 3) studies specifying the antiviral treatment pregnant women received. Studies among women who had coinfection with human immunodeficiency virus were included. The exclusion criteria were: case reports, abstracts, animal or in vitro studies, non-English literature, studies with investigational drug use, studies in infants born to HBsAg positive fathers and HBsAg negative mothers, and studies in women of childbearing age who were not pregnant. The outcomes of interest included: 1) HBV DNA levels and HBsAg and HBeAg titer levels in pregnant women, 2) cesarean section rates, 3) premature delivery rates, 4) mother to child HBV transmission rates, and 5) the teratogenicity of antiviral therapy in infants.

Results: With PubMed and Web of Science, 272 and 71 articles were found respectively. After screening, 35 studies were included in this literature review. The most common antiviral agent studied in pregnant women was lamivudine, followed by telbivudine and tenofovir. In studies investigating maternal outcomes, 13 (37.1%) studies reported that post-treatment HBV DNA levels were significantly lower in mothers who received an antiviral agent, compared to those

who did not receive any antiviral treatment. Six (17.1%) studies reported cesarean section rates were not significantly different between mothers taking antiviral therapy and those who did not. Twelve (34.3%) studies reported infants receiving immunoprophylaxis as recommended by the AASLD and WHO/CDC. Regarding infant safety, premature deliveries were reported in 21 (60%) studies and observed with the use of tenofovir, telbivudine, and lamivudine, as well as in control groups. Among these 21 studies, 9 (25.7%) studies reported premature birth rates were not significantly associated with antiviral use. No teratogenicity was reported in any of the studies included in this review. Twenty-two (62.9%) studies investigated mother to child transmission rates with two studies of note reporting significantly higher HBV vertical transmission rates in control groups, compared to treatment groups.

Conclusion: Based on this systematic literature review, the use of tenofovir, lamivudine, or telbivudine may be supported for pregnant women with chronic HBV infection, which aligns with the recent AASLD guideline recommendations. However, current evidence for the use of antiviral agents, aside from these antivirals, to treat chronic HBV infections in pregnant women is limited. No significantly higher rates of premature delivery or teratogenicity were reported in the current evidence we reviewed. However, clear documentation is lacking on other adverse drug reactions for infants born to mothers taking antiviral therapy for chronic HBV infections.

Submission Category: Preceptor Skills

Submission Type: Descriptive Report

Session-Board Number: 5a-059

Poster Title: Descriptive analysis of the relationship between midpoint evaluation scores and final grades for advanced pharmacy practice experience year student pharmacists

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Purpose: Advanced pharmacy practice experiences (APPEs) are on-site training courses. These courses makeup the final year of doctorate of pharmacy programs. While all APPEs require a final course score, midpoint evaluations are optional and limited research is available on the predictive qualities midpoint evaluations have on final scores. The purpose of this study was to analyze the relationship between midpoint scores and final scores.

Methods: . To observe a relationship between the potential impact midpoint evaluations may have on final outcomes of APPE scores, a cohort of APPE grades of University of Maryland Eastern Shore School of Pharmacy and Health Professions student pharmacists was collected and analyzed to determine if there were statistical differences between final scores of students who received a midpoint evaluation during the course and those who did not (these students only received a final score). T-tests were used to compare final grades, with the presence of midpoint grades being the variable. The data was further categorized and analyzed to account for variance in scores. A secondary analysis was done to determine the strength of the predictive quality of midpoint scores on final scores. These analysis were done using paired t-tests, correlation, and regression models.

Results: The results indicated a statistically significant difference in final scores between courses that included and did not include midpoint evaluations, with those who received a midpoint evaluation scoring higher than those who did not. The mean final score for all APPEs with midpoint scores was 4.34, and the mean final score for all APPEs without midpoint scores was 4.16, with a difference of 0.179, and $P < 0.01$. The secondary evaluation exhibited a significant relationship between midpoint and final grades. The mean increase in score from the midpoint evaluation to the final evaluation was 0.461 ($P < 0.0001$, R-squared 50.96%).

Conclusion: While a difference of 0.179 doesn't seem very large, it could mean the difference between passing, failing, or receiving honors in a course. Limitations to this study included the narrow subject pool, a need for more comprehensive course information, and inherent variability across preceptor grading. Future studies should include more inclusive data in order to come to a comprehensive conclusion that midpoint evaluations have a significant impact on final grades for APPEs. From the data collected and strength of significance, we would recommend to continue to encourage midpoint evaluations for pharmacy APPE students.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 5a-060

Poster Title: Vancomycin pharmacokinetic parameters in patients with traumatic brain injury

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Purpose: Traumatic brain injury (TBI) is a devastating injury with high disability and mortality rates. These patients are at an increased risk for many medical complications, especially infection, which significantly impact overall patient outcomes. Case reports have been published demonstrating alterations in vancomycin pharmacokinetic (PK) parameters in TBI patients that have resulted in sub-therapeutic antibiotic concentrations, but data assessing this phenomenon is scarce. The primary objective of this study is to evaluate the PK parameters of vancomycin in TBI patients in a larger patient population to determine if further research in this area is warranted.

Methods: The institutional review board approved this single-center, retrospective cohort study of adult patients at least 18 years of age with TBI who received vancomycin and had at least one reported steady-state vancomycin serum level from April 2014 to December 2015. Patients who were pregnant, had serum creatinine greater than 1.4 mg/dL, received renal replacement therapy during admission, had a history of nephrectomy, or had a BMI less than 18 kg/m2 were excluded from the study. Chart reviews were performed for baseline characteristics of age, gender, height, weight, classification of TBI, suspected infection source, Glasgow Coma Scale (GCS) score, Sequential Organ Failure Assessment (SOFA) score, serum creatinine, and comorbidities. Patient characteristics at the time of vancomycin serum trough concentration were collected including serum creatinine and GSC score, as well as fluid balance and the type of vasopressor given (if any) 48 hours prior to serum trough concentration. Data for vancomycin dosing regimens were collected for vancomycin dose, dosing frequency, days from injury to trough concentration, and serum trough concentration(s). Predicted PK parameters based on population data were compared with calculated PK parameters based on

serum trough concentrations at steady state. The difference was assessed using a two-sample Wilcoxon rank-sum test where P less than 0.05 was considered statistically significant.

Results: Of 34 identified patients meeting inclusion criteria, chart reviews were performed for 32 patients. The patients were primarily male (72%) with a median age of 36 years (IQR, 24.5-52), GCS of 7 (IQR, 5-10) and baseline creatinine clearance (CrCl) of 116 mL/min (IQR, 96-130.5). Most patients were treated for suspected respiratory infection (53%) using a dosing regimen of 17 mg/kg (IQR, 13-19) every 8 hours. Patients had an estimated volume of distribution of 54.81 L (IQR, 48.8-63.98) and a median CrCl of 167 mL/min (IQR, 128-198) when serum trough concentrations were taken. There was no significant difference between estimated and calculated elimination rate constant (0.14 inverse hour (IQR, 0.11-0.17) vs. 0.13 inverse hour (IQR, 0.12-0.15); P equals 0.7371). There was also no significant difference in predicted and measured trough concentrations (10.4 mcg/mL (IQR, 7.09-15.0) vs. 11.5 mcg/mL (IQR, 7.8-13.7); P equals 0.7986).

Conclusion: Patients with TBI were administered typical doses of vancomycin (15-20 mg/kg) on a frequent basis (every 8 hours) but still did not achieve adequate therapeutic concentrations. It should be noted that these patients also exhibited increased creatinine clearance. This alteration may be contributing to the sub-therapeutic trough levels obtained for these patients. The results of this study support the need for further research to be conducted evaluating vancomycin dosing methods and pharmacokinetic parameters in patients with TBI.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5a-061

Poster Title: Use of ceftaroline in osteomyelitis patients with complicated methicillin resistant Staphylococcus aureus (CO-MRSA)

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Purpose: Vancomycin is the standard therapy for methicillin-resistant Staphylococcus aureus (MRSA) infections. However, incidences of strains with high minimum inhibitory concentrations are increasing, requiring alternative therapy when vancomycin therapy fails. Ceftaroline has in vitro activity against MRSA and is Food and Drug Administration approved for the treatment of acute bacterial skin and soft tissue infections and community acquired pneumonia. While single cases have reported ceftaroline use for osteomyelitis, larger studies and case series are not available to guide clinical decision. The purpose of this study is to evaluate the efficacy and safety of ceftaroline in patients with osteomyelitis due to MRSA.

Methods: A retrospective chart review was conducted of patients admitted between April 2011 through March 2016 at a five hospital system. Patients 18 years and older were included if they had a diagnosis of osteomyelitis, and at least one positive culture for MRSA. The primary outcome is clinical cure, defined as completion of 6 to 8 weeks of ceftaroline therapy or a minimum course of 7 days with a switch to oral antibiotic therapy to complete the duration of therapy. Secondary outcomes include adverse reactions associated with ceftaroline, length of hospital stay. Failure is defined as a switch to an alternative intravenous agent, death due to infectious cause, or readmission within 6 months after treatment completion. Demographics and clinical characteristics will be compared in those achieving and not achieving clinical cure by Wilcoxon rank-sum test for continuous variables and the Fisher's exact test for nominal variables. This study was approved by the Legacy Health institutional review board.

Results: Fourteen patients met the inclusion criteria, including 8 males and 6 females with a median age of 56 years [ranging from 36-93]. Thirteen of the 14 patients had multiple, significant comorbidities. The median length of hospital stay was 21 days [ranging from 5-75] with a median duration of ceftaroline of 15 days [ranging from 4-70). All patients received prior antimicrobial therapy with a median time to switch to ceftaroline of 12 days [ranging from 2-159]. Six of the 14 patients (43%) achieved clinical cure. Three patients completed a total of 6 weeks of ceftaroline therapy, with 2 (67%) achieving clinical cure. Patients with vertebral osteomyelitis (57%) had a greater length of stay, longer ceftaroline treatment, and lower cure rates (38% vs. 50%) than those with non-vertebral osteomyelitis. Higher vancomycin MIC's were also associated with lower ceftaroline cure rates (P=0.12). Four (29%) patients died but only 1 death was considered infection-related. Two patients experienced adverse reactions leading to the discontinuation of ceftaroline (transaminitis, pruritic rash).

Conclusion: Ceftaroline is currently being used in patients with complicated MRSA infections. It is a reasonable alternative for patients failing other therapies and may improve outcomes in those who complete the full duration of therapy. However, further trials are warranted in order to confirm clinical outcomes in patients with MRSA osteomyelitis.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 5a-062

Poster Title: Clinical pharmacist identification of adverse drug events (ADEs) in a transitional care management program

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Purpose: Preventing medication-related readmissions is critical. Studies have shown that 30% of hospital discharges have at least one medication discrepancy and 20% of patients experience an adverse event within three weeks. Clinical pharmacists have specialized training to implement interventions during the transition from hospital to home. The overall goal of this poster is to illustrate the role of clinical pharmacists in identifying adverse drug events in a transitional care management service at a geriatric clinic.

Methods: A transitional care management program was developed and implemented at the University of Colorado Seniors Clinic. Clinical pharmacists within the clinic called patients to complete medication reconciliation after discharge from the hospital. Adverse drug events were identified via telephone outreach to the patients. Adverse drug events were defined as any adverse outcome of patient injury caused by medication use. The telephone calls, including descriptions of adverse drug events and recommendations, were documented within the electronic medical record and sent to the patient's provider for review. After the provider received notification of medication related issues, the provider was able to collaborate with the clinical pharmacist or follow up with the patient during an office visit to assess the adverse drug event. This project analyzed adverse drug events in senior's clinic patients discharged from the University of Colorado Hospital from August 2014 through October 2015.

Results: After 14 months, clinical pharmacists completed medication reconciliation on 369 patients. There were a total of 39 adverse drug events in 35 patients that were identified and documented by the clinical pharmacists. Of the 35 patients, 3 were readmitted within 30 days of discharge. There were 26 (66.7%) adverse drug events caused by medications known to cause adverse events in older adults over the age of 65.

Conclusion: Clinical pharmacists are vital members of the health care team. Clinical pharmacists' role in identifying adverse drug events during the transitional care management service at the University of Colorado Seniors Clinic benefited both patients and providers. Early identification and resolution of adverse drug events is one way for pharmacists to prevent future hospital readmissions.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 5a-063

Poster Title: Anti-Xa assay interference among patients transitioning from an oral selective factor Xa inhibitor to unfractionated heparin

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Purpose: Laboratory monitoring is essential when managing patients requiring unfractionated heparin (UFH), particularly when transitioning from other anticoagulants. At some institutions, the anti-Xa assay has replaced activated partial thromboplastin time (aPTT) as a measure of UFH activity. While anti-Xa lab monitoring has its advantages, recent use of a selective factor Xa inhibitor has been observed to falsely elevate anti-Xa concentrations in our patient population. Therefore, appropriate management of UFH in these patients presents a clinical challenge. The purpose of this project was to describe the impact of oral selective anti-Xa inhibitors on anti-Xa concentrations and to determine an appropriate management strategy.

Methods: This was a retrospective analysis of patients admitted to the University of Pittsburgh Medical Center (UPMC) Presbyterian Hospital. The project was approved by the UPMC Quality Improvement Board. Patients with supratherapeutic anti-Xa concentrations that received intravenous UFH and were prescribed either apixaban or rivaroxaban prior to admission were included. Patients admitted after March 2015 were targeted to coincide with the implementation of institutional anti-Xa monitoring for UFH. Data collection included: demographics (age, sex, race), co-morbid conditions (such as renal and hepatic function) and other anticoagulant use. Descriptive statistics were used to characterize the study results.

Results: This quality improvement initiative will describe the effects of oral selective factor Xa inhibitors on anti-Xa concentrations in patients that require UFH during their hospitalization at UPMC Presbyterian Hospital.

Conclusion: The results of this project will inform appropriate therapeutic decisions about how to monitor UFH in patients that recently received an oral selective Xa inhibitor.

Submission Category: Preceptor Skills

Submission Type: Evaluative Study

Session-Board Number: 5a-064

Poster Title: Effect of educational background on perceptions of teaching preparedness

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Purpose: Pharmacy faculty come from diverse educational backgrounds in terms of terminal degree and post-graduate training. They are a mix of PharmDs and PhDs, and faculty members with a PharmD represent an additional mix of clinical and non-clinical faculty. Most or all PhD programs have a required teaching component while few PharmD programs include teaching experience as a graduation requirement. We surveyed faculty at one college of pharmacy to see if differences in educational background have an impact on self-perception of teaching ability and need for further development.

Methods: Faculty at Campbell University College of Pharmacy & Health Sciences, a teaching-intensive institution, were surveyed for educational background, teaching experience, and self-perceptions of teaching ability using an online questionnaire approved by the Institutional Review Board. The questionnaire was designed after reviewing a previous publication, with permission of the author. A link to the questionnaire was sent to 55 faculty members in the Pharmacy Practice and Pharmaceutical Sciences departments. Faculty were eligible to participate if they held a terminal degree regardless of whether they taught in the Doctor of Pharmacy Program. The first portion of the questionnaire collected demographic information while the second portion asked about teaching experience prior to joining the faculty and included Likert-type questions on confidence in areas related to teaching. A reminder email was sent to all non-responders one week after the initial participation request was sent. A final reminder to complete the survey was sent two weeks after the initial contact. At the end of the three-week survey period, 31 faculty members had fully completed the survey, resulting in a 56.3% return rate. The data were analyzed using SPSS for frequency and descriptive statistics. The responses of faculty with prior teaching experience and those without were compared by t-test with significance determined at $p < 0.05$.

Results: Almost 68% of respondents had a PharmD while nearly 46% had a PhD. The majority of respondents (67.7%) were in the Pharmacy Practice department and the median range of time as a faculty member was 7-10 years. Half of faculty members taught students while they were in graduate or pharmacy school; the most common format involved providing lab instruction. After becoming faculty members, those with prior teaching experience did not feel as strongly that they needed faculty development in a variety of teaching areas including developing course objectives, writing exam questions and analyzing exam performance. However, a significant difference based on previous teaching experience was seen only with providing an effective lecture ($p=0.038$). Both groups placed high importance on developing their teaching methods as their career progresses. This was supported by 76% of respondents saying that they often or always attend teaching-related sessions at their professional meetings.

Conclusion: Teaching experience prior to becoming a faculty member had little impact on self-perceived need for development in multiple areas related to teaching. PhD and PharmD-educated faculty equally and strongly agree they need to improve their teaching ability and frequently take advantage of opportunities to do so. The faculty surveyed also felt supported by their department in pursuing professional development aimed at teaching.

Submission Category: Pharmacokinetics

Submission Type: Evaluative Study

Session-Board Number: 5a-065

Poster Title: Predicting Vancomycin AUC24 Based on Plasma Concentrations: A Simulated Evaluation

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Purpose: For vancomycin (VAN), the relationship between the AUC over 24 hr (AUC24) to the MIC for bacteria has been found to be a predictor of efficacy. Due to the multi-compartment features of VAN, routine plasma concentrations monitoring may not accurately permit estimates of AUC24's. The study investigated the usefulness of several proposed and new methods for estimating AUC24 from limited plasma concentration sampling.

Methods: A VAN population pharmacokinetic model was selected from the literature and used to predict VAN plasma concentrations for subject with 100%, 50%, 25% and 5% renal function on days 1, 3, and 7. There were 50 subjects in each renal function group and simulations were based on a loading dose followed by maintenance dose given at a time interval adjusted for renal function. Values of AUC24 were determined by a method suggested by Bauer (Method B), based on a 1-compartment model (Method C), as well as single point relationships. Sampling times utilized in the calculation included time 0 and post-dose times of either 1.5, 2, and 3 hr, and at the trough. Concentration values at the dosing interval midpoint (Cmid) and minimum (Cmin) were also estimated.

Results: The accuracy of AUC24 predictions varied among the methods, the points selected, and was also affected by renal function group. For all subjects, by the B and C methods, AUC24 was overestimated more when the post-dose sampling time was 1.5 hr (20.6±11.2% and 20.8±8.7%) as compared with 2 hr (10.8±7.9% and 13.1±6.6%) and 3 hr (2.7±10.1% and 7.0±7.2%) times. Method B appeared slightly better than method C depending on renal function group and sampling times. For the B and C methods, AUC24 prediction errors were significantly less for the normal renal function group compared to groups with 0.5, 0.25, and

0.05 fractions of renal function. Equations were determined to predict AUC24 based upon Cmid and Cmin and these AUC24 estimates were better than Methods B and C with % errors of 0.3±5.9% and 0.6+10.1%, respectively.

Conclusion: After 3-7 days of VAN dosing, values of Cmid or Cmin may be useful in accessing AUC24 and appear to be a better approach than methods utilizing 3 sampling times. These approaches need to be evaluated with different population parameters and also compared to Bayesian predictions.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 5a-066

Poster Title: Implementation of a diabetes collaborative drug therapy management (CDTM) agreement: Changes in hemoglobin A1c one year later

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Purpose: To assess the impact of pharmacist management of chronic diabetes in an outpatient setting. This project was designed to evaluate the outcomes of the Collaborative Drug Therapy Management (CDTM) agreement with practitioners by assessing changes in hemoglobin A1c values one year later after implementation.

Methods: This IRB approved retrospective observational study was performed via electronic chart review on patients referred by physicians to receive chronic management of their diabetes with a pharmacist at a primary care office. Patients A1c values before the referral and after management of their diabetes with the clinical pharmacist were compared. The inclusion and exclusion criteria listed in the CDTM agreement was used to enroll patients. Patients had to be receiving regular medical care at the clinic and be diagnosed with diabetes mellitus type 1 or 2. “High risk” patients were enrolled in this study as stated in the CDTM agreement. Patients were considered “high risk” if they met one of the following: HbA1C greater than or equal to 9%, HbA1C greater than or equal to 8% plus established coronary artery disease, peripheral artery disease, history of stroke, new insulin-dependent diagnosis, significant hypoglycemia/hyperglycemia, uncontrolled hypertension, or atherosclerotic cardiovascular disease risk greater than or equal to 7.5% and need for statin intensification. Patients were dismissed from the service if they failed to show up for three consecutive office and/or phone visits, if they no longer wanted to receive the service, or if the provider/pharmacist felt this service was no longer appropriate for them. The primary objective was measurement of glycemic control defined as having an HbA1C value less than seven percent as stated in the CDTM agreement.

Results: Of the 78 patients referred over by physicians to the service, 44 patients were excluded in the study. Of the 44 patients excluded, 19 patients were not “high risk” and 25 patients’ physicians were not part of the CDTM agreement. Nine patients were lost to follow-up during the study. Of the total 25 patients included in the study, 12 (48%) patients attained hemoglobin A1c goal of less than or equal to 7% and 16 (61.5%) patients achieved at least 1% or more reduction in their A1c. Average absolute change in A1c was 1.972%. Changes in A1c values varied from 0.4% to 7.5%.

Conclusion: This study demonstrated that implementation of the Collaborative Drug Therapy Management (CDTM) agreement has had a positive impact on patient’s hemoglobin A1c values within a year. It can be concluded that chronic diabetes management by clinical pharmacists in an outpatient setting can be a beneficial option for patients whose A1c values cannot be maintained at 7 percent or lower by their primary care physician.

Submission Category: Critical Care

Submission Type: Descriptive Report

Session-Board Number: 5a-067

Poster Title: Comparing the presence of family members to nurse's time spent performing delirium prevention activities in the medical intensive care unit

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Purpose: The purpose of this study is to investigate the impact of family presence on the nurse's time spent on conducting non-pharmacologic delirium prevention activities in a medical intensive care (MICU). We hypothesized that family presence will decrease the amount of time that the nurse spent on conducting delirium prevention activities due to the increased activity in the patients' rooms.

Methods: This was a time and motion study that included nurses working in the MICU at the University of Pittsburgh Medical Center, Presbyterian Hospital. Eighteen nurses, who were caring for thirty-five patients, were observed by student pharmacists for a total of 71.77 nonconsecutive hours. Observations occurred for four hour time blocks from 8:00 AM to 12:00 PM, 12:00 PM to 4:00 PM, or 3:00 PM to 7:00 PM. Of the eighteen nurses observed, seventeen were responsible for caring for two patients. During observation, the nurse's actions were timed and recorded with a focus on those activities used in delirium prevention. Data were summarized by median and ranges due to non-normal distributions. The Mann Whitney-U Test was used to compare the groups of nurses that did and did not have a family member present. We considered a p-value of ≤ 0.05 to be statistically significant.

Results: The median (range) for total time that nurses spent performing non-pharmacologic delirium prevention activities was 0.95 minutes (0-18.32) per patient out of the four hours block. Family members were present for 20 of the 35 patients that the observed nurses cared for during the four hour block. The median (range) time that a family member was present during the four hour time period observed was 0.33 hours (0-2.2 hours). The median time that

nurses spent conducting delirium prevention activities changed with respect to the presence of a family member. The median (range) time spent performing delirium prevention activities was 0.813 minutes (0-18.32 minutes) when a family member was present compared to 1.06 minutes (0-12.50 minutes) when a family member was not. There was not a statistically significant difference between the time that nurses spent conducting non-pharmacologic delirium prevention activities if family members were or were not present ($p = 0.50$).

Conclusion: There is no causal relationship between the presence of family and the nurses' time spent performing delirium prevention in the MICU and any difference is due to chance. The data suggests that nurses provide all patients with the same level of delirium prevention care and the presence of family does not lessen the need for delirium prevention methods to be utilized. This data shows the importance of educating nurses on practicing delirium prevention activities regardless of the presence of family members and further studies can be conducted to determine barriers to nurses delivering delirium prevention in the MICU.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5a-068

Poster Title: Pharmacist prophylactic probiotic prescribing: impact of a delegation protocol on Clostridium difficile rates in an academic medical center

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Purpose: Clostridium difficile infection (CDI) is a concern for many hospitals. Antibiotic exposure is an important risk factor for CDI and, often, a necessary treatment modality. Therefore, unique prevention strategies are being investigated, including probiotic administration. In order to increase probiotic utilization in patients receiving broad spectrum antibiotics, a delegation protocol allowing pharmacists to order probiotics for these patients was implemented. This study aims to determine compliance with probiotic ordering and the safety and efficacy of probiotics given during the index hospitalization for primary CDI prevention.

Methods: A pre/post retrospective review of patients receiving broad-spectrum antibiotics was conducted on the family medicine, general medicine, and hospitalist services for a total of two months. Data was collected using the electronic medical record. Inclusion criteria consisted of patients starting high-risk antibiotics for treatment of suspected infection. Patients who had active pancreatitis, gastrointestinal perforation, Crohn's disease, recent post-pyloric gastrointestinal surgery, were receiving exogenous immunosuppression, or who had CDI within 90 days were excluded. The primary outcome was compliance to delegation protocol, specifically, prescribing probiotics to qualifying patients within 24 hours of antibiotic administration. Secondary outcomes included receipt of probiotics after exposure to high-risk antibiotics greater than 24 hours but during the hospitalization and cases of CDI within 14 days of antibiotic administration.

Results: During two months, 253 patients met inclusion criteria. One-hundred and six patients were excluded, most often for pancreatitis. Pharmacists prescribed probiotics within 24 hours of starting high risk antibiotics in 93 of 147 (63.3%) of eligible patients. Probiotics were initiated during the hospitalization in 121 of 147 (82.3%) of patients. Zero patients receiving probiotics within 24 hours of high-risk antibiotic initiation developed CDI compared to two of 30 (0.07%) patients receiving probiotics after 24 hours (P = 0.0529). Unfortunately, probiotic delegation protocol implementation failed to change the ward CDI rate, 7.15 vs. 7.5/10,000 patient days, and a rate ratio of 0.95; 95% CI: 0.347, 2.43 (p=1.00) There were no complications, i.e. bacteremias, throughout the study period duration related to probiotic administration.

Conclusion: Overall, pharmacists demonstrate good compliance to implementing the probiotic delegation protocol and may be valuable in prevention of CDI. Still, it is unclear the impact of the protocol on CDI rate.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 5a-069

Poster Title: Contraception and teratogen registry analysis (CONTRA)

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Purpose: More than half of all pregnancies are unintended, yet recent studies have shown that family planning is not being discussed between the majority of women and their primary care providers. These discussions should include contraception options, teratogenic medication use, control of chronic conditions, and appropriate folic acid supplementation. Pharmacists can play a critical role in optimizing medication use prior to conception, counseling on contraception, and proactively identifying women in need of preventive reproductive health care. However, standardizing family planning documentation in electronic medical records (EMR) is crucial for pharmacists and other providers to identify potential pharmacotherapy interventions.

Methods: This retrospective chart review examined the effectiveness of using a registry and phone intervention by student pharmacists on women at risk for adverse outcomes with an unintended pregnancy. The EMR of a large academic family medicine practice was screened for females between ages 14-55 taking at least one teratogenic medication from this pre-specified list: angiotensin-converting enzyme inhibitors, angiotensin II receptor blockers, statins, valproic acid, lithium, paroxetine, methotrexate, and warfarin. Exclusion criteria included current pregnancy, age under 18 years old, or lack of an office visit in the last three years. In total, 182 patients met inclusion criteria. Student pharmacists reviewed patient charts for the type of teratogenic medication, contraception use, smoking status, and folic acid or multivitamin use. A new Family Planning tab was created in the EMR to standardize contraception documentation for all patients. Student pharmacists called patients without contraception documentation using an approved script to discuss family planning and updated their charts accordingly. Patients were encouraged to contact their primary care physician (PCP) for further family planning and to utilize free multivitamins provided by the clinic. The primary outcome was the

number of women using contraception while on a teratogen. Secondary outcomes included the percentages of incorrectly documented teratogen use, incorrect records of lack of contraception use, patients that followed up with their PCP, and patients using multivitamins with folic acid.

Results: Of the 182 included patients, 131 patients (71.9%) were using contraception while taking a teratogen. Thirty patients (16.5%) had ambiguous teratogen documentation but could not be reached by phone to verify their medication history. Forty-four patients (24.2%) were successfully contacted by student pharmacists to verify their contraception or teratogen use. Seven patients (3.8%) were no longer taking the teratogen originally documented in their chart. Thirteen patients (7.1%), originally missing contraception documentation, were found to actually be using contraception, and their charts were appropriately updated. Two patients (1.1%) that were not using contraception expressed interest in scheduling an appointment with their PCP to further discuss family planning. However, three months after the phone intervention, neither had scheduled an appointment with their PCP. One patient (0.5%) was not using contraception and was unwilling to follow-up with her PCP about family planning. Additionally, 55 (30.2%) women were taking multivitamins with folic acid. Ten patients (5.5%) were found to have transferred care and were thus excluded from the study.

Conclusion: This chart review and phone intervention led by student pharmacists demonstrated the lack of consistent, accurate contraception and teratogen documentation. This could lead to missed opportunities for a discussion of teratogenic medication use during childbearing age. Our study showed the need for a centralized location to record a patient's method of contraception in the EMR so providers can better evaluate medication use. Furthermore, less than one-third of our patients were taking multivitamins with folic acid, so it is evident that the promotion and education of the importance of folic acid supplementation must be expanded at this practice.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5a-070

Poster Title: Physician-Pharmacist Collaborative Management: Narrowing The Socioeconomic Blood Pressure Gap

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Purpose: Race, income, education, and insurance status are significant predictors of blood pressure control. Individuals with lower education or income have higher rates of uncontrolled hypertension. Uninsured (self-pay) individuals suffered from a higher rate of uncontrolled hypertension compared to those publicly and privately insured. Team-based care has been proven to improve hypertension control, but there is little information whether this model can reduce the gap in health care disparities. The purpose of this study was to evaluate whether pharmacist intervention could reduce health care disparities by improving blood pressure in high-risk racial and socioeconomic subjects compared to the control group.

Methods: This study was a prospective, cluster-randomized, multicenter clinical trial involving 32 medical offices from 15 U.S. states. The network of medical offices was selected to include a high percentage of minority patients. Offices were stratified based on structure of pharmacy services provided and percentage of minority patients. Offices were then randomized to one of three study arms after they were stratified: usual blood pressure care, a 9-month intervention, or a 24-month intervention. Both intervention arms were designed to be identical for the first 9 months so the a priori analysis plan was to combine the two at 9 months and compare to usual care for the main study outcomes. A clinical pharmacist was embedded within each medical office and made recommendations to physicians and patients. The analyses in minority subjects were pre-specified secondary analyses but all other comparisons were secondary, post-hoc analyses. The 9-month visit was completed by 539 patients, 345 received the intervention and 194 were in the control group. The primary outcome of interest in the current analysis was the difference in mean systolic blood pressure reduction between control and intervention study arms in groups with various racial and socioeconomic differences at the 9-month time period.

Results: Following the intervention, mean systolic blood pressure was 7.3 mm Hg (95%CI= 2.4, 12.3) lower in subjects from racial minority groups who received the intervention compared to the control group (p=0.0042). Subjects with < 12 years of education in the intervention group had a systolic blood pressure 8.1 mm Hg (95% CI=3.2, 13.1) lower than the control group with lower education (p=0.0001). There was a significantly greater reduction in systolic BP in the intervention group patients making < $25,000 than the control group patients making < $25,000 (7.3 mm Hg, 95% CI= 2.0, 12.6, p=0.008). The control group receiving Free and None/Self-Pay insurance had the smallest reduction in systolic BP by the 9-month endpoint. The intervention group achieved a systolic BP 13.1 mm Hg lower (95% CI=5.8, 20.4) than the control group in patients without insurance (p=0.0004).

Conclusion: This study demonstrated that pharmacist intervention reduced health care disparities in blood pressure in at-risk socioeconomic populations. We found that intervention groups at high-risk for health care disparities had a significantly larger reduction in blood pressure than the same high-risk control groups. Our findings suggest that a pharmacist intervention in primary care clinics can successfully reduce health care disparities for those at risk based on racial and socioeconomic characteristics.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 5a-071

Poster Title: Characteristics of Bicalutamide-Induced Neuroendocrine Differentiation of Prostate Cancer Cells in vitro

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Purpose: Therapies designed to reduce androgen production and/or receptor activation have proven to be effective in reducing the growth of prostate cancers. However, sustained treatment with antiandrogen therapies can result in androgen-independent growth, which leads to increased mortality. The switch of prostate cancer to an androgen-refractory state is associated with neuroendocrine differentiation (NED) of cancer cells. We hypothesize that NED is accompanied by significant changes in the Ca2+ homeostasis of prostate cancer cells. We investigated the effect of the androgen receptor blocker, biculatamide, in promoting NED of cancer cells and whether it was accompanied by increased T-type Ca2+ channel expression.

Methods: Lymph node-derived prostate LNCaP cells were used as a model of prostate cancer cells that undergo NED. LNCaP cells were treated with biculatamide (Casodex®, 10-20 µM) for 4-10 days. Cells were also cultured in an androgen-depleted media to simulate the effect of anti-androgen therapies. Changes in the T-type Ca2+ channel subunit Cav3.2 expression and several differentiation markers were assessed by western blot and real-time PCR analysis. Measurements of dendritic length and number of primary branches was use to determined morphological changes in prostate cancer cells undergoing NED.

Results: The treatment of LNCaP cells with bicalutamide for 4-10 days resulted in significant morphological differentiations as evidenced by the development of long dendrite-like processes and increased branching. Bicalutamide treatment of LNCaP cells also evoked a significant increase in the expression of neuron-specific enolase, a marker of prostate cancer cells undergoing NED. Bicalutamide-evoked NED of LNCaP cells resulted in a significant increase in the protein expression of the T-type Ca2+ channel subunit Cav3.2. There were no changes in

the levels of Cav3.2 mRNA, suggesting that bicalutamide regulates T-type Ca2+ channel subunit expression by a posttranscriptional mechanism.

Conclusion: These results demonstrated that the bicalutamide treatment of prostate cancer cells leads to NED and increased expression of T-type Ca2+ channels. Thus, it appears that T-type Ca2+ channels could be a possible target for future therapeutic strategies against prostate cancers refractory to anti-androgen therapies. Future work will investigate the role of T-type Ca2+ channels in promoting the NED of prostate cancer cells.

Submission Category: Automation/ Informatics

Submission Type: Descriptive Report

Session-Board Number: 5a-072

Poster Title: Quantitative Analysis of Electronic Prescribing Quality Related-Incidents

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Purpose: To analyze quality related events and errors related to e-prescribing that affect community pharmacist and patients and to develop best practice recommendations for improving patient safety. The aims were to: 1) examine the frequency, type, and contributing factors of e-prescribing quality events reported to the Pharmacy Quality Commitment (PQC) System and the Pharmacy and Provider prescribing Experience Reporting Portal (PEER) Portal; and 2) determine the potential impact of Surescripts e-prescribing "ideal prescription" guidelines adoption in preventing e-prescribing quality problems and errors.

Methods: This was a retrospective analysis of - extracted e-prescribing related events reported to PQC and PEER Portal between January 2011 and January 2015. For aim 1, descriptive statistics were calculated for variables of interest from each data source, PQC and PEER portal, independently. In addition, a combined PQC and Peer Portal dataset was created to estimate frequencies and percentages for variables that were collected using similar taxonomies in both reporting portals. Variables summarized for the combined sample included: event type (i.e., incorrect drug, strength, directions, quantity, or patient) and whether or not the event reached the patient. For aim 2, a random sample of the combined PQC and PEER dataset was analyzed by determining the proportion of e-prescription events that would be considered preventable if the prescriptions were compliant with the elements of the "ideal e-prescribing order."

Results: A total of 589 events were reported to the PEER Portal from 2010 to 2015. Patient directions problems were the most frequent type of incidents (n=210) of which 10% (n=21) reached the patients. Quantity selection (n=158) and drug selection (n=96) were the next most frequently reported events, 20% of which reached the patient. Similarly, the most frequent

event type reported to the PQC system was incorrect directions (23.3%, n=128) followed by incorrect prescriber (17 %), incorrect drug (15%) and incorrect strength (12%) from a sample of 550 reports. For aim 2, 429 of 1,139 events were analyzed and classified as preventable or not preventable. Three strategies were identified as potential error prevention strategies for over two thirds of the quality related issues. These were: 1) use of standardized drug descriptions; 2) use of valid prescription quantities; and 3) maintenance of accurate prescriber and pharmacy information in the Surescripts directory.

Conclusion: Most of the events were resolved before reaching the patient. However, a large number of events required intervention of the e-prescribing staff, which may contribute to a considerable cost burden for the pharmacies. Software developers and vendors have the potential to greatly impact the number of e-prescribing related incidents by adopting three strategies in their systems: 1) use of standardized drug descriptions; 2) use of appropriate prescription quantities; and 3) maintenance of up-to-date prescriber and pharmacy information in the Surescripts directory. Adopting these standards may aid in reducing errors, creating better health outcomes, increased safety, and better patient relationships.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5a-073

Poster Title: Provider compliance with an electronic Risk Evaluation and Mitigation Strategy (REMS) for Belatacept

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Purpose: The Food and Drug Administration mandates Risk Evaluation and Mitigation Strategies (REMS) for drugs with known serious risks, to ensure the benefits outweigh the risks. Belatacept, licensed in 2011 for maintenance immunosuppression after kidney transplant, confers an increased risk of post-transplant lymphoproliferative disorder (PTLD) and progressive multifocal leukoencephalopathy (PML) in EBV seronegative patients. To ensure compliance with the Belatacept REMS program, our institution created a previously described customized order entry item in the CPOE system, with a required pre-infusion checklist. Herein, we describe provider compliance with the pre-infusion checklist. In a secondary analysis, we examine in-hospital uses of Belatacept.

Methods: Researchers queried the electronic health record (EHR) database of NewYork-Presbyterian / Columbia University Medical Center for de-identified data dated after order entry item and pre-infusion checklist implementation. Data obtained included Belatacept order entries, Belatacept medical administration record entries, relevant labs and ICD codes for all patients receiving Belatacept, and all pre-infusion checklists. An independent researcher verified data accuracy using manual review. We conducted the descriptive analysis with R statistical package.

Results: 73.9% of all Belatacept infusions had a pre-infusion checklist completed any time prior to infusion, but only 54.3% had a checklist completed within 24 hours prior to infusion. If the provider completed a pre-infusion checklist, the provider checked all six items 95.4% of the time. The provider type completing the checklist constituted primarily nurses (89%). Providers

used Belatacept for both initial and conversion immunosuppression dosing (at 10mg/kg) followed by maintenance immunosuppression (at 5 mg/kg).

Conclusion: Our analysis indicates less than ideal compliance with a pre-infusion checklist for Belatacept. Whether providers complete the checklist's specified actions but do not fill out the checklist, or whether providers do not complete the checklist's actions, remains unclear. However, the degree of non-compliance highlights the need for additional strategies and monitoring to ensure proper implementation of REMS programs.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5a-074

Poster Title: Dental students' perceptions of the role of pharmacists in the practice of dentistry

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Purpose: A focus on interprofessional education has recently become a common theme in health sciences curricular standards. This study aims to identify the attitudes and perceptions of dental students regarding the role of pharmacists in the practice of dentistry.

Methods: Following IRB approval, students enrolled at Roseman University of Health Science College of Dental Medicine were given the opportunity to complete a 19-question paper survey. Participation in the study was voluntarily. Surveys were handed to participants individually and completed in person. To be included in our study, participants were required to be English-speaking students currently enrolled in the Roseman University of Health Science College of Dental Medicine. Dental students younger than 18 years of age were excluded from our study.

Results: A total of 132 dental students completed the questionnaire. Students in their first year of dental school (59) represented 44.7% of respondents. About half of respondents, (68, 51.52%) had less than one year of experience in oral healthcare. A small majority of respondents (69, 52%) had a friend or family member who works in the field of pharmacy, and these respondents were more likely to rate their knowledge of the field of pharmacy as greater than 'moderate' (24.6% vs. 12.7%). Nearly half (62, 46.97%) of respondents were aware that pharmacy students must earn a doctorate degree before becoming a pharmacist; 43 (32.58%) erroneously believed that becoming a pharmacist required only a bachelor's degree. One-hundred-four (79.39%) respondents agreed that pharmacists play an important role in the practice of dentistry, with 23 (17.56%) strongly agreeing. One-hundred-five (79.54%) agreed that pharmacists can help improve therapeutic outcomes for dental patients. Sixty (45.80%) of respondents agreed that they would trust a pharmacist to counsel patients on oral hygiene

products, but only 34 (25.95%) agreed that they would trust a pharmacist to counsel patients on oral hygiene behaviors. Finally, a large majority (78, 82.44%) agreed that patients would benefit from more collaboration between dentists and pharmacists.

Conclusion: Overall, dental students in this single-centered, cross-sectional study see value in interprofessional collaboration between dentists and pharmacists. Our investigation identified some gaps in knowledge and trust among dental students with respect to pharmacists. This exploration of the current perceptions of future dentists about the incorporation of pharmacists in their field of practice can serve as a gauge of the current state of interprofessional education between students of pharmacy and dentistry.

Submission Category: Automation/ Informatics

Submission Type: Descriptive Report

Session-Board Number: 5a-075

Poster Title: Evaluation of controlled substance drip discrepancies in the Pediatric Intensive Care Unit one-year post implementation of electronic documentation and wasting

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Purpose: Prior to May of 2015, Children's of Alabama used a Controlled Substance Transaction Form to document the use of controlled substance drips. Requirements for each form included documentation of the time of administration of each drip as well as any waste, which required a witness signature. Administration of each drip was also documented in the electronic medication administration record (eMAR). In May of 2015 the process of documentation of controlled substances switched from the traditional transaction form to an electronic format. The aim of this project was to evaluate the effectiveness of an electronic documentation and wasting system one-year post-implementation.

Methods: Beginning May of 2015 nurses in the PICU at Children's of Alabama used a new process for the use of controlled substance drips. While they were still required to document the administration of each drip in the eMAR, they now recorded the waste in an automated dispensing machine (ADM) instead of on the controlled substance transaction form. Education was provided to the nurses prior to the implementation of the new process. Six weeks of data from 12 months post-implementation was pulled from both the eMAR and the ADM and was further evaluated for discrepancies. The data from May of 2016 was then was compared to data collected from the first six weeks following the new procedure.

Results: In 2015, six weeks after the change in the documentation system, there were 537 total drips dispensed with 19 discrepancies (3.54 percent). This was a 0.48 percent increase in the number of discrepancies found compared to 3.06 percent calculated six weeks prior to the implementation. While the percentage of discrepancies due to lack of eMAR documentation did improve, this percentage was not statistically significant. From 5/1/2016 to 6/11/2016 there were 366 drips dispensed to the PICU with 4 discrepancies (1.09 percent) found (p=0.029). Three of the four (75 percent) discrepancies were due to lack of documentation in the eMAR. The one-year post-implementation data shows a statistically significant decrease in the number of discrepancies.

Conclusion: One-year post implementation of electronic documentation and wasting of controlled substance drips at Children's of Alabama showed a significant decrease in the number of discrepancies found. There were 171 less drips delivered to the PICU during the six-week time frame beginning May 1, 2016 compared to the six weeks post-implementation in May of 2015. While there was a 2.45 percent decrease in the number of discrepancies found, there does still seem to be some issues concerning documentation in the eMAR.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Evaluative Study

Session-Board Number: 5a-076

Poster Title: Do direct-acting oral anticoagulants provide good value for the money? A budgetary model of Medicaid beneficiaries with nonvalvular atrial fibrillation.

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Purpose: State Medicaid programs have encountered challenges with increasing prescription drug costs due to price inflation and the introduction of new medications. Decision analytic models are often utilized to facilitate budgetary analyses and formulary decisions about new medications. However, many published models cannot be applied to Medicaid programs due to long time horizons or assumed populations (commercially insured). The purpose of this study was to provide budgetary estimates from a Medicaid, payer perspective for direct-acting oral anticoagulants (DOACs) versus warfarin in nonvalvular atrial fibrillation (NVAF) using number needed to treat, an easily calculated measure of treatment impact.

Methods: A budgetary impact analysis utilized (a) Medicaid cost data and (b) efficacy outcomes from the following pivotal clinical trials: Randomized Evaluation of Long-Term Anticoagulation, (RE-LY 2009), Apixaban for Reduction in Stroke and Other Thromboembolic Events in Atrial Fibrillation, (ARISTOTLE 2011), and Rivaroxaban Once Daily Oral Direct Factor Xa Inhibition Compared with Vitamin K Antagonism for Prevention of Stroke and Embolism Trial, (ROCKET 2011). Medicaid drug utilization files were used from 2009 to the second quarter of 2015 to estimate total oral anticoagulant reimbursement accounting for rebates at generic/brand statutory minimum (13%/23%) and assumed maximum 13%/50%) to produce an average rebate of 40%. Drug cost per patient per year (PPPY) was calculated as cost per claim (summed cost divided by summed claims) times 12, assuming 30-day supplies. To address 60-and 90-day supplies, a sensitivity analysis was performed. For each national drug code (NDC) and quarter, the number of milligrams dispensed was calculated (as strength multiplied by quantity). These values were converted to months of treatment based on assumed average daily dosages in

milligrams: 10 (apixiban), 300 (dabigatran), 20 (rivaroxaban), and 5 (warfarin). NNT values were calculated from the trial reports and applied to a hypothetical population of 500,000 Medicaid enrollees with NVAF to estimate avoided medical events under two DOAC market share scenarios: 2015 actual and 50% increase. Costs were adjusted for inflation.

Results: Medicaid costs for oral anticoagulants increased consistently with DOAC market share. From 2009 to 2015, inflation and rebated adjusted cost per claim increase by 173-279% depending on the rebate amount (maximum and minimum). For all but two outcomes, intracranial hemorrhage and hemorrhagic stroke, the DOAC versus warfarin comparison was nonsignificant in at least one trial. For the primary outcome, stroke or systemic embolism, NNT values were: 167 (RE-LY), 303 (ARISTOTLE), and no significant difference (ROCKET, non-inferior but not superior). For intracranial hemorrhage, the NNT values ranged from 213-500. For gastrointestinal hemorrhage, warfarin was superior in two trials, and one trial found no difference. Thus, DOACs prevented 36 ischemic strokes, 111 systemic embolisms, and 280 intracranial hemorrhages and caused 794 gastrointestinal hemorrhages in a cohort of 500,000 people with 21% using DOACs. These changes in medical events resulted in an estimated reduction in medical costs of $8.5 to 9.4 million, which was (3-5%) of added drug costs. After accounting for medical events and reduced monitoring, total cost increased by $129.2-$232.2 million ($258-$464 PPPY), depending on rebates.

Conclusion: The use of DOACs in NVAF was associated with increased Medicaid costs with small cost reductions due to medical event avoidance. There was a substantial net cost to the Medicaid program five years after the initial launch of DOACs. Through the use of a model based on NNT values, such analyses can inform state Medicaid programs of drug value, aid in formulary decisions, and indicate the need for rebate negotiations with manufacturers in the future.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5a-077

Poster Title: Leveraging the benzathine penicillin G shortage: evaluating historical prescribing patterns in a community non-teaching hospital emergency department and identifying cost savings

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Purpose: In June 2016, the Centers for Disease Control and Prevention recommended reserving benzathine penicillin G for patients with syphilis, due to a shortage of the medication. The recommendation advised using alternative therapies for other infections. Prescribing restrictions were placed on benzathine penicillin G at the institution to reserve supplies for syphilis. Adherence to the restriction halted use of the medication. Due to this observation, the investigators sought to evaluate and categorize pre-shortage indications of benzathine penicillin G and determine if cost savings may have occurred if the restriction and use of alternative therapies was applied to historic use.

Methods: Following guidelines of the Institutional Review Board, this evaluation was categorized as a quality assessment and improvement activity. Data for benzathine penicillin G doses used at the study institution's emergency department from June 2015 through June 2016 was evaluated. Investigators collected the following information: dose, number of syringes used per dose, discharge diagnosis, and patient age. All doses administered were included in the evaluation and cost savings analysis. Doses were excluded from the cost savings analysis if used for a sexually transmitted disease related indication. Doses were categorized to the following indications: sexually transmitted disease related indication or non-sexually-transmitted disease related indication. Doses administered for non-sexually-transmitted disease related indications were converted to an alternative therapy, amoxicillin capsules or liquid. Investigators took a conservative approach and converted patients less than 18 years of age to liquid therapy and patients greater than or equal to 18 years of age to capsules. One benzathine penicillin G injection offers complete therapy and cost savings were calculated based on complete therapy

with amoxicillin. The cost for a dose of benzathine penicillin G varies based on syringe size used. Total cost of therapy with benzathine penicillin G was calculated based on the number of syringes used. Total therapy for liquid and capsule amoxicillin was estimated to be 1.8% and 1.2% of the average cost of a dose of benzathine penicillin G.

Results: Over the evaluation timeframe, there were 249 doses of benzathine penicillin G administered in the study institution's emergency department. Of these doses, only 2% (5 doses) were administered for a sexually transmitted disease related indication. Of the 244 doses administered for non-sexually-transmitted disease related indications, 97 doses were administered to patients less than 18 years old and 147 doses were for patients greater than or equal to 18 years old. Actual cost for benzathine penicillin G for non-sexually-transmitted disease related indications was estimated to be tens of thousands of dollars. Converting all of these patients to amoxicillin therapy would have cost approximately 1.5% of the actual cost of benzathine penicillin G therapy. Based on the historic use during the timeframe evaluated, a cost savings of 98.4% of the total cost of benzathine penicillin G therapy would occur if amoxicillin was used in place of benzathine penicillin G for these non-sexually-transmitted disease related indications.

Conclusion: Applying the Centers for Disease Control recommended restrictions to historical benzathine penicillin G use identified cost savings opportunities. Benefits of benzathine penicillin G use include therapy completion with a one-time injection, bypassing non-adherence to oral therapy. Limitations to this evaluation include the inability to account for non-adherence and complications of non-adherence. Additionally, patients may not be able to obtain total therapy at discharge. The investigators conclude that converting patients to amoxicillin therapy, instead of benzathine penicillin G for non-sexually-transmitted disease related indications, may result in cost savings and that discharge delivery services offered to patients may result in addressing non-adherence.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5a-078

Poster Title: Optimizing Verification Workflow for Improved Medication Safety in the Outpatient Pharmacy Environment

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Purpose: In the outpatient pharmacy setting, medication safety remains at the forefront of the pharmacist's focus. From an initial data analysis, 39 percent of medication errors in the pharmacy were initiated from the point of verification. This disproportionate amount of errors for one phase of the pharmacy workflow can cause major adverse events for patients and allow for Health Insurance Portability and Accountability Act (HIPAA) breaches to occur. To reduce the number of verification to will call medication errors, a key contributor to the overall number of verification-based errors, the verification to will call workflow procedure was restructured.

Methods: All medication errors used in this study were self-reported through a system called Hopkins Emergency Response Organization (HERO). HERO reports were collected from December 1, 2015 through July 19, 2016 and a total of 66 medication errors were reported through this system for the former verification workflow. Of those 66, the 26 verification-based errors were determined by finding the first position where an error was made in accordance with the Standard Operating Procedures. The data presented in the study for the current verification workflow are preliminary and represent HERO reports from July 25, 2016 through August 12, 2016. The data were normalized per prescription volume and a chi-squared analysis was run to test the data for statistical significance.

Results: Preliminary analysis of the new workflow HERO reports over a three-week period show that while the numerical verification to will call error rate had decreased, there was not a statistically significant difference between the old and new workflow ($p=0.64$) as per the chi-squared analysis. This difference results from the lack of longitudinal research, as chi-squared

tests are only reliable measures of statistical significance if all involved data points have a numerical value greater than or equal to five. In this data, there was only one verification to will call error made. However, after final data collection, there should be enough data points to show statistically significant comparative data.

Conclusion: While the change in verification to will call procedure does place slightly more responsibility on the verification pharmacist, this change is believed to help prevent medication errors based on perfunctory numerical analysis of the number of verification to will call-based errors per prescription volume before and after implementation of the new workflow procedure. After six additional months, data should be analyzed once more for final comparative analysis, which can yield more definitive results as to the utility of this workflow implementation.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Descriptive Report

Session-Board Number: 5a-079

Poster Title: Description of industry curriculum within accredited United States colleges of pharmacy

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Purpose: To increase awareness of pharmacy students and stakeholders for the need to enhance access and increase the variety of pharmaceutical industry courses within colleges of pharmacy to meet the growing student demand for industry practice.

Methods: A list of all currently accredited U.S. schools of pharmacy was gathered from the Accreditation Council for Pharmacy Education's (ACPE) website. School-specific curriculum information was collected using student handbooks and course catalogues listed on college of pharmacy websites. Courses were added if they included the word "industry" in their course title or description. Any course providing knowledge or information on a specific area of industry was included, specifically those within the areas of: health economics, clinical science/development, marketing, regulatory affairs (including the FDA), drug information, and pharmaceutical research/development. After manual data collection, a standardized email was sent to deans of their respective schools of pharmacy inquiring about specific industry courses/events, their credit-hour qualification, and a brief summary. This information was added to the database in aggregate. This is the first of a continuing effort by IPhO to monitor and report upon the curricular inclusions of industry pharmacy practice courses.

Results: It was determined that 40.7% of pharmacy schools offer at least one elective course that meets the entry criteria related to the pharmaceutical industry and/or includes a discipline, such as clinical research or pharmacogenomics that is relevant to the pharmaceutical industry. The majority of these elective courses were in disciplines, such as health economics (26%), preclinical research (18%), or clinical development (17%). The highest percentage (52%) of

pharmacy schools offering industry courses are located along the east coast of the U.S., while the lowest percentage (14%) are located in the Pacific Northwest. Only 13% of the elective courses identified and reported upon in this research provided syllabi topics describing the various aspects of pharmaceutical commercialization from drug development and regulatory approval to marketing and sales strategies through life-cycle management.

Conclusion: Pharmacy students have minimal opportunity to explore the biotech and pharmaceutical industry, as less than half of colleges offer relevant courses. When industry courses are offered, they explore a very narrow commercial function or discipline. Unfortunately, a narrow scope of the pharmaceutical and biotech industry does not provide students with an understanding and appreciation of the functional relationships, responsibilities, and collaborations that industry pharmacy practice provides. This knowledge is essential for those students applying for post-graduate industry fellowship programs and entry-level industry positions, as the competitiveness for securing these positions continues to increase.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 5a-080

Poster Title: Pharmacist and physician perspectives on medication dose adjustments in obese patients

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Purpose: The medical community has well established guidelines for health care providers to make dose adjustments in the following areas: pediatrics, geriatrics, renal and hepatic impairment. Such dose adjustments are easily found on tertiary resources; however there are no specific guidelines for dose adjustments in obese patients. This study was designed to determine where pharmacists and physicians obtain medication dose adjustment information for obese patients and to determine which providers are currently making these adjustments.

Methods: A survey was created containing ten questions related to medication dose adjustments in obese patients. This survey was distributed to pharmacists and physicians licensed and practicing in the state of Utah. The survey was structured to capture information in several key areas: current acknowledgement of the need to adjust medication doses in obese patients, employment protocols for medication dose adjustments, and current medications identified as needing a dose adjustment in obese populations (medication class, indication, and pharmacokinetics). The survey was open for participants to access from Sept 2nd 2016-Sept 29th 2016. The survey instrument was validated through content validity and face validity. Survey questions were developed through background literature and our study objectives. Face validity was established through a survey instrument reviewed by three groups: pharmacists, residents, and pharmacy students. Physicians and pharmacists working in bariatric surgery and/or weight loss clinics and physicians and pharmacists working in pediatrics were excluded from this survey.

Results: Seventy five pharmacists and thirty three physicians accessed the survey. Fifty eight pharmacist surveys were completed with enough information for statistical analysis. Twenty six physician surveys were completed with enough information for statistical analysis. Physicians who completed the survey worked in a clinic or a hospital. Pharmacists who completed the survey reported employment in clinics, hospitals or retail pharmacies. Physicians reported fifty percent of their institutions had protocols for dose adjustments in obese patients. Fifty two percent of pharmacists surveyed indicated their employers offered protocol for dose adjustments in obese patients. The majority of physicians and pharmacists identified that they learned about dose adjustments in obese patients during residency. The majority of physicians and pharmacists indicated they collaborated with other health care workers twenty five percent of the time. Pharmacists indicated they considered dose adjustments in obese patients fifty percent of the time. Physicians indicated they thought about dose adjustments in obese patients seventy five percent of the time. Physicians also indicated that they referred or consulted with a pharmacists seventy five percent of the time for medication dose adjustments in obese patients. Common medications that were listed as needing dose adjustments are vancomycin, enoxaparin, insulin and other antibiotics.

Conclusion: This survey was helpful in identifying if employers of physicians and pharmacists currently have protocols for medication dose adjustments in obese patients, which medications are commonly adjusted, and which health care providers are actively considering medication dose adjustments in obese populations.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5a-081

Poster Title: Nursing perception of discharge medication delivery before and after the implementation of a decentralized pharmacy technician

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Purpose: Patient medication adherence is a key initiative at Intermountain Medical Center. Ensuring that patients leave the hospital with their discharge medications in hand may improve adherence. A medication bedside delivery program was developed to facilitate adherence. Nursing frustration with the hospitals initial model catalyzed a quality improvement initiative to expedite delivery of medications. A decentralized pharmacy technician may help improve efficiency and success of this program and improve nurses' perception of it. A goal was set to gain a better understanding of nurses' perception of this program and its efficiency before and after the implementation of a decentralized pharmacy technician.

Methods: A 14-question, internal, web based survey was emailed to all nurses on the surgical trauma and surgical transplant floors at Intermountain Medical Center. 14 days after the initial invitation, nurses were sent an email reminder to complete the survey. The survey was closed after 30 days. The survey was administered before and 11 months after the implementation of a decentralized outpatient pharmacy technician stationed on the respective floors. The results of the two surveys were compared and analyzed. Additionally, following the implementation of a decentralized pharmacy technician, data involving the time it takes for medications to be delivered to patients following discharge orders was collected and analyzed.

Results: 52 out of 75 nurses completed the pre technician survey and 41 out of 82 nurses completed the post technician survey. The pre survey found that 5.8 percent of nurses had a very poor overall opinion of the medication bedside delivery program, 26.9 percent had a poor opinion of it, 23.1 percent had a neutral opinion of it, 9.6 percent had a good opinion of it, and 5.8 percent had a very good opinion of it. The post survey found that zero percent of nurses had a very poor or poor overall opinion of the program, 14.6 percent had a neutral opinion of it, 61 percent had a good opinion of it, and 12.2 percent had a very good opinion of it. Additionally, the post survey found that 65.9 percent of nurses believe discharge medications should be delivered within 30-60 minutes after placement of discharge orders and 24.4 percent of nurses believe this should occur within 61-90 minutes. Data collected following the implementation of the decentralized technician found that 31.5 percent of medication deliveries occurred within 30-60 minutes after placement of discharge orders, 37.5 percent occurred within 61-90 minutes, and 26.7 percent occurred after 90 minutes.

Conclusion: The addition of a decentralized pharmacy technician has demonstrated the benefit of this position to the medication bedside delivery program. The streamlining of the delivery process has given nurses a more favorable impression of the program. Additionally, with efficient delivery of medication, this may allow for additional time to provide medication education, which also benefits patient adherence. The results of this survey show that the utilization of a decentralized pharmacy technician to facilitate bedside delivery was a positive quality improvement. It should be noted that nursing expectations of a reasonable delivery time show there is still room for improvement.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5a-082

Poster Title: Pharmacy impact on preventing adverse drug events during hospital admissions by building the best possible medication history for patients on hemodialysis

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Purpose: Patients on hemodialysis often have numerous co-morbidities and multiple providers that result in polypharmacy and challenging medication management. The goal of this quality improvement project is to show how pharmacy staff can improve the accuracy of home medication lists and prevent potential adverse drug events for these complex patients during a hospital admission.

Methods: A pharmacy team comprising of two pharmacists, three pharmacy technicians, and two pharmacy students set out to perform medication histories on hemodialysis patients that were admitted through the emergency department. Data were collected from April 15, 2015 through July 15, 2016 for medication histories performed by the pharmacy team during weekday service hours between 7:00 am- 4:30 pm. A Best Possible Medication History (BPMH) was generated through patient, family member or caregiver interviews and included confirmation of medication fill data from pharmacies, electronic health information databases, dialysis centers, and health care providers. For patients admitted off hours, medication errors were identified upon reconciliation of the completed BPMH with the admission orders and communicated to providers for correction. Changes made to the home medication list were tracked and categorized by pharmacological classes.

Results: During this project, a total of 100 hemodialysis patients medication histories were performed by the pharmacy team. Original home medication lists or prior to admission (PTA) lists were compared to the BPMH completed by the pharmacy, summarizing the number and types of medication changes. For the 100 patients reviewed, a total of 1645 medications were on the PTA lists. Of this total, 46% of the medication changes made to the original PTA medication lists were categorized as removals, additions, or changes based on missing strength, dose, or frequency. The medication changes were further categorized by drug classes and summarized as removals/additions/changes. Dialysis administered medications were the most common class of medications added to the PTA lists. These medications included erythropoietin-stimulating agents (ESAs), injectable iron, oral or injectable vitamin D analogues and heparin. Other dialysis-associated medication classes such as antihypertensives, diuretics, hyperparathyroid-regulators and phosphate binders accounted for many of the changes made to the PTA medication lists.

Conclusion: Pharmacy involvement in generating the best possible medication histories for hemodialysis patients proves to be beneficial for both the patient and the hospital by improving the accuracy of the PTA medication lists and preventing medication errors from occurring during hospital admission. Pharmacists, pharmacy technicians and student pharmacists have the knowledge and experience to provide a more detailed and thorough approach to assure medications were correctly entered on the patient's home medication list and further assisted in the reconciliation of medication errors made during the admission.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5a-083

Poster Title: Establishing an institutional time to de-escalation in pediatric patients with Staphylococcus aureus and Enterobacteriaceae infections

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Purpose: Antimicrobial de-escalation is a key component of stewardship programs and clearly supported in national guidelines. Appropriate de-escalation of empiric antimicrobial therapy when microbiological results become available correlates with improved patient outcomes and decreased medical costs. This study aimed to examine the time to de-escalation of empiric antibiotic therapy to definitive pathogen directed therapy at a pediatric cancer hospital.

Methods: Laboratory Information Systems in conjunction with the antimicrobial stewardship program at our 68 bed pediatric hospital developed an automated email to notify pharmacists when susceptibilities had been resulted on positive blood cultures. Between June 2013 and April 2015, 614 emails were sent to the clinical pharmacists working directly with each care team, so that these individuals might take appropriate steps toward de-escalation. These alerts were retrospectively reviewed. De-escalation was defined as either eliminating one empiric antibiotic when combination therapy was used or changing to an agent with narrower activity spectrum.

Results: Of the 614 positive blood cultures, 141 unique bloodstream infections were identified. The most common bacteria identified were Staphylococcus aureus (14) and those belonging to the family Enterobacteriaceae (39). All patients with S. aureus (9 susceptible to methicillin and 5 resistant to methicillin) were initially started on vancomycin, and all were appropriately de-escalated when susceptibilities became available (9/9 stopped vancomycin and 5/5 stopped

concomitant cephalosporins). The mean time to de-escalation for S. aureus was 9.6 hours (2 – 31).
Enterobacteriaceae infections were divided into those susceptible to cephalosporins (31) and those resistant (7). Of the 31 susceptible to cephalosporins, 13 were empirically treated with a cephalosporin plus an aminoglycoside and 10 were de-escalated to cephalosporin monotherapy. Eighteen of the 31 were empirically started on a carbapenem and all were either de-escalated to a cephalosporin (15) or carbapenem without an aminoglycoside (3). The mean time to de-escalation for Enterobacteriaceae susceptible to cephalosporins was 12.3 hours (1-51). In all cases, treatment of Enterobacteriaceae identified as resistant to cephalosporins was appropriately changed based on susceptibilities within 5 hours of result availability (mean 2.1 hours, 1 – 5 hours). Overall mean time to pathogen-directed therapy for both S. aureus and Enterobacteriaceae was 10 hours.

Conclusion: Prompt notification of antimicrobial susceptibility results enables rapid modification of antimicrobial therapy. Further development and evaluation of computer-based decision support tools in the area of antimicrobial stewardship is warranted.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5a-084

Poster Title: Evaluation of medication administration of solid dosage forms via enteral feeding tubes in a community teaching hospital

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Purpose: The improper administration of medication via an enteral feeding tube can lead to numerous patient-safety concerns while increasing healthcare costs. Concerns include varied medication efficacy, altered medication absorption, and tube clogging, which may require tube replacement. Solid dosage forms (tablets or capsules) given via enteral tubes have been identified as potential sources of preventable medication errors. The primary objective was to characterize the inappropriate administration of solid dosage forms through enteral feeding tubes. The secondary objective was to identify barriers in the electronic health record (EHR) contributing to the inappropriate ordering and subsequent administration of medications via enteral feeding tubes.

Methods: Adult patients with enteral tube feed orders were included in this retrospective chart review between June 8 and July 15, 2016. Patients were excluded if nursing staff administered medications via the oral route. Orders for tablets and capsules were identified via the medication administration record (MAR). Appropriateness was evaluated based upon available evidence for administration of the medication via the patient specific enteral tube. In addition, the EHR was utilized to review accuracy of ordered administration route and whether the correct route was available for providers to select when ordering this medication. Nursing administration comments were also assessed for accuracy, specifically whether medications that should not be crushed were identified as such. The use of pancreatic enzyme and sodium bicarbonate was used to identify a clogged tube needing additional steps beyond flushing with water to open. Descriptive statistics were utilized to evaluate the results. The institutional

review board (IRB) categorized this review as a quality assurance/quality improvement activity exempt from IRB oversight.

Results: A total of 35 patients and 116 administered medications were included in this review. Incorrect medication administration via an enteral feeding tube was found to have occurred five times in four patients. These medications were duloxetine, omeprazole, aspirin/extended-release dipyridamole, and enteric coated aspirin. Of the 116 administered medications these five medications had no literature supporting administration via enteral tube. In addition, four occurrences were found where nursing administration comments failed to identify medications that should not be crushed. These were potassium chloride extended-release, ergocalciferol, and omeprazole in two separate instances. The majority of medications (89%) were ordered through the incorrect route, with providers selecting oral as the most common inappropriate choice. All non-crushable medications were found to be orderable through feeding tube routes within the computerized physician order entry (CPOE). Of the 35 patients, two patients were given pancreatic enzymes and sodium bicarbonate, signifying a clogged tube that could not be cleared via standard measures of flushing with water. One of these two patients was given duloxetine while the other did not receive any medications that should not be administered via enteral feeding tube.

Conclusion: Administration of solid dosage form medications via enteral feeding tubes presents several opportunities for preventable medication errors that may lead to patient harm. Of the 35 patients reviewed, four were found to have been given medications via enteral feeding tubes that should not be crushed, raising concerns of varied medication efficacy, altered medication absorption, and tube clogging. These findings revealed the need for improvements in the technological systems, including an evaluation of available routes of drug administration in the CPOE. Resources for all healthcare providers are also needed to help decrease medications errors and improve patient safety.

Submission Category: Pain Management

Submission Type: Descriptive Report

Session-Board Number: 5a-085

Poster Title: Role of pharmacy students in an opioid safety population health initiative

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Purpose: The chronic use of opioid pain medication presents serious risks, including overdose and opioid use disorder. In 2016, the US Department of Health and Human Services Centers for Disease Control and Prevention (CDC) published a guideline for prescribing opioids for chronic pain. Pharmacists play an important role in managing the population prescribed chronic opioid therapy. As such, it is advantageous to teach pharmacy students strategies to improve clinical outcomes for this population with chronic pain.

Methods: A collaboration between Veterans Affairs (VA) Northern California Health Care System (NCHCS) and University of the Pacific (UOP) was established in September of 2015. The focus was building a population health program whereby pharmacy students, under the direct supervision of VA clinical pharmacists, would provide population health services for Veterans within NCHCS. An introductory pharmacy practice experience elective course was developed and approved by the faculty at UOP; ten students were admitted into the course in August of 2016. Students were granted remote access privileges to the VA computerized patient record system (CPRS). The population health experiences were conducted by students and VA preceptors at UOP. A decision to focus initially on the VA opioid safety initiative was made. Learning activities included reviewing the CDC guidelines, performing state prescription drug monitoring to identify aberrant behavior, interpreting urine drug tests, documenting progress notes in CPRS, and communicating alarming findings to other health care professionals including a pain clinical pharmacy specialist or the patients' providers. Students were taught how to use a clinical dashboard to identify patients within the population of chronic opioid users who had upcoming medical appointments such that the results of screening could be

available for the appointment. Students completed a baseline assessment during the first day of the course regarding their experience and competence performing population health activities.

Results: Strategic members of the VA healthcare team included the pain clinical pharmacy technician, the pain clinical pharmacy specialist, the population health clinical pharmacy specialist and the primary care physician. The pain clinical pharmacy technician was instrumental in teaching strategic methods to identify aberrant behaviors using the state prescription drug monitoring program and teaching students the process to document progress notes into CPRS. The pain clinical pharmacy specialist was the most common VA team member added as a co-signer on students' progress notes. The baseline assessment of ten pharmacy students revealed that two had previous experience using a clinical dashboard to conduct population health activities, one had experience performing population health activities for the population prescribed chronic opioid therapy and one had experience interpreting the results from the state prescription drug monitoring program. VA is examining other high-risk populations and ranking next steps for pharmacy student-initiated population health endeavors.

Conclusion: Introductory pharmacy practice experiences can be developed to enable students to cultivate skills in managing populations at risk for adverse clinical outcomes. This includes populations taking high-risk medications such as chronic opioids, anticoagulants or oral chemotherapy; high-risk populations based on behaviors such as use of tobacco products or those requiring pre-exposure prophylaxis for HIV; and the population in transitions of care requiring medication reconciliation and education. Health systems such as VA are motivated to implement strategies to address the needs of high-risk populations.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Descriptive Report

Session-Board Number: 5a-086

Poster Title: PREVENT-OD: A pilot survey

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Purpose: In Massachusetts (MA), over 1500 fatalities may be attributed to opioids with an estimated rate of 24.6 deaths per 100,000 residents in the past year. Compare that with the rate of deaths due to motor vehicle crashes at 4.9 deaths per 100,000 residents within the same time period. The hypothesis of this study is that at discharge post-overdose (OD), patients have limited access to resources and that pharmacists can be viable in providing access to this care. This study aimed to identify barriers to implementing OD prevention services and to assess the feasibility of utilizing pharmacists to deliver these services.

Methods: Pharmacy directors within MA from 33 different hospital systems were contacted on August 29, 2016 to distribute the online survey titled Pharmacist REmedied ViEws in Needing to Treat OverDoses (PREVENT-OD). This anonymous survey and study design was approved by a local IRB and exempted from informed consent given minimal risk to participants. Additionally, a link to the survey was posted on a Massachusetts Pharmacists Association forum. Eligible survey participants consisted of hospital pharmacists currently practicing in MA that had some familiarity with their respective emergency department protocols. Participants were ineligible if they were pharmacists who did not practice in MA and/or if they had no familiarity with their hospital's ED services. Survey questions asked if each institution offered counseling and/or reversal agents (i.e. intranasal naloxone) at the point of discharge and rated pharmacists' perceived opinions on proposed ideas to increase access to OD prevention resources. The survey was closed on September 16, 2016.

Results: Overall, 15 unique responses were collected: 14 met inclusion criteria with 1 response exluded for not being from a pharmacist practicing in MA. 78.6 percent of eligible respondents indicated that their institution provides counseling at point of discharge for OD patients. Of those, 72.7 percent feel it's been effective in reducing opioid-related deaths. The most commonly cited barrier to implementing counseling services was time and staffing (90.9 percent). Despite a large amount of EDs offering counseling, relatively few, 28.6 percent, reported offering intranasal naloxone kits. For those successfully implementing providing nalxone, 100 percent feel this was effective in preventing deaths with the most common barrier being a lack of standardized protocols (75 percent). Participants were asked to rank feasibility of several proposals to increase access to preventive strategies on a scale of 1-5, with 1 being very easy and 5 being the most difficult. The mean reported implementation difficulty of each proposal was as follows: supply each patient with naloxone kits, 2.5; provide counseling by pharmacy staff, 3.0; provide counseling by nursing staff, 3.6; provide counseling by patient's PCP, 3.5; and offer naloxone kit/counseling to a spouse, partner, family member, or emergency contact in the care of the patient, 2.3.

Conclusion: Results show a large gap between the number of hospitals that offer counseling and those offering naloxone. However, all responses agree that naloxone is effective at reducing deaths. Of the three counseling resources provided (primary care provider, nursing, pharmacy), implementing pharmacy counseling services was easiest to implement. Furthermore, pharmacists feel it would be relatively easy to implement providing naloxone to high risk patients. The best treatment is often prevention, and this may offer some insights as a starting point to the next course of action.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5a-087

Poster Title: A review of student pharmacist discharge medication reconciliation program at a level 1 trauma, academic medical center

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Purpose: This quality improvement project focused on chart reviews to evaluate the effectiveness of student pharmacists performing discharge medication reconciliation. The purpose of this project is to analyze frequency and type of discrepancies found by the student pharmacists after the completion of the medication reconciliation at a level 1 trauma, academic medical center. The primary objective was to measure the effectiveness of student pharmacist-based medication reconciliation at discharge by collecting the frequency of medication related discrepancies. The secondary objective was to measure how student pharmacist-based medication reconciliation can improve medication related errors and characterize the types of discrepancies found.

Methods: Data was collected by performing a chart review of medical records from May 2015 to March 2016. Inclusion criteria were all patients greater than or equal to 18 years of age who were admitted to the adult medicine units and who have had a discharge medication reconciliation completed by student pharmacists. All patients who did not fit the inclusion criteria were excluded. Collected data included age, number of medications, number of discrepancies, types of discrepancies, severity level, and amount of time per review. The data was analyzed using descriptive statistics.

Results: A total of three patients were documented to have received discharge medication reconciliation between May 2015 and March 2016. The average discrepancy per patient was found to be 0.67 percent. The time spent per student to provide discharge medication reconciliation was 1 to 15 minutes for 2 data points and 31 to 60 minutes for 1 data point.

Conclusion: The average discrepancies were low compared to findings in other studies. There were no data available to analyze the severity and types of discrepancies. The current system at the facility does not require discharge medication reconciliation. Also, the facility does not enforce documentations in the electronic records. Additionally, patients may be discharged without alerting the pharmacy department. To increase efficiency of medication reconciliation and documentation at the facility, the pharmacy department should utilize graduate interns or students pharmacists who are not in their advanced pharmacy practice experience.

Submission Category: Pharmacokinetics

Submission Type: Descriptive Report

Session-Board Number: 5a-088

Poster Title: Development of a simple, rapid, accurate, and precise method for measuring vancomycin concentrations in rat pup kidneys using high-performance liquid chromatography (HPLC) with UV detection

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Purpose: The purpose of this research was to develop a simple, rapid, accurate, and precise method for measuring vancomycin concentrations in rat-pup kidney tissue homogenate (KTH) using high- performance liquid chromatography (HPLC). We aimed to extrapolate on previously developed assays for determination of vancomycin in rat plasma, for determination of vancomycin in rat- pup KTH.

Methods: Sprague-Dawley rat-pup kidneys were prepared for HPLC sampling by ultrasonic homogenization. Kidneys were weighed and water was added in a 1:3 ratio. Next, the mixture was homogenized for 3-5 minutes. Stock solutions of vancomycin hydrochloride (VHCl) and caffeine (CA) were prepared at concentrations of 1.5 mg/mL and 1 mg/mL respectively, in a mixture of methanol:water (1:1). Caffeine was used as the internal standard owing to its stability in formic acid. VHCl was added to rat KTH (40 microliters) to obtain concentrations of 15, 30, 45, 60 and 75 mcg/mL. CA was added to obtain a concentration of 10 mcg/mL. Samples were transferred to Phree phospholipid removal tubes (Phenomenex, Torrance, CA), mixed with 240 microliters of 1-percent formic acid in methanol and centrifuged at 6600 g for 15 minutes (Sorvall, Thermo-Scientific). The eluent was filtered through 0.2 micron syringe filters and analyzed using HPLC. A calibration curve was prepared in vancomycin-spiked rat-pup KTH with 6 replicated concentrations from 15-75 mcg/mL. An Agilent 1260 series HPLC system was used to analyze spiked rat KTH. A Kinetex Biphenyl analytical column (2.6 micrometers, 100 A, 50 x 3 mm. Phenomenex, Torrance, CA) was used with a preceding UHPLC guard column. A

gradient method was used to separate the analyte and mobile phase flow rate was 0.5 mL/min. Eluents were analyzed at wavelengths of 198, 220, 230 and 240 nm.

Results: For the blank rat- pup KTH samples, the wavelength 198 nm displayed the highest lambda max. Retention times of VHCl and CA in plasma were 4.32 and 5.22 min, respectively. No significant interfering peaks from endogenous substances in the blank rat KTH were observed at the retention time of the analyte or the internal standard, respectively. The mean regression equation for nominal vancomycin concentrations (i.e. “x”) to integrated area ratios (i.e. “y”) in spiked KTH was found to be: y = 0.0057x - 0.038 (R-squared value = 0.9996). Intra-day assay precision (percent-RSD) was found to range between 0.35 and 3.58 percent. Inter-day assay precision (percent-RSD) ranged from 0.40 to 1.72 percent. Corresponding accuracy always exceeded 96-percent. The highest percentage recovery was 91.2-percent. Percentage recovery remained constant in the samples both upon immediate HPLC and with HPLC 24 hours after KTH was spiked with vancomycin. The lower limit of quantification (LLOQ) for VHCl using this method was found to be 2.996 mcg/mL.

Conclusion: In conclusion, the described method was found to be efficient, accurate and precise for measuring vancomycin concentrations in rat- pup kidney tissue homogenate using HPLC. Our method will be useful for future translational studies of vancomycin pharmacokinetics in rats.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 5a-089

Poster Title: Audit of Antimicrobial Stewardship Interventions at a Pediatric Hospital Using Documentation in the Medical Record

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Purpose: In response to increasing rates of antimicrobial resistance worldwide, the Centers for Disease Control and Prevention and Infectious Diseases Society of America have recommended that all inpatient healthcare settings institute antimicrobial stewardship programs (ASP) to ensure patients receive proper therapy while slowing development of antibiotic resistance. The ASP at Nationwide Children's Hospital is comprised of a pharmacist and a physician champion and was implemented in January of 2015 to review hospital-wide usage of linezolid and meropenem. This study was designed to determine acceptance rates of recommendations made by the ASP regarding antibiotic regimens for admitted patients at Nationwide Children's Hospital.

Methods: This retrospective chart audit was found to be exempt from IRB review. All patients with an ASP intervention between February and May 2016 were included in the study. Interventions are documented as a "smart" note in the medical record, and all interventions are automatically compiled into a monthly report that lists patient information and type of intervention. Patients were excluded if the documented note could not be found or if information was incomplete. Each note was examined for the types of recommendations made ("continue current antimicrobials" vs. "other"), and whether each recommendation for a change in therapy was accepted within a time period of 48 hours. Other variables measured included the service to which the patient was admitted, incidence of prior consultation with Infectious Disease (ID), ASP medication, ASP treatment indication, note author, and justification for recommendation. The primary outcome measure was the rate of acceptance of "other" recommendations made by the ASP pharmacist. The secondary outcomes were overall compliance with ASP guidelines (rate of "continue" plus "accepted" recommendations),

acceptance of ASP recommendations with prior ID consult at the time of recommendation, and acceptance rate in the services utilizing ASP drugs the most (determined post-hoc).

Results: Sixty-nine patients had a total of 122 notes and 139 separate recommendations from the ASP pharmacist in the medical record. Ninety-one (65%) of these recommendations were made for linezolid and forty-eight (35%) were made for meropenem. Vancomycin monitoring had not yet begun during the period of interest. Ninety-six (69%) of the recommendations were "continue". Of the 43 "other" recommendations, twenty-six (60%) were accepted by the medical team, giving a total overall compliance rate of 88%. Reasons for non-acceptance were largely undocumented in the medical record. The most common "other" recommendations were as follows: "alternate agent based on culture/lab data" (44%), "consult with ID" (23%), and "dose optimization" (12%). Eleven patients had received an ID consult prior to the publication of the ASP pharmacist's recommendations, and only 3 (27%) of the recommendations were subsequently accepted by the medical team. Based on number of recommendations made, the top 3 services utilizing ASP targeted antibiotics were Non-Neonatal Intensive Care (Pediatric and Cardiothoracic), Pulmonary, and Nephrology; rates of compliance on these services were 84%, 91%, and 90% respectively.

Conclusion: The overall ASP compliance rate for our program is 88%, similar to those reported elsewhere in the literature. Notably, our ASP has also been successful in meeting all goals of reducing unnecessary antimicrobial use thus far. The use of "smart" documentation in the medical record appears to be a novel and effective method to capture ASP interventions. The program could benefit from increased resources and continued provider education on the goals of ASP recommendations. Future studies should explore the impact of ASP compliance rates on cost and clinical outcomes, as well as the impact of the ASP on vancomycin usage.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5a-090

Poster Title: Effects of mandatory and standardized initial pharmacist consultation on INR testing compliance and therapeutically in-range INR draw frequency in atrial fibrillation patients on warfarin

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Purpose: The purpose of this study was to evaluate the efficacy of a mandatory, pharmacist-led, educational intervention implemented at two Sun Life Family Health Center (SLFHC) pharmacy locations in Casa Grande and Eloy, Arizona upon atrial fibrillation patient compliance with INR (International Normalized Ratio) draws, recommended to be re-drawn every 30 days, and the number of therapeutically in-range INRs (range of 2.0-3.0). This intervention furthermore aimed to improve patient understanding of factors influencing INR and the importance of maintaining an in-range INR, due to the negative effects of having an out of range INR (i.e. too little or too much anticoagulation).

Methods: A mandatory, educational intervention, utilizing both direct pharmacist-patient consultation (in person or via telephone) and a patient education pamphlet, was implemented for atrial fibrillation patients at two SLFHC pharmacy locations in Casa Grande and Eloy, Arizona. The pharmacist-led consultation was a brief, initial/annual consultation to verify dosage and how the patient is taking the medication warfarin. Pharmacists conducting the consultations were provided with a checklist of counseling points to ensure added uniformity across the patient population. Measured nominal data included patient compliance with frequency of INR draws (every 30 days) and frequency of therapeutically in-range INRs (2.0-3.0 for atrial fibrillation patients). Data collection began on November 18, 2015. The educational intervention was implemented on February 7, 2016. Data collection concluded on April 7, 2016. Pretest data was collected via the Electronic Health Record kept by Sun Life Family Health Center. All data were collected, de-identified, and provided for analysis by the preceptor, Matthew Bertsch, PharmD, who is the director of pharmacy for SLFHC. The size of the sample

was 23 atrial fibrillation patients. A total of 83 INR draws were included in the pre-data. A total of 57 INR draws were included in the post data. Data were obtained through the use of purposive sampling. A chi-square test with an alpha level of 0.05 was calculated in order to compare pre and post-intervention outcomes.

Results: For baseline, pre-intervention results, 13 of the 23 atrial fibrillation patients (56.52%) demonstrated compliance in obtaining INR draws every 30 days, and 36 out of 83 INR draws (43.47%) were found to be therapeutically in-range. After the implementation of the intervention, 15 out of 23 atrial fibrillation patients (65.22%) demonstrated compliance in obtaining INR draws every 30 days, which was an 8.5% numerical increase (p=0.76) from baseline. 28 out of 57 INR draws (49.12%) were found to be therapeutically in-range, which was a 5.75% numerical increase (p=0.62) from baseline. Utilizing Chi-Square to analyze patient compliance for pre and post-results yielded a Yates' p-value of 0.76. Analyzing in-range INRs for pre and post-results yielded a Yates' p-value of 0.62.

Conclusion: Low baseline data values and marginal increase post-intervention demonstrated the need for intervention in INR monitoring and highlighted the potential positive impact of pharmacist-led patient education upon therapeutic outcomes. While the effect of the intervention was deemed inconclusive, as results were not statistically significant, this could have been partially due to project limitations. Despite this, a standardized approach to patient consultation on warfarin was established and provided insight into current patient compliance and in-range INR draws. An extended period of data collection would be warranted to sufficiently determine correlation, as well as the potential positive impact in the future.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Descriptive Report

Session-Board Number: 5a-091

Poster Title: Japanese pharmacy students' perceptions of medication adherence

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Purpose: Limited studies have shown that healthcare professional students studying in the U.S. who participated in medication adherence exercises have developed greater empathy and appreciation for their patients regarding the difficulty of achieving optimal medication adherence. However, it is unknown if a similar experience occurs among Japanese pharmacy students. This presentation describes the survey results completed by pharmacy students who participated in a medication adherence exercise at Kobe Gakuin University, Department of Pharmaceutical Sciences in Kobe, Japan.

Methods: A four-week elective course, consisting of 8 lectures and discussions, was provided by an American Clinical Professor of Pharmacy Practice for the Japanese pharmacy students at Kobe Gakuin University. All students enrolled in the elective course participated in a medication adherence exercise. The purpose was to expose students to the potential complexities of medication adherence with HIV therapy. Students were randomly assigned to take, as the patient, one of three simulated medication regimens. Each simulated regimen consisted of small round candies which represented three separate daily medications commonly used in HIV treatment. Each student was instructed to follow their assigned regimen (e.g. proper schedule and instructions on how to take the medication) to the best of their abilities for six consecutive days. At the end of the exercise, students discussed their experience with the class and course instructor. Following the discussion, students completed a 17-question survey regarding their experience with the medication adherence exercise. Survey questions assessed the students' adherence rates and perceptions in regards to medication adherence and barriers to adherence.

Results: A total of 29 students, mostly first and second year pharmacy students (in a six-year pharmacy program), completed both the adherence exercise and the survey. Before beginning the medication adherence exercise, 58.6% of the students agreed or strongly agreed that "it will be easy for patients to take medications." In comparison, 6.8% of students agreed or strongly agreed with this statement after completing the exercise. Nearly 80% of students rated their "prescribed" medication regimen as somewhat complex, complex, or very complex. At the completion of the exercise, 58.6% of students reported less than optimal (less than 95%) medication adherence. Among these students, the most common medication-related reasons for doses missed included inconvenient timing of doses (24.1%) and difficulty swallowing medications (20.7%). The most common patient-related reasons for missed doses included forgetfulness (27.6%) and other priorities/too busy (27.6%). All students agreed or strongly agreed that the exercise was valuable in "understanding a patient's perspective with taking medications." As a result of this exercise, 34.4% of students agreed or strongly agreed that they "will be able to provide patients with counseling and advice on how to achieve optimal medication adherence."

Conclusion: Prior to the activity, a majority of Japanese pharmacy students who participated in the medication adherence exercise believed that taking medications would be easy. However, more than half of the students experienced difficulty achieving optimal medication adherence. The students found the exercise valuable in understanding a patient's perspective with taking medications. The results of the survey suggest that a medication adherence exercise may benefit Japanese pharmacy students in understanding the issues patients may face adhering to their prescribed medications.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 5a-092

Poster Title: Changing the landscape of pharmacy compounding- Development of an extemporaneous orodispersible film preparation using the unit-dose method

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Purpose: The paradigm shift from oral liquid medicines to innovative solid dosage forms (iSDF) for pediatric patients was catalyzed by changes in global pediatric regulations in the last decade which have placed emphasis on the development of age-appropriate formulations. iSDF are a departure from traditional solid dosage forms (tablets or capsules) to more easily-swallowed, pediatric-friendly solid dosage forms such as orodispersible or chewable formulations. Our study aimed to develop a formulation and method for the compounding of an extemporaneous orodispersible film (ODF) preparation in the pharmacy setting.

Methods: Ondansetron hydrochloride dihydrate which is a Biopharmaceutical Classification System (BCS) Class I/III drug was used as the model drug. Its high solubility negates any potential bioavailability issues common with extemporaneous preparations thus making it an appropriate drug for pharmacy compounding. Hydroxypropyl methylcellulose (HPMC) was selected as the film-forming polymer and glycerol as the plasticizer in consideration of their relative safety in children. A casting solution was prepared by dissolving all formulation components in water and ODFs were subsequently prepared using the solvent-casting process. To overcome issues of poor content uniformity and dose variations associated with the conventional method of casting a master film and cutting individual film units to size, we developed the unit-dose method which effectively circumvents these problems. This method involves casting each film unit onto individual wells confined by circular bank structures. An ideal ODF should be thin, easy to handle without breaking and disintegrate rapidly in the buccal cavity before being swallowed with saliva. To optimize the formulation, we studied the effect of various critical formulation parameters (polymer concentration, drug concentration and volume

of casting solution) on the ease of preparation and critical quality attributes of the product: film thickness, mechanical properties and disintegration time. A two-level, full-factorial experimental design with three factors was employed. The ODFs were also characterized with respect to moisture content, drug crystallinity and in vitro dissolution.

Results: All ODFs prepared with the unit-dose method demonstrated excellent drug content uniformity with acceptance values (AV) of 0.38 - 4.95 which met U.S. Pharmacopeia requirements of AV less than 15. Casting solutions of higher HPMC concentration were preferred because they foamed less easily and require shorter drying times. Physical evaluation of the ODFs showed that they were smooth in texture, strong and flexible thus indicating good patient acceptability. ODFs with drug loads less than 16 percent formed amorphous solid dispersions but drug recrystallization was observed at a high drug load of 32 percent. Low HPMC concentration and low volume of casting solution yielded thin but strong and flexible ODFs with the shortest disintegration time (less than 11 sec). In vitro dissolution tests indicated a degree of taste-masking attributed to the basic nature of ondansetron (pKa 7.4). At pH 6.8 (buccal cavity simulation: phosphate buffer solution; 50mL; USP Apparatus II), less than 42 percent of drug was dissolved at 15 mins for ODFs with a high drug content of 12.8mg ondansetron. At pH 1.1 (gastric environment simulation: 0.1N hydrochloric acid; 500mL; USP Apparatus I), all ODFs achieved more than 95 percent drug dissolution within 30 minutes.

Conclusion: We present a simple, inexpensive method and easy-to-prepare formulation for the compounding of an extemporaneous ODF preparation as an alternative to conventional oral syrups/suspensions. An ODF formulation containing a water-soluble drug, ondansetron hydrochloride at clinically relevant strengths was developed. ODFs prepared fulfilled the requirements for clinical efficacy and safety with regards to drug content uniformity, in vitro dissolution and safety of excipients. The best formulation was selected based on product performance in terms of good mechanical properties and disintegration time. This formulation can be used as a basis for the development of extemporaneous ODFs for other suitable drugs.

Submission Category: Geriatrics

Submission Type: Descriptive Report

Session-Board Number: 5a-093

Poster Title: Antimicrobial utilization and potential drug-drug interactions in nursing homes in Singapore

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Purpose: Inappropriate antimicrobial use is an important problem in nursing homes where more than half of the residents were prescribed at least one course of antimicrobial in a year. Antimicrobial use data have been reported in many countries to assess its prevalence, utilization and appropriateness. The objective of this study is to determine antimicrobial usage prevalence and utilization in Singapore nursing homes as well as to describe the risk of significant drug-drug interactions with addition of antimicrobials to residents' medication regimens.

Methods: This retrospective study was conducted by using data from four nursing homes in Singapore. All medications used by residents in December 2008 were reviewed. Residents were eligible if they stayed in the nursing home during the study period. WHO ATC/DDD index was used to determine antimicrobial utilization rate. Only use of systemic antimicrobials was included in the study. Drug-drug interactions were detected by using online drug interaction checker program. The prevalence of systemic antimicrobial use, antimicrobial utilization, and drug-drug interactions with the addition of antimicrobials to the residents' medication regimens were analyzed.

Results: During the one-month period, 712 residents were eligible for the study of which 70 (9.8 percent) used at least one antimicrobial during their nursing home stay. The antimicrobial utilization rates were 28.3 DDD (defined daily doses) per 1000 resident days and 24.8 DOT (days of therapy) per 1000 resident days. Clinically significant drug-drug interactions were present in more than half of the residents (41 out of 70) and 15 out of 41 involved an antimicrobial agent.

The most commonly prescribed antimicrobials were amoxicillin-clavulanate, ciprofloxacin and doxycycline, respectively. Respiratory infections were the most common reason for the antimicrobial use in the nursing homes studied.

Conclusion: This study is the first that describes the utilization of antimicrobials in Singapore nursing homes. The utilization rate in our nursing homes is comparable to other developed countries. Prescription of antimicrobials resulted in a high incidence of significant drug-drug interactions. Further studies to assess the appropriateness of antimicrobial use in the nursing homes are needed.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 5a-094

Poster Title: Utilization of the University of North Carolina Hospitals' Drug Information Center across a multi-hospital health system

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Purpose: Drug Information Centers play a valuable role in providing support to physicians, pharmacists, nurses, and other healthcare providers. The University of North Carolina Hospitals' (UNCH) Drug Information Center (DIC) recently expanded its services to support 10 affiliate hospitals in its health system. After expansion, it was anticipated that request volume would increase and that common types of questions encountered might change as a result of more institutions utilizing DIC services. The purpose of this project was to compare the volume of DIC inquiries 1 year before and after the expansion date, and to evaluate the change in types of requests.

Methods: UNCH is a public, academic medical center with over 800 beds. The affiliates are community hospitals averaging 268 beds (range 25 to 660). The UNCH DIC offers support for classic drug information requests and also shares preexisting institution-specific documents, such as policies and formulary reviews. The UNCH DIC is supported by 2 pharmacists, 1 student intern, and 18-20 learners throughout the year rotating each month (1st year residents, 2nd year residents, and 4th year pharmacy students). The UNCH DIC uses a cloud-based electronic database to log many aspects of each question received, including (but not limited to): affiliation of the requestor, classification of the request, and time spent researching and answering the question. The DIC designates request types into 1 of 16 standardized categories. The UNCH DIC officially expanded it services to the health-system level on August 5, 2015. In order to compare how question volume, support time, and common request categories changed after the expansion date to affiliate hospitals, data were compared for 1 year preceding and 1 year following the expansion date (August 5, 2014 – August 4, 2015 versus August 5, 2015 – August 4, 2016). The total number of questions, documented time, and

question category each year were compared, as well as the most common categories of requests for UNCH versus its affiliates.

Results: The total number of requests was 339 in the year preceding the expansion date and 506 the year following the expansion date (monthly average, 28.1 vs. 41.8), though question volume and total time spent answering requests varied by month. The total amount of time spent responding to questions per year was 286.9 hours before the expansion and 478.1 hours after the expansion (monthly average, 23.8 vs. 38.8). Before expansion, the 3 most common categories of requests were more traditional drug information-type questions and comprised 42% of all requests received. These included adverse reactions/allergies (14%), drug compatibility/stability (14%), and dosing/administration (14%). After expansion, the 3 most common categories comprised 35% of all requests received and included dosing/administration (13%), adverse reactions/allergies (11%), and medication use policies/guidelines (11%). Differences between UNCH and affiliate request types post-expansion were also examined. The 3 most common categories received from UNCH were drug compatibility/stability (14%), dosing/administration (14%), and formulation/pharmaceutics (12%). The 3 most common categories received from hospital affiliates were medication use policy/guidelines (37%), formulary (management, restrictions, and preauthorization) (14%), and dosing/administration (13%). All affiliate hospitals utilized the UNCH DIC post-expansion, with the number of requests ranging from 2 to 32.

Conclusion: DICs can be a valuable resource for a health system as a whole. After expansion to affiliate hospitals, the annual number of requests increased by 49% and the amount of research/response time increased by 67%. More institution-specific information was sought rather than traditional drug information questions, as 2 categories encompassed over half of affiliates' inquiries: institutional policies/guidelines or formulary status/restrictions. This growth trend may continue over time as knowledge spreads about the services offered and/or other hospitals join the health system. If growth continues, the UNCH DIC may need to consider increasing support staff in the future.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5a-095

Poster Title: Analysis of electronic prescribing quality related-incidents: Look alike sound alike medications

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Purpose: Electronic prescribing requires a set of standards to maintain consistency from the provider entry system to the desired pharmacy network. These guidelines commonly coexist with recommendations created by organizations to decrease the occurrence of errors and increase patient safety. The objectives of this study were to 1) identify error-prone medications for electronic prescribing; 2) compare current national and international guidelines for electronic display of medication information, and assess their scope in preventing look alike sound alike (LASA) errors in the electronic setting. By comparing the guidelines and recommendations, a comprehensive set of standards may be created to further reduce errors.

Methods: This was a retrospective cross-sectional analysis of e-prescribing quality related events reported to two national web-based error reporting systems. Reports from 2011 to 2015 were reviewed to identify incidents related to LASA medications. The compilation of LASA pairs was compared to the existing LASA list provided in the Institute for Safe Medication Practices (ISMP) guidelines for possible inclusion of commonly confused drug names. Guidelines that addressed the electronic display of medication information were searched in various databases of peer and non-peer reviewed literature. The information used for the comparison was directly extracted from the publications of these guidelines. The comparison focused on the content of the recommendations for patient information, pharmacy information, medication names, abbreviations, numbers/units of measure, and information display. The project was exempted from IRB approval.

Results: Of the 1,139 events reviewed for incidents related to e-prescribing, 177 events were identified to have occurred as a result of incorrect drug selection. There were 87 potential LASA drug pairs, and only six pairs were found to be currently in the ISMP LASA list. Four guidelines were found: 2 from the United States (Surescripts and ISMP), 1 from Australia, and 1 from the United Kingdom. The comparative analysis revealed similar recommendations for medication names with the exception of Surescripts and the ISMP, which include additional recommendations for utilizing the standardized medication names only and the inclusion of medications suffixes for the generic and brand name within the input field. All systems address the same concerns for standardization of approved abbreviations and formatting of numerical/units of measure. Similarities in recommendations include using approved numerical formatting, the elimination of trailing zeros, and the inclusion of leading zeros. The greatest amount of variance occurs within information display. All guidelines identify the importance of avoiding word truncation within fields, but Surescripts includes more descriptive recommendations for the e-prescription components. All guidelines acknowledge the importance of using national tall man lettering in medication names to reduce LASA errors with the exception of the Surescripts.

Conclusion: The combination of the recommendations from each system can create a more secure e-prescription and eliminate many of the preventable errors which are occurring during the electronic prescribing process. Utilization of tall man lettering and the addition of new pairings of LASA medications to the ISMP list would assist in safer medication practices. Electronic prescribing errors, which are commonly resolved prior to reaching the patient, increase overall costs to the providers and pharmacies and increase patient wait times due to the need for provider/pharmacist contact for prescription clarifications.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5a-096

Poster Title: Standardization of a medication reconciliation workflow in an adherence packaging home delivery program

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Purpose: The goal of adherence packaging is to improve health outcomes and safety by facilitating patients' abilities to take medications as prescribed. This is accomplished by removing the burden of procurement and organization of medications, as well as having the medications verified by a dispensing pharmacist. A vital component of the program is the initial phone interview and medication reconciliation. A standardized format for conducting a medication reconciliation ensures the most reliable information is gathered from the patient and/or their caregiver(s). Our purpose was to standardize the medication reconciliation phone interview process to facilitate a more streamlined workflow.

Methods: A standardized medication reconciliation phone interview was created as a document and incorporated into the Cleveland Clinic Health System electronic medical record (EMR) system in the format of a fill-in medication review. This was created separately from the current inpatient medication reconciliation form, as such tasks in the outpatient setting are completed over-the-phone with additional variables to be addressed (e.g. shipping information, source reliability, and barriers to adherence). Additionally, a training presentation was created for conducting a medication reconciliation phone interview and documenting such encounters within the EMR. The content is written at a level ideal for technical personnel, pharmacy students, and interns. A corresponding training checklist was created to verify competency prior to trainees completing patient interviews. Having a standardized medication reconciliation tool to use comprehensively across the home delivery program will help prevent respective errors including, but not limited to: patients not receiving necessary medications, adverse drug events, drug-drug interactions, duplications in therapy, and medication use without an indication. Many of these discrepancies occur at transitions in care; thus, the transition to the

adherence packaging program requires a standardized and efficient guide to obtain the most accurate information from the patient and/or caregiver(s) in the initial on-boarding encounter.

Results: The method for use in the day-to-day workflow is described below. A pharmacist or technician trained in the standardized phone interview method will obtain a list of patients to call to conduct initial medication reconciliations or follow-up calls for subsequent monthly shipments. The interviewer will preview the patient using the EMR to obtain necessary background information prior to conducting the call. With the currently documented information available within the EMR for comparison, the interviewer will use the medication review documentation within the EMR to guide the course of the interview, with prompts to fill in information from the patient and/or caregiver(s). Logistics information is collected at this time to allow for the first medication shipment. Upon completing the interview, any discrepancies will be reconciled with the respective prescribers in order to maximize patient adherence. The first medication shipment is sent and the patient will receive a follow-up call at day 21 in the fill cycle. At this point, an abbreviated medication reconciliation is completed to discuss any new medication changes or barriers to adherence. Discrepancies are again reconciled before the next medication shipment.

Conclusion: Standardization and incorporation of a medication reconciliation tool within an adherence packaging home delivery program provides a streamlined workflow and improved quality of patient care by ensuring access to the most up-to-date patient information.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 5a-097

Poster Title: Does inhibition of Cyclin Dependent Kinase 8 prevent resistance to trastuzumab in HER2 positive breast cancer?

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Purpose: Resistance to targeted therapies is a significant problem for breast cancer and our lab recently showed that CDK8 is over expressed in breast cancer and associated with worse relapse free survival for breast cancer patients. Combination of CDK8 inhibitors with HER2 targeted therapies suggests that dual inhibition not only potentiates targeted therapies but can also slow the emergence of resistance to tyrosine kinase inhibitors such as Lapatinib. Here we tested a combination therapy of HER2 targeting monoclonal antibody, Trastuzumab (Herceptin), with a CDK8 inhibitor for overcoming resistance to Trastuzumab.

Methods: 14 T12.5 flasks were seeded with 150,000 SKBR3 cells and 14 T12.5 flasks of BT474 cells were seeded with 250k in each flask with a total of 3 ml of media per flask. We then split the flasks up into the following 4 groups: Control, Senexin B, Trastuzumab, and a combination of Trastuzumab + Senexin B. Drug-containing media was replenished every 3-4 days and cells were split when needed. The cells were treated twice a week until the control cells become confluent and there was an obvious treatment effect in the Trastuzumab alone group. At this point the first set of flasks were fixed and stained. This process was repeated for 3-months. At the end of the 3-month period the newly emerged “resistant” cells were allowed to grow in a P150 Petri dish to expand cell numbers for further testing whether inhibition of CDK8 prevents resistance to Trastuzumab. Once enough resistant cells were available they were seeded into 96-well plates for the MTT cell growth assays, a colorimetric assay for assessing cell growth, in duplicates to determine if they were resistant to either drug.

Results: The cells were treated for one week and were then stained with crystal violet. At approximately four weeks both Trastuzumab and SNXB caused a decrease in cell numbers. Similarly, the combination treatment had an even greater decrease in cell numbers than each of the monotherapies. Trastuzumab treated BT474 cells were actively growing and were less sensitive to Trastuzumab. Importantly, the BT474 cells did not grow under the combination treatment suggesting that the combination was very effective at preventing the emergence of resistance in these cells. However, in the SKBR3 cells despite an initial response to the combination treatment it was not effective at preventing the emergence of resistance and the cells grew back after approximately 5 weeks of treatment. This suggests that further study is required to determine whether this is a cell line specific effect.

Conclusion: Combination therapy of Senexin B and Trastuzumab showed a promising effect of prevention of resistance in the BT474 cells, but did not have the same effect in the SKBR3 breast cancer cells. This study suggests that further testing of the effects of Trastuzumab and Senexin B in HER2 positive breast cancer could yield promising results in the prevention of resistance.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5a-098

Poster Title: Evaluating the impact of a pharmacist-run diabetes needs assessment service on inpatient diabetes education rates and hospital length of stay

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Purpose: It is estimated that the overall length of stay is as high as 5 days for patients with diabetes and multiple co-morbid conditions. The Diabetes Management Team at Cleveland Clinic Akron General was established with the goal of decreasing the 30-day hospital readmission rate and hospital length of stay. We identified that diabetes education was occurring late in the hospital stay, which may have been resulting in increased length of stay. Our goal was to evaluate the impact of a diabetes needs assessment service on hospital length of stay for patients with diabetes.

Methods: The diabetes assessment service involves a PGY1 pharmacy resident who performs daily assessments on patients with diabetes who are admitted to the hospital. Patients with the following criteria were identified and assessed: on a medication for treatment of diabetes, admitted to hospital (OB/maternity areas), and either a hemoglobin A1c greater than 9 percent in past 10 days or a blood glucose greater than 300 mg/dL in the past 5 days. We completed a retrospective analysis of consecutive hospital admissions where criteria was met for screening between January 2015 and May 2016. Data collected included: admission date, discharge date, date patient assessed, inclusion and exclusion reason, date seen by education and/or endocrinology (and the date each was ordered), discharge disposition, and reason for hospital admission (ICD and DRG codes). The primary objective was to determine the impact of the service on hospital length of stay. We also intended to assess the reach of the service, the appropriateness of diabetes education referrals and the impact of the service on length of stay in the subgroup of patients discharged to home. Fisher's exact test was used to compare nominal data, and Student's t-test was used to compare continuous data.

Results: Between January 2015 and May 2016, there were a total of 2179 hospital admissions who met criteria for assessment. Of those, 1641 admissions were assessed by a pharmacy resident (75.2 percent reach). Patients met criteria for assessment within 1.67 days of admission, and were seen by a pharmacy resident within 0.5 days of being identified. Diabetes education was initiated by a pharmacy resident during 13.8 percent of the admissions where an assessment was performed. For admissions where a pharmacist did not assess the patient, diabetes education was ordered in 9.4 percent of the admissions (p-value for comparison equals 0.007). For all participants, there was a non-significant increase in length of stay for admissions where the patient was assessed by a pharmacy resident who ordered diabetes education as opposed to those not assessed (5.02 versus 4.78 days, respectively; p-value equals 0.619). However, for the subgroup of patients who were discharged home, there was a significant increase in length of stay for patients seen by a pharmacy resident who ordered diabetes education versus those not assessed (4.49 versus 3.41, respectively; p-value less than 0.001).

Conclusion: The diabetes assessment service assessed about 75 percent of patients identified, and did so early in the hospital stay (about 2 days after admission). We saw an increased length of stay in patients who had diabetes education ordered by the service if being discharged home. Diabetes education was provided within 3 days of admission, and many of the patients in the control group were missed due to being discharged early. Therefore, we feel that it is unlikely that the service itself increased length of stay, and may instead be related to other comorbidities.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 5a-099

Poster Title: Pharmacy Communication Barriers and Impact on Patient Health Outcomes, Medication Adherance, and Safety- A Review of the Literature

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Purpose: The purpose of this study was to collect and analyze peer-reviewed journal articles related to the subject of communication barriers in the field of pharmacy, specifically identifying communication barriers between pharmacists and patients and their impact on patient care. The focus of the search was on the impact that pharmacists had on the overall health outcomes of patients, medication adherence, and safety.

Methods: A literature review was conducted using PudMed Database. Peer-reviewed articles that expanded over the past 20 years were identified using search terms "pharmacy + communication + barriers, adherence, education, counseling, language." Both national and international literature was reviewed. The data was analyzed to identify the barriers that limit thorough communication between patients and pharmacists, different tools that are used by pharmacy staff to meet the needs of patients with communication challenges, the negative impacts of the lack of communication between patients and pharmacists, as well their views on how to improve the communication in the field of pharmacy.

Results: Of the search completed, 26 total articles were chosen for relevance to the topic. 15 articles found the biggest hindrances to the communications between pharmacists and patients were “Language Barriers” and “Education.” 10 articles suggested that “Cultural Differences” in regards to background and socioeconomical status as a contributing factor. The biggest negative impact found was that patients lack of knowledge in the side effects of medications, which lead to non-compliance and pharmacist workflow demands and time constraints.

Currently the most common tool used to address communication barriers in the pharmacy is using interpreter services. 6 articles suggested ideas on improving communications is to have on-going education for the patients over multiple visits to the pharmacy. 3 articles discussed implementing Spanish courses in the Doctor of Pharmacy curriculum to encourage graduating competent well diverse pharmacists.

Conclusion: Evaluating barriers in communication is very important to improving patient health outcomes. Better connection between pharmacists and patients can be made by providing interpreting services and material in different languages. Continuing patient education and follow up methods were also said to be a way to improve patient/pharmacist communication. Pharmacies and pharmacists being able to provide appropriate communication and education services to their patients is key to improving patient adherence and patient satisfaction overall. Future studies are planned to survey community pharmacists and preceptors to identify communication barriers and methods to address those with patients.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5a-100

Poster Title: Retrospective review of prescribing practices seen in a pediatric cohort diagnosed with bronchiolitis

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Purpose: The American Academy of Pediatrics (AAP) recommends that no medication and only supportive care supplemental oxygen be used in the treatment of bronchiolitis. This project was conducted to identify the frequencies of prescribed medications in the treatment of pediatric patients with bronchiolitis at Banner University Medical Center-Tucson (BUMC-T) and compare these prescribing practices to a national study.

Methods: The project was a retrospective chart review that analyzed all pediatric patients (ages 21 and under) in 2015 with the international classification of disease (ICD)-9 diagnosis codes for bronchiolitis (466.11 and 466.19) at BUMC-T. Exclusion criteria included patient readmissions within the study period for the same diagnosis, missing bronchiolitis diagnosis in the electronic health record (EHR), and patient unreconciled identities via EHR. Patient EHRs were reviewed and data were collected including: age of patient at admission, sex, length of stay, readmissions for same reason within 30 days, and medications given to patient. Respiratory medications given during the hospital stay were categorized into 4 classes: bronchodilators, steroids, oxygen, or none, and each category was further analyzed for specific type of mediation to determine the extent to which prescribers were authorizing medications against guidelines. All information was then compared to a national study that also analyzed prescribing practices against bronchiolitis guidelines.

Results: Out of the 163 patients analyzed in the study, 49.7 percent of patients were given a bronchodilator and/or a corticosteroid (against guidelines) versus 58 percent nationally. At BUMC-T, a total of 164 therapies were initiated against guidelines in 81 patients. The majority of medications given were bronchodilators (69.5 percent) with albuterol (43.3 percent) being prescribed the most. Corticosteroids were used in 12.2 percent of therapies (compared to national average of 16.3 percent) and hypertonic saline in 18.3 percent of therapies.

Conclusion: While BUMC-T physicians are prescribing less than the national average of 58 percent, 49.7 percent of the institute's pediatric patients with bronchiolitis were still prescribed medications against the guidelines. With current guidelines stating no medications should be given, improvement in BUMC-T's prescribing practices for pediatric patients diagnosed with bronchiolitis should be considered.

Submission Category: Small and Rural Pharmacy Practice

Submission Type: Evaluative Study

Session-Board Number: 5a-101

Poster Title: Investigation of factors associated with influenza vaccination uptake in rural Columbus County, NC

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Purpose: Influenza vaccines are either met with acceptance or rejection. Rural pharmacies are exposed to patients in both categories. It is important to find out who does not vaccinate based on demographics as well as reasons for not vaccinating. The purpose of this study was to find out which demographics are less likely to vaccinate in a rural healthcare setting, which can help rural pharmacists target methods and approaches to increase influenza vaccine uptake in these populations.

Methods: The study involves 100 patients, 18 years or older, who consented to and completed surveys that were distributed upon their visit to one of the three Walgreens Pharmacy locations in Columbus County, NC between June 1 and July 31, 2016. Information collected included age, sex, race, marital status, education, distance to doctor, distance to Walgreens, and their influenza vaccine uptake status within the past year. Logistic regression was used to analyze associations between the various factors and vaccine uptake in the past year. All analyses were performed using SPSS software, version 22 (IBM SPSS Statistics for Macintosh, Armonk, NY) at alpha level 0.05. This research project was approved by an institutional review board of Campbell University and Walgreens corporation.

Results: The results indicated that patients less than or equal to 35 years old and patients 36-50 years old are 2.07 and 2.52 times more likely, respectively, to not get vaccinated when compared with patients over age 50. Patients with a high school education or less were 1.87 times more likely to not get vaccinated compared to those with more than a high school education. We also found that males were 1.96 times more likely to not get vaccinated when

compared to women. The study also indicated that patients who live fifteen minutes or less from their doctor's office were 2.33 times more likely to get vaccinated compared to those patients with over a fifteen minute drive. Also, patients less than a five minute drive from Walgreens were 1.64 times more likely to get vaccinated compared to those patients who live over 15 minutes from a Walgreens.

Conclusion: In conclusion, patients younger than 50 years old, males, and those with education only up to high school level were less likely to vaccinate. It was also noted that nearness to a doctor's office or Walgreens Pharmacy had influence on patients' influenza vaccine uptake. This information is important to rural public health and pharmacy practice as it provides the necessary data of which populations should be targeted for education to increase influenza vaccine uptake.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5a-102

Poster Title: Piloting Medication Histories in the C.S. Mott Children's Hospital Post-Anesthesia Care Unit (PACU)

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Purpose: Medication errors are the third leading cause of death in the US. Surgical patients are at high risk due to postoperative medications and unintended alteration of regular regimens. Many mistakes are preventable through medication history and reconciliation. Accurate medication history and reconciliation at all care transitions is part of the Joint Commission's patient safety goals, and studies demonstrate that histories performed by trained pharmacy personnel are more accurate than histories performed by other professionals. In this project, we aimed to develop an efficient process for performing histories on PACU patients for early identification of discrepancies between home and inpatient medications.

Methods: Medication history and reconciliation forms were designed based on literature review of validated forms used at other institutions. Patients were tracked using a PACU "Status Board" in the electronic medical record portal, MiChart. Included patients were inpatient or surgical admits with an age of greater than two and less than eighteen years of age. Excluded patients were patients who were admitted to an intensive care unit from the PACU, patients undergoing a cardiac procedures, and patients with surgery end times beyond 1500. Interviews were conducted with the patient's parent(s)/guardian(s) while the patient was in Phase 1 recovery, after Status Board indicated, "family paged." Parents/guardians were asked about their child's prescription medication history, over-the-counter medication use, as well as allergy information and adherence. Information that was collected from parents was compared to what was on the patient's electronic medical record. Once a discrepancy was identified, the results were recorded and documented as a pharmacy note in the patient's medical record. Inpatient pharmacists then had access to the note at the time of order verification and could

page doctors regarding discrepancies found. Data was collected regarding the interview types, patient age and surgery type, medication categories, and error classifications.

Results: Families and nursing were generally receptive to pharmacy presence within the PACU. Over the course of twenty-two days (ranging from June to July 2016), seventy-five medication histories were performed. This covered 44.6 percent of all eligible surgical cases within the project period. The average age of patients was 9.6 years and the average time per interview was 9.5 minutes. A total of seventy-four discrepancies were found. The most common type of discrepancy was omission of medications, with the most common medication categories with errors being vitamins/herbals/supplements, allergy medications, and gastrointestinal medications. Using the error classification system developed by the National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP), the most common error category was category C, meaning and error occurred that reached the patient but did not cause harm.

Conclusion: The workflow designed in this pilot project was successful in assessing the frequency and type of discrepancies in medication lists in surgical patients when transitioning from the PACU to the general care unit. It was found that vitamins, herbals, and supplements had the most discrepancies. The most common type of discrepancy was omission of medications. This project paves the way for a permanent pharmacy presence within the PACU for performing and documenting medication histories.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5a-103

Poster Title: Proton pump inhibitors' post marketing adverse reactions and possible link to Alzheimer's disease development

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Purpose: Proton pump inhibitors (PPIs) are the leading therapeutic agent for gastro-esophageal disease, dyspepsia, peptic ulcer, acid reflux and other upper gastrointestinal disorders. PPI use is positively associated with an increased risk of community-acquired pneumonia (CAP) and osteoporosis development both in men and women. PPI use came into question after recent studies found an association between PPI use and risk of Alzheimer's dementia in elderly patients. The goal of this study was to perform a deeper analysis of PPI post marketing patient data and look for possible links between PPI use and development of CAP, osteoporosis and dementia.

Methods: FAERS (FDA Adverse Event Reporting System) and AERS (Adverse Event Reporting System, pre-2012 version) databases from 2002 to 2016 were combined and matched by case numbers into a master file. Over 8.1 million unique records were compiled. UNIX tools were used to search and isolate reports with the patients on the drug of interest. There were 5403 reports where PPIs were the only class of medication used. Same method was performed for patients on histamine-2 receptor antagonists (H2RAs) for comparison cohort with same drug indication. There were 1494 reports where H2RAs were the only class of medication used. ADR frequencies over 1.5 percent were analyzed. Odds ratios, log odds ratios (LogOR) and 95 percent confidence intervals were calculated. LogOR was used when comparing PPI ADRs to H2RA ADRs. Frequency analysis was used to assess ADRs where Odds ratios analysis was not possible due to zero reports in H2RA cohort.

Results: Patients on FAERS who only took PPIs had significantly lower reports of urticaria (LogOR -0.58, LogOR error 0.15), dizziness (LogOR -0.34, LogOR error 0.16), and dyspnea (LogOR-0.76, LogOR error 0.13), when compared to patients who only took H2RAs. Patients on FAERS who only took PPIs had a significantly higher frequency of reports of anxiety (LogOR 1.27, LogOR error 0.42), acute renal failure (LogOR 1.36, LogOR error 0.42), tubulointerstitial nephritis (LogOR 1.04, LogOR error 0.33), and gastro-esophageal reflux disease (LogOR 0.96, LogOR error 0.21), when compared to patients who only took H2RAs. Hypomagnesemia (3.56 percent), hypocalcemia (2.37 percent), subacute cutaneous lupus (1.93 percent), hypokalemia (0.85 percent), skin exfoliation (0.79 percent), and cutaneous lupus (0.73 percent) were present only in the PPI ADR reports.

Conclusion: PPI patients had adverse reactions that were absent in the H2RA group. PPI patient reports had a high frequency of hypomagnesemia and hypocalcemia. Magnesium plasma and cerebra-spinal fluid levels are lowered in Alzheimer's and other neurodegenerative disease patients. Decrease in magnesium and calcium levels is a possible risk factor in dementia development. Lowered magnesium and calcium levels are a major risk factor for osteoporosis development. The appearance of lupus which is an autoimmune disorder can possibly be linked to CAP prevalence in PPI users. Impaired immunity makes patients susceptible to infection.

Submission Category: Pain Management

Submission Type: Evaluative Study

Session-Board Number: 5a-104

Poster Title: Retrospective analysis of postsurgical outcomes following infiltration with liposomal bupivacaine with or without bupivacaine HCl in patients undergoing unilateral total knee arthroplasty

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Purpose: Methods for controlling post-surgical pain are mostly centered on opioid analgesics. These drugs, however, are associated with side effects such as nausea, vomiting, constipation and carry the risk for abuse and addiction. Liposomal bupivacaine is a non-opioid analgesic that provides analgesia at the surgical site for up to 72 hours after injection. The objectives of this retrospective study were to assess the postsurgical outcomes including length of stay, discharge disposition, and narcotic consumption in patients who underwent unilateral TKA and received general anesthesia, liposomal bupivacaine, or coadministration of liposomal bupivacaine with 0.5% bupivacaine HCl.

Methods: In this IRB approved retrospective study, data was collected on 348 unilateral TKA patients who were operated on by a single-surgeon at a single surgical site from January 2013 through July 2015. Anesthesia and nerve blocks were administered to each patient according to the attending anesthesiologist's clinical judgement. In addition to nerve blocks and anesthesia, patients either received an intraoperative injection of 20 ml of liposomal bupivacaine + 40 ml of normal or an intraoperative injection of 20 ml of liposomal bupivacaine + 30 ml of bupivacaine HCl + 40 ml of normal saline. Patients who underwent a TKA from January 2013-December 2013 did not receive any formulation of bupivacaine in addition to standard anesthesia and nerve blocks. Patients received any oral or IV pain medications deemed appropriate by the physician for controlling post-operative pain. Post-operative opioid use was recorded both as the number of pills and as morphine milligram equivalents (MME) dispensed to the patient within 90 days pre- and post-operatively. Data was collected from electronic medical records (EMR) and the

Louisiana Prescription Monitoring Program (LAPMP). This data was organized in an Excel spreadsheet on a password protected device and then analyzed for statistical significance.

Results: In 348 consecutive patients, the mean (SD) length of stay was 2.2 (0.9) days in the general anesthesia group, 1.8 (0.8) days in the liposomal bupivacaine group ($P < 0.0001$ vs the general anesthesia group), and 1.4 (0.7) days in the liposomal bupivacaine + 0.5% bupivacaine HCl group ($P < 0.0001$ vs each of the other treatment groups). It was found that there were no significant differences between groups in postsurgical narcotic consumption in patients who were not taking opioids before their surgery. However, in patients who were taking opioid painkillers within the 90 days leading up to surgery, it was shown that there was a significant reduction in number of narcotic pills dispensed to patients who received the combination of liposomal bupivacaine + bupivacaine HCl ($p=0.038211$). On average, patients in the liposomal bupivacaine + 0.5% bupivacaine HCl group had significantly fewer prescription fills, after the original post-operative prescription, compared with the liposomal bupivacaine group (1.3 [SD 1.2] vs 1.8 [SD 1.7]; $P < 0.05$) and the general anesthesia group (vs 2.2 [SD 1.8]; $P < 0.001$).

Conclusion: In this retrospective study, about twice as many patients who received liposomal bupivacaine combined with 0.5% bupivacaine HCl were discharged within 24 hours after surgery compared with the other two treatment groups, and earlier discharge was not associated with higher opioid use. Additionally, patients in this group who had been taking opioids within 90 days prior to surgery showed a reduction is post-operative opioid use. The use of liposomal bupivacaine in combination with 0.5% bupivacaine may decrease opioid consumption of unilateral total knee patients after surgery and could potentially decrease potential for opioid abuse.

Submission Category: Infectious Diseases

Submission Type: Case Report

Session-Board Number: 5a-105

Poster Title: Cure with ledipasvir/sofosbuvir for chronic hepatitis C virus in an individual with gastric bypass surgery

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Purpose: The impact of gastric bypass on the pharmacokinetics of various medications has been reported, specifically, in regard to reduction in oral medication absorption. The duodenum is completely bypassed which decreases the effective surface area for drug absorption. In addition, gastric pH is increased in this patient population, which can affect the absorption of pH-dependent drugs such as ledipasvir. As seen in pharmacokinetic studies, gastric pH affects the absorption of ledipasvir. Therefore, proton pump inhibitor (PPI) use raises concern with concomitant administration of ledipasvir/sofosbuvir (LDV/SOF). Presently, no data exists for the treatment of chronic hepatitis C virus (HCV) with LDV/SOF in an individual with a history of gastric bypass surgery. We report a single case of a patient who was cured of chronic HCV with LDV/SOF after 8 weeks of treatment, who had a past medical history significant for gastric bypass. The patient underwent elective Roux-en-Y gastrojejunostomy bariatric surgery roughly 3 years prior to initiation of LDV/SOF treatment. Baseline workup of the patient included: HCV treatment-naïve, HCV RNA viral load of 438,890, HCV genotype 1a, and fibrosis score of F1 (by FibroScan) and F1-F2 (by FibroSure). Concomitant medications included none with significant drug-drug interactions, with the exception of pantoprazole. Pantoprazole low dose (20 mg daily) was only used alongside treatment with LDV/SOF during the final week of therapy due to worsening gastroesophageal reflux disease. Throughout treatment, the patient tolerated LDV/SOF well while only experiencing a minor headache. No missed doses were reported. Follow-up HCV RNA viral loads were undetectable at weeks 3 and 7 of treatment. Lastly, a viral load was collected 16 weeks after completing full treatment, indicating sustained virological response. Based on this individual case, LDV/SOF may be an option in the treatment of HCV in patients post-gastric bypass surgery, although further research is warranted.

Methods:

Results:

Conclusion:

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5a-106

Poster Title: Evaluating the need for antibiotic stewardship services on evening, night and weekend shifts in a large academic medical center.

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Purpose: IDSA stewardship guidelines recommend prospective audit with feedback as the cornerstone for promoting appropriate antibiotic utilization. However, many stewardship programs are not resourced to implement this strategy during evenings, nights and weekends, and there is minimal data evaluating the incidence of inappropriate antibiotic use during these off hours. The objective of this study is to determine whether antibiotic prescribing may be improved with expansion of stewardship services to such periods.

Methods: The University of Michigan Hospital (UMHS) mandates prior authorization of 16 restricted antibiotics prior to dispensing 7-days per week between the hours of 0700-2300 via an approval pager. A member of the stewardship team (pharmacist or physician) covers the pager Mon-Fri during the day (0700- 1530) and an ID fellow or non-stewardship ID physician covers the pager on evenings (1530- 2300) and weekends (0700- 2300 Sat-Sun). No approval is required during nights (2300- 0700). Additionally, a stewardship pharmacist reviews a list of all patients receiving restricted antibiotics Mon-Fri, but this service does not occur on weekends. This retrospective single center cohort study included orders for restricted antibiotics in adult patients in May 2016. Orders for restricted antifungals per UMHS transplant or hematology prophylaxis protocols were excluded. The incidence of initial appropriate antibiotic therapy was compared during the day to evening, night, and weekend shifts. Additionally, the time to discontinuation/de-escalation of inappropriate restricted antibiotic use was compared in the different time periods, as were the effects of the “blackout” periods on the efficacy of a 72-hour “timeout” period wherein appropriate empiric therapy is reviewed for potential de-escalation.

Results: A total of 118 patients received a restricted antibiotic; 91 were included in the analysis and 27 were excluded. The rate of initial appropriate prescribing was 75/91 (82.4%) for all patients. The rate of appropriate prescribing was numerically higher for orders placed on the day shift versus evening/night shifts (82.4% vs. 75%, p=0.164), as well as for weekday versus weekend orders (87.5% vs. 66.7%, p=0.170). All 16 inappropriate antibiotics were stopped (n=4) or de-escalated (n=11), and there was no significant difference in time to discontinuation or de-escalation for orders started on day versus evening/night shifts (62.4 vs. 67.4 hours, p=0.860) or weekday versus weekend orders (52.3 vs. 75.3hr, p=0.415).
Modifications were made for 23/75 (30.7%) patients receiving initial appropriate empiric antibiotic therapy; 10 antibiotic orders were discontinued and 13 were de-escalated. The mean time to modification was 57.2 hours. The time to modification was significantly quicker if the 72-hour timeout period occurred during the weekday versus weekend (41.4 vs. 132 hours, p=0.001).

Conclusion: The rate of initially appropriate antibiotic prescribing was numerically higher when a member of the stewardship team covered the pager compared to evening/night shifts when there was no coverage or an ID fellow or non-stewardship ID attending covered the pager. Additionally, the time to discontinuation or de-escalation of initially appropriate antibiotic therapy was significantly quicker if the 72-hour timeout review occurred during the week when the stewardship team pharmacist reviewed patients compared to the weekend when no stewardship services are offered. This evaluation suggests antibiotic prescribing may be improved with expansion of current stewardship services to off hours.

Submission Category: Geriatrics

Submission Type: Descriptive Report

Session-Board Number: 5a-107

Poster Title: Developing a new tool to streamline the medication review process in fall assessment for community-dwelling older patients in Central Valley, California

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Purpose: Numerous medications may contribute to fall risk significantly in community-dwelling older patients. Medication review is an important component listed in the CDC's Algorithm for Fall Risk Assessment. The pharmacy students from California Health Science University (CHSU) have been collaborating with physical therapy, nursing and kinesiology students from California State University, Fresno through the Senior Awareness and Fall Education (SAFE) program since June of 2015. The goal of this project is to develop a new comprehensive approach to help guide pharmacy students with varying levels of drug knowledge to review patients' medication lists and assess patients' fall risks.

Methods: A comprehensive literature review was performed using PubMed. Articles included the American Geriatrics Society 2015 Updated Beers Criteria, START/STOPP criteria, Medication Interventions for Fall Prevention in the Older Adult by Cooper J. from JAPhA, Management of Falls in Older Persons: A Prescription for Prevention by Moncada L. from AAFP, etc. Major prescription medication classes were identified as "Fall Risk Increasing Drugs (FRIDs)" including antidiabetic agents, cardiovascular agents, benzodiazepines, hypnotics, antipsychotics, antidepressants, anticonvulsants, analgesics, anticholinergics, and antiemetics. An organizational tool (PDF document) was then created to categorize all the medications based on drug classes in tables. The tables included both generic and brand names of the medications, subclasses, fall-related side effects, suggested patient interview questions and patient education instructions. The pharmacy students used this tool during the Senior Awareness and Fall Education (SAFE) program to assess each patient's fall risk. Patient education materials

were then generated based on the patient's medication classes. All students involved in the SAFE screening events were asked to fill out a post-activity survey for quality assurance. The survey's data was used to analyze the effectiveness and efficiency of the new fall assessment approach.

Results: There was a total of nineteen students who participated in the SAFE screening in September 2016. Eighteen of the nineteen students completed the post-activity survey. There were five (27.78%) pharmacy-year-1 students, five (27.78%) pharmacy-year-2 students and eight (44.44%) pharmacy-year-3 students who attended the screening. Eight students (44.44%) were first-time participants while ten students (55.55%) participated in at least one other SAFE screening previously. Among the eighteen students, fourteen students (77.77%) ranked the SAFE screening FRIDs tables as "very helpful" or "extremely helpful" and four (22.22%) ranked the tool as "somewhat helpful". When the survey asked "how efficient using the SAFE screening FRIDs tables were in looking up patient's medications", eleven students (61.11%) ranked the tool as "very efficient" or "extremely efficient", five students (27.78%) ranked the tool as "somewhat efficient", and two students (11.11%) ranked the tool as "slightly efficient". When the survey asked "how useful the SAFE screening FRIDs tables were in generating patient-specific interview questions", fourteen students (77.78%) ranked the tool as "very useful" or "extremely useful", three students (16.67%) ranked the tool as "somewhat useful", and one student (5.56%) ranked the tool as "slightly useful". Other questions yielded similar results.

Conclusion: Medication review is an important component of fall risk assessment. Pharmacists play a key role in assessing community-dwelling older patients for fall risks. By using a search function on the downloaded PDF table, students can quickly identify FRIDs in patient's medications, pinpoint fall-related medication side effects, provide medication therapy modification recommendations to patient care providers, and convey the necessary patient education counseling points. Based on initial survey results, the tool that was designed and modified for SAFE screening appears to be efficient and useful in guiding the pharmacy students with varying levels of drug knowledge.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 5a-108

Poster Title: Evaluating the feasibility of maintaining a patient database for nine outpatient clinics

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Purpose: Pharmacists can improve chronic disease state management in the ambulatory care setting. Previous studies have measured pharmacist-led improvement in chronic disease control in individual clinics, but there is limited data on assessing ongoing clinical outcomes in multiple clinic sites. This project was designed to demonstrate the feasibility of creating and maintaining a database of patient outcomes in nine primary care clinics with an embedded pharmacist at a large academic health system.

Methods: To compile the patient database, reports were created in the electronic medical record (EMR) to extract patient demographic visit information for completed pharmacist appointments from July 2015 through June 2016. The patient level data in the report included medical record number (MRN), patient name, ZIP code, referral reason, payer (including ACO beneficiary status), and appointment diagnosis. The report also contained visit information, including visit date, clinic location, and pharmacist provider. Manual chart reviews were then performed for each patient to record markers of disease control, including blood pressure, hemoglobin A1c, and weight. The status of the patient was denoted as active, inactive, discharged, referred, or deceased.

Results: A total of 908 patients were seen by pharmacists at 1,847 visits during fiscal year 2016. Approximately 5 minutes was dedicated to each manual chart review over a period of 4 months.

Conclusion: Although examining outcomes data from nine outpatient clinics will provide valuable support for the role of pharmacists in chronic disease management, a more sustainable method of data collection is essential. This method of database compilation is limited by the extensive time required to maintain the dataset, making it unfeasible to collect data in real time. Automating the collection of visit data from the EMR would allow for continual assessment of disease control in pharmacist-managed patients. We are currently working with EMR programmers to develop an automated data extraction method for real time monitoring of clinic visits and patient outcomes.

Submission Category: Leadership

Submission Type: Descriptive Report

Session-Board Number: 5a-109

Poster Title: Implementation of new student leadership positions to increase committee participation in an American Society of Health-system Pharmacists state affiliate

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Purpose: Student involvement in professional pharmacy organizations is an important component of professional development. Motivation and awareness of opportunities in our state affiliate were limited at our School of Pharmacy. Student leadership recognized student-based gaps in representation and conveyance of information between the student chapter and state affiliate councils. Six new leadership positions were designed to address the need for sustainable student participation within key affiliate committees; expanded student representation at the state level; and creation of leadership opportunities external to the school. Secondary needs included increased communication between the student chapter and state-affiliate and opportunities to expand student body engagement.

Methods: A student holding the elected leadership position of the Oregon Society of Health-system Pharmacists (OSHP) Student Chapter President assessed current student participation in state affiliate committees. After identification of opportunity, student leadership drafted a proposal for the creation of six leadership positions on three major state affiliate committees. Job descriptions defining responsibilities, roles, terms of service, and reporting structure were drafted. The proposal was submitted to the organization faculty advisor, Assistant Dean of Student Affairs, and President of Oregon Society of Health-system Pharmacists. After receiving support, these positions were offered to the student body through an application and interview panel selection in the fall—three positions for second-year students and three positions for first-year students. Selected students were expected to attend monthly council meetings off campus and quarterly student organization meetings for a two-year staggered term. The current student chapter president was expected to initially communicate with the state affiliate

council chairs and attend the first monthly council meeting to facilitate introductions for each of the councils where students were seated. Student representatives were expected to record relevant information, seek opportunities for wider student involvement, and represent Pacific University School of Pharmacy Student Chapter interests. Additionally, these six positions were encouraged to volunteer and attend Oregon Society of Health-System Pharmacists conferences.

Results: Prior to implementation in August, one student participated at the Oregon Society of Health-system Pharmacists board meeting, and zero students participated in the three major councils—Educational Affairs, Organizational Affairs, and Professional Affairs. Five applications were received for the three second-year positions and seven applications were received for the first-year positions. After placement of students and conclusion of the school year in May, one student had continued to participate in the Oregon Society of Health-system Pharmacists board meeting, and six students participated in the three major councils. One student was additionally placed on the Industrial Relations sub-committee due to continued expressed interest in both leadership and professional service after the committee selection period was closed. Secondary measures of success included a threefold increase in the number of volunteer opportunities for the general student body at the Annual Seminar between 2015 and 2016. All new leaders attended monthly committee meetings when held, and were added to corresponding mailing lists. Information gathered was conveyed to student leadership at official quarterly meetings increasing the number of reports received from zero to twenty-one reports, not including unofficial conversations, emails, or impromptu student meetings.

Conclusion: By creating a leadership structure that encompassed both school leadership and connected external professional service, both areas of need were addressed. Overall student body awareness of health-system professional service increased and the six new leaders identified additional areas for students to volunteer which expanded student presence and engagement within the professional organization. Correlating information demonstrated greater student attendance at conferences hosted by the state affiliate compared to the year prior to implementation. Student participation was well received by the professional organization, formally acknowledged, and other state pharmacy school student chapters were requested to institute a similar structure.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 5a-110

Poster Title: Evaluating prevalence and types of clinical pharmacy interventions in an HIV ambulatory care setting

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Purpose: Previous studies have shown positive treatment outcomes when including an HIV clinical pharmacist as an integral part of the interdisciplinary healthcare team in the care of HIV infected patients. This role is becoming more important with an aging HIV population impacted by an increased prevalence of both comorbidities and polypharmacy. The objective of this study is to evaluate the prevalence and types of interventions made by the HIV clinical pharmacy team in an ambulatory care setting.

Methods: This study received IRB approval from the University of Houston. Our retrospective cohort analysis included 435 HIV patients from Therapeutic Concepts who were seen by the pharmacy team (comprising students, residents and an HIV clinical pharmacist) from July 2014 to September 2015. For each patient encounter, the pharmacy team identified problems and documented associated interventions using a standardized problem and intervention checklist. Acceptability of all interventions by the physician and physician assistant from the pharmacy team was recorded. The clinical pharmacy intervention types were comprehensive including optimization of antiretroviral (ARV) therapy, adherence assessment, managing drug-drug interactions (DDIs), medication reconciliation, and treatment optimization of a diverse range of common comorbidities such as depression, diabetes, dyslipidemia and hypertension. Results of these study findings were evaluated using descriptive statistics.

Results: Among the 435 patients who were included in the analysis, a total of 1359 interventions were made, averaging 3.1 interventions per patient. As a whole, 1295/1359 (95.3%) interventions were accepted by the physician and physician assistant at Therapeutic Concepts. Among the 1295 interventions accepted, 167 (12.9%) were focused on optimization of ARV therapy, 131 (10.1%) on adherence counseling (i.e. suboptimal adherence noted during clinic encounter), 141 (10.9%) on management of clinically relevant DDIs also including drug-food, drug-disease and drug-herbal/over the counter (OTC) interactions, 386 (29.8%) on medication reconciliation, 21 (1.6%) on referrals, 29 (2.2%) addressing miscellaneous physician consultation and drug information requests, 188 (14.5%) addressing miscellaneous patient consultation and drug information requests, and 232 (17.9%) interventions on treatment optimization of various comorbidities. Among the interventions for comorbidities, the most representative interventions (>5%) were hypertension (15.1%), pain (11.2%), diabetes (10.8%), dyslipidemia (9.9%), miscellaneous infections excluding opportunistic infections (8.2%), and depression (6.7%).

Conclusion: Numerous interventions were executed by the pharmacy team. Most common interventions (>10%) made included optimization of ARV therapy, adherence counseling for non-adherent patients, management of DDIs, medication reconciliation, patient drug information requests, and optimization of different comorbidities. There was a high acceptability rate (>95%) by the physician and physician assistant regarding pharmacy interventions. This study suggests that the pharmacy team can play a critically important role in improving overall treatment outcomes for an aging HIV-infected population with multiple comorbidities and polypharmacy. Future follow-up studies are planned to evaluate the impact of pharmacy interventions on both HIV and comorbidity treatment outcomes.

Submission Category: Pharmacokinetics

Submission Type: Evaluative Study

Session-Board Number: 5a-111

Poster Title: Evaluation of the frequency of the determinates of HLA-B*15:02 in a Mexican population compared with a Caucasian population

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Purpose: Carbamazepine has been associated with cutaneous adverse drug reactions such as Stevens-Johnson syndrome (SJS) and toxic epidermal necrolysis (TEN) in patients with the HLA-B*15:02 haplotype. HLA-B*1502 has been studied prominently in broad areas across Asia and has been found almost exclusively in the Han Chinese population. There is a lack of data on HLA-B*15:02 frequency in Hispanic populations within the United States. Due to the gap of clinical information regarding the proper evaluation of Hispanics in this regard, we cannot assume that the same association will not occur in this Hispanic population.

Methods: The Shenandoah University Institutional Review Board approved this cross-sectional study prior to its commencement. The Hispanic and Caucasian DNA samples came from existing databases. The DNA samples were analyzed for rs3909184 and rs2744682 on an Applied Biosystems Quantstudio 6 Flex with TaqMan Drug Metabolism Genotyping Assays under conditions specified by the manufacturer. Genotype and variant allele frequencies comparisons were done in SPSS v24 using Pearson Chi Square test and Fisher's exact test where appropriate. A $p < 0.05$ was considered to be statistically significant.

Results: A total of 188 Mexican and 179 Caucasian samples were analyzed. The frequency of the rs3909184 variant allele was 3.8% in the Mexican American samples and 5.2% in Caucasian samples (p=0.336). The rs3909184 genotype frequencies did not differ significantly (p=0.394). The frequency of the rs2844682 variant allele was 17.6% in the Mexican American samples and 13.2% in Caucasian samples (p=0.097). The rs2844682 genotype frequencies did not differ significantly either (p=0.111). Based on the combination of these two genetic variations, the

HLA*B 15:02 haplotype could be present in three (1.6%) Mexican American sample and one (0.006%) Caucasian sample, but this was not significantly different (p=0.328).

Conclusion: Based on results of this study, there were no significant differences in the frequency between the two genetic variations studied or the possible presence of the HLA*B 15:02 haplotype between Mexican American and Caucasians. Although there was a slight trend that the rs2844682 variant allele may occur at a higher frequency in the Mexican American population. A limitation of this study is that we could not determine if the genetic variations were in phase to confirm the presence or absence of the HLA*B 15:02 haplotype. Further evaluation needs to be performed with Sequence Specific Oligonucleotide Probe Hybridization Polymerase Chain Reaction.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 5a-112

Poster Title: Exploring potential predictors of intrinsic resistance to multi-targeted tyrosine kinase inhibitors in patients with solid tumors

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Purpose: Tyrosine kinase inhibitors (TKIs) are commonly prescribed antineoplastics used to treat a variety of cancer types. Unfortunately, approximately 15-25 percent of patients will not respond to treatment, which poses a significant burden considering the high potential for side effects and cost of these medications. This study explores the demographics and clinical factors of patients treated with multi-targeted TKIs in the context of whether they derived benefit or were resistant to treatment. We conducted a retrospective cohort study to investigate potential predictive factors of response in patients prescribed multi-targeted TKIs (i.e., axitinib, cabozantinib, pazopanib, regorafenib, sorafenib, sunitinib, or vandetanib).

Methods: Patients were identified from Moffitt Cancer Center's Total Cancer Care cohort with the inclusion criteria that they received a multi-targeted TKI and were diagnosed with a solid tumor. We performed chart reviews of electronic medical records to confirm diagnosis, TKI administration, and duration of treatment. Patient response to TKI was determined using imaging scans before TKI initiation and at first imaging follow-up, incorporating tumor size changes and radiologists' and oncologists' impressions to classify individuals as either a "responder" or "non-responder (resistant)". Patients with complete response, partial response, mixed response, or stable disease were classified as "responders", while patients who had progressive disease at first imaging follow-up were classified as "non-responders"; patients who discontinued treatment early due to side effects were excluded. Data was organized using Microsoft Excel, and demographic information, including age at diagnosis, sex, race, ethnicity, diagnosis, and multi-targeted TKI received was summarized. Each demographic and clinical category was evaluated to determine the rate of resistance based on the number of patients

who were non-responders divided by the total number of patients, in that category, who received the drug. We calculated the average, median, and range of treatment duration stratified by response, medication, and diagnosis. The primary objective of this study was to identify demographic or clinical variables that may be associated with resistance to multi-targeted TKIs.

Results: A total of 262 solid tumor patients who were prescribed multi-targeted TKIs were included in this study. The majority of patients were white (94 percent), non-Hispanic (92 percent), and the median age was 56 years old (range 21-88). The most common diagnosis in our cohort was renal cell carcinoma (RCC, 52 percent), followed by sarcoma (20 percent), and less than 10 percent for all other tumor types. Half of the patients received sunitinib, followed by sorafenib (28 percent). A total of 77 patients were excluded from further analyses due to unknown response. The overall resistance rate in our cohort was 21 percent, consistent with that observed in phase III clinical trials of these medications. Responders remained on treatment significantly longer than non-responders (median duration 11.0 mo vs. 3.6 mo, p less than 0.001). Patients aged 60-69 had a higher rate of resistance than expected (30 percent), as did patients who received pazopanib (35 percent). Tumor types with higher resistance rates than expected included melanoma (43 percent), pancreatic neuroendocrine (36 percent) and sarcoma (28 percent), among others. Overall, patients who received axitinib remained on therapy the longest (median 11.7 mo, range 9.6-20.7 mo).

Conclusion: Multi-targeted TKIs are highly effective therapies for a wide range of tumor types; however, according to phase III clinical trials, approximately 15-25 percent of patients do not respond. We conducted a retrospective cohort study to identify demographic and clinical factors that may be predictive of response to these agents. Results from our study suggest that demographic and clinical factors, including but not limited to, sex, age, and diagnosis, may influence likelihood of response to multi-targeted TKIs. Future studies will explore the utility of genetics to better predict resistance to these widely-prescribed medications.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5a-113

Poster Title: Evaluating and reducing missing medication messages at a large community teaching hospital

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Purpose: There is no doubt that advances in technology have made medication prescribing and verification easier and safer. Electronic health record (EHR) programs have more tools than ever that allow pharmacy, nursing, and physicians to communicate more easily. However, inefficient use of these tools can lead to a loss of productivity, operational failures, and patient safety issues. The objective of this study is to evaluate the incidence of missing medication messages and implement interventions that will reduce missing medications, and thus missing medication messages, within the institution.

Methods: An institutional review board exempt, descriptive, observational analysis was performed on all missing medication messages at Riverside Methodist Hospital (RMH). RMH has a hybrid model pharmacy (approximately 60:40) split between automatic dispensing cabinets and centralized dispensing. A new EHR with two-way electronic messaging capabilities was launched within the institution in May 2015. New reporting capabilities allowed for tracking of electronic message categorization, medication message description, message processing turnaround time, associated hospital unit, and overall content of the message. Measurable outcomes were dependent on proper medication message categorization which became a limitation. In September 2015, medication messages were categorized into the following groups: a) adjust time b) need new bag c) missing medication d) other. Many missing medication requests were for medications perceived to be missing (e.g. medication was delivered to wrong location so nurse could not administer it). Interventions were implemented to reduce these false requests. Pharmacy staff education was performed on five points

commonly identified to precipitate a missing medication request in order to prevent missing medications. The primary outcome measured was total missing medication messages over total medications dispensed in the hospital.

Results: Missing medication message counts decreased substantially. Immediately after EHR implementation, integrated two-way messaging allowed for communication of medication issues between nursing and pharmacy. Numerous types of messages were sent with no way of tracking them at first. With the eventual installation of message categories to the EHR, the messages of each type could accurately be tracked, allowing for data collection specifically on missing medication messages. Message tracking noted that particular medications experienced a high rate of missing medication messages. Pharmacy operations then relocated those particular medications from the central pharmacy to automated dispensing cabinets, which resulted in a 15.37% decrease in missing medication messages. Pharmacy operations noticed that some missing medication messages were sent as a result of pharmacy staff failing to place and locate medications per protocol. A department wide education session included guides and assessment on proper protocol which was followed by a 10.04% decrease in missing medication messages. Utilizing the features of EHR and performing operational adjustments have resulted in a decrease in the amount of missing medication messages.

Conclusion: Interventions made at RMH reduced the volume of missing medication messages sent to the pharmacy. Secondary to reducing the number of missing medication messages, these interventions also decreased the amount of missing or late medication administrations. Additionally, the interventions helped increase efficiency by decreasing the amount of time spent investigating and re-dispensing missing medications. Nursing is highly involved in medication administration operations. The next step is to intervene at the nursing level to improve medication delivery to patients.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5a-114

Poster Title: Effect of contaminated blood culture results on antimicrobial therapy in hospital setting

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Purpose: In the emergency department at Peninsula Regional Medical Center (PRMC) blood cultures are drawn by technicians rather than nurses or phlebotomists, resulting in an increase in contaminated samples. Contaminated cultures may result in therapeutic decisions that are not optimal for the patients. This may prolong the hospital stay, increase antibiotic use and resistance, and lead to possible adverse reactions and increased health care costs. The purpose of this study is to evaluate how false positive blood culture results affect antibiotic selection and the impact on length of hospital stay. The study will also investigate prescriber specialties in selecting antimicrobial therapy.

Methods: This retrospective study was conducted at PRMC in Salisbury, Maryland and was approved by the institutional review board. A list of patients with contaminated blood cultures was obtained from the microbiology department. The blood samples were drawn in the emergency department between July 2015 and July 2016. Blood cultures were considered contaminated if they grew coagulase-negative staphylococci, Corynebacterium species, Bacillus species other than Bacillus anthracis, Propionibacterium acnes, Micrococcus species, viridans group streptococci, enterococci, and Clostridium perfringens. Patients were excluded if they had clinical signs of bacteremia (prolonged temperature above 38 degrees Celsius, hypotension with systolic blood pressure less than 90mmHg, leukocytosis or neutropenia with a left shift differential, or disseminated intravascular coagulopathy) plus one of the following: long term IV catheter, immunocompromised with a central line, peritoneal dialysis, hemodialysis, or extensive postsurgical infection with coagulase-negative staphylococci. Also, patients were not included if they were not admitted to the hospital or if they were started on antibiotics deemed consistent with diagnosis on admission. Patient charts were reviewed to determine

appropriateness of antibiotic therapy using current therapy guidelines. Duration of hospital stay was recorded for patients receiving inappropriate treatment and compared to a control group. The control group was chosen randomly and consisted of patients with similar diagnoses over the same time period with double negative blood cultures. Chi-squared test was performed for nominal data.

Results: The total number of cases with contaminated blood cultures was 172 initially, but 127 cases were excluded by the criteria and appropriate therapy. The number of patients included in the analysis was 90 with 45 patients in the inappropriate treatment group and 45 patients in the control group. The average age of the inappropriate treatment group was 69 years, and 60 percent were male. For the control group, the average age was 70 years, and 53 percent of patients were male. There was a statistically significant difference between the length of hospital stay for patients with false positive blood cultures and those with true negative blood cultures (p equals 0.0114). The range for length of hospital stay in the inappropriate treatment group was 39 to 571 hours, compared 17 to 376 hours in the control group. The average length of stay between the two groups were 149 hours and 94 hours, respectively. Among the 23 prescribers that selected antibiotics for false positive blood cultures, 57 percent were hospitalists, 22 percent were internists, 9 percent were physician assistants, and 4 percent for each were specialists in family medicine, pulmonary medicine, and geriatric-internal medicine.

Conclusion: Contaminants in blood cultures can cause unnecessary antibiotic treatment and prolong hospital stays. Therefore, it is important to identify the common pathogens that mostly cause contaminants in blood culture to select the appropriate therapy and avoid other costs.

Submission Category: Pharmacokinetics

Submission Type: Evaluative Study

Session-Board Number: 5a-115

Poster Title: Comparative Pharmacodynamics of Imipenem and Imipenem-Relebactam Against Wild-type and Resistant Populations of P. aeruginosa and Non-Proteeae Enterobacteriaceae

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Purpose: A beta-lactamase inhibitor combination, imipenem (IMI)/relebactam (REL), is currently in Phase 3 (P3) clinical trials. Monte Carlo analysis (MCA) was used to assess the potential impact of imipenem (IMI)/relebactam (REL) compared to IMI alone against wild-type (WT) and imipenem-resistant (R) P. aeruginosa (PA) and non-proteeae Enterobacteriaceae (NPE).

Methods: Single-compartment pharmacokinetic parameters, current MIC distributions, and clinical pharmacodynamics (PD) targets from peer-reviewed literature were used to perform a 10,000 subject Monte Carlo simulation. A range of CrCl distributions from our institution, ranging from 10-120ml/min, were used to simulate individual clearances. The pharmacodynamic goals analyzed were 20%, 40%, and 60% free time above the MIC. The initial dose used for both IMI and IMI-REL was 500mg q6h. The analysis assed two methods of dealing with decreased renal function: the current package IMI insert renal adjustment guidelines and the P3 dosing for IMI-REL recommended by Merck. The effects of two volumes of distribution (0.24L/kg to represent healthy volunteers and 0.31L/kg to represent critically ill patients) and the effect of infusion time (0.5 hours or 3 hours) were also examined. The above parameters were used to perform MCA on wild-type and resistant subpopulations of Pseudomonas aeruginosa and non-proteeae Enterobacteriaceae.

Results: Target attainment (TA%) was ≥90% for IMI-REL for all PD targets and organisms except for T>MIC ≥60% for resistant Pseudomonas aeruginosa (81 to 89%). With IMI, TA% was ≥90% only for wild type Non-proteeae Enterobacteriaceae at all targets. TA% for IMI-REL was 35-50% greater than that of IMI alone. TA% was similar for normal and critically ill patient volumes (≤11% difference). Differences in TA% due to the length of the infusion were minimal; however,

with resistant populations, TA% was often slightly higher with the 0.5 hr. infusion at T>MIC≥20% and slightly lower at T>MIC≥60%. TA% for IMI was slightly higher with P3 IMI/REL dosing.

Conclusion: The addition of relebactam restored imipenem's activity against the resistant organisms evaluated. Imipenem alone still has sufficient activity against non-proteeae Enterobacteriaceae, but appeared ineffective against the other organisms studied. Given imipenem's short half-life and short dosing interval, the effects of increased patient volume had a negligible effect on target attainment. However, the proposed phase 3 dosing for IMI-REL appears superior to the current imipenem package insert adjustment for renal dysfunction as it improved target attainment at all PD targets.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 5a-116

Poster Title: Medication use evaluation: Identifying older adults on antidepressant therapy and the incidence of hyponatremia.

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Purpose: The 2015 American Geriatrics Society Beers Criteria contains a list of potentially inappropriate medications (PIM) that pose an added health risk to older adults. Included in this list are the following antidepressants; selective serotonin reuptake inhibitors (SSRIs), serotonin-norepinephrine reuptake inhibitors (SNRIs), and bupropion. One of the reasons they are on the Beers Criteria is because they may cause or exacerbate the syndrome of inappropriate antidiuretic hormone secretion (SIADH) or hyponatremia. This retrospective study identified patients on these therapies and determined incidence of hyponatremia with the goal of optimizing safe antidepressant prescribing within our clinic.

Methods: The institutional review board approved this retrospective medication use evaluation. Patients were identified within the electronic medical record (EMR) if they were greater than or equal to 65 years of age and taking an SSRI, SNRI, or bupropion. The population included in this evaluation included patients at least 65 years of age who were prescribed SSRI/SNRI, or bupropion therapy for at least 6 months. Additionally they must have had sodium levels drawn prior to therapy initiation and at any point after therapy initiation. The following data was collected from patient chart review: patient's date of birth, primary care physicians, antidepressant and dose of current antidepressant, dates of antidepressant use, and sodium levels. Age at pre-sodium draw and average post-sodium levels were calculated. Patients whose sodium levels were shown to be less than 135mg/dL were further evaluated for concurrent disease states or medications which may contribute to hyponatremia.

Results: Based on preliminary data collection, 103 patients were identified as at least 65 years of age and prescribed the aforementioned antidepressants. Of those, 46 patients fit the inclusion criteria and were evaluated for incidence of hyponatremia. Of the identified 46 patients, three patients were found to have average post- therapy sodium levels below 135mg/dL. Of the three hyponatremic patients, one was noted to have documented history of hyponatremic lab values before initiation of SSRI therapy. Medications prescribed for these patients include bupropion, fluoxetine, and citalopram.

Conclusion: Preliminary results showed a prevalence of hyponatremia of 6.5% in the study population. These results may indicate a place for improved provider education on the dangers of antidepressant use in the presence of hyponatremia. After further evaluation, there may also be opportunity to create a clinic specific protocol outlining appropriate monitoring for geriatric patients on those antidepressants and recommendations if hyponatremia is noted. All but one patient in the 103 screened patients had appropriate monitoring of sodium levels. There was also no documented antidepressant medication changes based on abnormal sodium readings.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 5a-117

Poster Title: Utilization of a CYP2C19 genotype-guided antiplatelet treatment algorithm over time in patients undergoing percutaneous coronary intervention

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Purpose: Dual anti-platelet therapy (DAPT) with aspirin and a P2Y12 inhibitor is the standard of care for patients undergoing percutaneous coronary intervention (PCI). Clopidogrel, a prodrug, requires CYP2C19 metabolism to form its active metabolite. Individuals that carry one or two CYP2C19 loss-of-function (LOF) alleles are at increased risk for adverse cardiovascular outcomes. To circumvent this risk, our institution implemented an algorithm that optimizes DAPT by integrating CYP2C19 genotype and clinical factors to guide P2Y12 inhibitor selection in high-risk patients undergoing PCI. In this study, we evaluated use of the treatment algorithm over 18 months following implementation in a real-world clinical practice.

Methods: This single-center, retrospective cohort study included all 903 patients receiving PCI with coronary stent placement between July 2012 and December 2013. Patient demographics, PCI indication, CYP2C19 genotype, cardiovascular history, antiplatelet therapy, and anticoagulant therapy were obtained from the electronic medical record at index PCI. To observe initial P2Y12 inhibitor selection and changes in treatment, antiplatelet therapy was recorded at admission, discharge, and three follow-up visits up to one year after coronary stent placement. Final maintenance therapy was defined as the P2Y12 inhibitor prescribed to the patient after index PCI and CYP2C19 genotyping at the last follow-up visit. Evaluation of algorithm sustainability in clinical practice was guided by assessment of genotype availability at the time of the index PCI and final P2Y12 inhibitor maintenance therapy selection in CYP2C19 LOF allele carriers. Temporal trends in algorithm utilization were evaluated using descriptive

statistics to compare completion of genotype testing (yes versus no), final maintenance P2Y12 inhibitor therapy (clopidogrel versus either prasugrel or ticagrelor), and changes in anti-platelet therapy from clopidogrel to prasugrel/ticagrelor in LOF carriers (yes versus no) over time. Comparisons of these endpoints were made across three 6-month intervals of time (July-Dec 2012, Jan-Jun 2013, July-Dec 2013) by chi-square. A P-value less than 0.05 was considered statistically significant.

Results: The study population were on average 63 years old, 66.2 percent male, 20.5 percent African American, and 49.6 percent presented for PCI with an acute coronary syndrome. Clopidogrel was more commonly selected as the final maintenance therapy (71.1 percent) compared to prasugrel/ticagrelor (29.9%). A CYP2C19 genotype was obtained in 636 (70.4 percent) patients; of these, 191 (30 percent) carried 1 or 2 LOF alleles. Prasugrel/ticagrelor was prescribed in 136 of 191 (71.2 percent) LOF carriers, and 101 of 445 (22.7 percent) patients without a LOF allele. CYP2C19 genotyping testing frequency at the time of index PCI significantly declined over time from 80.6 percent (Jul-Dec 2012) to 54.9 percent (Jan-Jun 2013) and 56.4 percent (Jul-Dec 2013) (P less than 0.001). There was also a significant decrease in use of prasugrel/ticagrelor as the final maintenance therapy in LOF carriers (83.1 to 76.4 to 53.8 percent, respectively, P less than 0.001), which was accompanied by less frequent switching from clopidogrel to prasugrel/ticagrelor in LOF carriers over time (P equals 0.025). No significant difference in use of prasugrel/ticagrelor as the final maintenance therapy was observed over time in those without a LOF allele (21.3 to 19.9 to 27.4 percent, respectively, P equals 0.289).

Conclusion: Overall, CYP2C19 genotype testing frequency in patients undergoing PCI and conversion to prasugrel/ticagrelor in LOF carriers was high over 18 months following implementation a genotype-guided treatment algorithm. However, sustained use of the algorithm in practice appeared to decrease over time, as indicated by a decrease in CYP2C19 genotype testing frequency and a decrease in prasugrel/ticagrelor use in LOF carriers. These results suggest that P2Y12 inhibitor selection is complex in real-world clinical practice and influenced by multiple factors. Ongoing analyses seek to identify predictors of genotype testing and therapy selection in order to better characterize obstacles that influence algorithm sustainability.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 5a-118

Poster Title: Comparing weight perception and actual weight in pharmacy students throughout their didactic pharmacy school career

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Purpose: As of 2016, Louisiana is at the forefront of the obesity epidemic, with the highest adult obesity rate at 36.2%. High obesity rates may skew individuals' perceptions of what a "normal weight" is. As the most accessible healthcare providers, pharmacists have the opportunity to educate and motivate patients regarding their weight and health. Currently most pharmacy graduates are likely unprepared to fulfill this role. The purpose of this study was to evaluate pharmacy students' perception of weight, intentions regarding weight, and overall health as they progressed through pharmacy school.

Methods: Consenting class of 2016 students completed an Institutional Review Board approved health and wellness survey during the fall semester of the first (P1), second (P2), and third (P3) professional years. Out of seventy-three students surveyed in the first year, fifty-eight students (79% response rate) completed the survey all three years. Students were asked to describe their current weight (underweight, normal, overweight, and obese), define their intentions regarding weight, and describe their current health as poor, intermediate, or ideal in addition to recording actual weight and height.

Results: Fifty-eight pharmacy students completed the survey throughout their didactic pharmacy education. There was a statistically positive change ($p=0.03$), using repeated measures analysis of variance, in description of current weight. Intentions regarding weight, body mass index (BMI), and perception of overall health status as these students progressed through pharmacy school did not change significantly ($p>0.05$). In their first year of pharmacy school, the majority (50%-75%) of students in each BMI classification of underweight, normal,

overweight, and obese believed their current weight was “normal”. In contrast, during their second and third years, these students’ perceptions of their weight more accurately reflected their true BMI classification (p=0.03). With respect to intentions regarding weight, half of underweight first year students wanted to lose weight, as compared to underweight students in their second and third year who reported wanting to gain weight. Of first year overweight and obese students, 35% and 50% respectively, perceived their overall health status to be ideal. This percentage decreased among these particular students during their second and third year of pharmacy school.

Conclusion: The pharmacy school curriculum may play a positive role in shaping pharmacy students’ perceptions of weight, intentions regarding weight, and overall health status. Although there was a significant change in pharmacy students’ ability to perceive weight, this study identifies that there is a need to better equip students to modify their own weight and lifestyle. By incorporating this into the curriculum, students may be better prepared to influence positive weight change in their patients and enhance patient education and outcomes.

Submission Category: Infectious Diseases

Submission Type: Case Report

Session-Board Number: 5a-119

Poster Title: Oritavancin for the treatment of recurrent cellulitis

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Purpose: Oritavancin is a lipoglycopeptide antibiotic used for the treatment of acute bacterial skin and skin structure infections (ABSSSIs) caused by gram-positive microorganisms. In clinical trials, oritavancin was shown to be non-inferior to vancomycin in treating ABSSSIs. Due to its long half-life, oritavancin can be administered as a single intravenous (IV) infusion in the emergency department (ED) or an outpatient setting. This single-dose therapy can be utilized to prevent hospital admissions or expedite early discharges in select patients. However, healthcare institutions may be hesitant to use oritavancin seeing its high drug acquisition cost and not consider its impact on the overall healthcare costs. This case illustrates the clinical and economic benefits of using oritavancin in a patient with recurrent cellulitis. A 33 years old, homeless female with a history of IV drug abuse (IVDA) presented to the ED with cellulitis of her left arm. The patient had presented to our institution with ABSSSIs in the past, which included 4 ED visits and 2 admissions involving 11 hospitalized days over the last 13 months. Her last ED encounter was for the same cellulitis on her left arm one month prior to this presentation. She was admittedly noncompliant with oral antibiotics and had left a previous hospital admission against medical advice without completing her full course of IV vancomycin. Prior antibiotics given for cellulitis included cephalexin, clindamycin, doxycycline, sulfamethoxazole-trimethoprim, cefazolin, and IV vancomycin.
On presentation in the ED, the patient had a fever of 100.1 degrees Fahrenheit, but was hemodynamically stable and her laboratory values were unremarkable. No cultures were obtained and she was not deemed a candidate for oral antibiotics due to noncompliance and social issues. The patient was given a 1,200 mg dose of oritavancin for this cellulitis episode and discharged from the ED without hospital admission. Other antibiotics she received during this

visit included one dose of oral azithromycin and one dose of intramuscular ceftriaxone for suspected pelvic inflammatory disease. There were no documented adverse reactions to oritavancin. After the treatment with oritavancin, the patient did not present to our institution for 7 months. She later presented to the ED for cellulitis of a lower extremity and her previous left arm infection had resolved. A financial analysis for this patient with Medicaid insurance revealed significant losses for her diagnosis related group (DRG) 603. The cost for 11 days of hospital stay at our institution, not inclusive of any other costs, exceeds 24,000 dollars. A total of only 9,914 dollars were received as payment for her DRG including the five separate instances when she presented to our hospital with cellulitis. The overall hospital charges for this patient exceeded 100,000 dollars prior to oritavancin administration. This case demonstrates that oritavancin can be an effective and financially beneficial treatment option for ABSSSIs in select patients by decreasing the long-term healthcare costs associated with preventable hospital admissions and readmissions. Further studies are needed to evaluate the full financial benefit of using oritavancin exploring drug reimbursement and potential cost avoidance.

Methods:

Results:

Conclusion:

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5a-120

Poster Title: Pharmacist impact on medication use and prevention of adverse events in patients enrolled in home-based primary care in the El Paso Veterans Affairs healthcare system

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Purpose: Pharmacists are an under-represented discipline in the Home Based Primary Care (HBPC) team when conducting home visits with patients. Traditionally, medication changes were determined solely through the online electronic visit conducted by the pharmacist. This study looks at the impact of the Veterans Affairs Clinical Pharmacy Specialist (CPS), who has prescribing authority and monitors medication use. The pharmacist conducts an online electronic (e-visit) on all newly enrolled patients in the El Paso, TX area and then follows up with a visit in the patient's home. In the patient's home, the pharmacist directly reviews and reconciles prescription and over-the-counter medication use.

Methods: This study used a visit checklist created by the clinical pharmacy specialist for consistency in reporting all possible interventions. Some of the items included reviewing the patient's active problems, drug allergies, medications (including medical supplies), refills, fill history, medication expirations, vitals, assessment/plan which includes any added, deleted, held, or changed medications. The initial checklist reviewed patient's age, sex, race/ethnicity, number of medications, number of disease states, reason for visit, and intervention that was needed during the visit. Interventions included discontinuing medications, medications not on the patient's medication list, over-the-counter medications, expired medications, how the patient is taking his/her medications, how he/she actually takes it, and how he/she organizes their medications. All demographic information was collected for each patient and recorded in their visit checklist. A two-tailed t-test was conducted on the electronic event and home visit interventions. A one-sample t-test was conducted on the home visit data to determine significance in the increase of total interventions conducted, when the home visit was added to

the electronic visit. A P-value was set to 0.05, and a Bonferroni Correction was used to correct for the multiple comparisons of the post hoc tests.

Results: A total of 222 interventions were completed during the electronic visit for the 29 patients and an additional 346 interventions were completed during the home-visits. All patients received an electronic visit followed by a home visit. Medication problems found could have resulted in an adverse event or hospitalization. The home visit was significant for added intervention (mean of 3.5862 [SD plus or minus 2.810], P less than 0.00001) compared to the electronic visit (mean of 0.6897 [SD plus or minus 0.660], P less than 0.00001). The deleted intervention was significant for the home visit (mean of 1.5517 [SD plus or minus 3.356], P less than 0.0007) compared to the electronic visit (mean of 1.5517 [SD plus or minus 1.682], P less than 0.0007). The electronic visit was significant in the other category (mean of 1.03 [SD plus or minus 0.186], P less than 0.00001) compared to home visit (mean of 0.1034 [SD plus or minus 0.310], P less than 0.00001). Overall, the home visit was significant (mean of 11.9310 [SD plus or minus 4.847], P less than 0.0001) over the electronic visit (mean of 7.6552 [SD plus or minus 3.384], P less than 0.001).

Conclusion: Prior to this project, evidence showing the importance of the clinical pharmacy specialist making home visits was undocumented. During home visits, the pharmacist found many interventions that were missed in the electronic visit. For example, deleting duplicate medications not identified during the electronic visit or adding (non-Veterans Affairs prescribed) medications the patient was taking but not listed on their medication list. The results show that the representation of clinical pharmacy specialist in the interdisciplinary team is beneficial to the patient's health, with an increase in: added, changed, and deleted interventions with home visits versus electronic visits.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5a-121

Poster Title: Quality improvement of diabetic care of adult and pediatric patients on insulin pumps at a tertiary care center

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Purpose: Current literature suggests that the most common errors in diabetic care in a hospital setting include: patients receiving the wrong insulin; receiving the wrong dose; receiving insulin at the incorrect time; and inadequate carbohydrate adjustment. At a local tertiary care center, differences exist between insulin protocols in the pediatric and adult units for pump-using insulin-dependent diabetics. This was identified as an area of interest for improving medication safety and appropriate use of a high-risk medication like insulin. The purpose of this project was to assess protocol adherence and compare quality of diabetic care in the adult and pediatric units.

Methods: Data were retrospectively collected for 50 patients (25 adult and 25 pediatric) admitted to the hospital between January 1, 2014 and January 1, 2016. Patients were identified by an order for rapid acting insulin (lispro, aspart, or glulisine). Information collected from the patients' electronic health record included both biometric markers and protocol adherence by providers. Biometric information collected included: initial blood glucose reading and average blood glucose in the first 24 hours, blood glucose readings for the remainder of their hospital stay, and incidence of hypoglycemia (defined as a single blood sugar reading of less than 70mg/dL). Information collected to assess adherence to hospital protocol included: documentation of site assessment, orders and documentation for correction ratios, basal rates, and carbohydrate adjustment. If the patient was admitted for either hyperglycemia or diabetic ketoacidosis, data collection started once the patient was taken off IV insulin and began using pump. When appropriate, data between adult and pediatric units was compared using a Student's t-test.

Results: Site assessment was documented for 14 patients in the pediatric unit versus 2 patients in the adult unit. In the pediatric unit, appropriate ordering of basal rates, correction dosing, and nutritional dosing took place in 100%, 100%, and 96% of cases respectively and was appropriately documented in 100%, 96%, and 96% of cases respectively. In the adult unit, appropriate ordering of basal rates, correction dosing, and nutritional dosing took place in 76%, 64%, and 52% of cases respectively and was appropriately documented in 72%, 56%, and 24% of cases respectively. A total of 14 hypoglycemic events were documented among 7 adult patients and a total of 9 hypoglycemic events were documented among 6 pediatric patients. The average blood glucose reading for the entire length of stay was 185.1 mg/dL (standard deviation equals 50.6) for the adult unit and 183.5 mg/dL (standard deviation equals 56.4) (p equals 0.457) for the pediatric unit.

Conclusion: Adherence to hospital protocol in documenting site assessment is higher in the pediatric unit than the adult unit. Numbers of appropriate orders and documentations for basal rates, correction doses, and carbohydrate adjustment were higher in the pediatric setting than the adult setting. Numbers of patients experiencing hypoglycemia were similar between the adult and pediatric units, but numbers of individual incidents of hypoglycemia were higher in the adult unit. There was no significant difference between the adult and pediatric units for average blood glucose during the entire length of stay, within the first 24 hours, or after the first 24 hours.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5a-122

Poster Title: Tolerance of intravenous iron dextran at a single academic facility

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Purpose: Intravenous low-molecular weight iron dextran is indicated for patients with iron deficiency who are unable to take oral iron or experience insufficient efficacy with oral replacement. Adverse effects have been reported, including anaphylaxis and death. Much of the reported clinical experience with this product is derived from use in patients undergoing dialysis. The primary purpose of this study was to determine the proportion of patients experiencing adverse reactions in a wide range of patients and to categorize the types of reactions experienced. The second purpose was to provide insight into the potential factors that contribute to reactions to iron dextran.

Methods: This is a retrospective study evaluating patients receiving intravenous iron dextran hospitalized at a single academic medical center between July 1, 2014 and July 31, 2015. Baseline demographics, concurrent steroid use, premedications, date/time of test dose and infusion, dose of infusion, reactions to test dose and/or infusion, and allergies were collected. The primary outcome was the proportion of patients experiencing adverse reactions. Anaphylaxis was characterized by sudden onset of respiratory difficulty, such as respiratory distress, and/or cardiovascular collapse. Cardiovascular reactions included hypertension, hypotension, chest pain/tightness, tachycardia, and/or flushing. Dermatologic reactions included pruritus. Gastrointestinal reactions included nausea and/or vomiting. Musculoskeletal reactions included myalgia, backache, and/or local phlebitis. Neurologic reactions included headache, chills, and/or dizziness. Respiratory reactions included shortness of breath. Patients were segregated based on presence of adverse reaction, and differences in baseline characteristics were assessed.

Results: Final analysis included 406 patients. Reactions to the test dose or infusion were reported in 11 (11/406=2.7%) and 21 patients (21/406=5.2%) respectively. Reported reactions were cardiovascular (13/406=3.2%), musculoskeletal/soft tissue (8/406=2%), gastrointestinal (6/406=1.5%), neurological (6/406=1.5%), dermatologic (2/406=0.5%), and/or respiratory (3/406=0.7%) in nature and treatable with diphenhydramine, acetaminophen, oxycodone, ondansetron, methylprednisolone, metoprolol, famotidine, and/or epinephrine. Respiratory distress was noted in two patients (2/406=0.5%). Of the patients experiencing a reaction from the test dose, 4 patients received an infusion dose. Of these, 2 patients (2/4=50%) experienced a reaction. Premedications, including methylprednisolone (10/406=2.5%), diphenhydramine (7/406=1.7%), and acetaminophen (2/406=0.5%) were administered to a total of 17 patients (17/406=4.2%), and adverse reactions were reported in 3 of these patients (3/17=17.6%). Use of daily steroids, including prednisone (202/406=49.8%), dexamethasone (1/406=0.2%), methylprednisolone (1/406=0.2%), or hydrocortisone (1/406=0.2%), was reported in a total of 205 patients (205/406=50.5%) with 16 patients (16/205=7.8%) experiencing an adverse reaction. Overall, the patients who experienced reactions to iron dextran were younger (49.8 years v. 55.8 years), and a greater proportion were male (59.4% v. 52.9%) and Caucasian (62.5% v. 58.3%). Patients experiencing reactions also reported fewer allergies with 71.9% reporting 0 or 1 allergy compared to 66.6% of those not experiencing reaction.

Conclusion: Although adverse reactions occurred, life-threatening reactions were rarely reported in this population. The low incidence of anaphylaxis supports that iron dextran is a safe option for treating iron deficiency. Daily steroid use may be associated with decreased incidence of adverse reactions. Increased incidence of adverse reactions may be correlated with younger, male, and Caucasian patients. This study indicates that an increased number of reported allergies does not correlate with an increased risk of adverse reactions.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5a-123

Poster Title: Increasing smart pump compliance in a tertiary teaching hospital

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Purpose: The Alaris smart pump is a computerized device used to infuse intravenous (IV) medications. Smart pumps have two modes, Guardrails or basic infusion. Guardrails is a software program that sets hard and soft limits for rates and volumes for a library of medications, thereby preventing medication administration errors. The medication safety committee at the Banner University Medical Center - South (BUMCS) identified low compliance with using Guardrails as a serious problem. The problem was approached by identifying the reasons why compliance was low, and then conducting training sessions for nurses to change attitudes and practices surrounding smart pumps and Guardrails.

Methods: Data was collected from the Continuous Quality Improvement (CQI) reporter in Guardrails at BUMCS for September 2015. The overall compliance was 83 percent using Guardrails, vs. 17 percent using basic infusion. The medication safety committee determined that the target compliance rate was 90 percent or higher. Next, a survey was created and administered to discover nurses' attitudes and practices towards using the software. The survey was administered using paper copies given to 81 total nurses in several units, including the intensive care unit (ICU), the emergency department (ED), and the medical/surgical unit, by pharmacy students in person during work hours at the hospital. Survey results were summarized in order to create a targeted, site-specific training session for nurses on several units at BUMCS. The training, which was given at eight different nursing staff meetings around the hospital in January, included real examples of how using Guardrails has helped nurses avoid medication administration errors, a discussion of the current compliance rate and the goal compliance rate, technical instruction on how to find various medications within Guardrails,

and hands-on practice with actual smart pump units. A total of 77 nurses were educated at these training sessions. Finally, compliance data was collected for March 2016 from the Guardrails CQI reporter, and the September 2015 rate vs. March 2016 were compared using chi-square.

Results: The survey results from January showed that the majority of nurses surveyed (42 percent of 81 nurses) received lecture-based training about smart pumps without a hands-on component. Sixty six percent of nurses felt that their training was adequate. Forty eight of 81 nurses surveyed said that their top reason to not use Guardrails was because the drug was not in the library. Nurses' survey results from January 2016 revealed that many nurses (20 of 81) were not using Guardrails to infuse IV fluids including electrolytes, lactated ringers solution, fluids and fluid boluses.
Our intervention focused on teaching the nurses on how to find drugs in the system and most importantly be able to navigate through the Alaris smart pump's different fluids with ease. In September of 2015, 83 percent of the 15,120 total infusions were administered using Guardrails, while 17 percent were done using the basic infusion function. In March 2016, during the post-intervention time period, 90 percent of the 8,432 total infusions were completed using Guardrails and 10 percent with basic infusion. The 7 percent increase in compliance was statistically significant (p is less than 0.001).

Conclusion: Guardrails can protect the patient and the hospital from IV medication administration errors. The better compliance there is, the more protection Guardrails can provide. The data suggests that a site-specific, hands-on educational intervention for nurses can be an effective way to increase compliance with Guardrails. The percent compliance may have increased even more if the training had been provided to all nurses using smart pumps, and also if more than 10 minutes had been allotted for the training sessions. Another important way to increase Guardrails compliance is to ensure that the drug library in Guardrails is constantly updated.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 5a-124

Poster Title: Incidence of hypoglycemia in burn patients: A focus in process improvement

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Purpose: Glycemic control in burn patients is difficult due to altered processes and physiological responses to insulin in the body. Recommendations for goal blood glucose have changed over time for intensive care patients, and evidence exists to suggest benefit for a different target in thermal injury. It was previously thought that a more strict intensive insulin therapy improved morbidity and mortality, but it has been shown to increase incidence of hypoglycemia and mortality. This study was conducted in a single southeastern United States burn center to assess the incidence and outcomes of hypoglycemia during continuous insulin infusions (CII).

Methods: This study was a retrospective, single center, electronic chart review conducted with institutional review board approval. All patients admitted to the burn unit between January 1, 2013 and October 31, 2014, who received a continuous insulin infusion (CII) were included. Patients with incomplete data or who received less than 24 hours of CII were excluded. Data was collected using the institution's electronic medical record system. SigmaPlot 11.2 was used for data analysis. Univariate analysis was used to compare patients with and without hypoglycemia. Independent variables with a p less than or equal to 0.1 were included in a multivariable logistic regression. During regression modeling, p less than 0.05 was considered significant. Nominal data were analyzed by Fisher's exact test. Continuous variables were compared using either Mann-Whitney U test or t-test, depending on normal distribution. Shapiro-Wilk test was used to test for normal distribution. Analysis of variance was utilized to compare glucose variability between scales.

Results: During the study period 38 patients met inclusion criteria with 6 being excluded. The average patient was a 52-year-old Caucasian male, weighing 95 kg with a 33 percent TBSA burn, and an APACHE II score of 20. Hypoglycemia was present for 87 of 6540 hours of CII therapy (1.1 percent). Two thirds experienced a serum glucose less than 70 mg/dL and half less than 60 mg/dL. The most common assessed reasons for the hypoglycemic episodes were protocol violations and glucose variability. Patients with hypoglycemia (less than 60 mg/dL) were older, had a history of diabetes, lower albumin and serum creatinine, longer CII duration and length of stay, and lower average carbohydrate intake. After multivariable logistic regression, only history of diabetes remained a statistically significant risk factor with an odds ratio of 15.4 (95 percent CI: 2.5, 95.1). Four different CII scales were prescribed. A modified scale for renal failure (Scale 1) reduced the amount of renal failure patients experiencing hypoglycemia from 91 percent to 62 percent. All scales had high glucose variability as assessed by hours per day within goal range. Scales 0 and 3 had lower rates of hypoglycemia, but also lower time within the goal range.

Conclusion: The overall rates of hypoglycemia, blood glucose variability, and protocol violations raise concerns about the scales in use during the time period of the study. Education to increase protocol adherence is unlikely to achieve adequate control, as evidenced by the high percentage of patients with large drops in glucose in absence of protocol violations. The amount of different scales in use with varying protocols likely contributed to protocol violations. Our data together with nursing feedback and updated glucose targets demonstrate the need to create and consolidate usage to a single scale in attempts to improve glycemic control.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5a-125

Poster Title: Analysis of projected costs and savings associated with the establishment of a heart failure clinic

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Purpose: Heart failure currently affects 5.1 million people in the United States alone and accounts for a large amount of hospital readmissions every year. The Center for Medicare and Medicaid Services penalizes hospitals for 30-day readmissions, costing hospitals thousands of dollars every year. The overall purpose of this retrospective, quality improvement project was to determine the frequency of 30-day readmissions for congestive heart failure at Banner University Medical Center South and compare the costs of these readmissions to the projected costs of opening a clinic.

Methods: Information regarding 30-day readmissions for congestive heart failure patients over a 6-month period was gathered using the Banner University Medical Center South electronic health record database. Using these numbers, we extrapolated to a 12-month period and found an estimated annual cost of 30-day readmissions using cost information acquired from the hospital's finance department. We then estimated the costs of opening and running a heart failure clinic where patients may go during an acute exacerbation. We used a conservative estimate that the clinic could prevent roughly 30% of the current 30-day readmissions at Banner University Medical Center South and calculated how much money this reduction in readmissions could potentially save. A flow chart comparing the costs of readmissions to the projected costs of a congestive heart failure clinic was completed.

Results: Between April 2015 and September 2015, 10 of 43 patients at Banner University Medical Center South were readmitted within 30 days due to congestive heart failure exacerbation, with one patient being readmitted twice (number equals 11). The average length of stay per patient was 3 days, at 2,100 dollars per day (6,300 dollars per patient per 3 day stay) according to the hospital's finance department. Through the extrapolation of our patient data to a 12-month period, it was found that readmissions cost the hospital approximately 138,600 dollars per year. Using a conservative estimate that the clinic could prevent roughly 30 percent of readmissions, it was found that the number of readmissions could be reduced by 6.6, which was rounded to 7 people. The cost of 7 readmissions would be 44,100 dollars, which was used as the reduction in cost due to the potential heart failure clinic. We then subtracted the estimated cost of the clinic, which was 12,456 dollars, from the estimated savings of preventing 7 readmissions. This gave an overall savings of 31,644 dollars.

Conclusion: The most cost effective option for Banner University Medical Center South is to have patients visit a congestive heart failure clinic to receive care and counseling instead of being readmitted for every acute exacerbation. By preventing roughly 30 percent of readmissions (7 people), an estimated 31,644 dollars in hospital costs could be saved yearly. While this estimate appears marginal, an expansion of the clinic across multiple facilities may result in an increase in savings. Additionally, the clinic carries the ability to improve health and social outcomes for heart failure patients. Limitations include limited patient data and time frame.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5a-126

Poster Title: Antibiotic prescriptions on discharge from hospital to long-term care

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Purpose: The Centers for Medicare and Medicaid Services (CMS) recently proposed to require long-term care facilities (LTCFs) to develop antibiotic stewardship programs. The prevalence of antibiotic prescribing on discharge from acute care to LTCFs will clearly impact these processes; however this has not previously been well-described. In this study, we aimed to quantify the frequency and characteristics of patients prescribed antibiotics on discharge from acute care to LTCFs. We hypothesized that patients with evidence of an infection or receiving antibiotics on the index admission would be more likely to be prescribed antibiotics on discharge compared to patients without these exposures.

Methods: This was a retrospective cohort study examining the frequency of antibiotic prescriptions among adult (age ≥ 18 years old) inpatients discharged from Oregon Health and & Science University (OHSU) Hospital to a LTCF between February 1, 2012 and January 31, 2015. Prior to study commencement, the OHSU Institutional Review Board approved this study and granted a waiver of informed consent. We utilized discharge disposition data from the OHSU Department of Care Management and demographic, diagnosis, laboratory, and pharmacy data from a repository of patients' electronic health records. Our primary outcome of interest was receiving an outpatient prescription for systemic antibiotics on discharge to a LTCF. Our primary exposures of interest were evidence of bacterial infections or receiving antibiotics on the index hospital admission. Evidence of a bacterial infection was defined as having both a positive clinical culture for a bacterial organism AND an International Classification of Diseases, version 9 (ICD-9) diagnosis code for a bacterial infection. Descriptive statistics including means, standard deviations (SD), medians, and interquartile ranges (IQR) were calculated. Odds ratios

(ORs) and 95% confidence intervals (CIs) were used to quantify the relationship between our exposures and outcomes of interest.

Results: There were 4,457 adult discharges to LTCFs during the study period. Mean (SD) age was 68.7 (14.3) years and 49.6% were male. Median (IQR) inpatient length of stay was 7 (4-12) days. Approximately 28.6% of patients had an outpatient antibiotic prescription on discharge of which 25.7% had >1 antibiotic prescription. The most frequently prescribed antibiotics were fluoroquinolones (17.8%), cephalosporins (17.6%), and penicillins (15.3%). Among patients who had an outpatient antibiotic prescription on discharge, 52.3% had evidence of an infection and 96.5% received antibiotics on the index admission . Patients with evidence of a bacterial infection on the index admission were significantly more likely to receive an outpatient antibiotic prescription on discharge to LTCFs (OR = 9.9, 95% CI = 8.4 to 11.6). Similarly, patients who received antibiotics during the index admission were significantly more likely to receive an outpatient antibiotic prescription on discharge to LTCFs (OR = 16.7, 95% CI = 12.3 to 22.7). Approximately 39% of patients discharged to LTCFs were readmitted to the hospital within 30 days of discharge.

Conclusion: These data suggest that a large proportion of patients discharged from acute care to LTCFs receive outpatient prescriptions for antibiotics. In addition, although receiving a prescription for antibiotic on discharge to LTCFs was associated with evidence of an infection on the index hospital stay, only 52% of patients who received an antibiotic prescription had evidence of an infection. These results may have important implications for the proposed CMS antibiotic stewardship requirements in LTCFs. Our future studies will aim to better understand how this high prevalence of antibiotic prescribing on discharge affects antibiotic prescribing and resident outcomes following LTCF admission.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 5a-127

Poster Title: Texting and educating on lifestyle therapy: a pilot study in a Spanish-speaking population in North Carolina

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Purpose: Access to mobile phones is becoming commonplace as technology becomes widespread for Americans. This study evaluated the effectiveness of using cellular communication as a means of enhancing health outcomes in a community outreach program connected with a Spanish language mass in a Catholic church in North Carolina. Patients received biweekly text messages containing cardiovascular lifestyle modification recommendations. The primary objective of this study was to determine if a text messaging program impacted participants' blood pressure and confidence in managing their health. Interest in continuing the program beyond the study was a secondary outcome.

Methods: Participants for this Institutional Review Board-approved prospective cohort study were recruited via weekly announcements in a Spanish language mass during a six-week period. Inclusion criteria were age 18 years or older, owning a mobile phone with unlimited text messages, and informed consent. Participants completed a 7-item, investigator-developed survey. Survey items included age, gender, cardiovascular-related medical conditions, preference for English or Spanish messages, difficulty understanding medical conditions (1-5 scale, with 1 indicating never and 5 indicating always), needing help reading prescriptions (1-5 scale, with 1 indicating never and 5 indicating always), and confidence in managing health (1-10 scale, with 10 indicating most confident). Investigators performed blood pressure assessment for each participant. Participants received two messages per week focused on personalized cardiovascular lifestyle modifications for 20 weeks. At study conclusion, participants completed a 6-item follow-up survey including 3 prior questions regarding difficulty understanding medical

conditions, help reading prescriptions, and confidence in managing health, plus 3 new questions regarding frequency of reading text messages (1-3 scale, with 1 indicating never and 3 indicating always), helpfulness of text messages (1-10 scale, with 1 indicating not helpful and 10 indicating very helpful), and interest in continuing to receive messages. Post-intervention blood pressures were performed by investigators. Survey questions with scaled responses were assessed with the Siegel-Tukey test. Blood pressure readings were assessed using Wilcoxon signed ranks test.

Results: In total, 33 persons enrolled; 1 person withdrew. Of the 32 participants, 31 persons received Spanish-language messages. Baseline survey was completed by 32 participants; 21 (43 percent) were female with an average age of 48 years. Self-reported cardiovascular risk factors included 8 (25 percent) with type 2 diabetes, 7 (22 percent) with hypertension, and 9 (28 percent) with hyperlipidemia. Follow-up survey was completed by 7 persons (25 persons were lost to follow-up). Median rated difficulty understanding medical conditions remained 2 pre- and post-intervention (5 indicating always). Median baseline score of needing assistance reading prescriptions was 2 and increased to 3 post-intervention (5 indicating always). Median score in confidence managing health remained 7 pre- and post-intervention (10 indicating most confident). Average baseline systolic blood pressure was 131 mmHg, which decreased to 118 mmHg (mean difference -13 mmHg, p equals 0.06). Average baseline diastolic blood pressure was 79 mmHg, which decreased to 78 mmHg (mean difference -1 mmHg, p equals 1). Median score in how often messages were read was 3 (3 being always). Median score in helpfulness of the messages was 9 (10 indicating very helpful). A total of 6 persons (86 percent) expressed desire to continue receiving text messages.

Conclusion: This pilot study notes the positive benefits of implementing a texting intervention designed to improve blood pressure control and confidence in managing health in a Spanish-speaking population in North Carolina. Although there were no differences in confidence measured pre- and post-intervention, participants ranked the messages 9/10 in terms of helpfulness. For a population in which 22 percent of individuals have hypertension, a decrease in systolic blood pressure from a pre-hypertensive to a normal range exemplifies the potential benefits of text messages that reinforce lifestyle changes.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 5a-128

Poster Title: Sustainability of an antimicrobial stewardship program (ASP) to reduce antibiotic prescribing in children admitted to the hospital for asthma

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Purpose: Antibiotics are generally not recommended during an asthma exacerbation; however, they continue to be prescribed in children. When antibiotic use is not indicated, unjustified use may lead to antimicrobial resistance, adverse reactions, and increased health care costs. The American Academy of Pediatrics (AAP) set a benchmark for unjustified antibiotic prescribing at 6.6 percent. In 2015/2016, we implemented an antibiotic stewardship program at our institution to change prescribing behaviors. The program reduced unjustified antibiotic prescribing from 8.7 to 4.9 percent. The purpose of this study was to observe whether our ASP was able to sustain this reduction in antibiotic prescribing.

Methods: This study was exempt from Institutional Review Board approval. This was a concurrent chart review of antibiotic use in pediatric patients admitted for asthma at our institution. Included were children 6 months to 19 years who were admitted for an asthma exacerbation. Patients with any underlying diseases such as muscular dystrophy, cerebral palsy, or complement deficiency were excluded from the study. Data collection included patient demographics, length of hospital stay, 7-day readmission rates, maximum temperature at home and during the first 24 hours of admission, prior antibiotic or steroid use within 7 days of admission, culture results, complete blood count and differential, lactate levels, and antibiotic prescribed, including name, dose, frequency, route of administration, number of doses, and diagnosis for use. Antibiotics were justified if used for: 1) Empiric antibiotic therapy for a high suspicion for infection, such as elevated neutrophil, band or white blood cells counts along with fever, or an elevated lactate level or 2) the treatment of a documented infection, including pneumonia or other infections. Data were analyzed for the unjustified rate of antibiotic use and the rate of 7-day readmission.

Results: From February to September 2016, we enrolled 47 pediatric patients in this study. Ages ranged from 10 months to 19 years (mean = 6.2 years, CI: 5.9-7.4), and 64 percent were male. One patient was excluded due to cerebral palsy. The average length of stay was 3.6 days (CI: 2.9-4.3). In 21 patients, after being admitted for asthma exacerbation, sepsis was ruled out and in 3 children urinary tract infections were ruled out. Ten patients received antibiotics (21.3 percent) and of those, 3 were unjustified (6.4 percent). Of the antibiotics prescribed, 7 children received ceftriaxone, 3 azithromycin, 2 amoxicillin, 1 levofloxacin, and 1 tobramycin. There was an average of 1.7 doses administered (CI: 1.3- 2.1) and an average of 3 days (CI: 2.5-3.5) of antibiotic exposure. Nine patients previously received antibiotics within 7 days of admission to the hospital and of those, 5 continued to receive antibiotics after admission (55.6 percent). Of 11 patients who received steroids within 7 days of admission, 1 patient received antibiotics (9.1 percent). One patient was readmitted within 7 days of being discharged home. The patient was originally diagnosed with parainfluenza virus and given azithromycin and cephalexin, but was readmitted with a diagnosis of pneumonia.

Conclusion: Over the course of eight months, our children's medical center continued to be successful in sustaining the reduction in unjustified antibiotic prescribing in children admitted for asthma exacerbations. Our rates of unjustified use continued to fall below the expectations set by the AAP. Long-term effects of sustaining this improvement is expected to help reduce antibiotic resistance and the development of adverse reactions related to antibiotic prescribing in children.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Evaluative Study

Session-Board Number: 5a-129

Poster Title: Comparing the time for nursing administration of inhaler treatments vs nebulized treatments in patients with COPD at Rochester General Hospital

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Purpose: Chronic obstructive pulmonary disease (COPD) exacerbations commonly lead to hospital admissions in the United States. Multi-dose inhalers have up to a month's supply of medication, and at times cost over $200 per inhaler, are frequently ordered then discarded after a 3-4 day admission. The purpose of this Investigational Review Board approved study was to determine if using single-dose nebulized treatments instead of inhalers would negatively impact nursing administration time at Rochester General Hospital (RGH), a 528 bed community hospital. Earlier work suggested the cost savings in using nebulized medications in place of inhalers could save RGH over $450,000 annually.

Methods: In May 2016 RGH Pharmacy Interns collected the time that nurses were directly involved with inhaler administration on one surgical floor and one medical floor. Time was recorded while nurses obtained the inhaler from the floor's automated dispensing machines (ADM), prepared, administered, and documented the treatment. A stopwatch was utilized to collect time during direct involvement, and was paused if the nurse performed other functions unrelated to the administration of the inhaled medications. In June 2016 new orders for inhalers on the same surgical and medical floor were changed to nebulized treatments as approved by the Pharmacy and Therapeutics Committee for this project. Nurses at RGH were already familiar with administering nebulized treatments. A pharmacy resident prepared a compatibility chart that was provided for nurses, indicating which nebulized solutions could be mixed together and inhaled simultaneously. Data was collected during morning administrations for both inhaler and nebulizer therapies. Times were rounded to the nearest minute.

Results: Thirty-one inhaler administrations were observed. All 31 samples came from patients who were prescribed fluticasone-salmeterol or umeclidinium for COPD. The mean time was 4 minutes for administration. Nurses spent time locating the inhaler, which was frequently not stored in the ADM in opposition to hospital policy. There were instances where the inhalers could not be found and replacement inhalers were dispensed. Thirty-six nebulized treatments were observed after the Pharmacy & Therapeutics Committee approved change. Data came from administrations of ipratropium-albuterol, budesonide, and albuterol nebulizer treatments. The mean time was 2 minutes for nurses to obtain, administer, and document the treatments. Nine samples came from administrations where two nebulized medications were mixed and given at the same time. Nebulized medications were consistently stored in the ADMs. Nurses did not stay in the patient's room during treatment unless they were attending to other tasks.

Conclusion: Using nebulized treatments in place of inhalers for admitted patients with COPD did not present a negative impact on the time nurses needed to administer the treatment. Further review of primarily using nebulized treatments for inpatients with COPD can move forward at RGH. In addition to saving time, this represents a cost savings of which a portion could be used to hire Respiratory Therapists to educate patients prior to discharge on the proper use of inhalers at home, along with assuring the proper discharged inhaler is being ordered for the patient's need and insurance coverage.

Submission Category: Pharmacy Law/ Regulatory/ Accreditation

Submission Type: Descriptive Report

Session-Board Number: 5a-130

Poster Title: Trends associated with the Office of Prescription Drug Promotion warning letters for advertising and promotion (2000-2016)

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Purpose: One of the issues with the Office of Prescription Drug Promotions' regulations of pharmaceutical advertising and promotion is the fact that only a small portion of all advertisements and promotions are reviewed. This is especially a concern for direct-to-consumer advertisements where the potential for exposing consumers and patients to misleading information is a risk. We evaluated the trend of Office of Prescription Drug Promotion warning letters to gain insight on the areas of focus from the Office of Prescription Drug Promotion.

Methods: The Office of Prescription Drug Promotion periodically issues warning letters for misleading promotional and advertisement content created by pharmaceutical companies. All the warning letters publicly issued by the Office of Prescription Drug Promotion on their website from 2000 to 2016, totaling 336 warning letters, were reviewed and categorized as relating to either direct-to-consumer or promotional content. Then, the most frequent forms of advertisement and promotion that appeared in the warning letters were identified and defined by percentage, to the total number of warning letters from 2000 to 2016. The most commonly occurring forms of advertisement and promotion were then individually analyzed by yearly frequency to determine any trends.

Results: There are various forms of promotion and advertisement used by pharmaceutical companies. The most common forms of promotion that target healthcare professionals include brochures, sales aids, professional journals, and convention exhibits while the most common forms of advertisements that target consumers and patients include websites, brochures, print advertisements, and television advertisements. From 2000 to 2016, the ratio of warning letters,

related to direct-to-consumer advertising, to the total number of warning letters remained relatively consistent (approximately 50 percent). The total number of warning letters fluctuated without any correlation. The yearly percentage of warning letters related to website advertisement and promotion has an increasing trend. The yearly percentage of warning letters related to print advertisement has a decreasing trend. The number of warning letters related to television advertisements has a decreasing trend. The number of warning letters related to convention exhibits has a decreasing trend. In addition, the number of warning letters related to professional journal promotions has a decreasing trend as well.

Conclusion: Direct-to-consumer advertisements make up approximately 50 percent of all warning letters issued by the Office of Prescription Drug Promotion from 2000 to 2016. The main areas of focus for warning letters include sales aids, websites, print advertisements, television advertisements, and convention exhibits. With the growth of the internet in the past decade, there have been increases in warning letters associated with website advertisements and promotions and decreases in warning letters related to print advertisements, professional journal promotions, convention exhibit promotions, and television advertisements. Additional research is needed to evaluate these changes as they are related to market forces.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 5a-131

Poster Title: Efficacy and safety of various abuse deterrent formulations on the prevention of inappropriate use of oxycodone: a systematic review

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Purpose: Opioid abuse is a major public health issue that has been growing in the past decade throughout the United States. One of the most highly abused opioids is oxycodone. Oxycodone is widely accessible and easily manipulated to increase euphoria. The purpose of this systematic review is to evaluate the efficacy and safety of opioid-deterrent formulations on reducing opioid abuse and identify gaps in current knowledge of the effectiveness of formulations. Specifically, the study compared current abuse deterrent formulations to educate prescribers, pharmacists, and patients about innovative strategies to prevent abuse.

Methods: A systematic review was conducted via randomized controlled trials published in English, performed in North America, conducted within the past 5 years and studied abuse deterrent formulations of oxycodone. Three abuse deterrent formulation categories were analyzed from the studies: opioid antagonist formulations, formulation technology and aversive excipient formulations. The 12 studies included in the systematic review evaluated one or more abuse deterrent formulation categories that were compared to the original oxycodone formulation or a placebo. Subjects included in the studies were either patients that use oxycodone to treat chronic pain or recreational users of oxycodone. Three reviewers conducted the systematic review for quality assurance. The systematic review was conducted through Pubmed, MEDLINE, clinicaltrials.gov, Cochrane Database of Systematic Review, and Cochrane Central Register of Controlled Trials (CENTRAL). A ranking system was utilized in comparing the adverse event profile and efficacy of reducing opioid abuse with 1 indicating the preferred formulation and 3 being the undesired formulation. The ranking was performed individually by 3 reviewers to increase the inter-rater reliability.

Results: The majority of abuse deterrent technology analyzed demonstrated potential to decrease the abuse of opioid analgesics and had similar efficacy results; however, their safety profiles and types of abuse they prevented differed. Aversive excipient formulations with niacin is efficacious in preventing opioid abuse, however, it has a high incidence of adverse effects. Studies showed that 98-100% of patients experienced treatment-emergent adverse effects with aversive excipient formulations. Medications formulated with opioid antagonists such as naloxone or naltrexone have been found to be relatively efficacious in preventing abuse, particularly by non-oral routes such as intravenous injection and intranasal inhalation. These medications have similar safety effects as currently FDA approved opioid analgesics. However, the use of opioid antagonist formulations is limited among patients who have trouble swallowing or requiring the use of a feeding tube for medication administration. Formulation Technology demonstrated efficacy and a significant reduction in opioid abuse, while maintaining a similar adverse event profile to oxycodone alone. Crushed formulation technology products maintained the desired pharmacokinetics thus lowering the likelihood of illicit use by crushing. Consequently, this allowed these medications to be available for patients who have trouble swallowing or require gastric tube for medication administration.

Conclusion: Based on the results of the systematic review, opioid antagonists are efficacious in preventing abuse; however, they are more successful in preventing abuse via non-oral routes such as intravenous or intranasal routes. Formulation technology prevents opioid abuse by oral route and non-oral routes of administration and has a safety profile similar to currently approved opioid analgesics. Aversive excipient formulations demonstrated significant abuse prevention but had adverse events in nearly all patients. Formulation technology demonstrated the best efficacy in reducing opioid abuse potential while maintaining a much lower incidence of adverse effects than aversive excipient and opioid antagonist formulations with oxycodone.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5a-132

Poster Title: Assessment of medication safety labeling risk factors present on investigational drugs

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Purpose: The Food and Drug Administration (FDA) does not currently regulate investigational drug labels, making them highly susceptible to contain Institute for Safe Medication Practices (ISMP)-identified labeling safety risk factors. This study quantified the incidence of ISMP-identified labeling risk factors present on investigational drugs managed by the University of Michigan Health System Research Pharmacy (UMHS-RP). The intent was to validate the presence of risk factors identified by ISMP in 2007 and to determine the need for further guidance from the FDA on investigational drug labeling.

Methods: The UMHS-RP electronic inventory system was used to identify investigational drugs managed by the service at the start of the study. Investigational drugs that were already commercially available, out-of-stock at time of evaluation, or required non-sterile compounding such as over encapsulation were excluded. For drugs with multiple strengths, only one strength was included. Data was collected between June 15th and July 31st of 2016. For each included drug, packaging and labeling were assessed via a data collection form containing the factors identified by ISMP. Broad categories of factors assessed included drug naming conventions; drug labeling, content, and formatting; drug packaging; and expiration dating. For quality assurance, a sample of 20% of data forms were reviewed for accuracy by a second reviewer. For each risk factor, the percent of drugs evaluated that were positive for the factor was calculated. Sub-analysis by study phase, study sponsor, and study design was also completed to identify any notable trends.

Results: At the start of the study, the initial data extract contained 1138 drugs. Of these,158 met criteria for inclusion in the analysis. Over 90% of drug labels contained the drug name, drug strength, and dosage form. The average label font size was 8.8 points, compared to the ISMP-recommended font size of 12 points. Less than 30% of drugs used font size or otherwise differentiated drug name and strength from other label content. Seventy-percent of proprietary names were comprised of letters and numbers only (i.e. not a generic name). Over half (52%) of the protocol identifiers contained look-alike, sound-alike portions that were present with other protocols managed by UMHS-RP. Only about half (54%) of all drug labels contained an expiration date. Most notable trends were related to the phase of the study. Compared to Phase I studies, Phase III studies were more likely to have an expiration date present (33% vs. 86%), protocol number present (42% vs 94%), and additional languages other than English present (31% vs 80%).

Conclusion: Despite recent and increased attention on unsafe labeling practices of investigational drugs, these results show that there still exist significant rates of known labeling risk factors regardless of the study phase, design, or sponsor. Stronger regulations or recommendations must be set in place by the FDA in order to reduce the presence of risk factors on investigational drugs and improve the safety of their use in patients enrolled in clinical trials.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 5a-133

Poster Title: Assessing patient comprehension of step-by-step proper inhaler use

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Purpose: Inadequate inhaler use can often lead to exacerbations and increased hospitalization. Education on proper inhaler use is a vital component to promote patient adherence, prevent exacerbations and increase overall quality of life. This study was designed to assess inhaler use and determine whether patients could demonstrate the correct steps to ensure proper administration.

Methods: Student pharmacists enrolled at MCPHS University on a six week ambulatory care Advanced Pharmacy Practice Experiential (APPE) rotation, evaluated patients on how they use their inhaler. Criteria for the study included the following; English-speaking patients, 18 years of age or older, on active inhaler medication listed on the electronic medical record, and informed patient consent. Standardized forms were created for each inhaler citing each step as recommended by the manufacturer. An intake form gathered the following information; diagnosis for inhaler use, name and strength of inhaler, dose/frequency, inhaler duration, who taught inhaler use, compliance, spacer use/cleaning, priming, expiration dates, and whether they performed all steps correctly. Student pharmacists educated patients when improper inhaler use was identified. This study was approved by the MCPHS University Institutional Review Board (IRB).

Results: A total of 14 patients (50% female, 50% male) were assessed regarding their inhaler use. The average patient age was 54 years old, 64.28% were Caucasian and 21.43% were Hispanic. Eighty-two percent were diagnosed with asthma and 18% were diagnosed with COPD. Seventy-six percent of patients were taught how to use an inhaler by a provider (38%) or nurse (38%), while 24% were self-taught. None of the patients reported being educated on how to

use their inhaler by a pharmacist. Based on the overall collected data, 38.19% of patients did not perform all inhaler steps correctly and were diagnosed with asthma; 75% or both asthma and COPD; 25%. The majority of errors; 75% were associated with albuterol inhalers. Of the patients who were prescribed inhalers that required priming, 38.88% of patients performed priming before administration. One hundred percent of the patients who reported priming, performed priming correctly. Thirty three percent of patients regularly checked the expiration date on their inhalers.

Conclusion: This study highlighted areas of concern around proper inhaler use, specifically with rescue inhalers which can have an impact on asthma and COPD, leading to increased exacerbations, doctor visits and hospitalizations. A greater need for patient education is necessary when dispensing inhalers as revealed by the research. Pharmacists are the most accessible providers, are knowledgeable in medication use and are often one of the last health care providers a patient comes in contact with before starting their inhaler. Patient counseling by pharmacists on every new inhaler may help increase adherence and decrease exacerbations.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5a-134

Poster Title: Neonatal abstinence syndrome prevention behaviors among primary care prescribers, buprenorphine prescribers, and pain management clinic directors

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Purpose: Neonatal abstinence syndrome (NAS) is a growing public health concern in the United States, and particularly so in Tennessee. Despite prescribers' acknowledgement of the importance of NAS prevention, very little is known about prescribers' NAS prevention behaviors. The objective of this study was to evaluate opioid prescribers' NAS prevention attitudes, subjective norm beliefs, perceived behavioral control beliefs, and behaviors.

Methods: A survey instrument was developed using Tennessee-specific chronic pain guidelines as a resource for question content and the theory of planned behavior (TPB) as a theoretical framework. The survey instrument assessed how often a prescriber would engage in prevention across 15 distinct behaviors. For each behavior, a total of 12 items measured prescribers' attitudes, subjective norm beliefs, and perceived behavioral control beliefs. TPB items were responded to using a 7-point scale with appropriate response anchors. A random sample of 100 primary care physicians (PCPs), 100 DATA-waivered buprenorphine prescribers (BUP), and 100 pain management clinic directors (PMC) comprised the sampling frame. The survey was administered using the Tailored Design Method and took place between December 2014 and February 2015. Data were analyzed using SPSS version 22.

Results: A total of 41 usable responses were obtained. Primary care prescribers engaged in NAS prevention behaviors less often than buprenorphine prescribers and pain management clinic directors. Given 10 female patients of child bearing age prescribed a prescription opioid for greater than 7 days, PCPs indicated they would discuss the risk of NAS with 5.8 patients (PMC,

8.6 BUP, 7.0), discuss a birth control plan with 5.7 patients (PMC, 7.5 BUP, 8.2), recommend long acting reversible contraception (LARC) to 3.7 patients (PMC, 6.4 BUP, 5.9), direct 3.5 patients (PMC, 5.8 BUP, 4.0) to resources that provide LARC, and give 5.2 patients (PMC, 7.2 BUP, 6.8) a pregnancy test. Significant differences in the extent to which prescribers discuss controlled substance database results with patients (PCP, 5.5; PMC, 9.3; BUP, 7.1; p equals 0.005) and discuss the expectation that patients inform providers if they become pregnant (PCP, 6.8; PMC, 9.3; BUP, 9.9; p equals 0.011) were noted across study cohorts. Perceived importance of behavioral engagement and self-efficacy beliefs toward prevention behaviors were overwhelmingly positive (medians 7 on 7-point scale). The extent to which respondents perceived other prescribers like them to engage in prevention behaviors was generally positive, but varied across behaviors (medians 4-7).

Conclusion: The extent to which prescribers engage in NAS prevention is variable across prevention behaviors. In general, PCPs engaged in NAS prevention behaviors less often than their BUP and PMC colleagues. Low engagement was particularly noted for recommending LARC and directing patients to community resources that provided access to LARC. Pharmacists, especially in community settings, may be able to assist prescribers by checking patient profiles and recommending patients talk to their providers about starting LARC. Moreover, with appropriate contraception prescribing authority and collaborative practice agreements, pharmacists may be able to provide access to LARC and thus prevent NAS.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5a-135

Poster Title: Medication use evaluation of fluoroquinolones within a rural medical center

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Purpose: Evaluate the appropriateness of fluoroquinolone prescribing within a rural medical center. Recent FDA safety alerts have been issued to caution the use of these antimicrobial agents in uncomplicated urinary tract infections, acute sinusitis, and acute bronchitis because the serious adverse effects associated with these drugs generally outweigh the benefits.

Methods: Retrospective electronic medical chart review was conducted to identify patients who had received fluoroquinolone antibiotics from 1/1/2016 to 6/30/2016. The following data was reviewed: current antibiotic prescription, dose and instructions, patient age, indication, concurrent corticosteroid use, previous antibiotic prescribed within the last 3 months, drug allergies, co-morbidities, renal function, culture and susceptibility results, and recent laboratory parameters used for monitoring purposes. The focused indications included acute sinusitis, acute exacerbation of bronchitis, and uncomplicated urinary tract infection, but also included other indications for which a fluoroquinolone was prescribed. The current IDSA and Sanford Antimicrobial Guidelines were referenced as the most up-to-date recommendations. Descriptive statistics based on the data collected was used to analyze the appropriateness of fluoroquinolone prescriptions.

Results: The study identified 167 patients with prescriptions for a fluoroquinolone antibiotic from January 2016 through June 2016. Fluoroquinolones were found to be empirically prescribed most commonly for UTIs, COPD exacerbation, pneumonia, sinusitis, and bronchitis, respectively. The prevalence of inappropriately prescribed fluoroquinolones was 35 percent based on patients' clinical profiles, diagnoses, and the availability of alternative antibiotic therapies. 109 prescriptions were deemed appropriate while 58 prescriptions were considered

inappropriate. There were no severe adverse effects reported for patients that were prescribed a fluoroquinolone for the three indications stated in the FDA alert.

Conclusion: The results of this evaluation will be presented to the Pharmacy and Therapeutics Committee. Intervention will be provided to prescribers and pharmacists in the form of clinical education to highlight and reinforce the FDA warning against the use of fluoroquinolones as first-line agents for acute sinusitis, acute exacerbations of bronchitis, and uncomplicated urinary tract infections. This intervention is provided due to the potential risk of serious adverse reactions outweighing the benefits. Prescribers and pharmacists will be encouraged to provide consistent patient education to heighten the awareness about the potential disabling side effects of fluoroquinolones.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 5a-136

Poster Title: Outcomes and characteristics of patients with potentially inappropriate classification of Clostridium difficile infection at a community hospital

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Purpose: Clostridium difficile infection (CDI) is the most commonly recognized cause of diarrhea in hospitalized patients. The Center for Disease Control and Prevention (CDC) classifies CDI as healthcare facility-onset, community-onset, or community-onset healthcare facility-associated. Delays in stool sample collection or physician laboratory orders may lead to inaccurate patient classifications and potentially adverse clinical and economic implications. The objective of this pilot study was to evaluate the difference in clinical outcomes between patients with definite community onset CDI and those who may have been inappropriately classified as healthcare facility-onset due to delayed stool sample collection or physician orders for Clostridium difficile testing.

Methods: This was a retrospective, observational study of inpatient-adults with a positive stool sample for Clostridium difficile from January 1, 2015 to March 31, 2016 at a community hospital. A patient's CDI was classified as definite community-onset CDI (positive stool sample within 3 days of admission) or healthcare facility-onset (positive stool sample at least 3 days post-admission). The healthcare facility-onset group was further analyzed to identify patients who were symptomatic within 3 days of admission but had a delay in obtaining either a stool sample or physician laboratory order until after 3 days. This group was defined in the study as the possible community onset CDI group. The definite community-onset group was compared to the possible community-onset group with respect to several clinical endpoints. Study endpoints included patient demographics, admission diagnoses, white blood cell counts, serum albumin, serum creatinine, loose stool count, treatments for CDI, duration of therapy,

concurrent antibiotic use, re-admission, and death. Data was analyzed using descriptive statistics utilizing the Statistical Analysis System version 9.3.

Results: A total of 105 patients were identified as having definite community-onset CDI compared to 25 patients who were classified as possible community-onset CDI. All patients in the possible community-onset CDI group had a delayed stool sample collection or a physician order beyond hospital day 3 despite being symptomatic for CDI during the first 3 days of admission. No statistically significant differences were noted between groups with respect to patient demographics, admission diagnoses, or admission laboratories for white count, serum albumin or serum creatinine. In addition, no differences were noted in type of initial CDI treatments or concurrent antibiotic use. However, the possible community-onset group did have a longer total length of hospitalization (10.8 days versus 7.6 days, adjusted P-value 0.0075) and duration of initial CDI treatment (5.5 days versus. 3.5 days, P-value 0.0352). Furthermore, patients in the possible community-onset CDI group were more likely to be discharged on oral vancomycin and less likely to receive oral fidaxomicin (6 percent versus 15 percent, P-value 0.0223). No differences were noted between groups with respect to 30-day readmission, 90-day readmission, or death.

Conclusion: Our findings suggest that patients who receive inappropriate CDI classification due to delayed stool sample collection or physician laboratory ordering, may have longer length of hospitalization and duration of therapy, which represents potentially significant clinical and economic challenges for the health care system. Further research is warranted to confirm these findings in a broader range of health care systems. If confirmed, research regarding interventions to improve accurate CDI classification may be warranted.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 5a-137

Poster Title: Repurposing raloxifene for use in KRAS-dependent pancreatic adenocarcinoma

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Purpose: We investigated whether the drug raloxifene could be repurposed for the treatment of pancreatic cancer. Treatment is challenging due to 1) lack of target-specific drugs, 2) prohibitive cost of drug development, and 3) chemoresistance. Raloxifene can induce cell death in cancer, and was FDA-approved for breast cancer treatment in postmenopausal women, making its use in pancreatic cancer a therapeutic extension. Since 90 percent of patients have a mutation in the Kristen Rat Sarcoma viral (KRAS) oncogene, our goals were to 1) identify the affected molecular pathways following raloxifene treatment, and 2) compare these changes in KRAS-dependent versus non-KRAS pancreatic cancer.

Methods: To rapidly identify drugs that could have an important impact on the treatment of pancreatic cancer, we sought to re-purpose existing FDA-approved drugs. For this, we screened drugs that could induce apoptosis (cell death) of human pancreatic cancer cells. Raloxifene was identified from this screen since it 1) induced apoptosis of cultured human pancreatic cancer cells; 2) altered either apoptotic or cell survival proteins; and, 3) elicited specificity, by effecting these changes only in the mutant, but not wild-type KRAS pancreatic cancer. We treated human KRAS-mutant, or KRAS wild-type pancreatic cancer cells in culture with increasing doses of raloxifene (0.05 uM, 0.5 uM, 5 uM, and 20 uM) for 3 days. Following treatment, we conducted protein analysis by Western blot to determine changes in protein targets or determine differential protein activation between KRAS mutant or wild-type cells. To verify our results, we ablated the tafazzin gene, a reduction of which was our primary finding in response to raloxifene treatment, and investigated whether raloxifene treatment could cause cell death in the absence of tafazzin. We used the student t-test and ANOVA for statistical analysis; setting p less than 0.01 to reflect high significance. All experiments were repeated a minimum of three separate times.

Results: Raloxifene reduces tafazzin expression in a dose-dependent manner. At physiological dose, there occurs a 50 percent decrease in the tafazzin protein when KRAS-mutant cells are treated with raloxifene, a p value of 0.0136. At the highest dose, there is an 83 percent decrease in tafazzin levels, a p value of 0.0009. These p values suggest that the raloxifene-mediated reduction in tafazzin is significant. Reduction of tafazzin is therapeutically relevant because it compromises the mitochondria, setting up the conditions for killing KRAS-mutant cells. This effect is limited to the KRAS-mutant cells, thus suggesting a targeted effect. Raloxifene causes a threefold increase in the protein level of the pro-apoptotic protein Bim, suggesting that this SERM drug has multiple effects in pancreatic cancer. To test the effect of tafazzin reduction on cellular energy, we measured ATP levels of raloxifene-treated pancreatic cancer cells at different time points. ATP first increases up to one day after treatment and then decreases by 52 percent over the next two days of treatment. This trend is observed across all treatment points. This decrease in ATP induces signalling pathways that can cause cell death.

Conclusion: Our results demonstrate that targeting the mitochondria in mutant KRAS pancreatic cancer is a viable strategy for making these chemoresistant cells susceptible to drug treatment. Specifically, raloxifene targets and suppresses the mitochondrial protein tafazzin, and destabilizes KRAS-dependent pancreatic cancer cells. Our data also provide mechanistic insights by showing a raloxifene-mediated increase in the proapoptotic protein Bim, and an overall reduction of cellular energy, indicating that raloxifene activates multiple signal transduction pathways simultaneously. Importantly, since our study was conducted employing human pancreatic cancer cells, our data illustrate the most plausible pharmacological effects of raloxifene were it used in human pancreatic cancer.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5a-138

Poster Title: Impact of pharmacy education on the accuracy of tobacco-use documentation in hospitalized patients

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Purpose: Having accurate tobacco-use documentation allows healthcare providers to assess readiness for change in those who may want to quit using tobacco products. It allows them to accurately prescribe medication, avoid possible drug interactions, verify appropriate therapy during dispensing, and to monitor other adverse drug events caused by tobacco products or nicotine replacement therapy after administration. The purpose of this project was to determine if pharmacy education provided to nurses would improve the accuracy of tobacco-use documentation on admission to the general medical floor at Northwest Medical Center in Tucson, Arizona.

Methods: All qualifying patients (those admitted within the past three days to the general medical floor, who were physically present, awake, English-speaking, and consented to being interviewed) were interviewed on three separate days in February 2016. Each patient had his or her current and former tobacco-use status as well as quantity of tobacco-use documented based on answers from an interview script. Patient answers were compared to tobacco-use status on the electronic health record. The electronic health record must have the current status, former status, and quantity that match what was obtained from the interview to be considered correct. This data constituted the pre-intervention data. Over the course of one week, pharmacy students instilled the importance of correct tobacco-use documentation to the nurses on the general medical floor at selected nursing huddles, disseminated fliers stressing the importance of correct documentation to the nursing staff, and sent an email reiterating the importance to the clinical nurse leaders and nurse directors to further disseminate to their respective nursing staffs. On three separate days in March, the same methods conducted pre-

intervention were repeated to obtain the post-intervention data. The primary outcome measured was the accuracy of tobacco-use documentation in patient's electronic health record.

Results: Prior to the intervention, 41 out of 62 patients (66.13 percent) had tobacco-use status correctly documented and 21 out of 62 patients (33.87 percent) had incorrect tobacco-use documentation. After the intervention, 52 out of 58 patients (89.66 percent) had tobacco-use status correctly documented and 6 out of 58 patients (10.34 percent) had incorrect tobacco-use documentation. Pharmacy education provided from pharmacy students to nurses showed a statistically significant impact on accurate tobacco-use documentation (P equals 0.002), showing an absolute increase in accuracy of 23.53 percent.

Conclusion: Interprofessional collaboration represents a unique approach to optimizing patient care. Coordinated efforts between pharmacy students and the nursing staff at Northwest Medical Center showed a statistically significant improvement in correctly documenting patient tobacco-use status. Correct documentation of patient tobacco-use status allows healthcare professionals the opportunity to provide tobacco cessation interventions to those patients who are correctly identified as tobacco users. Additionally, potential drug interactions between patients' medications and tobacco can be caught before becoming a problem in those patients. Further research should be done to determine the longevity of these interventions.

Submission Category: Leadership

Submission Type: Descriptive Report

Session-Board Number: 5a-139

Poster Title: Relevance of student involvement in professional organizations, leadership positions, and service to pharmacy postgraduate residency program acceptance - a literature review

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Purpose: The purpose of the study was to conduct a thorough literature review identifying the extent student involvement in professional organizations, leadership positions, and service correlates to pharmacy postgraduate residency attainment. In addition to extensive effort in academic achievement of a competitive GPA and class rank, pharmacy students are encouraged to spend time in professional organizations, leadership obligations, and service endeavors to increase their chance of obtaining a residency. Participation in these non-didactic activities have not been extensively identified in the literature in regards to importance.

Methods: A thorough review of literature published in the last twenty years regarding pharmacy postgraduate residency programs was conducted using the US National Library of Medicine's PubMed database. Articles selected for inclusion were peer reviewed articles that focused on the characteristics that have been proven to assist pharmacy students as they apply for postgraduate residency programs. Search terms included: "class rank," "GPA," "professional organizations," "leadership positions," "service," as primary terms. Additionally "research," "work experience," and "publications" were utilized for inclusivity. Results from the aforementioned foci were compiled in order to analyze and assess their significance to acceptance into post graduate residency programs. Themes were identified and each peer-reviewed article was assigned to specific categories.

Results: Thirty-five articles were identified as relevant to the study's aims. Twenty-two articles (63%) were published between 2006 and 2015. Twelve articles (34%) pertained to pharmacy, eleven (31%) pertained to medical, and ten (29%) pertained to other healthcare professions. Thirteen articles (37%) cited membership in professional organizations as a contributing factor to residency attainment. Eight articles (23%) cited leadership positions as a contributing factor to residency attainment. Ten articles (29%) cited service as a contributing factor to residency attainment. Thirteen articles (38%) cited test scores as a contributing factor to residency attainment. Twelve articles (34%) cited GPA as a contributing factor to residency attainment. Eleven articles (31%) cited class ranking as a contributing factor to residency attainment. Twelve articles (34%) cited student publications as a contributing factor for residency attainment. Within the twelve articles pertaining to pharmacy five (42%) cited leadership, five (42%) cited service, five (42%) cited GPA as a contributing factor, five (42%) cited class ranking, and 5 (42%) cited student publication as a contributing factor to attaining a pharmacy post graduate residency.

Conclusion: A literature review identified professional organization membership, leadership position, and service as factors for attainment of a pharmacy postgraduate residency. Membership in a professional organization, test scores, and GPA were the most cited for obtaining a postgraduate residency followed by student publications and class ranking. Within the articles pertaining to pharmacy, two of the characteristics of interest, professional organization membership and leadership positions, were among the most prevalent. The significance and level of importance of each characteristic was not clear. Future studies are needed to quantitatively rank the characteristics that contribute to pharmacy residency candidate selection, attainment and successful performance.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5a-140

Poster Title: Evaluating the Accuracy of Inpatient Electronic Medical Record Penicillin Allergy Fields

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Purpose: A thorough history is one of the most important components in the clinical evaluation of drug hypersensitivity. Previous studies have detailed the inaccuracy of drug allergy reporting in paper charts, which results in prolonged patient admissions and unnecessary avoidance of first-line medications. The impact of the electronic medical record (EMR) on documentation of patient allergies has not been extensively evaluated. The purpose of this study is to evaluate the accuracy of patients' penicillin allergy reactions documented in the EMR compared to their interview responses.

Methods: Adult inpatients with a documented penicillin allergy were randomly selected and prospectively interviewed using a penicillin allergy history algorithm (PAHA) from February to August 2016. The PAHA assessed and categorized allergic reactions based on the Gell and Coombs classification scheme. The penicillin allergy history obtained from the patient interviews were then compared to the penicillin allergy history documented in the EMR. Patients unable to give informed consent or hospitalized in the intensive care unit were excluded.

Results: A total of 100 patients were enrolled in the study: 68 female, 32 male, with an average age of 64 ± 17 years. When comparing data obtained using the PAHA to the EMR there was a total of 69 discrepancies: 32 patients had an incomplete EMR history, reporting some but not all symptoms; 19 patients reported different symptoms than what was documented in the EMR; 14 patients had no reaction documented; 2 patients had a penicillin allergy of 'family history' without a personal history; 1 patient had an intolerance inappropriately documented as an allergy; 1 patient confirmed a history of a penicillin allergy but had since tolerated penicillin..

Documentation of the penicillin allergy history was poor across all professions, however, advanced practice providers and nurses had the most accurate entries (40%, 32%).

Conclusion: The majority of the reviewed EMR penicillin allergy histories were inconsistent with the patient interview responses. Implementation of a standardized PAHA to thoroughly and accurately obtain a penicillin allergy history could serve to improve EMR allergy history documentation, which may improve patient outcomes.

Submission Category: Automation/ Informatics

Submission Type: Descriptive Report

Session-Board Number: 5a-141

Poster Title: Impact of integration between smart infusion pumps and the electronic health record on related key performance indicators.

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Purpose: Programmable infusion pumps have been in use as early as the 1960s, with modern smart infusion pumps becoming available in the early 2000s. Smart infusion pumps introduced unique safety features; however, the electronic health record (EHR) and smart infusion pumps remained on separate systems without any interoperability. Recently, there has been a focus to close the loop between smart pumps and the EHR, often referred to as 'smart pump integration.' This study examines data from the University of Iowa Hospitals and Clinics, a 700+ bed, 200+ clinic tertiary health system which implemented system-wide integration in June of 2015.

Methods: Data were collected from quarterly reports over a range of 21 months from October 1, 2014 to June 30, 2016. Integration of BD (Becton, Dickinson and Company) CareFusion Alaris smart pumps and Epic EHR (electronic health record) occurred from April 2015 to June 2015, with pilots as early as February 2014. Metrics evaluated include: Total Counter Starts; Total Guardrails compliance (adult, pediatric, and neonatology libraries); Top 5 (drug) Overrides; Guardrails Alerts; and Total Good Catches. Within the Guardrail Alerts, subcategories were broken into: Overrides (All Overrides with Risk, High Risk Overrides, and Overrides Completed in less than 2 seconds); Cancelled Infusions; and Reprogrammed Infusions. The Overrides were also analyzed by drug libraries and types of infusions. The drug libraries include: Adult; Adult High Risk; Pediatrics; Pediatrics High Risk; Neonatology; and Neonatology High Risk. The types of infusions are: Bolus Infusions; Continuous Infusions; Fluid Infusion; Intermittent Infusion; and PCA (patient controlled analgesia) Infusion. Total Good Catches were also analyzed by the drug libraries (Adult, Pediatric, and Neonatology) and by error type: Decimal Point Errors; Double Digit Entry Errors; Rate/Dose Errors; and High Rate.

Results: From January 2013 through June 2016, there were over 9.3 million total counter starts. Out of these counter starts, the Guardrails Compliance was 90% (Adult 91%, Pediatric 85%, Neonatology 88%). The most common top 5 override drugs for every quarter in the 6 quarters were (in no specific order): propofol, oxytocin, 3% sodium chloride, nicardipine, and epinephrine. There were a total of 332,563 Guardrail Alerts across the 3.5-year time period. Out of these, an average of 13% were cancelled infusions, with a downward trend (slope of -0.0017 and R-squared = 0.57) and an average of 6% were reprogrammed, with a downward trend (slope of -0.0027 and R-squared = 0.63) after integration. The overall percentage of non-overridden alerts ranged from 16.0% to 28.6% per quarter. The overall percentage of overridden alerts (average 80.1%) ranged from 71.4% to 84.0%. The percentage of high risk overrides ranged from 3.4-4.4%. Out of the five different types of infusions, intermittent infusions consistently had the highest amounts of overrides. The total amount of good catches for the entire period was 2,333 with a downward trend, slope of -12.57 and R-squared value of 0.49 after integration. The most common type of good catch was decimal point errors.

Conclusion: Overall, pump integration increased guardrail compliance, even with an increase in smart infusion pump utilization. This increase in utilization introduced an increase in alerts, which is expected as drug libraries need to be updated as workflow changes and clinical decisions alter. The total amount of alert overrides increased with utilization. The amount of alerts that were not overridden remained relatively static, regardless of how many overrides. The amount of 'good catches' increases with utilization, but decreases after integration. Further data analysis on alerts and overrides can evaluate additional parameters such as patient units, types of medications, and drug library updates.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 5a-142

Poster Title: Could statin use lead to new onset diabetes mellitus?

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Purpose: In recent years, statins have been shown to have added benefits as treatment or prevention for many common disease states. At the same time, type 2 diabetes mellitus is also on the rise. A review of these studies is needed in order to determine if there is any harmful correlation between statin use and type 2 diabetes mellitus.

Methods: Retrospective cohort studies were completed in different countries investigating the correlation between statin use and type 2 diabetes mellitus. A review of this literature was completed.

Results: In the Wang et al trial, there were 5,754 cases (13.7%) studied from 1997 to 2009 that developed new onset of diabetes mellitus. The Kaplan-Meir curve showed the use of statins increases the risk of onset of diabetes mellitus with a HR: 1.15; 95% CI: 1.08-1.22, and $p < 0.001$. The results of the Ma et al trial showed 1,360 out of 16,027 of patients (8.5%) studied from 2006 to 2009 developed new onset of diabetes mellitus. With the use of pravastatin (HR: 1.34; 95% CI 1.15-1.55; p—0.0001) and atorvastatin (HR: 1.29, 95% CI 1.16-1.44; $p < 0.0001$), there was an increased risk of new onset of diabetes mellitus. Any association for new onset of diabetes mellitus and the use of simvastatin could not be assessed due to the results not being statistically significant. In the Carter et al trial, there was an association of increased cases of new onset of diabetes mellitus for the use of atorvastatin (HR: 1.22; 95% CI: 1.15-1.29), simvastatin (HR: 1.10; 95% CI: 1.04-1.17), and rosuvastatin (HR: 1.18; 95% CI: 1.10-1.26). Fluvastatin and lovastatin could not be assessed due to the results being statistically insignificant.

Conclusion: After reviewing trials, there seems to be some association between statin use and the development of new onset diabetes mellitus. Yet, because all three trials were retrospective studies, a cause-and-effect relationship between statins and new onset of diabetes mellitus is not clear. However, it is note-worthy that no particular statin showed a consistent association for causing new onset diabetes mellitus. In conclusion, it is in the best interest of health care professionals to monitor glucose and HbA1c levels in all patients taking any statin in hopes of decreasing their risks of developing new onset of diabetes mellitus.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5a-143

Poster Title: Tearing down the walls: barriers to medication access in urban populations and solutions to bridge the gap

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Purpose: As of the 2010 United States Census, 80.7 percent of the population lived in urban areas. Globally, in 2014, 54 percent of the population lived in urban areas; both figures continue to rise annually. The purpose of this project was to identify healthcare access issues faced by patients in urban centers, present solutions that healthcare professionals of varying disciplines can implement to address these access barriers, and to evaluate current practices in comparison to the solutions created by an expert panel.

Methods: An initial literature search was conducted to attain background knowledge on barriers to medication access in urban centers in the United States and globally. A panel of interdisciplinary experts was assembled, representative of health policy, nursing, pharmacy, and social work. These panelists were interviewed and probed individually and as a group, with the goal of identifying key issues faced by patients in urban populations. Once key issues were identified, the panel provided its experience that included examples of innovative approaches. The concluding portion of the symposium focused on solutions. It also involved audience interaction with the panel to brainstorm ideas regarding bridging the gap between patients and medication access and adherence.
After the conclusion of the symposium, a more detailed literature search was conducted to identify current practices in urban centers in the United States, with special attention paid to the four pillars identified in the event (Uninsured/ Underinsured Patients, Medication Adherence, Coordination of Care, and the Social Determinants of Health). The literature was then compared to the recommendations given by the expert panelists.

Results: The panelists noted that affordable health services for all immigrants are essential to ensure basic human rights and promote preventive healthcare. In addition, they deemed medication adherence as a major problem in urban areas. Research has shown that communication between physicians and patients is key to increasing adherence. In order to improve, the panelists suggested that counseling on medications at multiple points along the healthcare journey will benefit patients.

The panelists cited that walking the patient to the outpatient clinic increases the likelihood of patients returning for follow-up. A study documenting an inner-city, community-based outpatient health center observed that the group visit format maximized healthcare provider productivity and patient learning, and identified flaws in the current system.

Regarding several social determinants of health discussed, the panelists suggested physician office hours in the evenings and weekends. A study in an urgent care clinic confirmed the most common reasons for seeking care in this setting were extended hours, transportation availability, and, most commonly, appointments were not required. These factors held greater weight than the absence of copay, suggesting income is not the strongest influence in patient access to healthcare.

Conclusion: Following the subsequent literature search, it is evident that the four pillars of barriers identified remain prominent issues in today's urban areas. There are many solutions that can be presented that healthcare professionals of varying disciplines can implement to address these access barriers. Discussion by the expert panel and further research both suggest that change must occur not only in financial coverage but also in the infrastructure of primary care.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5a-144

Poster Title: Evaluation of over the counter medication knowledge and literacy in middle school and high school students

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Purpose: Over the counter (OTC) medications are commonly utilized by the public, including adolescents, to self-treat many conditions. Unfortunately, these products can be dangerous if not used safely and appropriately. Adolescents between 13 and 19 years old composed 7.32 percent of the human exposure cases reported to U.S. poison control centers in 2014. Among these cases, there were 53 fatalities involving pharmaceuticals. This is an age range where medication use becomes more independent and the education they receive throughout the school curriculum is unknown. This study was designed to evaluate OTC medication knowledge and literacy among middle and high school students.

Methods: We conducted a cross-sectional study that included a two-part survey completed by middle school (MS) and high school (HS) students in a local school district; MS included grades 7 and 8 and HS included grades 9-12. This study was approved by the institutional review board and consent was indicated by voluntary completion of the survey. Students were presented with the option to complete the survey by their teacher during their physical education class. The survey included demographic questions (age, gender, race, ethnicity, grade, etc.) as well as questions about their medication use for chronic illness and where they receive medication information. To assess OTC medication knowledge and literacy, the survey included two subsections: knowledge and interpretation. The knowledge subsection included questions on brand vs. generic (6 questions), side effects (4 questions), indication (3 questions) and combination use of OTC medications (2 questions) and the interpretation subsection (4 questions) included a reference sheet with two drug information labels. The knowledge section of the survey was distributed and completed separately so that the reference sheet with drug

information labels did not influence answers. Data were analyzed using simple descriptive statistics, as well as chi-square and student t-test for comparative statistics.

Results: A total of 309 students completed the survey. Students were predominantly male (61.4 percent), white (81.2 percent), and non-Hispanic (84.3 percent). The mean age was 14 years (sd 1.8, range 11-18); 46.2 percent were in MS and 53.8 percent in HS. Students reported getting medication information from their doctor (73.1 percent), parents (56.6 percent), pharmacist (41.4 percent) and school (21.4 percent). The percentage of students with correct medication knowledge responses were 17.6 (side effects 7.6, brand vs. generic 18.8, and indication 26.4) and correct interpretation responses were 54.7. 63.2 percent of students did not know it is unsafe to take naproxen and ibuprofen at the same time; 65.2 percent did not know it is unsafe to take two products containing acetaminophen at the same time. When asked specifically if active and brand drug names are different, 60.3 percent of students were not aware (MS 73.6 percent vs. HS 48.8 percent, p-value less than 0.001). Most students (68.5 percent) agreed they always talk to an adult before taking any medication (MS 78.6 percent vs. HS 60.5 percent, p-value less than 0.001). Overall, HS students answered more knowledge and interpretation questions correctly compared to MS students (all p-values less than 0.05).

Conclusion: Our study describes the knowledge and literacy levels regarding OTC medications in a large cross-section of middle and high school students. Overall, students were better at the interpretation of drug labels compared to knowledge-based concepts. It is likely that this population needs additional education and counseling regarding the safe and appropriate management of OTC medications. The information learned from this study is an important foundation for future educational programs aimed at proper use of OTC medications in middle and high school students.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 5a-145

Poster Title: Evaluation of factors leading to inpatient falls in patients with low Hendrich II score

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Purpose: The Hendrich II Fall Risk Assessment (HIIFRA) tool is used at our institution for primary prevention of falls. The tool is utilized upon admission and during hospital stay. A HIIFRA score of 5 or more indicates high risk of falls and requires patients to be placed on falls prevention strategies. However, it was observed that some patients with low fall-risk also receive falls prevention strategies, a practice that is driven by clinical judgement. The purpose of this project was to identify factors that drive clinical judgment to place low fall-risk patients on fall prevention strategies.

Methods: A retrospective review was done on 102 patients, representing 103 falls, who experienced falls while hospitalized between November 2015 and April 2016. The data collected comprised of patient age, gender, past medical history, HIIFRA score upon admission and before the fall time, and whether patients were placed on additional fall prevention strategies. The HIIFRA tool focuses on eight independent risk factors: symptomatic depression, altered elimination, dizziness/vertigo, confusion/disorientation/impulsivity, male gender, any administered benzodiazepines or anti-epileptics, as well as a get-up-and-go test to identify any issues with gait or balance. Each factor is assigned a score, and a HIIFRA score of 5 or more indicates a patient is at high-risk of falls. Hospital policy requires that all patients, regardless of fall risk, are placed on universal fall precautions, which include placing the call button and phone within patient reach, and ensuring the patient's bed is secured in a low position with locked wheels. In addition, it is mandatory that high-risk patients are placed on additional fall precautions, which include a yellow wristband and non-slip socks, and a yellow fall precautions sign placed outside the patient's room, to notify staff of the increased fall risk. If a patient was

placed on additional fall precautions despite a low-risk HIIFRA score, the reason for the intervention was documented.

Results: Upon admission, 46.1 percent of the total 102 patients had a HIIFRA score of 5 or more and were initiated on additional fall prevention strategies, 17.6 percent had a score of less than 5 and were not placed on fall precaution strategies, and 4.9 percent of patients had no HIIFRA data available. Of the 50 patients who scored low, 32 patients (64 percent) were placed on additional fall precaution strategies despite their HIIFRA score. This decision was determined using the clinical judgment of the nursing staff. Of the low-risk patients placed on additional fall precautions, 34.4 percent had a history of previous falls, 12.5 percent experienced extreme generalized weakness, 6.25 percent had hematuria and anemia, 6.25 percent had psychiatric conditions (drug/alcohol abuse or suicidal ideation), and 6.25 percent had altered mental status. Other conditions associated with additional fall precautions included recent surgery, alcohol withdrawal, malignancy, septic shock, and seizure disorders. When comparing these findings to the risk factors of the patients who were deemed low-risk for falls and were not placed on falls precautions, the most common reasons for initiating fall precautions in low-risk patients were a history of falls or recent surgery.

Conclusion: Factors that drive the clinical judgment of the nursing staff to place low fall-risk patients on fall prevention interventions include specific clinical conditions, such as a recent surgery or a history of falls. These characteristics, along with other clinical conditions, are not captured in fall-risk assessment tools such as the HIIFRA, and should be evaluated further in order to accurately identify factors that predispose patients to inpatient falls.

Submission Category: Geriatrics

Submission Type: Descriptive Report

Session-Board Number: 5a-146

Poster Title: Development and implementation of a pilot pharmacy home care service with second and fourth year pharmacy students in older adults.

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Purpose: The purpose of this study is to describe the development and implementation of the pharmacy home care service conducted by pharmacy faculty members, second year, and fourth year pharmacy students to add to the literature on potential roles and impact of pharmacists in providing care to older adults in the home setting and potential impact on pharmacy student learning outcomes. Pharmacy students, under the supervision of a Clinical Pharmacist followed the Pharmacist Patient Care Process to guide patient-centered care and establish the value pharmacists bring to an interprofessional healthcare team.

Methods: A pharmacist and second-year pharmacy students completed twenty-seven home visits conducting medication reconciliation, patient education, and comprehensive medication reviews. Before each visit, the pharmacy team collected pertinent patient information from the patient's medical chart, assessed medication therapy for appropriateness, and identified potential discrepancies to be addressed during the patient interview. After each visit, clinical interventions and recommendations were documented via a SOAP note that was added to the patient's medical chart and shared with the health care team. The pharmacist followed up regarding the recommendations with the CRNP and RN case manager during weekly rounds.

Results: Twenty-one patients were seen in a three-month period, which consisted of 27 patient encounters. Median number of medications reported per patient were 13 (IQR 10-17) and median number of medication discrepancies identified per patient were 3 (IQR 2-4.5). A total of 146 pharmacy interventions were made, which consisted of the following: 50 therapeutic

interventions, 15 drug information, and 81 patient education interventions. A median of 2 (IQR 1-2) therapeutic interventions were made per patient. Therapeutic interventions requiring provider approval had an acceptance rate of 65%. Total median time spent in providing clinical pharmacy services and coordination of care was reported at 3 hours per patient. Based on overall satisfaction survey results, both patients and pharmacy students involved in the home visits reported high satisfaction rates with pharmacy services provided and learning experiences.

Conclusion: Pharmacy students participated in a service learning opportunity in which valuable knowledge and experiences were gained that enhanced didactic learning. Having seen firsthand the daily struggles that older patients and their caregivers face, the students gained a broader perspective and better understanding of the challenges presented when caring for this population.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5a-147

Poster Title: Antimicrobial stewardship strategies: Assessing the potential impact of antibiotic de-escalation in an inpatient setting, a current state analysis

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Purpose: Antimicrobial stewardship is becoming an increasingly important area in medicine and is now a Joint Commission requirement for all hospitals. One facet of antimicrobial stewardship programs (ASP) is an antibiotic time out (ATO). An ATO is a reassessment of antibiotic therapy after 48 hours. Since bacterial cultures usually return data after 48 hours, the ATO represents an opportunity to tailor therapy to positive cultures, and/or de-escalate antibiotics to a less broad spectrum agent. The objective of this investigation was to evaluate the potential impact of antibiotic de-escalation among patients receiving piperacillin/tazobactam (P/T) empirically for the treatment of respiratory tract infection.

Methods: This was a retrospective, current state analysis, conducted at a 303-bed, acute care community hospital within the Seattle metropolitan area of Washington. IRB approval was not sought as this project was determined to be a quality improvement activity as defined by the Department of Health and Human Services Office for Human Research Protections. We included all adults, at least 18 years old, admitted during the month of January 2016 and received P/T for treatment of respiratory tract infection. Among patients whose antibiotics were de-escalated or not de-escalated from P/T, we compared demographic information, results of respiratory microbiology cultures, and severity of illness defined according to intensive care unit (ICU) admission and CURB-65 score. The primary endpoints were survival to discharge and hospital readmission within 30 days. Secondary endpoints included length of stay, occurrence of Clostridium difficile infection (CDI), and clinical stability, defined by 2007 IDSA community-acquired pneumonia guidelines. Descriptive statistics were used to analyze data.

Results: 51 patients were included; median age was 69 years, 57 percent were male, 63 percent were admitted to the ICU. 34 of 51 (67 percent) patients had antibiotic therapy de-escalated prior to discharge and 17 of 51 (33 percent) patients did not. Median length of P/T before de-escalation was 3 days, and median duration of total antibiotic therapy was 8 days, including inpatient and outpatient prescriptions . The de-escalated group had a higher rate of ICU admission (65 percent vs 59 percent), more patients with procalcitonin level obtained (62 percent vs 38 percent), and were younger (69 years vs 72 years) compared to the non-deescalated group . Median CURB-65 score was 2 in both groups. 79 and 65 percent of patients with de-escalated and non-deescalated therapy respectively, survived to discharge. 15 percent and 6 percent of patients in the de-escalated and non-deescalated groups respectively were readmitted to the hospital within 30 days. No patients developed new CDI. At discharge, 62 percent of de-escalated patients and 59 percent of non-de-escalated patients met criteria for clinical stability. 26 patients (51 percent) had respiratory cultures; 9 (35 percent) were positive: 8 bacterial and 1 viral, none had Pseudomonas isolated.

Conclusion: Overall, de-escalating antibiotic therapy was not associated with increased mortality, however, patients did have a higher rate of readmission. The low rate of microbiologically confirmed infection may indicate non-bacterial and/or non-infectious etiologies. More frequent hospital readmission in the de-escalated group warrants further investigation, particularly regarding patients' co-morbidities and underlying pathology. These data support the need for a targeted antibiotic de-escalation strategy to preserve the function of broad spectrum antibiotics. Our study demonstrates ample opportunities for implementation of ASP strategies at our institution.

Submission Category: Pharmacy Law/ Regulatory/ Accreditation

Submission Type: Descriptive Report

Session-Board Number: 5a-148

Poster Title: Systematic characterization of pediatric elective courses

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Purpose: As of July 2016, there are 135 U.S.-based colleges and schools of pharmacy with accredited professional degree programs and 3 schools with precandidate status. The 2011 ACPE Accreditation Standards indicate that part of the pharmacy school curriculum must include "Pharmacist-Provided Care for Special Populations," including pediatric patients. Although the 2016 ACPE Accreditation Standards make no specific mention of required special populations, it can be inferred that pediatrics would still be a significant component of the didactic pharmacy school curriculum. The purpose of this study was to systematically characterize various pediatric elective courses currently provided at different schools of pharmacy.

Methods: This was a descriptive study to characterize the various pediatric elective courses provided at different U.S. schools of pharmacy. Pediatric course syllabi, teaching methods, and/or special topics were solicited through three organizational listservs in May 2016. Data was collected by reading and evaluating those syllabi and extracting the following pertinent information: course descriptions, number and types of instructors, evaluation processes, credit hours, hours per week, length of course, estimated out-of-class work/time, prerequisites, student composition, required texts, outcomes/objectives, teaching style/format of course, grade composition, assignment types, unique projects of the courses, and presence of satellite campuses. All data was entered into a secured Google Sheets document. Course syllabi were used to develop a list of common topics related to pediatrics.

Results: Twenty-three pediatric course elective syllabi, email descriptions, research reports, and topic overviews representing 16 schools across 10 states from 2011 to 2016 were evaluated. Faculty composition of the courses varied from one coordinator/instructor (n=4, 17.39%) to multiple coordinators/instructors (n=5, 21.74%) of various combinations. Instructors included clinical pharmacists, physicians, pharmacy residents, and other healthcare disciplines. Course credit hours were typically either 2 credits (n=11, 47.83%) or 3 credits (n=5, 21.74 %); however, not every sample evaluated had credit hour information presented. Major topics of discussion included pharmacokinetics (11/15, 73.33%), common pediatric disease states and disease process (11/15, 73.33%), and drug information/literature evaluation (9/15, 60%). Topics not covered as frequently included ethics and legislation (5/15, 33.33%), pediatric psychiatry (5/15, 33.33%), and neonatal intensive care unit (NICU) concepts (2/15, 13.33%). Unique projects observed include mock patient rounds, clinical debates, and on-site experiences.

Conclusion: Each school had widely varied methods of delivering their pediatric elective courses. Through the data collection, commonalities in major topics covered were found, but there are still discrepancies that should be addressed. Future work includes surveying pediatric course coordinators to gain more specific information regarding their programs where data is lacking. The data obtained through this characterization will allow the various U.S. schools of pharmacy to evaluate their own pediatric course electives as part of their ongoing course development to ensure all students have similar topic and disease state exposure to pediatrics.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5a-149

Poster Title: Leishmania persistance in immunocompromised patients: an in-vitro model of parasite survival

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Purpose: Leishmaniasis is caused by over 20 species of Leishmania parasites, most prevalently found in tropical climates. In the United States, a growing number of cases have been reported due to increased international travel to endemic areas. Patients are considered cured of the disease when clinical symptoms are resolved, however, Leishmania parasites can persist after therapy cessation suggesting more effective treatments are needed. The purpose of this study was to develop an in vitro model to explore long-term survival and persistence of Leishmania parasites with the ultimate goal to develop better therapeutic strategies.

Methods: Two case reports were analyzed to better understand the relevance of Leishmania persistence in patients. In addition, a model was developed to study Leishmania persistence in the laboratory using gene deletion mutants unable to synthesize polyamines. Long-term survival experiments were performed to assess whether these parasites were able to subsist in a quiescent-like stage. Mutants were incubated in polyamine- free media and survival was assessed by rescue with polyamine- supplemented media. In addition, cell cycle phase arrest of wild type and polyamine- starved parasites was determined to test our hypothesis that quiescent-like parasites arrest in G1/G0 phase of the cell cycle.

Results: Review of the literature revealed that clinically cured patients could develop leishmaniasis years after initial diagnosis. We generated and characterized polyamine pathway mutants as models for quiescence. Parasites that were not capable of synthesizing the polyamines putrescine and spermidine died within two weeks, while the presence of putrescine

alone enabled parasites to survive for up to 6 weeks. Cell cycle analysis was performed and revealed that while wild type parasites showed 47.8% accumulation in G1/G0 phase, quiescent-like cells exhibited 64.1% accumulation in G1/G0 phase.

Conclusion: Leishmania can establish chronic intracellular parasitism and persist lifelong in the host. In immunocompromising conditions the host no longer has the ability to contain the parasite infection leading to reactivation. We established that polyamine pathway gene deletion mutants could serve as model for quiescent parasites. While mutant parasites died in the absence of both polyamines, the presence of putrescine alone resulted in arrest in G1/G0 phase, typical for quiescent cells. This model can be used to explore the cellular reprogramming in parasites that enables persistence and may ultimately aid in the development of future therapeutic strategies for full parasite eradication.

Submission Category: Automation/ Informatics

Submission Type: Evaluative Study

Session-Board Number: 5a-150

Poster Title: Evaluation and compliance of the prescription drug monitoring programs (PDMPs)

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Purpose: Prescription drug abuse is among the fastest-growing drug problems in the nation. Prescription Drug Monitoring Programs (PDMPs) have been implemented to track controlled substances prescribed by authorized practitioners that is dispensed by pharmacies. PDMPs help providing early warning signs of drug epidemics and detecting drug diversion. The purpose of this study is to evaluate the compliance and opinions of practicing pharmacists on the PDMP in West Virginia and the Tri-State (Kentucky and Ohio) area. The data collected from this project seek to provide recommendations that could be used to help improve compliance and ease the use of the PDMP programs.

Methods: Board certified pharmacists were invited to complete an online survey created in Qualtrics (licensed by Marshall University) to evaluate their current compliance and opinions of the PDMP in their state that is used to track controlled substances prescribed by authorized practitioners and dispensed by pharmacies. Non-practicing pharmacists were excluded from the study. Respondents were asked their gender, age, ethnicity, primary state of practice, years of experience as a pharmacist, current role, how many prescriptions are dispensed daily, whether if they have access to the state PDMP program or not, and questions to assess their opinions, level of compliance and finally any recommendations on how to improve their state PDMP program. All data were collected, recorded, de-identified and analyzed directly onto a secure password protected data sheet built within Qualtrics. Descriptive statistics were used to analyze the results. The project was approved by the IRB prior to the deployment of the survey to collect the data.

Results: All the respondents (66) stated that they have access to their state's PDMP but only 92 percent have access on terminals where they process prescriptions. The results showed that 92 percent indicated that PDMP programs helped them identify issues with control substances prescriptions. The majority of respondents (85 percent) agreed that PDMP helps in the reduction of control substance abuse. Using Likert scale survey items, respondents were asked about the barriers of the program. Most of the respondents (32 percent) stated that the PDMP is inconvenient while only 8 percent said that it was very convenient. The majority of the respondents (82 percent) thought that the program need some to significant improvement in the completeness aspect. Accuracy comes as a close second to be improved. Asking the participants for when to use the program; over 80 percent indicated that they should always check in cases that involve patients with multiple providers in the last 3 months, out of town or unfamiliar prescribers and potential signs of abuse and diversion. The recommendations from the participants almost took the same theme which is to have the system integrate between all states and include updates in real time.

Conclusion: Prescription Drug Monitoring Programs are very valuable tool to help prescribers and pharmacists track control substance use, which in turn assists with the efforts to decrease abuse of control substances. The findings of the study provide evidence to suggest the importance and effectiveness of the PDMPs in preventing drug abuse and verifying prescriptions to differentiate between prescriptions that are prescribed for legitimate medical use. These programs allow patients to fill controlled substance prescriptions for legitimate uses.

Submission Category: Clinical Services Management

Submission Type: Evaluative Study

Session-Board Number: 5a-151

Poster Title: Does insurance type alter the pharmacy-based health system resources required to access 17 alpha-hydroxyprogesterone (17OHP), a women's health specialty medication?

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Purpose: Specialty medications are those requiring special handling, administration, or monitoring, and are usually high cost. Specialty medications require health system resources to overcome access barriers such as prior authorizations. Delay in access to time-sensitive specialty medications, such as 17 alpha-hydroxyprogesterone (17OHP) for prevention of preterm birth, may be detrimental to patient care. Pharmacists and pharmacy students are pharmacy-based health system resources, and often play a vital role in acquiring specialty medications. This study investigates variance in utilization of pharmacy-based health system resources required among different insurance types to access 17OHP.

Methods: This retrospective cohort evaluation includes patients prescribed brand 17OHP (Makena®) for prevention of preterm labor at the University of Illinois at Chicago between September 1, 2013 and April 1, 2016. Patients were identified by 17OHP administration records. Pharmacist or pharmacy student interventions were documented as standard 17OHP ordering procedure, and included submission of prior authorization(s) and communication with healthcare staff. Primary outcomes include the number of interventions over a therapy course. Secondary outcomes include number of days from ordering to 17OHP initiation. Data was extracted from 17OHP pharmacist ordering records and the electronic medical record using a Redcap standardized data collection sheet. SPSS software was used for descriptive statistics and ANOVA analysis.

Results: A total of 152 patients were evaluated; 63 (41 percent) were insured by traditional Medicaid, 60 (39 percent) were covered under a Medicaid managed care organization (MCO), and 29 (20 percent) had non-Medicaid insurance. There was a difference in the total number of documented interventions between groups (mean 11.7 plus and minus sign 5.0, versus 11.9 plus and minus sign 5.2, versus 14.7 plus and minus sign 4.0, P equals 0.021). No difference was found between the groups in days to 17OHP initiation (mean 15.1 plus and minus sign 14.3, versus 17.0 plus and minus sign 16.6, versus 17.6 plus and minus sign 7.4, P equals 0.677).

Conclusion: The number of pharmacist or pharmacy student interventions is a surrogate marker for the pharmacy-based health system resources required to overcome access barriers associated with 17OHP. Significantly more pharmacy based health system resources were required to access of 17OHP for non-Medicaid insurances compared to traditional Medicaid and MCOs. While non-Medicaid insurance required more interventions to access 17OHP, number of days to initiation remained consistent between the groups.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5a-152

Poster Title: Multi-year evaluation of fidaxomicin use for treatment of Clostridium Difficile Infection at a community hospital

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Purpose: Clostridium difficile infection (CDI) is one of the most common etiologies of hospital-acquired infection. Current guidelines from the Infectious Disease Society of America and American College of Gastroenterology recommend first-line treatment with metronidazole or oral vancomycin depending on severity of infection. Fidaxomicin was approved for treatment of CDI in 2011 based on studies demonstrating non-inferiority to oral vancomycin. The objective of this study was to evaluate the characteristics and the use of fidaxomicin for treatment of patients with suspected CDI at a community hospital.

Methods: This was a retrospective, observational study of adult patients admitted to a community hospital from November 2011 to June 2015 who received a charge for fidaxomicin 200 mg twice daily. Prescribing of fidaxomicin at the hospital was restricted to the infectious disease and gastroenterology services. Data collected included baseline demographics, admission diagnoses, past medical history, risk factors for CDI, onset of diarrhea, C. difficile laboratory test results, number of stools, white blood cell count, serum albumin, prior treatment regimens for CDI, response to fidaxomicin, and use of concomitant antibiotics, excluding agents to treat CDI. Risk factors for CDI included age, duration of hospital stay, past and current exposure to antimicrobial agents, exposure to chemotherapy, immunosuppression, gastrointestinal surgery, tube feedings, and use of proton pump inhibitors or histamine-2 antagonists. Clinical outcomes evaluated were resolution of diarrhea symptoms as noted by nurse documentation, re-admission at day 90 post-discharge, and recurrence of CDI defined as re-admission to the hospital within 90 days with a diagnosis of CDI. Institutional Review Board

approval was obtained from the study institution and Mercer University. Data collected from our study were analyzed utilizing the Statistical Analysis System (SAS) version 9.4 and summarized using descriptive statistics.

Results: A total of 102 patients were evaluated, including 40 patients who received fidaxomicin as initial therapy and 61 patients who received fidaxomicin after receiving another agent for initial CDI therapy. Risk factors for CDI included prior antibiotic use (80 percent), home use of acid suppressive therapy (52 percent), age greater than 65 years (50 percent), and prior hospitalization in past 90 days (50 percent). Thirty-eight patients were categorized as mild or moderate (37 percent), 24 patients as severe (24 percent), 5 as severe and complicated (5 percent), and 25 patients as recurrent (25 percent). Ten patients were uncategorized due to insufficient lab data (10 percent). The average length of hospital stay was 20 days and average duration of fidaxomicin therapy was 5.4 days. Sixty patients (59 percent) received previous oral metronidazole (26 percent), oral vancomycin (41 percent), or both (8 percent). A total of 41 patients (40 percent) had resolution of diarrhea symptoms during the hospital stay. Forty-four patients (43 percent) were readmitted to the hospital within 90 days of discharge with 8 of these patients having recurrent CDI (8 percent of total).

Conclusion: These findings support a potential role for fidaxomicin in the treatment of patients with CDI admitted to the community hospital. Opportunities for improvement in quality of care exist as evidenced by the relatively low response to therapy compared to clinical trials; however, CDI recurrence was lower than national rates, and all-cause re-admission comparable to national rates. Extensive length of stay may be driven by CDI severity, with the majority categorized as either severe or recurrent. Further research is warranted to study factors that predict positive clinical response to fidaxomicin as initial and alternate therapy for CDI.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5a-153

Poster Title: Assessing the health care student's perceptions and attitudes of pharmacy and interprofessional education at student-run free clinics

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Purpose: One method to improve the healthcare system in the United States it by facilitating collaboration through interdisciplinary teams. This starts with interprofessional education which can range from modules to clinical experience, with the latter shown to be more impactful. While student run free clinics can provide valuable clinical and interdisciplinary experience, there is a lack of a clear distinction of roles within these clinics, particularly for pharmacy students. This study assessed perceptions and attitudes of pharmacy and non-pharmacy students towards interdisciplinary healthcare and the role of pharmacists at student-run clinics after pharmacy roles had been clearly delineated.

Methods: The Institutional Review Board approved this cross-sectional study which was conducted at two homeless shelters in Central Phoenix, Arizona from 2015 to 2016. Midwestern University student volunteers signed an informed consent and completed surveys before and after attending student-run free clinics. At each clinic, pharmacy students were assigned to an interdisciplinary team with students from the following disciplines: osteopathic medicine, physician assistant, dental, and physical therapy. All student volunteers were verbally instructed about their responsibilities for the clinic. Pharmacy students were specifically provided with a comprehensive list of goals to guide them through each patient encounter. Interdisciplinary teams were assigned patients to complete a non-invasive work-up, formulate an assessment, and propose a treatment which was presented to physician and pharmacy preceptors. These specific instructions included acquiring the patient's list of current medications, their allergies and reactions, checking for any disease and drug interactions,

presenting the patient case and assessment to the pharmacy preceptor, and appropriately counseling for medications dispensed. Survey questions utilized a five-point Likert scale to assess the student's attitudes and perception of general interdisciplinary health care and to assess the role of pharmacists in interdisciplinary health care. Pre and post surveys were matched by a unique identifier and compared using Wilcoxon signed-rank and Mann-Whitney U tests.

Results: A total of 141 students were surveyed but 23 students were excluded for incomplete surveys, resulting in a total of 76 non-pharmacy students and 42 pharmacy students with data for analysis. Surveys responses from non-pharmacy disciplines were made up of 67.1 percent of Doctors of Osteopathic Medicine students, 15.8 percent Physician Assistant students, 14.4 percent Occupational Therapy students, and 2.6 percent Nurse Anesthetist students. Baseline opinions regarding the benefits of overall interdisciplinary experiences were more positive with pharmacy students compared to the non-pharmacy students in both the pre and post surveys. Both pharmacy and non-pharmacy students showed statistically significant improvement in opinions regarding the use of interdisciplinary teams to maintain enthusiasm in careers (p equals 0.002 and 0.011 respectively) and to better meet the emotional and financial needs of patients (p equals 0.007 and less than 0.001 respectively). When comparing the perceptions of non-pharmacy students who worked with pharmacy on their team during clinic to those who did not, there was a statistically significant improvement in opinion regarding whether or not having pharmacists or pharmacy students on the team improves the quality of healthcare (p equals 0.024).

Conclusion: Both the use of student run free clinics and delineation of specific roles of each discipline are beneficial in improving attitude and perception towards interdisciplinary teams and also of the role of pharmacists in health care. By improving the attitudes and perceptions, we can promote and facilitate better collaboration in interdisciplinary teams to improve the quality of health care delivery to patients. Additionally, early collaboration in a student's interdisciplinary education can help with promoting the profession of pharmacy to provide more comprehensive, and consistent high-quality care.

Submission Category: Leadership

Submission Type: Descriptive Report

Session-Board Number: 5a-154

Poster Title: Cultivating leaders in pharmacy: a leadership development program for pharmacy students

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Purpose: Although participation in pharmacy organizations is common for students, leadership positions tend to be held by more senior students rather than entry level or junior students. In addition, pharmacy students may not be presented with many overall opportunities to formally develop leadership skills throughout pharmacy programs. Our NCPA chapter designed the Leadership Development Program (LDP) which provides participants with structured workshops related to essential leadership skills. The purpose is to expose entry-level and junior students to the various facets of becoming a leader earlier in their pharmacy education while continuing to develop students in executive leadership roles.

Methods: Each fall, NCPA's Professional Affairs coordinator informs potential participants, first pre-professional (PP1), second pre-professional (PP2), and first professional (P1) students, about the LDP program via Facebook and email. The program is promoted at the pharmacy school's involvement fair and during the organization's General Interest Meeting. An application for the program is released to students online. Students may submit their applications over a period of ten calendar days. The application gathers information regarding students' participation interests, their desired learning outcomes from the program, and committee preferences (Legislative Affairs, Business Plan, Public Relations, Fundraising, Professional Affairs, Social, and Patient Care). The committee coordinator serves as a mentor to one or two applicants (mentees). Mentees are invited to the program at the discretion of the Professional Affairs coordinator, who looks for specificity and maturity in applicants' responses. In collaboration with the coordinator, the mentee must draw up an outline for an event that is relevant to the committee. The mentee will be responsible for executing their plan in the spring semester. Formal development of leadership skills occurs through the Professional Affairs

committee's initiatives. The Professional Affairs coordinator designs workshops which target specific leadership skill sets, such as public speaking, networking, CV building, interviewing, and professional dressing. Mentees are required to attend each workshop. The program concludes with a golfing lesson to expose mentees to an active networking skill.

Results: In the 2015-2016 program year, eighteen LDP applications were received from six PP1s, seven PP2s, and five P1s. A total of 12 students (66.7%) were selected as LDP mentees: four PP1s (33.3%), five PP2s (41.7%), and three P1s (25%). Each committee coordinator was assigned two mentees with the exception of the Social and Public Relations committees, which only received one mentee each. Five 2-hour leadership-based workshops were held from November through April, and were led by three post-doctoral fellows and two faculty members. Interactive sessions followed each lesson to allow students the opportunity to practice the skills they learned. These included four public speaking exercises, two-minute rounds of speed-networking between mentees, mentors, and fellows, CV critiques, followed by a five-minute mock interview with two mentors, 20 examples of business appropriate and inappropriate attire, and a golf lesson and practice session at a driving range. Upon completion of the program, participants have expressed that the experience taught them many valuable lessons and improved their overall self-confidence. Many of these students have subsequently served on executive boards and committees in numerous other organizations, including 13 of 22 (59.1%) executive board and committee members of NCPA for 2016-2017.

Conclusion: Students who have participated in the LDP gained experience in public speaking, networking, CV building, interviewing, professional dressing, and golfing. These opportunities may not have been available to them otherwise. Through structured workshops and programs, less experienced PP1, PP2, and P1 students learned and applied skills to enhance their involvement in leadership opportunities while seasoned leaders further developed their leadership and mentoring skills. The LDP model can be utilized by other schools of pharmacy interested in further developing their current and soon to be leaders.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 5a-155

Poster Title: Impact of the addition of a clinic pharmacist on the safety of heart failure and heart transplant patients

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Purpose: Heart failure and heart transplant medication regimens are complex and put patients at a high risk for readmission after discharge. A multidisciplinary approach is vital in preventing medication errors, lowering hospital re-admission rates, and improving patient outcomes. A pharmacist was added to a cardiology clinic with the aim of improving heart failure and heart transplant patient safety and improving patient's baseline knowledge about their disease state. This study is designed to identify these safety interventions and to serve as a framework for other clinics wishing to initiate a pharmacist for the care of patients with heart failure and heart transplant.

Methods: This was a retrospective observational study that evaluated patients followed in an outpatient cardiology clinic from November 2015 to July 2016. The clinic pharmacist documented encounters with patients in the electronic medical record. Patient encounters were defined as any interaction with the patient, including telephone calls after discharge, office visits alongside an attending physician or advanced practitioner, one on one office visits with the patient and pharmacist for medication therapy management, assistance with access to medications, and clinical questions/consults. Clinic and telephone encounter notes were extracted using the clinic's electronic medical record. The types of patients evaluated by the clinic pharmacist included recently diagnosed, highly symptomatic, and potentially non-compliant heart failure; advanced heart failure with a ventricular assist device; and patients who received a heart transplant. The safety of patients was evaluated by analyzing data on pharmacist documented services including medication reconciliation, disease state and medication education, clinical recommendations, and aid with patient access to medications

including prior authorization, refills, and lower-cost options. Additionally during a transitional care phone call, the pharmacist identified and resolved medication discrepancies after hospital discharge. A medication discrepancy was defined as the patient taking a medication differently from the discharge instructions.

Results: A total of 658 patients were included in the 9 month study, accounting for 1,549 patient encounters, averaging 9 encounters per day. Thirty-seven percent of the encounters were office visits with heart failure patients recently discharged from the hospital or during routine follow up. The breakdown of the remainder of patient encounters conducted by the clinic pharmacist included ventricular assist device clinic visits, 23 percent; transitional care telephone calls to patients after hospital discharge, 17 percent; assistance with access to medications,10 percent; heart transplant evaluations and post transplant office visits, 6 percent; medication therapy management, 5 percent; and clinical questions/consults, 2 percent.
During these 1,549 patient encounters the pharmacist contributed to the safety and education of the patients. The majority of safety interventions included medication reconciliation, which occurred during 1,206 encounters. Pharmacist assistance with access to medications and care occurred 770 times. The pharmacist educated patients on medication and disease management in 518 encounters and made 503 clinical recommendations on guideline directed medical therapy and monitoring. Starting in January 2016, the pharmacist called 260 patients recently discharged from the hospital during a transitional care call. The pharmacist resolved at least one medication discrepancy in 85 patients during the phone calls.

Conclusion: The addition of a pharmacist in a clinic setting resulted in a substantial number of clinical interventions and the resolution of a number of medication discrepancies from discharge. The pharmacist was also able to provide medication therapy management, education, and assistance with access to medications. This is the first observational study of its kind to describe the impact of a clinic pharmacist on the care of patients with heart failure, left ventricular assist device, and heart transplant. This study may serve as a framework for other pharmacists wishing to initiate a cardiology clinic for the safety of this patient population.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5a-156

Poster Title: Impact of sleeve gastrectomy on psychiatric medication use

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Purpose: Sleeve gastrectomy (SG) is the most common surgical intervention for obesity in the U.S. The SG involves removal of 80 percent of the stomach without manipulation of the intestinal tract. It is thought medications are not significantly altered with SG. Given that about 56 percent of obese subjects presenting for surgery have comorbid psychiatric diagnoses, it is of interest to determine symptom change and medication use after SG. Therefore, the primary objective is to identify patient reported perception of change in anxiety and depression symptoms after SG. The secondary objective is to identify medication use and relationship to symptom change.

Methods: The protocol was approved by the State University of New York at Buffalo Institutional Review Board. Subjects with anxiety or depression diagnoses treated with medication at the time of SG were retrospectively identified from medical records of a bariatric surgery center in Buffalo, NY. Phone outreach to eligible subjects was made by the study investigators to complete a seven-point global impression of change scale that classified symptoms as very much worse, much worse, minimally worse, minimally improved, much improved, very much improved, and those having no change. Symptom improvement was defined as either all reported symptoms improving or at least one symptom improving while the remaining were unchanged. The same criteria were applied for worsening. A mixed profile was established if at least one symptom improved and one worsened. No change required the same profile before and after surgery. Antianxiety and antidepressant medication changes were identified during subject interview and verified by electronic medical records. Medication changes were categorized as no change, discontinued, decreased or increased. Results are presented descriptively as the percentage change from the pre-surgery baseline.

Results: 43 subjects completed telephone survey. 17 diagnosed with anxiety were on benzodiazepine, SSRI or combination therapy. 13 (75 percent) had no change in therapy. 3 (18 percent) decreased use. 1 (6 percent) increased. Symptoms were unchanged in 1 (6 percent), improved in 9 (53 percent), worsened in 2 (12 percent) and mixed in 5 (29 percent). When symptoms improved the same dose was present in 6 of 9 cases (67 percent), dose decreased in 2 (22 percent), and dose increased in 1 (11 percent). The 2 cases of symptom worsening came while on the same dose. 42 subjects diagnosed with depression were on SSRI, SNRI or combination therapy. 30 (70 percent) had no change in therapy while 8 (19 percent) discontinued, 2 (5 percent) decreased, and 1 (2 percent) increased. Symptoms were unchanged in 2 (5 percent), improved in 29 (70 percent), worsened in 3 (6 percent), and mixed in 8 (19 percent). When symptoms were improved the same regimen and dose was present in 21 of 29 cases (72 percent) and discontinued in 6 (14 percent). The 3 cases of worsening included 2 (67 percent) where medication was discontinued and the third a dose increase (33 percent).

Conclusion: Anxiety symptoms improved in over 50 percent of subjects. 75 percent had no therapy change. Symptom improvement came predominantly at same or reduced doses. In 12 percent of cases worsening dose was the same. Depression symptoms improved in 70 percent. 70 percent had no therapy change. Symptom improvement came predominantly on same regimen and doses. In 7 percent of cases worsening medication was discontinued in 66 percent. These data indicate a majority will have symptom improvement while on the same anxiety or depression regimen and implicates benzodiazepines and SSRIs are not likely to have clinically significant pharmacodynamic alteration after SG.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 5a-157

Poster Title: Concomitant Opioid and Benzodiazepine Use: A Systematic Review

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Purpose: In opioid users, the concomitant use of a benzodiazepine medication is associated with an increased risk of adverse reactions and overdose due to the synergistic effects on sedation and respiratory depression. The degree to which adverse events and overdoses occur is unclear when assessing patient characteristics, dosage and formulation. This study primarily sought to assess the prevalence of an adverse event or death after concomitantly taking an opioid and benzodiazepine prescription medication and to determine whether there is an impact on the formulation, dosing, or administration of the medication in overdose.

Methods: A review of the literature was performed using the following databases: PubMed, PsycINFO, The Cochrane Library, and Scopus for peer-reviewed journal articles in English to identify studies regarding concomitant benzodiazepine and opioid medication overdose in adolescents and adults for non-cancer pain through August 2016. Relevant publications and their reference lists were reviewed to assess for inclusion criteria based upon relevance and quality. Applicable publications were reviewed and included if outcomes of patients were clearly documented by medication use. Information on the study design, sample characteristics, purpose of study, intervention components, primary outcome, key findings and risk of bias were abstracted for each article and presented in a table. Articles were excluded in the review if concomitant use of benzodiazepine and opioid analgesic use was not clear or intentional suicide was indicated as cause of mortality. Key search terms utilized were: ‘opioid analgesic’, ‘benzodiazepine’, ‘non-cancer pain’, ‘substance-related disorders’, ‘polypharmacy’, ‘co-prescribing’, ‘illicit use’, and ‘overdose’.

Results: Of the 1,098 reviewed articles, 11 were included in this systematic review and are presented in the summary of findings table. Relevant studies assessed morbidity and mortality associated with opioid and benzodiazepine use, incidence of non-prescribed medications or illicit drug use, and descriptive information on patient populations of greatest risk of overdose. Common reasons for not selecting a particular article were due to study design and incomplete information of medications within each class.

Conclusion: The prevalence of opioid and benzodiazepine misuse and abuse has warranted international attention due to the increased overdose risk with concomitant use. More information is needed regarding dosing, formulation, and particular agent for opioids and benzodiazepines. Assessment of mortality risk is lacking when comparing acute versus chronic drug users and abusers. The incidence of overdose increases as potency increases or when an illicit agent is included due to the central nervous system (CNS) depressant effects.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5a-158

Poster Title: Evaluation of aspirin utilization in a psychiatric facility

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Purpose: Aspirin therapy may be indicated in certain adults for the primary prevention of cardiovascular disease (CVD); however, previous studies have shown inappropriate aspirin utilization, by either over or under prescribing for this indication in select samples. Our primary objective was to determine if aspirin utilization for primary prevention of CVD and if prescribing habits in a state psychiatric facility were appropriate, as previous research does not address utilization in this special subpopulation. Further objectives included quantifying the prevalence of drug interactions with aspirin and the number of bleeding events in patients prescribed aspirin.

Methods: Our Institutional Review Board of record, New York State Psychiatric Institute, approved this study. All inpatient medical charts were reviewed for patients ages 50 to 69 years and those prescribed aspirin during their hospitalization at the Buffalo Psychiatric Center between April 1, 2016 through August 31, 2016. Patients were excluded if they were prescribed aspirin for any indication other than primary prevention of CVD (such as secondary prevention of CVD or pain/fever), if they were hospitalized under a criminal procedural law status, or if their medical records had incomplete laboratory information or past medical history. Aspirin eligibility was based on patients' 10-year risk for atherosclerotic cardiovascular disease (ASCVD) score and the 2016 recommendations from the U.S. Preventive Task Force. A drug interaction report was conducted utilizing Clinical Pharmacology database for individuals being prescribed aspirin for primary prevention of CVD. Drug interactions between aspirin and concurrently prescribed pharmacotherapy were then classified based on severity, and past bleeding events were quantified.

Results: Ninety-six patients met the inclusion criteria for the study. Results indicated that 25 patients would benefit from aspirin therapy based on the calculated ASCVD 10-year risk scores; twenty-two (88 percent) of which were not prescribed aspirin. The remaining 71 patients did not meet criteria for aspirin therapy; fourteen (19.7 percent) were taking aspirin regularly without indication. A total of 17 patients were taking aspirin during the selected time period, and all were concurrently prescribed other medications; therefore, the potential for drug interactions was possible for 100 percent of this sample at some level. Of the total 65 interactions discovered, 10.8 percent were major, 87.7 percent were moderate, and 1.5 percent were minor interactions. For those 17 patients on aspirin therapy, there were no gastrointestinal bleeding episodes or hemorrhagic strokes documented.

Conclusion: Aspirin utilization requires individualized treatment and monitoring, especially in a psychiatric population where polypharmacy is often ubiquitous. Underutilization of aspirin was more prevalent in our psychiatric institution than overutilization. Overutilization did not pose a serious risk for those on aspirin therapy in this sample, as there were no major episodes of bleeding. However, future harm from aspirin still exists based on the high number of major and moderate potential drug interactions with aspirin (98.5 percent). The impact of our findings demonstrates that polypharmacy for multiple disease states affects patient safety.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 5a-159

Poster Title: Tissue plasminogen activator (tPA) dosing for catheter occlusion in pediatric patients at a large academic medical center

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Purpose: Tissue plasminogen activator (tPA) is a thrombolytic protein involved in the lysis of blood clots. While the adult dose for catheter occlusion has been well established, recommended dosing for pediatric patients < 30kg remains challenging due to dose calculation based on catheter volume. The primary objective of this study was to evaluate a tPA dosing guideline in pediatric patients less than 30kg at West Virginia University Medicine Children's Hospital. The secondary objectives were to determine the number of patients that did not follow the guideline, and to describe these doses as being higher or lower than advised.

Methods: This is an Institutional Review Board approved retrospective study. Electronic medical records were used to generate a report of 36 pediatric patients that received tPA for catheter occlusion in a seven-month time frame. Patients that were less than 30 kg, less than 18 years of age, and received alteplase for the treatment of catheter occlusion were eligible for inclusion. Exclusion criteria included patients that had a venous access device without French size and/or length of insertion recorded. Data collected included age, weight, medical service, dose of alteplase given (in mLs), catheter type and size, and total number of doses of alteplase given. Descriptive statistics were used to determine the primary outcome.

Results: Guidelines for tPA dosing were followed 77.8% (28 out of 36) of the time. Of the 8 patients that the guideline was not followed, 100% of the doses prescribed were higher than guideline recommendations. Of the 28 patients where guidelines were followed, 89.3% (25 out of 28) of tPA doses were considered successful at resolving catheter occlusion after the first dose. Three out of 28 patients (10.7%) required a second dose for catheter occlusion resolution. These guidelines were implemented shortly prior to data collection. There was a decreasing amount of noncompliance to protocol as time elapsed, with 50% (6 out of 12) not following

protocol in the first three months of the study, versus 8.3% (2 out of 24) noncompliance in the last four months.

Conclusion: At West Virginia University Medicine Children's, we were compliant with our new tPA dosing guideline 77.8% of the time. When the guidelines were followed, 89.3% of doses were effective in restoration of access to catheters after the first dose. After implementation, there was incomplete physician and provider buy in due to lack of confidence in the small doses requested by the guidelines. This data suggests that the guideline implementation is becoming more accepted amongst these providers, and the doses of tPA stated by the guideline are effective in treating catheter occlusion.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5a-160

Poster Title: Evaluating the continued use of stress ulcer prophylaxis medications after pediatric intensive care unit transfer

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Purpose: Proton pump inhibitors and H2 receptor antagonists are commonly used in the pediatric intensive care unit (PICU) for stress ulcer prophylaxis. Currently there are no specific pediatric guidelines for stress ulcer prophylaxis indication while in the PICU. These medications are often continued unnecessarily once patients transfer out of the PICU and can even continue at hospital discharge. The purpose of this study was to evaluate the frequency of PICU patients receiving stress ulcer prophylaxis beyond PICU transfer and at hospital discharge. The potential cost burdens to both the hospital and patient were also calculated.

Methods: This was a randomized, retrospective chart review of patients admitted to the Nationwide Children's Hospital PICU from January through April 2016 for stress ulcer prophylaxis who were prescribed either oral or intravenous ranitidine, omeprazole, or pantoprazole. Patients were excluded if one of these medications were a home medication at time of admission. Baseline demographics were collected as well as dates and times for medication discontinuation, PICU transfer, and hospital discharge. Discharge prescription information was also collected. This study underwent the institutional review board and was deemed exempt.

Results: Out of these 138 patient encounters, 35 encounters were excluded due to one of these medications being listed as a home medication at the time of their hospital admission, leaving 103 patient encounters to be evaluated. Indications for those continued on therapy beyond PICU transfer included 66 percent for stress ulcer prophylaxis, 3 percent for gastroesophageal reflux disease, 2 percent for gastritis, 2 percent for emesis, and 27 percent for unknown indications. Furthermore, 24 percent of those continued on therapy were discharged from the hospital with a prescription for a stress-ulcer prophylaxis medication. Therefore, 14 percent of

patients started on stress ulcer prophylaxis during their PICU admission were continued on therapy at hospital discharge. Estimates for potential patient costs for one extra patient-day of unnecessary therapy for an entire year were calculated using a 70 kg patient and initial starting doses. Yearly patient cost for ranitidine therapy would be about 4,600 dollars for oral therapy and 97,000 dollars for intravenous therapy. For oral omeprazole, this would be about 2,700 dollars per year for capsules and 6,400 dollars for liquid. Lastly, Intravenous pantoprazole would be 36,000 dollars per year.

Conclusion: Results showed that a significant amount of patients are transferred out of the PICU on stress ulcer prophylaxis. Unnecessary use of these medications can be associated with increased risk of adverse events, as well as increased cost burdens to both the patient and the hospital. Therefore, it is important that practices and protocols are put in place to decrease the occurrence of the continued use of these medications beyond PICU transfer if not indicated. Further studies could include implementation of a stress ulcer prophylaxis protocol in the PICU, outpatient medication cost, and pharmacist intervention at PICU transfer.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Evaluative Study

Session-Board Number: 5a-161

Poster Title: Factors influencing fourth year pharmacy student pursuit of research

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Purpose: There are limited studies regarding pharmacy students' perception of and attitudes towards participating in research. Identifying factors that influence students' pursuit of research opportunities and perceived barriers to pursuing these opportunities may help pharmacy faculty successfully guide students to appropriate research experiences. Information is also lacking as to the best time during pharmacy school to introduce research projects to pharmacy students. The purpose of this study was to identify the factors that influence students to pursue research.

Methods: A voluntary paper-based questionnaire regarding factors that influence students to pursue research opportunities (n=15 questions) as well as demographic information (n=10 questions) was distributed to all fourth year pharmacy students during a mandatory class meeting on two occasions. A cover letter included with the survey served as a consent form and assured confidentiality as results were to be reported on the aggregate. Names or identifying information were not collected. Each student received a $5 Starbucks gift card when turning in their survey. This study was approved by the Institutional Review Board at Midwestern University.

Results: One hundred and sixty 4th year pharmacy students completed the survey (80%). The average respondent was female (n=107, 67.3%) 25 years old (IQR 24-27 years), employed (n=115, 72.8%), and entered pharmacy school with a prior degree (n=104, 65.4). Forty-four percent (n=70) pursued a research project while in pharmacy school. Of the 89 students that did not pursue a research project during pharmacy school, a mandatory research class as a part of the curriculum (n=55, 63.2%), participation in a research workshop during the first weeks of pharmacy school (n=45, 51.7%), and faculty contacting students directly to work on a research

project (n=41, 47.1%) would most strongly influence them to complete a research project. Lack of time (n=61, 68.5%), too much coursework (n=36, 40.5%), and unfamiliarity with the research process (n=35, 39.3) were cited as the top three perceived barriers that have prevented these students from pursuing research. Most students agreed that research is very important to pharmacy practice (n=129, 82.2) and that students should be exposed to research early in their pharmacy education (n=81, 50.6%).

Conclusion: Students perceive research as important to pharmacy practice and feel early exposure would positively influence their decision to pursue research in pharmacy school. Mandatory events that expose students to research early on, including a workshop or research class, appear instrumental in positively influencing pharmacy students to pursue research. Future research should evaluate the efficacy of programs and strategies used to promote research participation among pharmacy students.

Submission Category: Pain Management

Submission Type: Descriptive Report

Session-Board Number: 5a-162

Poster Title: Review of intrathecal medications for chronic pain management

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Purpose: Achieving adequate pain control can be challenging for patients with chronic pain due to cancer and other illnesses. For patients who have failed other treatment options, intrathecal (IT) analgesia can be used to manage persistent pain. The aim of this review was to identify and evaluate literature related to the stability, compatibility, safety, and efficacy of compounds used for long-term IT analgesia.

Methods: A literature search was completed to evaluate the stability, compatibility, safety, and efficacy of IT compounds administered via implantable IT pumps. A variety of drug information resources were utilized including reference and text books, compounding and pain organizations, and published articles cataloged on PubMed, Cochrane Database of Systematic Reviews, and Cumulative Index of Nursing and Allied Health Literature (CINAHL). Compounds were only evaluated for safety and efficacy after sufficient data had been found supporting the stability and compatibility of the solution. Articles were excluded if implanted IT pumps were not involved.

Results: After completing the review of stability and compatibility data, there were 10 compounds remaining which were evaluated for safety and efficacy. These compounds were morphine, hydromorphone, bupivacaine, fentanyl, morphine with baclofen, morphine with bupivacaine, hydromorphone with clonidine, hydromorphone with bupivacaine, fentanyl with bupivacaine, and hydromorphone with both bupivacaine and clonidine. A total of 71 studies were included in the review. Stability and compatibility information was obtained from 25 studies, safety and efficacy information was obtained from 45 studies, and 1 study had information in both categories. The 10 IT compounds evaluated for safety and efficacy in this review appeared to be relatively safe and effective, though the overall quality of the available

literature was poor. Side effects reported in the literature were often easily managed or subsided over time. Most compounds appeared to be successful at managing the patients' pain on a long-term basis where other pain management strategies had failed.

Conclusion: While medical disciplines continue to pursue evidence-based practices, the management of pain intrathecally is done primarily based on the clinical opinions and past experiences of practitioners. This is primarily due to the fact that published data in IT chronic pain management are severely lacking, presenting many concerns for the safety of these patients. More stability and compatibility studies need to be done to ensure that compounds being used long-term in IT pumps are stable for that duration of time. Pain management is an art as much as it is a science, but more studies evaluating efficacy and safety are necessary.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5a-163

Poster Title: Identifying safe and unexpected drugs for depression using inverse-frequency analysis of population scale data

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Purpose: Ketamine, a drug indicated for anesthesia, has recently been explored for use in treatment resistant depression and pain management. Ketamine's fast onset of action compared to traditional antidepressants has potential therapeutic advantages for patients with acute depressive episodes. Population scale analysis of ketamine patient outcomes and adverse effects was needed to support previous small scale evidence of ketamine's psychiatric pharmacology. The purpose of this study was to assess the efficacy and safety of ketamine therapy, using the FDA Adverse Event Reporting System (FAERS), and to use inverse-frequency analysis (IFA) to identify other drugs with unexpected psychiatric polypharmacology.

Methods: This study utilized the FDA Adverse Event Reporting System's (FAERS) eight million patient records spanning from 2002 to 2016. FAERS is a database intended to support the FDA's post-marketing drug safety surveillance program. Although the database was designed to be used for monitoring of adverse drug reactions (ADRs), FAERS's large size has made other investigations possible. Here we developed inverse-frequency analysis (IFA), a statistical methodology for determining drug efficacy using population scare adverse effect data. IFA uses the log of the odds ratio (LogOR) in order to determine a drug of interest's efficacy for off-label indications. The large scale of FAERS data makes detection of a drug's unintended protective effects possible with high statistical power. In this study 41,337 patients, who were given ketamine in combination with other drugs, were compared with 238,516 patients, who were given any combination of drugs indicated for pain besides ketamine. ADRs with frequencies above 2.5% were reported and odds ratios were calculated comparing the ketamine patient group with the non-ketamine patient control group. Additionally, important entries indicative

of off-label ketamine pharmacology were reported via IFA as LogOR. The FAERS database was searched by IFA for drugs with negative LogOR for ADR entries indicative of psychiatric pharmacology. Three such drugs were found using this method.

Results: Patients who received ketamine in addition to other therapeutics had significantly lower frequency of reports of depression (LogOR -0.67, LogORerror 0.033), pain (LogOR -0.41, LogORerror 0.019), constipation (LogOR -0.17, LORerror 0.033), vomiting (LogOR -0.16, LORerror 0.025), and nausea (LogOR -0.45, LogORerror 0.023) than patients who received any other combination of drugs indicated for pain. Renal side effects were observed to be the most frequent ADR for patients receiving ketamine. 7.93% of ketamine patients had renal failure and 4.83% had acute renal failure. Other drugs were also found to have significant antidepressant psychiatric activity including, diclofenac (LOR -2.21, LogORerror 0.14), Botox (LOR -1.81, LogORerror 0.053), and minocycline (LOR -0.49, LogORerror 0.017).

Conclusion: Ketamine patients had lower rates of depression and pain than patients who received any other combination of drugs for pain. This may be resultant of a decrease in pain which could impact depression associated with pain or ketamine may be directly helping patients with both pain and depression simultaneously. Further, ketamine receiving patients had lower rates of opioid side effects including nausea, vomiting and diarrhea. Ketamine was also observed to have a high frequency of renal side effects and may be contraindicated in patients with renal impairment. Further, drugs such as antibiotics and NSAIDS may have off label psychiatric effects.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5a-164

Poster Title: NSCLC Stage IV Pharmacotherapy: Comparison of NCCN Guideline recommendations with approved FDA labeling

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Purpose: Non-small cell lung cancer (NSCLC) is a deadly disease, which accounts for about 85% of all lung cancer. With a 5-year survival rate of 1%, patients with Stage IV NSCLC are in desperate need for the most optimal and effective treatment in order to decrease their mortality. Most guidelines used by clinicians for treatment of this disease may make recommendations about off-label use of chemotherapeutic agents. We conducted this study in order to evaluate how pharmacotherapy recommended by NCCN Guidelines (January 12, 2016) compares to current approved FDA labeling of the drugs recommended.

Methods: We conducted a literature search using Medline and Guideline.gov to find guidelines for Stage IV NSCLC treatment. Different guidelines were reviewed for completeness of their recommendations. NCCN Guidelines was selected because they had the most comprehensive recommendations that would help guide clinical decision making in treatment of Stage IV NSCLC. We compared all pharmacotherapeutic options, including combo and mono therapy, recommendations to FDA approved indications of those drugs. FDA AccessData and drug manufacturer websites were used for searching FDA approved indications. We considered a recommendation to be “matching” with the FDA labeling if the package insert indication matched the NCCN recommendation and drug combinations suggested by NCCN were explicitly stated in a package insert of one of the drugs used in combination. For EGFR-positive and ALK-positive NSCLC, the package insert had to explicitly state those mutations in order for the recommendations to be considered “matching”. If the package insert recommended a drug for first-line therapy while the NCCN Guidelines recommended it for subsequent therapy or vice-versa, the recommendation would be considered “non-matching” with the FDA labeling. Cisplatin and Carboplatin were considered non-interchangeable. After data collection, percentages of “matching” recommendations were calculated for the four types of NSCLC:

Large Cell Adenocarcinoma of the Lung, Squamous Cell Carcinoma of the Lung, EGFR-positive NSCLC, and ALK-positive NSCLC.

Results: The total of 24 drugs recommended in the NCCN Guidelines for any category of stage IV NSCLC was evaluated. Out of 24 drugs, 20 (83.3%) were indicated in the FDA approved labeling and 4 did not have any indication for NSCLC. 12 of 15 recommended drugs (80%) had the FDA labeling for Large Cell Adenocarcinoma NSCLC, 10/13 (77%) for Squamous Cell NSCLC, 4/5 (80%) for EGFR-positive NSCLC, and 3/3 (100%) for ALK-positive NSCLC. Only 17 of 37 NCCN Guidelines recommendations (46%) matched the FDA approved right indications for Large Cell Adenocarcinoma NSCLC, 12/33 (43%) for Squamous Cell NSCLC, 4/8 (50%) for EGFR-positive NSCLC, and 4/4 (100%) for ALK-positive NSCLC. Out of the total 82 NCCN Guidelines recommendations only 36 (44%) matched the official FDA approved indications for those drugs.

Conclusion: In conclusion, 83% of the total drugs recommended by the NCCN Guidelines have approved indication for NSCLC and 44% of the total recommendations from NCCN Guidelines are approved for matching indications. Further research is needed to evaluate and quantify the reasons for these differences.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 5a-165

Poster Title: Acanthamoeba Keratitis: Review of pharmacotherapeutic outcomes (25 year case history).

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Purpose: Acanthamoeba Keratitis (AK) is a rare but growing ocular disease caused by improper contact lens hygiene and/or ocular trauma. The purpose of our project was to assess treatments and clinical outcomes of AK by reviewing multiple case-series of the various available treatment options over the past 25 years. Furthermore, to review in vitro studies of novel treatments of AK aimed at decreasing treatment cytopathic effect (CPE) on human corneal epithelial (HCE) cells while increasing CPE on Acanthamoeba trophozoites and cysts.

Methods: A literature review was conducted using Medline to identify and review retrospective case studies dating from 1992-2016. The data was compiled based upon the treatment regimen utilized. The 4 main areas analyzed were: treatment regimen, pre-treatment visual acuity, post-treatment visual acuity, and treatment regimen outcomes leading to the need for surgical intervention. Additional data points analyzed were: prior contact lenses usage and hygiene, medication usage prior to AK diagnosis, and delay in diagnoses. Further, consolidation of early diagnosed groups were analyzed to find overall final visual acuity of patients diagnosed within 1 month.

Results: Nineteen studies were found detailing the treatment of AK. Within the reviewed cases the treatment that was most used was combination topical therapy to treat an AK infection. Duguid et al conducted the largest case study with 105 patients (111 eyes). The treatment with PHMB and Brolene resulted with 79.3 percent of patients with a final visual acuity better than 6/12. In addition, in patients who received the same treatment, 90.8 percent of those diagnosed early (less than 1 month) had a final visual acuity of 6/12 or better as opposed to 65

percent of patients in the late group (greater than 2 months). In vitro studies with cellulose synthesis inhibitors, 2,6-dichlorobenzonitrile (DCB) and isoxaben, showed decreasing PHMB concentration to 0.00125 percent showed no significant CPE on HCE, but addition of 100 mM DCB or 10 mM isoxaben had 23.4 percent or 18.7 percent additional amebicidal effects on Acanthamoeba. In many patients, corticosteroids have been used prior to diagnosis, but there is insufficient evidence showing any links to positive or negative outcomes.

Conclusion: Acanthamoeba Keratitis is a rare ocular infection that can affect all healthy individuals. The CDC conservatively estimates incidence to be one to two cases per million per year. This case-series review has shown that early diagnosis (less than 1 month) of AK has the best post-treatment results in patients in all treatment groups due to the ability of treatments limiting the ability of AK to spread deeper into tissues. The best visual acuity was attained through the combination of a biguanide and propamidine isethionate treatment.

Submission Category: Pharmacokinetics

Submission Type: Evaluative Study

Session-Board Number: 5a-166

Poster Title: Gold nanoparticles: A medium for antibiotic delivery

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Purpose: There is an increasing prevalence of multidrug-resistant (MDR) gram negative bacteria including Acinetobacter baumannii, Pseudomonas aeruginosa and Klebsiella pneumonia. Antibiotics linked to gold nanoparticles (AuNP) have different physiochemical, pharmacokinetic, and pharmacodynamic properties that may improve treatment options for these MDR pathogens. We sought to evaluate the distribution of gold nanoparticles when linked to a commercially available antibiotic. For patent reasons, we are not disclosing the antibiotic or methods of linking at this time.

Methods: Male Sprague-Dawley rats (~300g) were dosed intravenously via the lateral tail vein (n=10). The first cohort (n=5) was the “antibiotic-only” control group and the second (n=5) was the antibiotic-AuNP compound. Blood samples were collected via jugular catheter and prepared as serum and plasma. Tissues were harvested at 24-hour post dose. Tissues included liver, kidneys, skeletal muscle, lungs and thymus. Inductively Coupled Plasma-Mass-Spectrometry (ICP-MS) was utilized to measure elemental [Au].

Results: The antibiotic-only group demonstrated that Au/ tissue (g/g) was less than 0.00001 for all tissues. Rats in the AuNP group tolerated the injections well. The second cohort was the negative control, which was just the AuNP. We found much higher concentrations of Au in the tissue samples. The highest concentrations were found in the Kidney (0.0013 g Au/ g Tissue) and Lung (0.00021 g Au/ g Tissue). Preliminary blood data show that the initial Au plasma concentrations increase with time.

Conclusion: Our preliminary data demonstrated that minimal gold is present in rat tissues that are treated with antibiotic only. Rats tolerated the AuNP well and gold is measurable in various tissues. Gold nanoparticles are a viable option for linking antibiotics. Future work will define the pharmacokinetics of all compounds singly and linked.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 5a-167

Poster Title: Efficacy of an extemporaneous formulation of propranolol in Mexican patients with problematic infantile hemangioma

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Purpose: Infantile hemangiomas (IH) are the most common vascular tumors of childhood, are presented by 10% in children less than one year. Propranolol one β-blocker mainly indicated for hypertension has proven effective in reducing this type of tumors. In Mexico there are no studies that evaluate the efficacy or parameters to guide treatment in patients with IH, neither propranolol formulations appropriate for the pediatric population.
The purpose of this study is evaluated the efficacy of propranolol in Mexican pediatric patients diagnosed with problematic infantile hemangioma, treated with an extemporaneous solution of propranolol.

Methods: An open prospective observational study at the Children's Hospital of the California´s in Mexico was performed in pediatric patients diagnosed with infantile hemangioma, between the ages of 3-12 months. Patients were treated with an oral solution of propranolol prepared for the pharmacist in doses ranging from 0.5-2.5 mg/kg per day. The treatment efficacy was assessed using a visual scale clinical improvement and measurement of hemangioma, safety of propranolol was determined based on the adverse effects reported.

Results: In a period of 24 months 63 patients were treated, 64% female and 36% male. The IH location was mainly in head and neck (57%). The effectiveness was proven in 95% of patients. Treatment had an average duration of 9.6 ± 2.2 months. Children who started therapy before six months of age had a significantly better response and shorter duration of treatment (8.7 months and 10.7 months respectively). The average effective dose was 1.5 mg/kg/day. On six

patients (9%) cases of adverse effects occurred (insomnia, hypertension, diarrhea and dental caries).

Conclusion: Treatment with extemporaneous formulation of propranolol in this group of Mexican pediatric patients, proved to be safe and effective at an average dose of 1.5 mg/kg/day, reducing the problematic infantile hemangioma; with a minimum incidence of adverse effects.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 5a-168

Poster Title: Frontline pharmacist: HIV screening initiative in an urban academia setting

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Purpose: Global efforts to combat the Acquired Immunodeficiency Syndrome (AIDS) epidemic have been increasing due to the impending public health threat. Of the more than 1.2 million people in the US living with HIV, 1 in 8 are unaware of their status, greatly increasing the risk of disease progression and transmission. Rapid point-of-care testing (POCT) can aid in filling the current gaps existing in HIV data. Recently, students and faculty at Touro College of Pharmacy (TCOP) in Harlem, NY have launched an initiative to help increase HIV screenings and integrate patients into care.

Methods: Students and faculty from TCOP conducted a health fair on National HIV Testing Day (June 27th, 2016). At this event, a college affiliated non-profit organization performed POCT for HIV and provided counseling and social work services. All individuals had the choice to discuss healthcare and insurance options allowing for an increased transition into care for the Harlem community. In addition to HIV testing, participants were able to take advantage of blood pressure screenings, medication management and smoking cessation counseling performed by pharmacy students under the direct supervision of clinical faculty members. Pre- and post-surveys were conducted to gather data on demographics, social histories, health care beliefs, screening results, transitions into care, and changes the individuals hope to implement due to the event. The primary objective was to identify persons with HIV who remain undiagnosed and link them into care.

Results: A total of 86 patients completed pre-surveys and 37 patients completed post-surveys. The mean age was 51.67 years with 67.44% of patient identifying as African American. Of the total amount of patients tested, 4.65% tested positive, and 11.63% were integrated into care.

Conclusion: Early detection with subsequent transition into care is a crucial step towards ending the AIDS epidemic. It is the role of healthcare practitioners and institutions to aid in improving this public health crisis. Free community screening events are an effective way to diagnose HIV-positive individuals who remain undiagnosed and establish patient-provider relationships.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5a-169

Poster Title: Physical compatibility of ketamine with selected drugs during simulated Y-site administration

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Purpose: Ketamine is increasingly being studied for its efficacy in many conditions including analgosedation and chronic pain, particularly for use in the settings of the intensive care and oncology units. In addition to its efficacy it is currently both relatively inexpensive and readily available; hence the resurgence in the use of ketamine. However, ketamine compatibility data is lacking. The purpose of this study was to determine the physical compatibility of ketamine via simulated Y-site administration with drugs commonly used in the pediatric population.

Methods: Study drugs and parenteral nutrition (PN) solutions were chosen based on their frequency of use in the pediatric intensive care unit (PICU) and pediatric oncology unit at The Johns Hopkins Hospital. The most concentrated solution used clinically was chosen for each drug. Test drugs were aseptically prepared using the same process, procedures, and diluents used for preparation of those medications administered in clinical practice. Each test drug was added into an empty individual glass sample cell to which an equal volume of ketamine injection solution (10 mg/mL) was added; to create a 1:1 mixing ratio to simulate Y-site administration. Controls were created by adding each test drug alone into an empty sample cell at the same total volume as the ketamine/test drug combination. Physical compatibility of the admixtures was determined by visual and turbidimetric assessments performed immediately, at 1 hour, and at 4 hours after mixing. The final time period of four hours was chosen based on the typical length of administration and/or flow rates of continuous infusions at this institution. Incompatibility was defined as a significant increase in turbidity of greater than or equal to 0.5 Nephelometric Turbidity Units (NTU) of the mixtures compared to the controls. Visual assessment was used to confirm incompatibilities observed based on turbidity measurements.

Results: Fifteen out of 26 test drugs did not have a significant difference in turbidity measurements between control and test solutions and were therefore determined to be compatible with ketamine. The remaining eleven test drugs demonstrated a significant increase in turbidity between control and test solutions. Based on this development of precipitation, these drugs were found to be incompatible with ketamine. Of note, the addition of ketamine to chlorothiazide resulted in immediate crystallization of the solution.

Conclusion: Cisatracurium, famotidine, ketorolac, levetiracetam, methylprednisolone, mycophenolate, norepinephrine, ondansetron, phenylephrine, prochlorperazine, tacrolimus, vasopressin, vecuronium, and both the Aminosyn- and Trophamine-based PN solutions at concentrations equal to or less than the concentrations tested may be co-infused via a single intravenous line and Y-site connection, with ketamine hydrochloride (10 mg/mL or lower concentration), based upon their physical compatibility over a period of four hours examined in this study. Ketamine should not be administered in combination with any of the other tested drugs due to identified physical incompatibility.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5a-170

Poster Title: Evaluation of liposomal amphotericin B dosing on renal outcomes in a tertiary care hospital

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Purpose: Since its introduction in the 1950's, amphotericin B has remained the standard of care for invasive fungal infections. Although considered a standard of care, amphotericin B has been prescribed with caution because of its ability to cause dose and duration dependent nephrotoxicity to patients. Despite improving the dose-dependent safety profile for this drug by using liposomal and lipid formulations, additional hurdles still remain with its use in the obese patient population. The aim of this retrospective study is to review and compare hospital outcomes in obese versus non-obese patients treated with liposomal amphotericin B (LAmB) and the dosing strategy utilized.

Methods: A retrospective chart review of patients admitted to Methodist LeBonheur Healthcare Adult Hospitals between 1-01-2015 through 7-31-2016 with orders for liposomal amphotericin B (LAmB) was conducted. Patients were initially categorized based on their BMI classification of obese (> 30 kg/m2) or non-obese (< 30 kg/m2). Each patient was evaluated to determine dosing weight used for LAmB (ideal body weight, adjusted body weight, or actual body weight). A determination of the state of the patient's kidney function prior to hospitalization was assessed by a review of the patient's medical history and laboratory values documented in their medical record. Inclusion criteria consisted of: > 18 years of age and active orders for LAmB for minimum of 48 hours. Patients were excluded if they had ESRD on hemodialysis/peritoneal dialysis, incomplete data points for patients and/or pregnancy. The primary objective of this study was to determine the incidence of LAmB-induced acute kidney injury (AKI) in obese versus non-obese patients. Additionally, we aimed to stratify AKI

development based on BMI classification and evaluate treatment failure rates in obese versus non-obese patients.

Results: After review, 44 patients were included in the study (32 non-obese group and 12 obese group). The average BMI for the non-obese group was 21.9 kg/m2 with standard deviation equal to 3.6 and a BMI of 39.1 kg/m2 with standard deviation equal to 7.4 in the obese group. In the obese group, the majority of patients were dosed on actual body weight (83 percent). AKI occurred in 41.6 percent of the obese group compared to 15.6 percent of the non-obese group (p equals 0.11). Based on BMI classification AKI occurred in 1 patient in the underweight group, 1 patient in normal weight, 3 patients in overweight, 2 patients in obesity 1 group, 1 patient in obesity 2 group, and 2 patients with extreme obesity. No significant differences were noted in treatment failure between the groups (16.6 percent obese group versus 12.5 percent non-obese group; p equals 0.66).

Conclusion: Our study revealed a non-significant increase in the incidence of LAmB induced AKI in the obese patient population. The study was limited by the small number of obese patients receiving LAmB. Further studies in the obese patient population are warranted to determine if an association with dosing weight and LAmB exists.

Submission Category: Clinical Services Management

Submission Type: Descriptive Report

Session-Board Number: 5a-171

Poster Title: A literature review of the emphasis of adherence in asthma education programs

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Purpose: Current asthma guidelines recommend clinicians to assess and encourage medication adherence, yet the non-adherence rate among patients is 30-70% which can lead to increased asthma exacerbations requiring hospitalization and an overall increase in healthcare costs. Though there are various tools to measure drug therapy adherence such as urine/blood tracers, health outcomes, and pill/refill counts; asthma education programs are often more heavily focused on teaching patients proper medication technique and disease state education. An overall emphasis on medication adherence should be implemented in asthma education programs to ensure patients are receiving maximal benefit from their drug therapy.

Methods: A Pubmed search was performed using the mesh terms: asthma education intervention, asthma education program, and asthma inhaler technique. Articles from 2011 to 2015 were evaluated if an asthma education program was applied with patients in the study.

Results: The search criteria produced eleven total articles. Five articles were excluded because they only provided background information. Six studies with varied study designs, patient population, and duration of treatment were assessed to evaluate if an emphasis was placed on medication adherence in the asthma education programs. Overall, asthma education programs lacked emphasis on adherence and it was only a secondary outcome or unaddressed. More focus was placed on inhaler technique and disease state education in asthma education programs.

Conclusion: Asthma education programs focus on inhaler technique, disease pathophysiology, and reviewing the asthma action plan and had limited emphasis on medication adherence. A possible barrier to measuring adherence is the difficulty in attaining patient reports or the time-consuming nature of collecting tracers and performing pill counts. Future studies with asthma education programs should assess measuring adherence using multiple methods to help determine if one adherence marker is better or easier to perform than another.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5a-172

Poster Title: Epac role as a novel regulator of airway smooth muscle proliferation in asthma

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Purpose: Asthma, a chronic inflammatory disorder, alters key structural cells in the airways. Changes to airway smooth muscle (ASM) include increased ASM mass through increased cell proliferation. These changes are a component of airway remodeling and linked to poorer clinical outcomes in asthmatics. Controlling ASM proliferation is the second messenger cyclic adenosine monophosphate (cAMP) with cellular amounts regulated by phosphodiesterase (PDEs) enzymes. The role of cAMP effector, exchange protein directly activated by cAMP (Epac), in ASM proliferation remains to be elucidated. PDE-Epac signaling in ASM cell proliferation will be researched in primary human airway smooth muscle cells (HASMCs) from asthmatic individuals.

Methods: Cell Proliferation Asthmatic HASMCs were grown to 80-85% confluency and growth-arrested for 24h. Serum-starved HASMCs were treated with 5% FBS for 48h in the absence or presence of rolipram (10 µM) or albuterol (2 µM), or the agonist 8-(4-Chlorophenylthio)-2'-O-methyladenosine-3',5'-cyclic monophosphate sodium salt (8-CPT-2Me-cAMP; 100 µM) which activates Epac but not PKA, or CE3F4 (1 µM) which inhibits Epac. DNA synthesis of ASM was measured by 5-bromo-2'-deoxyuridine (BrdU) incorporation.

Results: Increased cAMP levels following Epac activation by 8-CPT-2Me-cAMP significantly decreased cell proliferation greater than PDE4 inhibition in asthmatic ASM (206% and 29%; $P < 0.0001$ and 0.01, respectively). Co-treatment of asthmatic ASM with the Epac agonist, 8-CPT-2Me-cAMP, and albuterol significantly enhanced the anti-mitogenic effect of the β2-agonist (579%; $P < 0.0001$). In the presence of PDE4 inhibition, 8-CPT-2Me-cAMP further enhanced the anti-proliferative effect of albuterol in asthmatic ASM (109%; $P < 0.0001$). Epac inhibition by

CE3F4 reduced the effects of cAMP-elevating agents: albuterol and 8-CPT-2Me-cAMP on asthmatic ASM cell proliferation (21% and 96%; $P < 0.1$ and 0.001, respectively).

Conclusion: The cAMP effector Epac enhanced the anti-proliferative effects of albuterol and PDE4 inhibition in asthmatic cells. These data suggest the contribution of the cAMP effector Epac in regulating the pro-mitogenic state in ASM. Dysregulated cAMP levels in asthmatic ASM is associated with decreased lung function, and poorer clinical outcomes. Thus, Epac and PDE4 may have the therapeutic potential to control airway remodeling in asthma and improve lung function.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Evaluative Study

Session-Board Number: 5a-173

Poster Title: Role of gender in the comparison of successful rate control with intravenous diltiazem and intravenous metoprolol in an emergency department setting

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Purpose: Atrial Fibrillation/Flutter is a common admission diagnosis in the emergency department (ED) and both intravenous (IV) metoprolol and IV diltiazem are commonly utilized to acutely treat these patients. However, there continues to be debate between providers as to if a calcium channel blocker or a beta-blocker will be more effective in rate control. The purpose of this study was to examine if gender played a role in successful rate control with either or both agents in order to contribute to effective advancements in the optimization of acute atrial fibrillation/flutter treatment in the ED.

Methods: This study is a retrospective, comparative study conducted in an academic emergency department. Data was gathered over a 6-month period (January 1, 2015 to June 30, 2015) through medical chart review of ED patients treated for atrial fibrillation/flutter. Patients were included into the study if they were treated with IV diltiazem, IV metoprolol, or both in order to rate control heart rate. Exclusion criteria include suspicion of sepsis/pneumonia, pregnancy, mental status change, the dose was not given specifically in the ED, or if the agent was given for indications other than rate control. Data was collected from the IV diltiazem group, IV metoprolol group, and the cross-over group (use of both agents) in order to evaluate the effectiveness of either or both treatments by determining if successful rate control was achieved, which was defined as heart rate less than 110 beats per minute or a decrease in value greater than 20 percent after the dose was given. From there, the role of gender was examined by determining the number of both males and females that were either successful or unsuccessful in achieving rate control within each group. Secondary endpoints of blood pressure before and after the dose were also collected to examine adverse effects.

Results: Of the 126 patients initially included to be screened, 60 patients were excluded due to defined exclusion criteria. A total of 27 patients were included in the IV metoprolol group, 27 patients in the IV diltiazem group, and 12 patients in the crossover group. In the IV diltiazem group, 18 of 27 or 66.7 percent of patients had successful rate control and 9 of 27 or 33.3 percent did not. Of the successful rate control achieved patients, 9 of 15 were females (95 percent CI, 35.21 percent to 84.79 percent, P less than 0.001) and 9 of 12 patients were males (95 percent CI, 50.5 percent to 99.5 percent, P equals 0.0015). This did not change significantly with the IV metoprolol group, in which 14 of 27 or 51.9 percent of patients had successful rate control and 13 of 27 or 48.1 percent did not. Of the successful rate control that was achieved with IV metoprolol, 5 of 9 were females (95 percent CI, 23.03 percent to 87.9 percent, P less than 0.001) and 10 of 18 were males (95 percent CI, 32.54 percent to 78.46 percent, P less than 0.001). The cross-over group also had comparable results.

Conclusion: From the results of this study, either or both IV diltiazem and IV metoprolol were shown to be effective in allowing for successful rate control in the acute treatment of atrial fibrillation/flutter within the ED setting for both genders. However, many limitations of this study suggest that future studies utilizing a stronger data pool are definitely needed to further explore the safety and effectiveness of the two treatment options to see if there is truly a better acute treatment option for the ED setting for both males and females.

Submission Category: Geriatrics

Submission Type: Evaluative Study

Session-Board Number: 5a-174

Poster Title: Correlations of anticholinergic rating scale lists with driving impairment in older adults

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Purpose: The purpose of this study was to investigate the correlation of three anticholinergic rating scale lists with driving impairment in older adults. The anticholinergic rating scales lists considered were the Carnahan's Anticholinergic Drug Scale (ADS), Rudolph's Anticholinergic Risk Scale (ARS), and Boustanti's Anticholinergic Cognitive Burden (ACB). The study also aimed to identify which anticholinergic rating scale list (ADS, ARS, or ACB) best predicts driving impairment in older adults.

Methods: A prospective, cross-sectional study (N=114) was conducted at Touro University California. Participants were recruited throughout Napa-Solano Counties of California using convenience sampling. Inclusion criteria were: (1) 60 years of age or greater, (2) actively driving on a weekly basis, and (3) willing to bring in all current medication bottles. Exclusion criteria were: (1) color blindness, (2) cataract surgery, (3) deafness or vestibular balance issues, (4) history of brain tumor, (5) diagnosis of severe psychiatric condition or acute psychiatric episode, (6) baseline Standardized Mini-Mental State Examination (SMMSE) < 25, (7) alcohol or caffeine consumption on study day, and (8) on stimulant medications or illicit drugs. The Charlson Comorbidity Index (CCI) was used as a baseline test to control for confounding comorbidities. SMMSE and Rapid Detect Saliva Drug Screen (SDS) 10-panel were also used as preliminary tests to screen for exclusions among participants. STISIM Drive® M100 Driving Simulator (Hawthorne, California) measured driving outcomes such as the standard deviation of lateral position (SDLP, in cm), mean speed, speed exceedances, and car following coherence. A generalized linear model was used to analyze continuous outcomes such as SDLP. A Zero-Inflated Poisson regression analyzed count outcomes that included non-negative integer values

(i.e. speed exceedances, centerline crossings). Comparison of the lowest Akaike Information Criterion (AIC) selected the best fitting model to predict driving impairments.

Results: The ACB and ARS anticholinergic rating scale lists showed correlations with driving impairment. There were statistically significant correlations between the ACB list and the primary outcome, SDLP (p=0.037), which measured the amount of weaving of the car, and secondary outcomes of speed exceedances (p=0.018) and centerline crossings (p=0.003). Additionally, there were statistically significant correlations between the ARS list and mean time across center line (p=0.035) and mean distance across centerline (p=0.029). Both the ARS and ACB lists showed statistical significance in detecting impairments in car following coherence, which was the time taken for a driver to respond to the lead vehicle's speed. Comparison of the lowest AIC value determined that the ACB list was the best fitting model to determine driving impairment with regards to SDLP, car following coherence, speed exceedance, and center line crossings, whereas the ARS model was the best fitting model to determine impairments in mean time across center line and mean distance across centerline.

Conclusion: Overall, the ACB list was the best model used to predict driving impairments due to adverse effects from anticholinergic drugs. Thus, implementation of the ACB list in clinical settings can help practitioners identify medications with high anticholinergic burden risks to reduce adverse effects among patients. These results are the first to compare the correlations of each anticholinergic drug potency rating scale lists and driving impairment using a driving simulator.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5a-175

Poster Title: Outpatient antimicrobial prescribing for skin and soft tissue infections in the United States: 2000 and 2014

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Purpose: Skin and soft tissue infections (SSTIs) present a challenging public health problem in the United States, particularly due to the emergence and rise of community-associated methicillin-resistant Staphylococcus aureus over the past two decades. This change in epidemiology might have profound effects on the antimicrobial management of SSTIs. However, recent trends of antimicrobials prescribed for SSTIs are unknown. The purpose of this study was to characterize the change in antimicrobial prescribing patterns associated with the management of SSTIs in the U.S. from 2000 to 2014.

Methods: This was a cross-sectional analysis of nationally representative data from the Medical Expenditure Panel Surveys (MEPS) in 2000 and 2014. SSTIs were defined by Clinical Classification Software code 197. Therapeutic drug classes were identified by using the National Drug Code directory, generic names, and the Multum Lexicon therapeutic classification database (Cerner Multum, Inc). Population-based prescription rates were defined as the annual number of outpatient antibiotic prescriptions for SSTIs divided by the overall US civilian non-institutionalized population per 10,000 persons. All analyses were adjusted to account for the MEPS complex study design using weights, clustering, and stratification to derive national estimates. SPSS 23.0® (IBM Corp, Armonk, NY, USA) was used for all statistical analyses.

Results: Overall, outpatient antimicrobial prescribing for SSTIs increased from 1.6 million prescriptions in 2000 to 4.2 million in 2014. Population-based antimicrobial prescription rates for SSTIs doubled from 2000 to 2014 (risk ratio 2.23, 95% confidence interval (95% CI) 1.65 to 3.03). The use of beta-lactam antibiotics significantly decreased from 2000 to 2014 (75% vs. 34%; $P < 0.0001$). In 2014, the most frequently prescribed antibiotics were cephalosporins

(23%), sulfonamides (16%), and macrolides (16%). Prescription rates for antifungal Furthermore, rates of population-based prescribing for non-beta lactam antibiotics substantially increased from 2000 to 2014 for the following antibiotics: 49-fold for sulfamethoxazole-trimethoprim (0.4 per 10,000 persons to 21.4 per 10,000 persons), 33-fold for clindamycin (0.2 per 10,000 persons to 8 per 10,000 persons), 7-fold for macrolides (3 per 10,000 persons to 22 per 10,000 persons), and 6-fold for tetracyclines (2 per 10,000 persons to 12 per 10,000 persons). Prescription rates for antifungal and antiviral agents remained stable.

Conclusion: Antimicrobial prescription rates for SSTIs have drastically increased from 2000 to 2014. There has been a dramatic shift in prescribing non-beta lactam antibiotics, especially sulfamethoxazole-trimethoprim and clindamycin with a decrease in beta-lactam utilization in 2014 compared to 2000.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5a-176

Poster Title: Student pharmacists' impact on the Visiting Pharmacist In-Home Program novel advanced pharmacy practice experience

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Purpose: To analyze quality assurance data on the APPE course at the Tria Health practice site in collaboration with the Visiting Nurse Association. The purpose was to deliver contemporary pharmacy practice content, meet course performance competencies, and to determine the number and types of drug related problems along with pharmacy care plan recommendations identified by senior pharmacy students. Additionally, 30-day readmission rates were tabulated.

Methods: A retrospective record review was performed to collect information on the number of drug related problems, the types of drug related problems and the care plan recommendations identified by student pharmacists who conducted home visits with patients referred through the Visiting Pharmacist In-Home Program from the time period of June 2014 through December 2015. Drug related problems and care plan recommendations were then correlated to current financial data to determine the potential impact on cost-savings by the program. Student evaluation data was reviewed to determine if course competencies were met.

Results: Twenty-one senior students, assigned to Tria Health for an advanced pharmacy practice experience rotation from June 2014-December 2015, participated in the Visiting Pharmacist In-Home Program as part of the clinical course experience. Data was collected through a retrospective record review to identify drug related problems including doses too low, doses too high, indications with no drug, drugs with no indication, therapeutic duplications, and drug interactions. Data was also collected to identify pharmacy care plan

recommendations, potential cost-savings associated with the care plan recommendations, and 30-day readmission rates for patients seen in the Visiting Pharmacist In-Home Program. Student pharmacists saw a total of 590 patients from June 2014 through December 2015. There were 4,472 drugs reviewed and a total of 778 drug related problems were identified. The most common drug related problems were compliance and indications with no drug prescribed. The Visiting Pharmacist In-Home Program potentially avoided 747,795 dollars in health care costs to the patients. 30-day readmission rates were evaluated and pharmacists were not proven to be statistically significant in reducing readmission rates. All students met stated course performance competencies.

Conclusion: Overall, the Visiting Pharmacist In-Home Program identified many drug related problems resulting in potentially thousands of dollars saved. By collaborating with Tria Health and the Visiting Nurse Association, student pharmacists were able to successfully provide contemporary patient care services to patients in their home environment, identify drug related problems, impact cost of care, and meet course learning objectives.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 5a-177

Poster Title: Implications of smart phone applications in patient self-management of diabetes

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Purpose: Various smart phone applications have been developed and are available to assist diabetic patients in management of diet, exercise, and blood glucose. A review of all available diabetes related apps in the iOS app store was performed to determine which diabetic app provides the most interactive offering of operations such as monitoring glucose, water, carbohydrates, weight, body mass index, medication, blood pressure levels, reminders/push notifications, food database, charts, exercise management, email, sync between devices, synching data directly to the prescribers, and other miscellaneous functions such as (twitter integration, password protection, retina display, barcode scanner, apple watch functionality, and cloud synching).

Methods: Data was gathered using the iOS app store on an iPad. The search term used was "diabetes" and 1209 results were obtained. Many results obtained were remotely related to diabetes and focused mainly on diet, exercise, emergency services, refill reminders, providing general diabetes information, and other non-therapeutic options. Each app description was reviewed to only include apps that were designed for tracking blood glucose. All data were obtained in one sitting by one person on the same device, because carrying out the search at different times or on different devices (iPhone) disrupts the order of results. Apps that did not have a glucose tracking feature were excluded from the study.

Results: The search resulted in 1209 results, 85 apps were ultimately retained based on the above explained inclusion criteria. All apps were reviewed for average customer ratings, number of reviews, price, and functions. Among all apps surveyed, 18 apps with the highest

number of user ratings were used for in depth analysis. Out of these 18 apps, nine apps also had a medication adherence function in addition to blood glucose monitoring. The analysis revealed that Diabetes logbook by mySugr app was one of the best apps for blood glucose tracking, differentiating itself by introducing fun as a method of increasing adherence.

Conclusion: A large variation was seen in patient ratings of app features. Many patient reviewers desired simplicity of app functions. Glucose tracking and email features potentially helped patients and health-care providers manage the diabetes more efficiently. However, none of the apps provided the ability to synch data directly to the prescribers. Additional features such as graph customization, availability of data backup, and memorization of previous entries were also requested by many users. The use of apps in patient disease management along with patients and health-care providers' involvement in future refinement and app development should be encouraged.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 5a-178

Poster Title: Identifying Common Adverse Drug Reactions (ADRs) and Over-The-Counter (OTC) Options to Manage Patient Health

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Purpose: Pharmacists are responsible for counseling patients on potential adverse drug reactions (ADRs) to reduce medication discrepancies and improve adherence and outcomes. In particular, pharmacists can help patients manage ADRs by recommending over-the-counter (OTC) products. A study conducted in community pharmacies in US metropolitan areas found that only 43% of patients receive verbal counseling. These results suggest pharmacists are underutilizing opportunities to manage medication therapies. This project seeks to identify the most common ADRs associated with commonly prescribed drugs to pinpoint how pharmacists can further provide value to the patient's overall well-being with appropriate counseling and recommendations.

Methods: In this investigation, the top 200 drugs were compiled using multiple sources to be applied to the U.S. community pharmacy setting. Using MICROMEDEX, each of the drugs was listed with their generic name, brand name, indication, and common adverse effects. The data collected was further evaluated to identify trends and patterns that might help understand common ADRs and potential ways to mitigate associated risks. Available OTC management options for each of the common ADRs were identified using the Mintel Solutions database.

Results: Of the top 200 drugs investigated, 197 associated ADRs were identified. Of those 197 associated ADRs, the top 15 frequently encountered make up greater than 50% of the total prevalence. 10 of the 15 most commonly associated ADRs can be managed with OTC options.

These two findings reveal that 42% of the most common ADRs associated with the top 200 drugs can be managed with OTCs.

Conclusion: The findings of this investigation highlight the importance of pharmacists' education on associated ADRs and OTC management options available. As the landscape of the medical profession continues to change, it is important to ensure that pharmacists are knowledgeable of all aspects of disease state management. Moreover, it is important that patients are provided accurate information and evidence-based recommendations. Further investigation will identify the knowledge gaps of associated ADRs and OTC management options. Armed with this information, pharmacists can continue to add value through medication therapy management services that will help to improve adherence and overall health and well-being.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 5a-179

Poster Title: Clinical efficacy and financial impact of pharmacogenetic testing in psychiatric patients

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Purpose: In psychiatric practice, a trial and error method of prescribing is commonly utilized, which consumes four to six weeks to establish appropriate dosing, often fails to achieve full remission and increases the risk of exposure to drug side effects. There is a need for a better approach in ensuring optimal and cost-efficient medication treatment for psychiatric patients, and pharmacogenetic testing is a possible solution. Pharmacogenetics may provide a more personalized and evidence-based intervention. This literature review was conducted to evaluate the clinical efficacy and the financial impacts of pharmacogenetic testing in psychiatric patient populations.

Methods: A Medline search was conducted from 2005 to 2016, using the following medical subject headings: pharmacogenetics, antipsychotic agents, antidepressive agents, medication adherence, and costs. Also, clinical studies on psychiatric pharmacogenetic testing that were available on the websites' of pharmacogenetic companies like Genomind and GeneSight were assessed. Each article was evaluated for relevance and appropriateness to the objective of this study. All articles were analyzed for study design, patient population, adherence, intervention type, clinical outcomes, and costs. Articles that had outcomes that assessed clinical efficacy and cost-effectiveness of pharmacogenetic testing in psychiatric patients were reviewed.

Results: Nine articles were reviewed. Seven studies used GeneSight Pharmacogenetic testing which evaluated three pharmacokinetic (CYP2D6, CYP2C19, CYP1A2) enzymes and two pharmacodynamic (SLC6A4, HTR2A) genes to categorize medications into three groups (red, yellow, and green) based on the degree of gene-drug interaction. Two studies used the Genecept assay which evaluated three pharmacokinetic (CYP2D6, CYP2C19, CYP3A4) enzymes and seven pharmacodynamic (SLC6A4, 5HT2C, DRD2, CACNA1C, ANK3, COMT, MTHFR) genes.

Two articles evaluated the cost-effectiveness and impact on medication adherence of pharmacogenetic testing. Both studies observed an increase in adherence and a decrease in overall costs in patients using pharmacogenetic testing, though one study saw an increase in medication costs. Another study observed an increase in direct and indirect costs in the group without pharmacogenetic testing. Six studies evaluating the clinical efficacy of pharmacogenetic testing in psychiatric patients showed improved clinical outcomes and higher rates of remission as compared to those who were not tested. In studies using the GeneSight Assay, patients on a medication in the red category (highest gene-drug interaction) observed the most benefit when switched to a medication in the green category (lowest gene-drug interaction). However, there was one randomized clinical trial, which is the gold standard for research.

Conclusion: Though there is a limited amount of research on this issue, pharmacogenetic testing has proven to benefit psychiatric patients by improving clinical outcomes and reducing overall cost of treatment, especially in patients with major depressive disorder with a HAMD-17 score of greater than or equal to14 and one or more previously failed treatments. Furthermore, this literature review was utilized to establish a protocol for pharmcogenetic testing in psychiatric patients in an outpatient setting at Mommouth Medical Center in New Jersey. Future research will be done to study clinical outcomes in patients treated at this facility.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 5a-180

Poster Title: Student residency aspirations and perspectives of a longitudinal Advanced Pharmacy Practice Experiences academic year at the Cleveland Clinic

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Purpose: The purpose of this study is to 1) describe the unique longitudinal Advanced Pharmacy Practice Experiences (APPE) experience at the Cleveland Clinic and 2) investigate perceptions of pharmacy students from Roseman University of Health Sciences that are attending the Cleveland Clinic for a unique longitudinal 42 week APPE rotation schedule. This is the first type of experience offered to students out-of-state to travel and complete all APPE intern hours for an entire academic year at a large, highly ranked teaching medical institution. The majority of students went to increase their competitiveness for residency opportunities upon graduation.

Methods: The class of 2017 from Roseman University of Health Sciences College of Pharmacy was given the opportunity to apply, interview, and be chosen to complete their APPE rotations at the Cleveland Clinic. The process for students involved submitting an application to faculty and staff at Roseman University, which included a written essay, curriculum vitae, reviews from preceptors during Introductory Pharmacy Practice Experiences (IPPE), and the students had to maintain test scores of 90% on all didactic assessments to be eligible. After the initial application process, selected students were interviewed by a panel including two APPE coordinators, two clinical pharmacists who hold positions on their respective residency committees, and Roseman University's Associate Dean of Academic Affairs. Candidates with the highest scores after interviews were invited to attend the Cleveland Clinic for their final year of pharmacy school.

Results: 35 complete applications were received by the selection committee. An initial review determined who to interview. After 24 interviews were conducted, 10 students were accepted to participate in APPE rotations at Cleveland Clinic from July 2016 to May 2017. The students visited the Cleveland Clinic four months before their rotations began to obtain Pharmacy Intern licenses in Ohio and become familiar with the clinic and submit requests for rotations. They were provided with numerous opportunities for unique rotations, research, networking, community events, and other opportunities they would not have had if they hadn't attended Cleveland Clinic. Students self-reported feeling that they were more motivated and driven to learn and participate in events than they would have been if they had stayed in a smaller hospital system. They were required to communicate with members of the pharmacy team as well as physicians and many other members of the healthcare team, building relationships between pharmacists and other medical providers. Doing this helped them build confidence in clinical situations and helped them develop skills that will be valuable when applying for residency and in the future as clinical pharmacists.

Conclusion: Students report that transitioning from a private College of Pharmacy to a large and highly successful health system for continuation of pharmacy school education has provided a unique and invaluable experience. The opportunity to incorporate the culture of the Cleveland Clinic's pharmacy practice with our APPE rotation learning activities provided the students a learning experience unique to that of their peers. Students reported that the rotation experiences at the Cleveland Clinic provided them with experiences that will make them competitive candidates for residency. Future studies evaluating this unique program, assessing student learning outcomes and post-graduate residency attainment would prove useful.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5a-181

Poster Title: Connector integrity testing to assess the efficacy of multiple closed system transfer devices

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Purpose: The risks associated with compounding and administration of hazardous drugs is well known. Numerous studies have been published that demonstrate that potential adverse effects can occur when compounding these types of medications. The risk is increased when individuals do not utilize proper protection. The use of closed system transfer devices (CSTDs) has become commonplace in hospitals, and recent United States Pharmacopeia (USP) 800 guidelines require the use of CSTDs for administration. The purpose of this study is to determine the connector integrity of CSTDs when tested with actual drug in a sterile compounding environment.

Methods: A study was conducted to compare the connector integrity of 6 different CSTDs. Each device was tested for leakage following up to 3 membrane connections. 5-fluorouracil vials were fitted with one CSTD vial access device. A 10 mL syringe was connected to the vial and 7 mLs of total volume was withdrawn in a Pull-Push-Pull method to simulate air bubble removal. The vial was inverted upright to re-inject 5 mLs into the vial and then the connectors were disconnected. The syringe was then reconnected to the vial and the remaining 2 mLs of drug was injected into the vial. This process of withdrawing and injecting volume was then repeated. Litmus paper was used to wipe the membrane of the vial and the syringe connector surface. These methods were repeated with the same CSTD two more times. Testing Group 1 contained 5 samples with data from the 2nd and 3rd connection, and Testing Group 2 contained 5 samples with data from the 1st and 3rd connection. A total of 10 samples were tested for each CSTD. A positive and negative control were also utilized for each device.

Results: A total of 10 samples were tested for each of the 6 CSTD types. Each sample had one litmus paper with qualitative data from the syringe and vial connector demonstrating drug leakage. This resulted in a total of 120 measures that assessed for discoloration. When comparing connector mechanisms across the types of devices, double membrane connectors were found to have 62.5 percent less leakage in comparison to valve connectors. Two CSTDs had no documented leakage in any of the manipulations. The CSTD with the most leakage was valve-based with 100 percent leakage overall in Testing Group 1 and 2.

Conclusion: Out of 6 CSTDs, 4 had detectable leakage while 2 had no detectable leakage. Data showed that double membrane-based CSTDs have significantly less leakage in comparison to valve-based CSTDs.

Submission Category: Oncology

Submission Type: Descriptive Report

Session-Board Number: 5a-182

Poster Title: Identifying pharmacy practice patterns and predictors associated with surface contamination of hazardous drugs in pharmacies: a descriptive summary of five commonly used antineoplastic agents

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Purpose: Antineoplastic agents are known to be harmful to both healthy and cancerous cells, and thus are considered hazardous drugs. The new USP Chapter 800 outlines standards to protect health care personnel when handling hazardous drugs. One strategy to minimize exposure to health care employees is to ensure that the environment has minimal contamination of antineoplastic agents on surfaces. USP Chapter 800 recommends that environmental wipe sampling for hazardous drug surface residue be performed routinely to verify containments. This study analyzed 6 years of wipe data collected from over 300 healthcare institutions to understand patterns of hazardous drug surface exposures.

Methods: The surface exposures of docetaxel, paclitaxel, cyclophosphamide, ifosfamide, and 5-fluorouracil were measured in over 300 pharmacies using the ChemoGLO Wipe Kits. A wipe event was defined as each time an institution ordered a wipe study to be performed. There were 799 different wipe events analyzed in this study. At each wipe event, the institution selected the number of drugs and locations tested. The highest contamination result for each drug among the locations tested was used to summarize the surface contamination. The contamination level for each drug was categorized as non-detectable (ND; ≤10 ng/ft2), low (10-100 ng/ft2), medium (100-1,000 ng/ft2), and high (≥1,000 ng/ft2). Surface exposures for each drug were summarized based on the contamination at first and subsequent wipe events, on the locations associated with high contamination, and on the use of a closed system transfer device (CSTD).

Results: On first wipe event, the incidence (median; range) of high, medium, low, and ND exposures of all drugs analyzed was 6% (3-23%), 18% (13-23%), 17% (14-21%), and 56% (40-67%), respectively; whereas, the incidence of drug exposures on subsequent wipe events was 6% (1-12%), 10% (6-20%), 13% (10-17%), and 71% (57-83%), respectively. Furthermore, 67-86% of all high contamination results were found at locations where chemotherapy was prepared (e.g. airfoil in biologic safety cabinet (BSC), floor near BSC, or BSC surfaces). However, 13-32% of high contamination results were found at other locations in the pharmacy (e.g. countertops, floors, misc. items). The incidence of high, medium, low and ND exposures among institutions who were not using a CSTD was 10% (4-26%), 17% (14-25%), 15% (13-25%), and 52% (31-67%), respectively; whereas, the incidence among institutions who did report using a CSTD was 5% (2-15%), 11% (6-21%), 13% (12-16%), and 71% (54-80%), respectively.

Conclusion: A higher incidence of contamination was identified at first wipe event compared to subsequent wipe events, suggesting that monitoring is beneficial in recognizing and correcting practices that lead to surface exposures. Contaminations were still not completely eliminated at subsequent wipe events, which suggest that continued monitoring is required. High levels of contamination were more prevalent in locations where chemotherapy was prepared. A higher incidence of high, medium, and low contamination levels was detected at institutions that did not use a CSTD compared to institutions that did use these devices, although use of a CSTD did not completely remove all exposures.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5a-183

Poster Title: Manufacturers, average wholesale prices (AWPs), and characteristics of controlled substances collected at a series of medication take-back events

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Purpose: Significant quantities of prescription medication remain unused in homes, resulting in an increased risk of poisonings, abuse, and environmental contamination. Moreover, the financial implications associated with accumulated unused medication may significantly impact families and healthcare spending. This study quantifies, categorizes, and identifies the manufacturers of the controlled substances collected at regional community medication disposal programs also known as take-back events. This aids in identifying the largest contributors of unused medication and is important for the development of public health policy and processes designed to address such issues.

Methods: Community medication take-back events were conducted in three cities in the panhandle of Texas during the months of March and April 2016. Local law enforcement provided control and custody of controlled substances throughout the events. In preparation for these events, volunteers were required to attend one and a half hours training session that included information regarding protection of patient confidentiality, a zero tolerance policy for drug diversion, and safety issues. The medication data were recorded by trained event staffs and pharmacy students. Information collected included medication name, strength, original fill quantity, collected quantity, manufacturer/distributor, and expiration date, as available. The term unit was used to describe one pill, tablet, capsule, unit dose, or milliliter. Information was logged into Microsoft Excel spreadsheets. The Red Book Online tool of Truven Health Analytics Micromedex Solutions application was used to assign average wholesale price (AWP) to each item with the specific manufacturer. However, if the specific manufacturer information was neither recorded nor identified, an average of three listed AWPs for a similar product with the same medication and strength was assigned. Medication waste was calculated by dividing the quantity collected by the original fill quantity. Medication categories were excluded if fewer

than ten line items were collected leaving the remaining controlled substances to be included in the results. Descriptive statistics were used to evaluate and report results.

Results: A total of 3,275 pounds of unused controlled and non-controlled medication were collected from 1,256 participants. Controlled substances were reported by weight, as a proportion of the total medication collected and six percent of the collections were controlled drugs. Cost related to reported controlled drugs was $96,822. Ranked by category, benzodiazepines had the greatest cost ($18,692), followed by testosterone, pregabalin, stimulants, and opioids. In addition, hydrocodone-containing products accounted for one-third of the amount collected. The cost of wasted medication was lowest for carisoprodol ($189). When measured in terms of proportion of medication wasted, testosterone had the highest waste at 83%, followed by hydromorphone, atropine/diphenoxylate, pregabalin, and fentanyl. The lowest proportion of medication wasted was carisoprodol at 46%. The top five manufacturers identified, ranked from greatest related to unused drugs cost to least, they were Actavis ($32,589), Valeant, Pfizer, Qualitest, and Mylan. The top five manufacturers ranked from greatest number of units to the least, they were Qualitest, Mylan, Mallinckrodt, Watson, and Amneal. An overall unused medication rate of 64% was calculated.

Conclusion: This study adds to the growing body of evidence related to the overprescribing of controlled substances and provides insight into the negative economic impact as well as the increased risk of abuse and poisoning in family households. Moreover, manufacturer-specific information is revealed, providing further justification for increased manufacturer stewardship efforts at take-back events. Increasing the number of take-back events in the country help to promote consumer awareness of safe medication disposal and reduce drug abuse and poisoning.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 5a-184

Poster Title: Comparison of plasma vascular endothelial growth factor levels between chronic kidney disease and cardio-renal syndrome patients

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Purpose: Chronic Cardio-Renal Syndrome (CRS), a condition of coexisting cardiac and renal failure. Evidence shows that hypoxia plays a role in pathogenesis of both renal and cardiac diseases. We are interested in the role of hypoxic signaling in the pathophysiology of CRS. Vascular Endothelial Growth Factor (VEGF) is an angiogenic protein, transcriptionally induced in response to hypoxic signaling. We propose that hypoxic signaling via VEGF is altered in CRS compared to patients with Chronic Kidney Disease (CKD) alone. The objective of this study is to assess transcriptional activity between disease states by quantifying VEGF in CRS vs. CKD patients.

Methods: This study was approved by Shenandoah University Institutional Review Board. All patients were recruited from a participating kidney and hypertension specialists clinic in Manassas, VA. Chronic CRS was defined as diagnosis of chronic heart failure secondary to kidney disease. CKD staging was defined based on National Kidney Foundation's definitions of stage II-V kidney disease. Patients were recruited on predefined inclusion and exclusion criteria. There were 33 patients in the CHF group and 30 CKD. We quantified and compared VEGF protein levels through ELISA on blood plasma samples in both patient populations. Blood samples were centrifuged to extract plasma and stored at -80 degrees Celsius. Samples were thawed to room temperature upon experimentation. We utilized Abcam INC. ELISA kit for human VEGF and colorimetric detection to help quantify protein expression. Protein levels between groups were compared using standard curve analysis of protein expression via

GraphPad Prism. Patient samples were spiked with 0.074 ng/ml per well from a 6 ng/ml stock due to a low plasma values compared to signal detection threshold.

Results: We were able to quantify plasma VEGF values for 7 CHF patients and 12 CKD patients as they fell within range of detection. The mean values for CHF 215 47 were and for CKD 18313 picograms/ml. The p value was at 0.204
between both groups was not found to be statistically different.

Conclusion: VEGF has a narrow threshold of expression and we tried to spike concentrations to account for this.. The spike could have been added to the samples first as opposed to directly in the wells of the plate. We also had to subtract the standard spike as well as some noise from our negative control for all patient absorbance values. In order to obtain normal distribution and to increase significance we should increase patient population to at least n=50 per disease state group. We could have also used fresh patient samples in order to possibly fix the narrow threshold.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5a-185

Poster Title: Evaluation of an emergency department admission medication history pilot using pharmacy technicians

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Purpose: Well-trained pharmacy technicians can perform patient interviews, call retail pharmacies, perform database input, and promote communication between healthcare professionals. Use of pharmacy technicians can decrease the additional time that nurses, pharmacists and other healthcare team members would need to obtain an accurate prior to admission (PTA) medication list and work to make sure a correct medication list is available for admission teams. Tampa General Hospital (TGH) sought to evaluate the effectiveness of utilizing pharmacy technicians to obtain medication histories in the emergency department.

Methods: The pharmacy department trained five pharmacy interns to serve as medication history technicians. The interns functioned in the scope of technicians in regards to the level of electronic medical record access and patient interview. The project involved 16 hour coverage of the emergency department for 30 days (7/5/2016 to 8/3/2016) from 07:00-23:00. Interns reviewed the department trackboard and selected patient interviews according to an established workflow. Patient's marked as 'Intent to Admit' were interviewed first, and additional priority was given to patients flagged for more than 20 medications, age over 75 years, long-acting insulin, and/or no medications listed. During patient interviews, the intern inquired about allergies and preferred outpatient pharmacy, as well as collected the following information for each medication: name, dose, route, frequency, and informant. Following the encounter, interns documented corrections, duration of data collection, duration of electronic medical record update, and whether or not a nurse had previously reviewed the list as complete. For data analysis purposes, the medication errors were further classified into the

following categories: omission, addition, duplication, wrong dose, wrong dosage form, and wrong administration instructions. Descriptive statistical analysis was used to evaluate errors.

Results: A total of 903 patients were assessed and 4026 errors were updated on the PTA medication list with an average of 4.46 errors per patient. The data revealed that 67.4 percent of the time a nurse had previously reviewed the medication list prior to the technician. Of the 4026 total errors that were updated, 1645 errors were omissions, 1131 were addition errors, 543 errors involved incorrect administration instructions, 362 errors involved the wrong dose of a medication, 174 errors involved the wrong dosage form of a medication, and 48 errors involved duplications of a medication. Approximately 2 percent of the medication errors were due to high risk medications. The most cited source of information was the patient or a medication list. The average total time per assessment was 21 minutes, with an average of 14 minutes collecting information from sources and 6 minutes updating the record. A total of 322 patients required an update to allergies, with missing reaction as the most common error.

Conclusion: Utilizing pharmacy technicians to conduct admission medication histories in the emergency department reduces the number of medication errors. Corrected prior to admission lists and allergies enhances patient safety by allowing providers to have an enhanced clinical picture when ordering medications inpatient. Implementing positions filled by pharmacy technicians allows for improved accuracy on prior to admission medication lists. Correct lists improves patient satisfaction by decreasing repeat questions concerning medications, allows nurses and other members of the medical team to have time to perform other duties, and increases accuracy of discharge medication reconciliation.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5a-186

Poster Title: Impact of transitions of care pharmacist discharge counseling on patient understanding of high-risk medications

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Purpose: Multiple institutions have implemented the federally funded Community-based Care Transitions Program (CCTP) to improve quality of care and reduce hospital readmissions in high-risk Medicare patients. Studies have examined the impact of transitions of care (TOC) programs on hospital readmission rates. However, few have analyzed the effects of TOC services on patient medication understanding, which has the long-term potential to reduce preventable readmissions. The purpose of this study is to evaluate the impact of TOC pharmacist discharge counseling on patient understanding of high-risk medications.

Methods: Researchers conducted a prospective pre-post study on eligible CCTP patients referred for pharmacist counseling during the two-month study period. Pharmacists provided medication education counseling and patient-friendly medication schedules using a Medication Action Plan prior to discharge from the hospital. Data were collected for up to five randomly selected high-risk medications, including anticoagulants, anti-diabetics, anti-platelets, anti-hypertensives, asthma or chronic obstructive pulmonary disease treatments, and cardiovascular medications. Data were quantified through an adapted Medication Understanding Questionnaire (MUQ), which was scored after being delivered verbally to patients in the hospital before discharge counseling and again via telephone 48 to 72 hours after discharge from the hospital. MUQ scores ranged from 0 to 3 and were normalized based on number of high-risk medications per questionnaire. Pre-MUQ and post-MUQ scores were analyzed using the Wilcoxon matched-pairs signed-rank test. Secondary end points included analysis of primary adherence barriers.

Results: A total of 27 individuals completed the pre-MUQ and post-MUQ, including 13 males and 14 females whose combined mean age was 69.3 years plus or minus 10.92. The median MUQ score was 2.5 (range of 0.5 to 3) before pharmacist counseling, which differed significantly from the median MUQ score of 2.7 (range of 2.1 to 3) after counseling (Z equals -3.36, P less than 0.001). The most common primary adherence barrier was failure to pick up new medications after discharge.

Conclusion: TOC pharmacist counseling significantly improved patient understanding of high-risk medications based on MUQ score. However, limitations included a small sample size and omission of some high-risk medications (i.e., opioids). Future studies might analyze the correlation between post-discharge medication understanding and hospital readmissions.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5a-187

Poster Title: Impact of pharmacy intervention component of a community based care transitions program (CCTP) on readmission and emergency department (ED) utilization rates

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Purpose: Nearly 1 in 5 Medicare patients is readmitted to a hospital within 30 days of discharge. Created under Section 3026 of the Affordable Care Act, the Community-based Care Transitions Program (CCTP) aims to improve care transitions from hospitals to other care settings and reduce readmissions for high-risk Medicare beneficiaries through the use of both intensive nurse coaching and pharmacist interventions including medication education and reconciliation. The objective of this study was to evaluate the impact of pharmacy discharge medication reconciliation by comparing readmission rates for patients who received pharmacist discharge medication reconciliation and those who did not.

Methods: This was a retrospective cohort study of high risk patients at Palomar Health referred for CCTP pharmacy intervention services in addition to intensive nurse coaching between June 1st 2013 and February 21st 2015. A total of 2641 patient charts were reviewed for data collection. Subjects were separated into two groups: patients who received pharmacist discharge medication reconciliation versus patients who did not. Subjects were excluded from analysis if they were enrolled in hospice or expired within the 30 and 60 day time frames for analyses. Chi squared and odds ratio tests were used for statistical analysis, with a predefined p value of less than 0.05 for statistical significance. The primary outcome measured for this study was 30 day overall readmission rate for the two groups. Secondary outcomes included 60 day overall readmission rate, 30 and 60 day post-discharge emergency department (ED) utilization rates, and 30 and 60 day composite of readmission and ED utilization rates. It was determined that total of 8240 subjects were needed to achieve 80 percent power with an alpha of 0.05.

Results: The 30 day overall readmission rate for the group with pharmacist discharge medication reconciliation was 11.88 percent compared to 13.95 percent for the group without pharmacist discharge medication reconciliation. This reflects a 2.07 percent absolute risk reduction (95 percent CI, 0.65 percent to 1.07 percent, P equals 0.13) for 30 day readmission rate for patients who received discharge medication reconciliation. Although also not statistically significant, the 60 day readmission rate was 1.91 percent lower (95 percent CI, 0.71 percent to 1.09 percent, P equals 0.23) for patients who received pharmacist discharge medication reconciliation. Other secondary outcomes demonstrated minimal changes due to pharmacist intervention, and showed no statistically significant difference between two subject groups.

Conclusion: This study was not sufficiently powered to detect a statistically significant difference in hospital readmission between patient groups with pharmacist discharge medication reconciliation and those without. However, 30 and 60 day hospital readmission rates reflected a downward trend towards reduced readmission associated with pharmacist intervention. Results suggested that a single pharmacist intervention at discharge may not be sufficient to prevent long-term readmissions, but may help reduce short-term readmission. Future studies may expand the scope of interventions studied and determine their effects on hospital readmission and emergency department utilization rates.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5a-188

Poster Title: Prevalence of gastrointestinal adverse events with co-administration of dolutegravir and metformin

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Purpose: Dolutegravir is known to increase metformin plasma concentration levels when used simultaneously in patients living with HIV (PLWH) and diabetes mellitus. However, there is no clinical data available to show the prevalence of gastrointestinal (GI) adverse events associated with the use of these two medications together. The purpose of this study was to determine the prevalence of GI side effects reported by patients taking dolutegravir and metformin synchronously.

Methods: The Positive Health Program at Ward 86 located at San Francisco General Hospital has approval from the University of California, San Francisco's institutional review board for this retrospective cohort study. We identified all patients taking 'Anti-HIV integrase inhibitor' medications and 'Biguanides' or 'Glucophage' from August 2013 to July 2016 in PLWH and receiving care at Ward 86. We narrowed down the initial list to patients who took dolutegravir and metformin concomitantly. We examined duration of overlap between the two medications, prevalence of GI adverse events, and self-reported associations between GI adverse events and either medication.

Results: Among the 35 patients taking dolutegravir and metformin simultaneously, 85.7% were male, mean age was 57 years old, and 48.6% were Caucasian. Patients took dolutegravir and metformin (17.1% on 500mg/day, 48.6% on 1000mg/day, 5.7% on 1500mg/day, 2.9% on 1700mg/day, 22.8% on 2000mg/day, and 2.9% on 2550mg/day) for a mean of 14 months (range 1-32 months). Overall, 11 (31%) reported experiencing GI adverse events. Of these, 7 (63.6%) reported symptoms associated with metformin, 2 (18.2%) associated symptoms with dolutegravir, and 2 (18.2%) could not determine if symptoms were associated with dolutegravir

or metformin. GI adverse events included diarrhea (6), nausea (4), bloating (1), flatulence (1), and constipation (1). Patients reported adverse events within a mean of 3 months after starting both medications. Of the 11 reporting GI adverse events, 5 were taking doses higher than 1000mg per day of metformin (1 on 1500mg, 1 on 1700mg, and 3 on 2000mg). When metformin dose was decreased to 1000mg per day, 3 reported improvement in symptoms. The remaining 2 maintained the same dose and eventually discontinued the use of metformin. Among the 6 individuals who had symptoms at 1000mg a day of metformin, 4 had minor symptoms while 2 eventually discontinued metformin use.

Conclusion: The prevalence of GI adverse events in patients taking dolutegravir and metformin concomitantly was lower than that reported in the metformin clinical trials and similar between those at 1000mg per day of metformin and those at higher doses. Diarrhea was the most commonly reported adverse event. Even though dolutegravir is known to increase metformin plasma levels when taken together, the use of the two medications, even at higher doses may be safe and well-tolerated.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5a-189

Poster Title: Application of vapor containment protocol for closed system transfer devices to assess efficacy during pharmacy compounding and administration of hazardous drugs

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Purpose: Recent United States Pharmacopeia 800 guidelines require the use of closed system transfer devices (CSTDs) for hazardous drug administration. The National Institute for Occupational Safety and Health (NIOSH) released a proposed protocol to evaluate the vapor or liquid containment abilities of different CSTDs in order to provide meaningful comparisons for purposes of safety and efficacy. To date, no study has comprehensively evaluated various CSTDs against this protocol. The purpose of this study is to assess the ability of various CSTDs when following the methodology as outlined by NIOSH.

Methods: This study evaluated 6 different CSTD products when following the NIOSH vapor containment protocol. The testing process evaluated each CSTD system during both compounding (Task 1) and administration (Task 2). This is repeated for a total of 4 manipulations per device.
In task 1, the technician added 90 mL of isopropyl alcohol, using two 45 mL transfers from two 60 mL syringes and two 50 ml vials, to a 500 mL normal saline IV bag. The CSTD components evaluated under this task included one bag adapter, two vial adapters, and two syringe adapters.
In task 2, the technician prepared a 45 mL dose of isopropyl alcohol in each of two 60 mL syringes and injected each prepared syringe into the Y-site of the IV tubing. This simulated administering an IV push. The CSTD components evaluated under this task included two vial adapters, two syringe adapters, one bag adapter, and one IV port adapter.
Measurements were recorded at each step of both processes. Vapor release was detected by the Miran Analyzer and measurements were gathered in real time after each step of the

process. Readings below 0.3 parts per million were considered below the detection limit of the equipment. Data points were adjusted for background concentration and adjusted for the limit of detection of the equipment.

Results: Both Task 1 and Task 2 were conducted using 4 samples for each product, with vapor levels recorded after each of the 5 pre-specified steps throughout the task. The metric of interest was the highest adjusted data point for each sample. This resulted in 4 adjusted values per product for each task. The mean and 95 percent confidence intervals were calculated for each set of adjusted values to determine the ability of each CSTD to effectively contain isopropyl alcohol vapor.
In Task 1, the following mean values were observed for each set of adjusted values: 0.35, 0.48, 0.93, 2.68, 4.88, and 10.78 parts per million. In Task 2, the following mean values were observed: 0.30, 0.60, 0.60, 2.60, 5.40, and 14.85 parts per million. Some of the CSTDs tested were able to contain all of the isopropyl alcohol during Task 1 and 2, whereas others were unable to contain it.

Conclusion: A CSTD failed to effectively contain vapor if the 95 percent confidence interval of the mean contained greater than or equal to 1.0 part per million. Average values less than 1.0 part per million indicated a CSTD that successfully contains isopropyl alcohol vapor as per NIOSH protocol.
For Task 1, 2 CSTD products adequately contained the isopropyl alcohol vapor, and in Task 2, the same 2 products also contained the vapor with 1 additional product passing the testing protocol for that task. Based on the results of this study, only 2 out of 6 CSTD products function as closed systems.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5a-190

Poster Title: Incidence of neutropenia with long-term ceftaroline therapy

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Purpose: Ceftaroline is FDA approved for skin and skin structure infections and community-acquired pneumonia. Phase III trials demonstrated a favorable safety profile when the mean duration of therapy was approximately 7 days. With the increasing prevalence of methicillin-resistant Staphylococcus aureus (MRSA) infections, ceftaroline is being used for off-label indications such as bacteremia, endocarditis, and osteomyelitis, necessitating a longer duration of therapy. Several small reports suggest a higher than expected incidence of neutropenia with prolonged use. The purpose of this study is to assess the incidence of neutropenia with long-term ceftaroline therapy in a larger cohort.

Methods: A retrospective cohort analysis was performed from April 2011 to March 2016 of patients over the age of 18 who received ceftaroline for greater than or equal to 7 days during hospital admission. Patients with baseline neutropenia were excluded. The primary outcome was the development of neutropenia. Neutropenia was defined as an absolute neutrophil count (ANC) less than or equal to 1500 cells/mm3. Baseline and clinical characteristics between patients who experienced the primary outcome and those who did not were compared using Fisher's exact test and the Wilcoxon rank-sum test.

Results: A total of 77 patients met the inclusion and exclusion criteria. Median age was 52 years (range from 20 to 89 years). Median duration of ceftaroline therapy was 14 days (range from 7 to 79 days). Seven patients (9.1 percent) developed neutropenia with a median ANC nadir of 980 cells/mm3 after receiving a median of 23 days of ceftaroline therapy. Patients receiving 21 days of therapy or more were at much higher risk of developing neutropenia than those receiving shorter durations (27.3 percent versus 1.8 percent, P equals 0.002). The greatest risk was in those receiving greater than 6 weeks of therapy of which 50 percent experienced

neutropenia (4/8 patients). While not significant, females were twice as likely to develop neutropenia as males (6.7 percent versus 12.5 percent, P equals 0.44). Only 5 patients received ceftaroline at a higher dosing frequency of every 8 hours; however, none of these patients developed neutropenia. Body mass index did not appear to influence incidence of neutropenia (P equals 0.93). Of the seven patients who developed neutropenia, two had post-therapy data for determining resolution. One of these patient's neutropenia resolved during therapy and the other resolved within 4 days of ceftaroline discontinuation.

Conclusion: In phase III trials, neutropenia occurred in less than 2 percent of patients treated with ceftaroline for approximately 7 days. Seven patients (9.1 percent) in our cohort developed neutropenia when treated with ceftaroline for at least 7 days. Six of these seven patients (85.7 percent) received ceftaroline for 21 days or more, putting them at substantially higher risk. Patients who received 6 weeks of therapy or more were at the highest risk. The results of this study confirm that of previous findings but suggest the overall incidence of neutropenia is correlated to days of therapy.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5a-191

Poster Title: Urinary kidney injury molecule-1 (KIM-1) as a marker of vancomycin associated kidney injury in rats

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Purpose: Standard methods of determining renal function, blood-urea nitrogen (BUN) and serum creatinine (Scr), require a two-thirds reduction in nephron function before detectability. Urinary kidney injury molecule-1 (KIM-1) is both sensitive and specific for proximal tubular acute kidney injury (AKI). Unlike BUN and Scr, KIM-1 concentrations peak within 24 hours and maintain elevated concentrations for 5 days. This permits swifter detection and therapeutic decisions. Rats and humans experience rises in KIM-1 with renal proximal tubule injury, making the rat an appropriate model. We will study the relationship between vancomycin exposure and AKI using rat-specific pharmacokinetic data and urinary biomarkers in rats.

Methods: We will complete an interventional animal model study designed to determine the relationship between vancomycin exposure and AKI. Rats will be given varying doses between 150mg/kg/day and 200mg/kg/day of vancomycin. The dosing schedule will also vary between daily and twice daily dosing. The duration of therapy will be either 1 day, 3 days, or 7 days. A control of saline will be given for each duration and dosing schedule to control for any kidney injury due to the stress of injection. Plasma, serum, urine, and kidney samples will be collected and analyzed to determine exposure and extent of AKI associated with that exposure. Urinary KIM-1 will be quantified and correlated with vancomycin exposure as well as histopathology scores for each subject. Bayesian estimation techniques will be used to determine the PK parameters and exposure variables of interest for each rat under study. Maximum plasma concentration (Cmax), area under the curve (AUC), and minimum plasma concentration (Cmin)

will be used as indices in exposure-response analysis. Ultimately the aim of this study is to identify the exposure of vancomycin in which the rats will incur AKI.

Results: Preliminary results from the first 52 rats included 10 control rats and 42 experimental rats, which are subdivided into cohorts based on duration of treatment, dosage strengths, and frequencies. The Bayesian 2 compartment model of observed vs predicted vancomycin concentrations revealed a variance of 0.98 validating the accuracy of our pharmacokinetic model in rats. Plots of KIM-1 vs. pharmacokinetic parameters showed that the KIM-1 levels revealed a higher variance in with both Cmax and AUC and a lower variance with Cmin.

Conclusion: From the mathematical modeling, it is shown that Cmax and AUC are better predictors of AKI in rats than Cmin. Therefore, assessing trough values as the standard of assessing the degree of kidney insult is not recommended. Rather, Cmax or AUC would be better surrogate measures of kidney injury. Future experiments are laid out for controlled-infusion drug dosage schemes. This will further elucidate the causative, underlying factor in developing AKI.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5a-192

Poster Title: Arizona Controlled Substance Prescription Monitoring Program: attitudes, beliefs, and usage by pharmacists and physicians

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Purpose: In 2011, the Centers for Disease Control identified prescription drug abuse as an epidemic in the US. Prescription drug monitoring programs are statewide electronic databases that track controlled substance (CS) prescriptions dispensed by pharmacists and other healthcare providers. The Arizona Controlled Substance Prescription Monitoring Program (AS CSPMP) is a mandatory report and voluntary look program that is housed within the Arizona State Board of Pharmacy. This project was designed to establish baseline data regarding the attitudes, beliefs, and the usage of the AZ CSPMP by Arizona pharmacists and physicians.

Methods: The institutional review board approved this cross-sectional, descriptive study of Arizona physicians and pharmacists. Lists of current Arizona licensed physicians (MDs and DOs) and pharmacists were obtained from the AZ Medical Board, the AZ Board of Osteopathic Examiners, and the AZ State Board of Pharmacy. Stratification (MDs, DOs, Pharmacists) and sampling was based on a 95% confidence interval, a + sampling error of 5%, 50/50 proportion with required numbers for each strata as follows: MDs = 373, DOs = 325, and Pharmacists = 365.
A total of 7026 MDs (n = 2486), DOs (n = 2107), and Pharmacists (n = 2433) in Arizona were contacted based on an anticipated 15% response rate. Study subjects were mailed a letter with the study explanation, the URL, and QR code to the electronic Qualtrics ® survey. A reminder letter was mailed 2 weeks later; the online survey was open for 6 weeks. The survey contained five sections: 1) demographics, 2) views on prescription drug abuse and diversion, 3) general prescribing practices, 4) AZ CSPMP usage, and 5) education and training. Data was analyzed

using Qualtrics® and IBM SPSS © 22.0; descriptive (parametric and nonparametric) statistics were used.

Results: The overall usable response rate was 5.3% (356/6670). Pharmacists provided 60% of the responses. Overall respondents were: 60% male; 40% were 56 years or older), 55% have practiced for 20 or more years; and 89% were Caucasian.
Overall, MDs, DOs, and pharmacists believe there is a prescription drug abuse problem in AZ (87%), county (85%), and city/town (80%). The level of concern about prescription drug abuse is over 90% for all at the state and city/town level, and less than 70% at the practice site. All groups rate the effectiveness of the CSPMP at 90% or higher; the exception is that only 80% of Pharmacists believe the CSPMP is effective in controlling prescription drug diversion. The top three reasons for accessing the CSPMP were: patients suspected of drug seeking (69%), new patient's history prior to dispensing CS (68%), and review an established patient's history prior to prescribing/dispensing a CS (52%). While 80% of pharmacists believe that healthcare providers should be required to access the CSPMP prior to writing a prescription for a CS; less than 25% of MDs and DOs believe so. Approximately 60% of all groups believe that healthcare providers should access the CSPMP prior to dispensing a CS.

Conclusion: Healthcare providers are concerned about prescription drug abuse at all levels; though each group believes that there is less of a concern at the level of their practice site. Overall, the CSPMP is viewed as a useful tool to monitor patient use of controlled substances and screen for suspected drug seeking. Physicians and pharmacists are in agreement that the CSPMP should be required to be accessed prior to dispensing. The greatest disconnect between physicians and pharmacists is that pharmacists believe that healthcare providers prescribing controlled substances should be required to access the CSPMP prior to prescribing a controlled substance.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5a-193

Poster Title: Liposomal encapsulation of vancomycin for reduced nephrotoxicity

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Purpose: For patients infected with methicillin-resistant Staphylococcus aureus (MRSA), vancomycin remains a drug of choice. Used primarily in the hospital setting, vancomycin has been shown to induce nephrotoxicity within patients. As shown in previous studies, nephrotoxicity correlates with high kidney concentrations. Liposomes encapsulating vancomycin were prepared to reduce their absorption in kidneys vis-à-vis hoping to mitigate nephrotoxicity.

Methods: PEGylated and Non-PEGylated liposomes were prepared using (1) Freeze Thaw and (2) Reverse Phase Evaporation Methods. Both PEGylated and Non-PEGylated liposomes were similar except for the use of PEG-DPSE 2000 (1,2-distearoyl-sn-glycero-3-phosphoethanolamine-N-[maleimide(polyethylene glycol)-2000]) in PEGylated liposomes. In the Freeze Thaw Method, liposomes were prepared using the thin film hydration technique, dissolution in organic solvents, evaporation using a Rotavac (Buchi, Germany), and drying using nitrogen gas. The resultant film was hydrated with 1x PBS buffer solution containing vancomycin to form crude liposomes. Liposomes were subjected to 5 cycles of freeze thaw in liquid nitrogen and were thawed in ambient conditions. The liposomes were sized around 200 nm using an extruder (Lipex Northern Lipids, Canada). For the Reverse Phase Evaporation Method, phospholipids were dissolved in organic solvent and mixed with vancomycin solution in PBS, evaporated via Rotavac and exposed to nitrogen gas. Sizing was performed as above. Both the formulations for these liposomes were controlled for quality based on particle size and polydispersity index (PDI) using the Zetasizer Nano ZS (Malvern Instruments, UK). Vancomycin

loading and encapsulation in the liposomes was assessed via HPLC. Lastly, the release of vancomycin from the liposomes was tested using the dialysis bag method for 48 hours.

Results: PDI after extrusion was less than 0.2, demonstrating a stable homogenized particle size for both the PEGylated and Non-PEGylated liposomes. Freeze Thaw Method gave the highest encapsulation percentage (62 percent) for the PEGylated liposomes compared to the Reverse Phase PEGylated liposomes which had an encapsulation percent stage of 16.9 percent. For the Non-PEGylated liposomes, the Reverse Phase Evaporation Method gave the highest encapsulation (28.5 percent) and Freeze Thaw Method gave an encapsulation percent of 15.5 percent.

Conclusion: A nanosized stable liposomal preparation of vancomycin was obtained using two methods of encapsulation via Freeze Thaw and Reverse Phase Encapsulation Method. PEGylated liposomes provided the highest encapsulation using the Freeze Thaw Method; the highest encapsulation was via Reverse Phase Evaporation for the Non-PEGylated liposomes. The Freeze Thaw may be superior for vancomycin encapsulation because of formed multilamellar and multivesicular vesicles, resulting in an increased volume for the internal aqueous chamber.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5a-194

Poster Title: Student pharmacists engagement in new collaborative efforts to provide antimicrobial stewardship education

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Purpose: Inappropriate use of antibiotics can lead to unnecessary emergency room visits due to adverse drug reactions and may also result in antimicrobial resistance which can limit first line therapies. A statement published by ASHP describes the pharmacist's role in antimicrobial stewardship (AS) including implementation of programs to educate individuals on appropriate antimicrobial use and infection prevention measures. A project was designed to involve student pharmacists from the University of Pittsburgh to collaborate with the Pennsylvania Department of Health (PADOH) and the Centers for Disease Control and Prevention (CDC) Get Smart About Antibiotics programs to promote AS.

Methods: In 2013, the University of Pittsburgh School of Pharmacy began collaborating with the PADOH and CDC Get Smart About Antibiotics programs to increase AS awareness in Pennsylvania. The PADOH provides outreach through four initiatives: communication, pediatric, pharmacy, and long term care. PittPharmacy supports student pharmacist participation in the PADOH pharmacy and pediatric initiatives in the first (P1) and second (P2) professional year curriculums. Student pharmacists in either year volunteer to the pediatric initiative by providing interactive demonstrations of proper hand hygiene at childcare centers. P2 student pharmacists participate in the pharmacy initiative, first, by attending an annual hands-on workshop focused on AS for a redesigned course with an integrated network of community pharmacies providing introductory pharmacy practice experiences (IPPE). The workshop incorporates an onsite presentation from the PADOH. Secondly, P2 students interact with patients at over 75 community pharmacies within the IPPE network using a dedicated outreach program to gauge patient attitudes and awareness about appropriate antibiotic use. Resources from the CDC, including a CDC quiz assessing patient antibiotic knowledge as well as Get Smart About

Antibiotics materials are used to deliver information and collect patient attitudes and awareness.

Results: Student pharmacists provided education on appropriate antibiotic use and infection prevention to over 2300 individuals in Southwestern Pennsylvania via the PADOH initiatives between 2014-2016. Every year, student leaders from the P2 class refine, plan, and deliver the annual hands on workshop and provide community outreach materials. Educational materials used during the community IPPEs are refined using feedback from students in the previous year to ensure yearly continuous improvement. Results from the antibiotic quizzes completed by patients in 2014 revealed areas for improvement and education points to emphasize. Evaluation of quizzes reveal gaps in knowledge where student pharmacists can intervene to educate future patients. This initiative has opened up channels of opportunities for student leadership and involvement. This year, P3 students are organizing a campus wide Get Smart week to involve students, including undergraduate and other health science professional students, in educating about appropriate antibiotic use. Additionally, student pharmacists have volunteered as ambassadors to other schools who have expressed interests in implementing similar AS initiatives.

Conclusion: Student pharmacist participation in educational outreach in collaboration with PADOH and CDC Get Smart About Antibiotic programs has promoted appropriate use of antibiotics in Southwestern Pennsylvania. By targeting appropriate and correct medication use, student led educational outreach programs are powerfully positioned to identify ongoing knowledge gaps, and ultimately may help to reduce antimicrobial related adverse medication events and other negative effects of inappropriate antibiotic use including antimicrobial resistance.

Submission Category: Pharmacokinetics

Submission Type: Evaluative Study

Session-Board Number: 5a-195

Poster Title: Comparison of ocular gel forming solutions of gellan and calcium gluconate with and without polyvinyl pyrollidone

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Purpose: When treating many conditions, drugs administered locally via eye drop, have a short duration of action and/or are eliminated quickly. One way to ensure enhanced ocular presentation of medication is to strengthen the viscosity of ophthalmic products by adding water soluble polymers. Previous research indicates that addition of polyvinyl pyrollidone (PVP) to an aqueous, low-acyl gellan/calcium gluconate gel forming solution (GFS) can reduce the rate of release of timolol from the polymer. This study focuses on the optimization of in situ gel forming properties of low-acyl gellan/calcium gluconate formulations both with and without PVP.

Methods: Fifty-three aqueous formulations of low-acyl gellan and calcium gluconate and 67 formulations of low-acyl gellan, calcium gluconate, and PVP were prepared to varying concentrations. Samples were subjected to viscosity measurements using a ViscoTester 550 at ambient temperature (22-24 degrees C). This process includes an initial measurement of the viscosity of the gel sample (RT K'), a shearing step, and then a secondary measurement of viscosity (RT K''). The RT K'' value is important identifying formulations able to be applied from a common ophthalmic package configuration. Each formulation is used to prepare a test sample, 5:1, of the original formulation sample to physiological artificial tear solution (PATS). The test preparations are subjected to viscosity measurements (ET K', ET K'') at the physiological temperature of the external eye (32-36 degrees C). The gel/PATS preparation simulates the formulation in the tear-filled environment of the eye. The ET K' value of the gel/PATS test preparation simulates the viscosity of the formulation in the external eye. The independent variables of viscosity data (K', K'') and the predictor variables of gellan, calcium gluconate, and PVP concentrations were mathematically modeled using multi-variate, non-

linear regression analysis. Drop size and expulsion pressure testing from an ophthalmic bottle determined the highest allowable K'' value which was used as a limiting factor in calculating the highest obtainable viscosities (K') of GFS both with and without PVP.

Results: The mathematically derived models are as follows for those sample preparations with no PVP:
Predicted (r = 0.89) RT K''value = -5.408 + (1122.934 · g/mL gellan) + (418.459 · g/mL Calcium Gluconate)
Predicted (r = 0.69) ET K' value = -4.667 + (1318.7907 · g/mL gellan) + (950.700 · g/mL Calcium Gluconate)
The mathematically derived models are as follows for those sample preparations with PVP:
Predicted (r = 0.84) RT K'' value = -6.889 + (1121.926 · g/mL gellan) + (2557.328 · g/mL Calcium Gluconate) + (31.193 · g/mL PVP)
Predicted (r = 0.86) ET K' = -9.0449 + (1701.451 · g/mL gellan) + (4325.176 · g/mL Calcium Gluconate) + (16.421 · g/mL PVP)
The data indicates that the addition of PVP to gellan/Ca gluconate GFS results in a slight increase in resultant ET K' values.

Conclusion: Optimizing rate of delivery of ophthalmic drugs is beneficial in treating chronic conditions or infections in which a more sustained delivery of drug to the eye could improve clinical outcomes or reduce dosing requirements. The data indicates that addition of PVP to ophthalmic gellan/Ca Gluconate formulations increases the viscosity of the gel in eye-like conditions. PVP in low-acyl gellan, calcium gluconate ophthalmic formulations has been shown to reduce the rate of release of timolol from the gel matrix. These properties of PVP in aqueous low-acyl/calcium gluconate gel solutions demonstrate their potential benefits in ophthalmic drug delivery.

Submission Category: Geriatrics

Submission Type: Descriptive Report

Session-Board Number: 5a-196

Poster Title: Assessing the effectiveness of Beers criteria for medication review on fall risks in older community-dwelling adults

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Purpose: The departments of Physical Therapy and Kinesiology, School of Nursing and College of Pharmacy have provided interprofessional collaborative practice (ICP) activities for students through the Senior Awareness and Fall Education (SAFE) program since September 2014. The 2015 Updated Beers Criteria, is a guideline that lists potentially inappropriate medications to be avoided in older adults. One of the intents of the criteria is to serve as a tool for evaluating patterns of medication use in older adults. The purpose is to assess the effectiveness of the Beers Criteria in patients participating in the SAFE program.

Methods: Older adults with fall risks participated in the SAFE program following approval from their primary care provider. Medication lists, patient demographics, and pertinent medical history were collected from each patient. Each of these variables and their combined effects were used to evaluate a patient's risk of falling. We compared the patients' medication lists with the Beers Criteria to assess the frequency pattern of medication use in older adults with risk for falls. Analysis was done to identify the effectiveness of the Beers Criteria, which will help identify qualities in an assessment tool in order for it to be successful in the community-dwelling population. After review of the descriptive statistics, a determination of applicability of the assessment tools in the community population, along with suggestions for a more applicable assessment tool, can be made. IRB approval was granted from both California State University, Fresno and California Health Sciences University.

Results: 545 adults (55 to 97 years old) were interviewed during the SAFE screening program. Variables including their age, gender, ethnicity, medical history, and medications list including prescription, non-prescription, and supplements were obtained. The mean age was 76 years old. Of the 545 participants, 113 were male and 432 were female. The participants' ethnicities include: 72.9% Caucasian, 18.3% Hispanic, 4.4% Asian, 1.1% African American, and 2.4% unknown. The top five chronic conditions, in order from most to least reported, hypertension (61.3%), arthritis (57.4%), chronic back pain (45.4%), osteoporosis and fractures (26.3%), and diabetes (22.8%). A review of patient medications was completed, which includes prescription, non-prescription, and OTC NSAID products. Prescription medications and OTC NSAID products were emphasized during this review in order to make a more comparable comparison of the applicability of Beers Criteria. Of the 254 medications reviewed, 60 medications (23%) were identified as inappropriately prescribed medications via Beers Criteria. The top five medications were Aspirin, Thyroid replacement, Lisinopril, Atenolol, and Metoprolol. Of these, only Aspirin is listed in the Beers Criteria. The remaining 77% have been known to increase fall risk and are not included in Beers criteria.

Conclusion: Though medication review and patient assessment through the use of various assessment tools are pivotal in assessing a patient's fall risk, they are not all-encompassing, as seen with the Beers Criteria. This tool is drug focused, missing medications from specific classes or drug classes all together known to have adverse effects that can lead to falls. Assessment tool modification is needed for effective fall risk assessment.

Submission Category: Critical Care

Submission Type: Descriptive Report

Session-Board Number: 5a-197

Poster Title: Time and Motion Study of Non-Pharmacologic Delirium-Prevention Measures Performed by Nurses in an Intensive Care Unit Setting

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Purpose: The purpose of this study was to evaluate and categorize the amount of time nurses spend on delirium-prevention activities compared to other nursing activities within a medical intensive care unit (MICU) and to determine whether delirium prevention is appropriately implemented in a MICU setting at University of Pittsburgh Medical Center (UPMC), Presbyterian Hospital. We hypothesized that nurses would spend significantly more time performing non-delirium preventing activities such as obtaining and administering medications, helping other nurses within the unit, and charting or documenting.

Methods: Student pharmacists performed a time and motion study of nurses in the MICU at UPMC Presbyterian Hospital, a large tertiary medical center, through four hour increments during April 2016. Eighteen different nurses were observed, with most nurses caring for two patients and only one nurse caring for a single patient. Nurses were eligible for observation if they were at least 18 years old and had been working as a registered nurse for at least 6 months. Prior to data collection, nursing activities were categorized into different delirium preventing and non-delirium preventing activities. Preliminary sessions with students were held to help standardize methods of timing nursing activities. Categories of delirium preventing measures include: opening/shutting blinds, turning lights on/off, re-orienting patient through verbal communication, talking to patient about non-medical topics, offering eyeshade, helping patient with contacts and/or glasses, helping patient with hearing aids, and helping patient with ear plugs. Other timed activities were common nursing duties including charting, obtaining medications, administering medications, and helping other nurses. The amounts of time nurses

spent doing each activity was recorded. Data were summarized by median and ranges due to non-normal distributions. The Mann Whitney-U Test was used to compare the time non-pharmacologic delirium prevention activities were conducted versus the other nursing activities. We considered a p-value of less than or equal to 0.05 to be statistically significant.

Results: Nurses spent less time performing non-pharmacologic delirium prevention activities as compared to other patient care activities with total time (median (minutes), range (minutes)) of 158.413 minutes (1, 0-18.32) compared to 1216.85 minutes (29.4, 6.1-58.2), respectively (p less than 0.001). The most common delirium prevention activities involved talking to the patient directly. This was comprised of reorienting the patient, 28.631 minutes (0.33, 0-12.5) and talking to patients about non-medical related topics, which was done for a total of 37.479 minutes (0.175, 0-18.1). The least common delirium prevention activity was offering the patient an eyeshade and/or earbuds with a total of 0 minutes (0, 0-0). Significantly more time was spent charting, 528.08 minutes (12.675, 2.6-52.7), helping other nurses, 343.52 minutes (3.325, 0-154), and giving and obtaining medications, 199.08 minutes (3.35, 0-24.74) and 146.17 minutes (2.13, 0.07-20.2), respectively. Overall nurses spent 1.58% (68.32 min/4320 min) of the time observed helping to prevent delirium in their patients and 28.17% (1216.85 min/4320 min) on other activities. Additionally, the amount of time that blinds were open or closed was recorded. Blinds were open a total of 4062 minutes (114.9, 0-240) more than closed, 1732.8 minutes (0, 0-240).

Conclusion: Our data shows that nurses in the MICU spent significantly more time on non-delirium related activities and that delirium prevention only comprised of a small portion of the overall time observed. Out of all the delirium preventing activities, the most common measure was talking to the patient, while the least common measure was providing an eyeshade and/or earplugs.
While the use of non-pharmacologic delirium prevention strategies could prove to be beneficial, most nursing time in a large, tertiary medical center is spent performing more directed tasks focused on patient care (administering medications, charting) and getting their required daily duties done.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5a-198

Poster Title: Pharmacists' perceptions of a newly-implemented discharge counseling initiative

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Purpose: At many institutions around the country, pharmacists are optimizing patient care by providing clinical services throughout a patient's hospital stay. Pharmacists perform medication reconciliation upon admission, provide inpatient monitoring, and educate the patient upon discharge. Pharmacist-led discharge counseling has been shown to reduce medication errors, return visits to emergency departments, and hospital readmission rates. The purpose of this study was to identify pharmacists' perceptions of a new discharge counseling initiative at Intermountain Medical Center in Murray, Utah.

Methods: A link to an online survey was distributed via email to pharmacists and pharmacy residents in critical care, cardiology, medicine, transplant, and ambulatory patient care. All responses to the questionnaire were anonymous and participation in the survey was voluntary. The results of the survey were compiled after a two-week period.

Results: A total of 37 pharmacists completed the survey. Over 86% of participants (26) agreed or strongly agreed that discharge counseling is a valuable use of their time, and 83.3% (25) agreed or strongly agreed that they have made meaningful interventions while providing discharge counseling. The vast majority of participants (25, 86.2%) reported frequently making educational interventions regarding new medications at discharge, and nearly 1/3 reported frequently educating patients about pre-admission drugs or disease states. Around 1/3 reported that that they frequently make interventions regarding cost, wrong dose, and indications without an appropriate drug. Participants believed that interventions regarding new medication education, drug-drug interactions, and indications without an appropriate drug were the most impactful. About 3/4 of participants reported having a method of prioritizing patients for discharge counseling. Patients being discharged with new high-alert medications

and patients meeting BOOST or Core Measures criteria were the most commonly reported patients receiving higher priority.
Lack of time was a barrier to providing adequate discharge counseling reported by a majority of respondents (16, 55.2%). Participants suggested that hiring a dedicated pharmacist, receiving earlier notification about discharge patients, and improving communication with the care team would improve the discharge counseling process.

Conclusion: In general, the surveyed pharmacists find value in discharge counseling and feel like a valued member of the patient's care team while providing this service. Additionally, most surveyed pharmacists have been able to make meaningful interventions while providing this service to patients. Our study identified several gaps in the discharge counseling process and potential solutions to rectify these gaps.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 5a-199

Poster Title: Evaluation of vitamin D status and replacement regimens within an inpatient pediatric psychiatry population

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Purpose: During human development, vitamin D is important for calcium homeostasis and skeletal development. The importance of vitamin D to the central nervous system (CNS) in both healthy and psychiatric populations is less appreciated and understood compared to its known impact on bone health. There is a growing concern that insufficient levels of vitamin D may affect brain function and mental health. To date, there have been few studies that have evaluated the incidence of vitamin D deficiency in a pediatric psychiatric population. Therefore, this study was conducted to determine the prevalence of vitamin D deficiency in a pediatric psychiatric population.

Methods: This was a single-center, retrospective, and observational cohort analysis with convenience samples. Institutional Review Board approval was obtained using expedited review. The primary objective was to determine the incidence of vitamin D deficiency and insufficiency in a pediatric psychiatric population. The secondary objective was to determine what replacement regimens used to treat vitamin D sufficiency and insufficiency were most effective in this population. Patients were identified electronically via an electronic medical record report of admissions to the inpatient psychiatric service at a large free-standing children's hospital. Patients ages 0 to 18 years who were admitted to the Behavioral Health unit for management of psychiatric illness between December 1, 2014 and May 31, 2016 with a 25-hydroxyvitamin D level measured on admission were eligible for inclusion. Patients who did not have a 25-hydroxyvitamin D level measured upon admission or who were diagnosed previously with cystic fibrosis, short bowl syndrome, or end-stage renal disease were excluded. Pertinent demographic and related data were collected including: age, sex, race, ethnicity, height, weight, body mass index (BMI), admission 25-hydroxyvitamin D level and subsequent levels during that admission, current home medication dose of vitamin D supplementation, vitamin D treatment

upon admission, discharge prescription of vitamin if applicable, and any levels upon readmission and/or clinic follow-up. Data were evaluated using descriptive statistics.

Results: Eight-hundred and twenty-eight patients were included with a mean age of 13 plus or minus 3 years. The mean admission 25-hydroxyvitamin D level was 28 plus or minus 12 ng/ml which correlated with deficiency in 170 (20.5 percent) patients, insufficiency in 399 (48.2 percent) patients, sufficiency in 257 (31 percent) patients, and elevated levels in 2 (0.2 percent) patients. Patients were categorized as vitamin D deficient if 25-hydroxyvitamin D levels were < 20 ng/ml, insufficient if levels between 20-30 ng/ml, sufficient if levels between 30-100 ng/ml, and elevated if levels were >100 ng/ml. Of the cohort, 77 (9.3 percent) patients were prescribed vitamin D prior to admission. Among these 77 patients, 6 (7.8 percent) patients had deficient levels, 29 (37.7 percent) patients had insufficient levels, and 42 (54.5 percent) patients had sufficient levels. Upon discharge, 313 (37.8 percent) patients were prescribed various vitamin D dosing regimens. One-hundred and twelve patients with deficient levels were prescribed vitamin D upon admission with the most common regimen being cholecalciferol 2000 international units (IU) daily (49 patients, 43.8 percent) followed by cholecalciferol 5000 IU daily (41 patients, 36.7 percent). This same trend was also seen in patients with insufficient levels and sufficient levels.

Conclusion: The study demonstrated a high incidence of vitamin D deficiency (20.5 percent) and insufficiency (48.2 percent) among pediatric patients presenting with psychiatric illness. Currently, there is no standard dosing for vitamin D deficiency for psychiatric pediatric populations. Dosing regimens frequently used are 2000 IU daily, 5000 IU daily, 50000 IU weekly, or 50000 IU weekly plus a daily dose until vitamin D level rises above 30 ng/ml, which were all observed in this study. Additional studies are warranted to further describe the relationship between vitamin D status and prevalence of psychiatric illness.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5a-200

Poster Title: Impact of updated metformin renal dosing recommendations: a simulated study in elderly patients

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Purpose: Metformin, a biguanide, is used as first-line therapy in type 2 diabetes. Metformin was previously contraindicated if serum creatinine (SCr) levels were 1.4 mg/dL or greater for women and 1.5 mg/dL or greater for men. However, SCr may inaccurately assess renal function in certain patients. Recently, the Food and Drug Administration revised the labeling of medications containing metformin and replaced SCr with estimated glomerular filtration rate (eGFR), a parameter that provides a more accurate assessment of renal function. The purpose of this study was to determine how many patients would be affected by this update in metformin dosing recommendations.

Methods: The institutional review board approved this retrospective chart review. Patients aged 65 and older admitted to Long Island Jewish Medical Center to a non-critical care area over a month period were included. Patients were excluded if they had acute renal dysfunction (defined as an elevation in SCr of greater than 0.5 mg/dL from baseline) or had end stage renal disease on dialysis. We utilized a data collection sheet which collected patient parameters such as age, gender, ethnicity, SCr, weight, and height. These parameters allowed us to calculate eGFR based on the Modification of Diet in Renal Disease-4 (MDRD4) and Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) equations as well as creatinine clearance (CrCl) by the Cockcroft-Gault equation. Dosing recommendations based on the old and new labeling of metformin were simulated. The new recommendations state that metformin is contraindicated in patients with an eGFR less than 30 mL/min/m2. For those with an eGFR between 30 and 45 mL/min/m2, metformin should not be initiated and used cautiously in those already on it. The primary outcome of the study was to compare the number of patients who

were originally ineligible for metformin under the previous criteria and were now considered eligible. We calculated the number of patients who required discontinuation of metformin on the basis of not meeting the new eGFR criteria as well as compared overall eligibility.

Results: A total of 270 patients with a mean age of 79 years (65 to 99) were included. The average SCr was 1.29 mg/dL, CrCl was 55.1 mL/min, MDRD4 eGFR was 73.7 mL/min/1.73 m2, BSA-adjusted MDRD4 eGFR was 75.5 mL/min, CKD-EPI eGFR was 65.3 ml/min/m2, and BSA-adjusted CKD-EPI eGFR was 66.9 mL/min. Out of 270 patients, 56 percent were female. Thirty-eight percent were Caucasian, 17 percent were African-American, 12 percent were Asian, and 8 percent were Latino/Hispanic. Overall, eligibility for metformin was 80 percent based on serum creatinine compared to 88 percent by eGFR. Two point six percent (MDRD4) and 2.2 percent of patients (CKD-EPI) were originally ineligible for metformin based on serum creatinine criteria but became eligible based on the new criteria. Additionally, 5.6 percent of patients (MDRD4 and CKD-EPI) who were disqualified from continuing metformin by SCr became eligible for continuation. Moreover, 6.3 (MDRD4) and 6.6 percent of patients (CKD-EPI) were originally eligible but had to be reevaluated due to an eGFR between 30 to 45 mL/min. One patient (MDRD4 and CKD-EPI) was originally qualified but became ineligible. The eligibility status for the remainder of the patients was unchanged.

Conclusion: According to this study, the eGFR criteria allowed more patients with renal impairment to receive metformin; however, the majority of patients did not change their eligibility status. An increase in the number of patients that could remain on metformin with monitoring was observed. It may be necessary to examine eGFR dosing recommendations in younger populations with impaired renal function to determine the accuracy of these new recommendations, as this study focused on the elderly.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5a-201

Poster Title: Evaluation of a phosphorus replacement protocol for ICU patients receiving continuous renal replacement therapy

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Purpose: Phosphate homeostasis is largely regulated by the kidney, and hypophosphatemia is a common complication associated with continuous renal replacement therapy (CRRT). Prolonged hypophosphatemia can lead to seizures, dysrhythmias, acute respiratory failure, and musculoskeletal weakness. The benefits of protocol-driven interventions to direct electrolyte replacement have been illustrated in previous studies. A phosphate replacement protocol currently exists to direct replacement in patients in the ICU on CRRT who experience hypophosphatemia. This protocol allows nurses to administer phosphate replacement based on the severity of hypophosphatemia. This study was conducted to evaluate the effectiveness of and adherence to the current protocol.

Methods: This was a non-interventional, retrospective study of patients who received CRRT while admitted to the ICU at a large, tertiary medical center between June 2015 and June 2016. The current protocol specifies that phosphate levels less than or equal to 2.5 milligrams per deciliter warrant phosphate replacement at varying doses based on the severity of hypophosphatemia. Additionally, the protocol stipulates that labs should be drawn every 24 hours. Effectiveness was determined by the number of low phosphate levels corrected when replacement was administered in concordance with protocol parameters. Protocol adherence was evaluated by the timing of laboratory results and the number of patients with hypophosphatemia who received replacement as specified by the protocol. Additional analysis of the average dose required to normalize phosphate levels, regardless of protocol adherence, was performed to determine if current protocol dosing parameters are adequate. Analysis was conducted using descriptive statistics, with continuous data described as averages and standard deviations and nominal data reported as numbers and percentages.

Results: Of 612 patients in the ICU on CRRT, the phosphate replacement protocol was ordered for 603 patients. Phosphate levels were checked for 315 (52.2 percent) of the 603 patients and 187 (59.36 percent) of those 315 patients required phosphate replacement at least once during CRRT. A total of 1529 low phosphate levels were reported during the study time frame, and 301 (19.7 percent) of these levels were treated in concordance with the current protocol. A total of 67 (22.3 percent) of the levels treated according to the protocol resulted in a normalized phosphate level. A total of 239 low phosphate levels were corrected with replacement by the subsequent phosphate level report, which may or may not have been in concordance with the current protocol. Correcting the 239 low phosphate levels required an average phosphate dose of 26.8 plus or minus 12.6 millimoles. On average, phosphate replacement was administered within 4 hours and 40 minutes plus or minus 4 hours and 1 minute of laboratory results. Of the 4273 phosphate levels reported, 1588 (37.2 percent) labs were reported more than 24 hours apart.

Conclusion: In conclusion, this study demonstrates significant non-adherence to the current protocol. While phosphate replacement was administered in a relatively timely manner, on average, a very low percentage of patients actually received replacement in concordance with the current protocol. The majority of patients who received phosphate replacement in concordance with the protocol resulted in a subtherapeutic phosphate level. Additionally, the average phosphate dose required to normalize phosphate levels was significantly higher than the lowest dose recommended by the protocol. Based on these conclusions, education on protocol compliance is required and more aggressive phosphate dosing should be considered.

Submission Category: Leadership

Submission Type: Descriptive Report

Session-Board Number: 5a-202

Poster Title: Student Societies of Health-System Pharmacy (SSHPs) clinical experience in institutional practice in first and second professional years for clinical skills enhancement.

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Purpose: The ASHP-SSHP Executive Council at the University of Mississippi School of Pharmacy developed an institutional shadowing experience to provide first and second year pharmacy student SSHP members with clinical skills at the local Baptist Memorial Hospital-North Mississippi (BMH-NM). The 217 bed community hospital is located 1 mile from the University of Mississippi campus in Oxford, MS. The central goals of this program include enhancing pharmacy student's clinical skills, familiarizing students with health-system operations, and providing patient-centered care to improve patient outcomes through the continuum of care.

Methods: First and second year pharmacy student SSHP members volunteered for a one-hour time period at the BMH-NM. Students were given the opportunity to sign up for a maximum of three hours a semester. First year students were assigned to round with the two BMH-NM PGY1 pharmacy residents while second year students were paired with a fourth year APPE student to provide patient discharge medication counseling. Five BMH-NM pharmacists served as preceptors for the APPE students. A BMH-NM pharmacist provided students with a 30-minute orientation to BMH-NM at the University a week before the experience began. Students were expected to arrive 10 minutes prior to their assigned hour and to behave and dress professionally. This program was offered on Tuesdays and Thursdays from 9am-12pm for 9 weeks during the spring semester, allowing 54 first year and 54 second year student SSHP members to participate in the program. Students were requested to complete an open-ended feedback questionnaire regarding their experience.

Results: This inaugural program allowed students to gain experience in applying the following clinical skills: pharmacists' role in rounding with the health care team, communicating patient discharge counseling, completing medication reconciliation forms, and providing interventions during transitions of care. Student pharmacists also had the opportunity to ask questions of pharmacy staff, PGY1 pharmacy residents, and fourth year pharmacy APPE students regarding their professional career. Students reported receiving career counseling and mentorship from health care professionals that greatly impacted their career aspirations. Several students reported consideration of a career in institutional practice after completing this experience. Of the 108 one-hour time slots offered, 40 slots were filled. Each student had direct patient interaction while at the hospital. Student feedback suggested to modify the three 1-hour shifts to one 3-hour shift, which would allow more time to deepen their clinical skills as part of the healthcare team.

Conclusion: This institutional shadowing experienced provided first and second year pharmacy student SSHP members the valuable opportunity to apply and strengthen their clinical skills in an institutional setting. Students gained mentorship from professionals which helped to aid them in their decision to pursue a career in institutional practice. The leadership students demonstrated and patient-centered care they provided was valued by hospital staff, patients, friends, family, and the community. Student feedback helped shape programmatic improvement for subsequent years. This student led initiative aligns with the goals of the Practice Advancement Initiative (PAI) through ASHP within the University of Mississippi and Oxford communities.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 5a-203

Poster Title: Effects of Medication Reconciliation on Medication-Related Problems in an Ambulatory Care Setting

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Purpose: To determine whether obtaining a medication list over the phone prior to an office visit results in fewer medication-related problems in an ambulatory care setting.

Methods: The institutional review board approved this randomized, single-blind, controlled trial. Men and women over 18 years of age who provided informed consent were enrolled if they were taking at least 5 medications, had at least 3 chronic medical conditions, or were taking a narrow therapeutic index medication. Patients were excluded if they did not speak English or if they had a member of the same household already enrolled in the study. If the physician requested the pharmacist to review a subject's medication list at any time during the study period, the subject was withdrawn from the study and his or her data was removed from the database. Subjects were randomized into an intervention or control group. A pharmacy student called intervention subjects within 3 days prior to their office visit to obtain a medication history. The pharmacy student then forwarded subjects' medication lists to their physicians prior to the office visit. A pharmacy student called control subjects within 3 days after their office visit to obtain a list of medications they were taking prior to their office visit. This medication list was not available to the physician at their office visit. A pharmacist and physician blinded to group assignment reviewed each subject's medical record to identify any drug-related problems that occurred during the office visit.

Results: Seventy-two patients were enrolled in the trial: 42 in the intervention group and 30 in the control group. Subjects enrolled in the study were predominantly female (75%), were on average 51 years of age, were taking an average of 12 medications, and had on average 6 chronic medical conditions. No statistically or clinically significant differences were found

between the intervention and control groups with respect to gender, age, number of medications, and number of chronic medical conditions ($p>0.05$). The intervention and control group had a similar average number of drug-related problems (1.5 in both groups, $p = 0.924$). A larger percentage of intervention subjects (55%) had at least one medication related problem compared to control subjects (43%), but this difference was not statistically significant ($p=0.339$). The major limitation of this study was the lack of power to detect a statistically significant difference in the outcome (power = 0.158).

Conclusion: This study was not powered to detect a difference in the groups. Further research should include a larger number of subjects, investigate whether older patients may benefit more from the intervention, and investigate whether other factors (for e.g. socioeconomic status, race) may affect the efficacy of the intervention.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5a-204

Poster Title: Proactive statin therapy needed for patients between 40-75 years of age.

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Purpose: Statin therapy has been shown to effectively reduce major cardiovascular event rates in both low- and high-risk patients and improving long-term health outcomes, especially in patients with diabetes mellitus (DM) over the age of 40. The American Diabetes Association (ADA) recommends all patients between the ages of 40-75 with type II diabetes mellitus be prescribed either a moderate- or high-intensity statin regardless of low density lipoprotein (LDL) levels. The purpose of this study was to determine the number of patients between the ages of 40-75 with type II DM on statin therapy to reduce cardiovascular events.

Methods: Men and women between the ages of 40-75 at a one retail pharmacy in the Southwest United States were screened for type II DM through prescriptions for metformin, a biguanide drug considered first-line therapy for type II diabetic patients. Each patient was analyzed for concurrent statin therapy. Statin therapy included rosuvastatin, atorvastatin, simvastatin, lovastatin, pravastatin, or fluvastatin. Patients who were not taking concurrent statin therapy were screened for potential drug-drug interactions (DDIs) that may occur if a statin medication was added to their current drug therapy. Data were analyzed using a Chi-Square test with an alpha level set at 0.05 performed in Microsoft Excel.

Results: A total of 88 patients were identified who met the ADA guideline recommendations for statin therapy. Forty-three patients met the guideline recommendations with concomitant therapy of at least a moderate-intensity statin. Forty-five patients did not meet the guideline recommendations. Of those 45 patients, 9 had a potential drug-drug interaction with the addition of statin medication. Thus, 36 total patients did not meet the ADA guidelines to reduce cardiovascular events. All 88 patients were expected to be on statin therapy per ADA

guidelines. Patients between the ages of 40-75 years of age with type II diabetes mellitus are not concomitantly on at least a moderate-intensity statin (p-value less than 0.01).

Conclusion: More than half of patients who qualify for statin therapy per ADA guidelines were not concomitantly on statin therapy. The ADA guidelines have shifted from monitoring cholesterol levels to recommending treatment to high-risk populations, such as those with diabetes. It is imperative that pharmacist ensure patients with diabetes are adequately treated to prevent complications.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 5a-205

Poster Title: Evaluation of pharmacist-provided discharge counseling and its impact on 30-day readmission rates for chronic obstructive pulmonary disease (COPD) patients in a community hospital

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Purpose: Chronic obstructive pulmonary disease (COPD) is a progressive lung disease that leads to chronic airflow limitation causing increased morbidity and mortality. For multiple years, Valley Medical Center has had a pharmacist education program to target high risk patients, including those with COPD, but its efficacy on readmission rates has not previously been evaluated. The purpose of this study is to evaluate the impact of this pharmacist-provided discharge counseling on 30-day-readmission rates in COPD patients in a community hospital setting. Additional factors other than pharmacist-provided counseling that could possibly contribute to readmissions were also assessed in this study.

Methods: This study is a single center, retrospective, block-randomized, chart review of 148 patients admitted with a primary diagnosis of COPD exacerbation. Every admission with a primary diagnosis of COPD exacerbation and an active COPD intervention ("i-vent") during 1/1/16 – 6/30/16 was included. Patients that were deceased either during or within 30 days after an admission, patients who left the hospital against medical advice, patients who were discharged to a skilled nursing facility or an adult family home, and patients who did not have an active COPD i-vent were excluded. The total sample included 74 COPD patients that received pharmacist discharge counseling and 74 that did not. The primary endpoints were 30-day-readmission rates in patients that received pharmacy discharge counseling versus those who did not . The secondary endpoints included 30-day-readmission rates based on sex, age, number of respiratory-related discharge medications, total number of discharge medications, and number of respiratory-related comorbidities.

Results: The average overall COPD readmission rate was 16.9%. The readmission rate with counseling was 12% whereas the rate without counseling was 21.6%. This resulted in a non-statistically significant difference of 9.6% between the two patient groups (95% CI=0.1778, 0.0714, p=0.125). Sex, age, number of respiratory-related discharge medications, total number of discharge medications, and number of respiratory-related comorbidities also did not show any statistical differences in readmission rates. (95% CI=0.4082, 0.2564, p=0.332; 0.873; 0.112; 0.240; respectively, where $p < 0.05$ indicates significance).

Conclusion: Pharmacist-provided discharge counseling did not make a statistical significant difference in 30-day-readmission rates in COPD patients. Despite this, there appeared to be a positive clinical trend in readmissions with pharmacist intervention. There was almost twice the amount of COPD readmissions in patients that did not receive counseling than those who did. One limitation to this study was that it was single centered. Larger samples may determine stronger statistical and clinical significance. Another limitation is that multiple factors were not accounted for that could contribute to readmissions, such as social, economical, and other factors that are outside of a pharmacy's control.

Submission Category: Pediatrics

Submission Type: Descriptive Report

Session-Board Number: 5a-206

Poster Title: Levetiracetam monotherapy use in the PICU for the treatment and prophylaxis of status epilepticus

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Purpose: There have been limited safety and efficacy studies in pediatric critically ill patients who receive levetiracetam as a monotherapy agent. Open label studies have examined the use of levetiracetam as adjunctive therapy in pediatric populations, and have reported a 50% reduction in seizure frequency. Safety studies and clinical trials that involve levetiracetam monotherapy use have showed promise; however, there's limited data regarding its use as a first line monotherapy agent in the pediatric population. To address this deficit, the efficacy of levetiracetam as a monotherapy agent among the pediatric population (0-18 y/o) with status epilepticus in a PICU was evaluated.

Methods: A two year retrospective observational study was conducted of medical records in patients under the age of eighteen who were admitted to the PICU at an academic stand-alone pediatric institution. Patients were identified by utilizing a pharmacy derived list of all patients who received levetiracetam during the targeted two years. Chart reviews were conducted to identify those patients from the initial list who were in the PICU and who met the inclusion/exclusion criteria. For a patient to be included in the study, the patient had to be admitted to the PICU, be under the age of eighteen, and exhibited signs and symptoms of status epilepticus. Exclusion criteria of this study included patients greater than the age of eighteen, patients who exhibited no signs or symptoms of status epilepticus, and patient who received antiepileptic polytherapy during their PICU stay. The etiologies of seizures were classified according to the documented cause of seizures. Data collected included the length of PICU stay, reason for admission, prior levetiracetam use, levetiracetam dose, and indication of use. The primary outcome was incidence of seizures while in the PICU. Secondary outcomes included length of stay in PICU, length of treatment, and the optimal dose range of levetiracetam. Descriptive statistics were used to analyze the data.

Results: Over the 2-year study period, 59 PICU patients were identified on levetiracetam, 12 received levetiracetam monotherapy with an age range of 0-18 (mean age of 4.92). Demographically, of the 12 subjects that were studied, 58% were male and 42% were female. The percentage of Caucasian, African American, and Hispanic patients were 33%, 58%, and 8%, respectively. The average weight of participants was 32.04 kg ranging 3.2-116 kg. The average dose administered to subjects was 44.7 mg/kg/dose ranging from 17.2-107 mg/kg/dose with a corresponding daily dose of 55.3 mg/kg/day ranging 20.4 -107 mg/kg/day for status epilepticus and acute control of seizures. Sixty seven percent of these patients received oral levetiracetam and 33% received intravenous levetiracetam for treatment or prophylaxis of status epilepticus. The average length of stay spent in the PICU with patients on levetiracetam monotherapy was 6.25 days ranging 2-27 days. The average length of treatment was 9.5 days ranging 1-36 days. Of the 12 patients, 4 were treated acutely and seizures were controlled. Three of those 4 patients had no seizure history prior to treatment. One patient was treated prophylactically. The remaining 7 of the 12 patients were treated for seizures orally once the admission disease state was controlled.

Conclusion: It's of utmost importance to control status epilepticus expediently as possible in an acute setting. This study presents pertinent data from a 2 year retrospective observation study that was conducted at an academic stand-along pediatric institution. Higher doses of levetiracetam were utilized in this study than compared to previous studies. The efficacy of levetiracetam monotherapy was determined by the amount of seizures that were controlled acutely and prophylactically. It would be recommended to obtain further data in regards to seizure controlled in acutely treated patient and prophylaxis in acutely ill patients for future studies.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5a-207

Poster Title: Evaluation of a novel time within therapeutic range metric for erythropoiesis stimulating agents in hemodialysis patients

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Purpose: Erythopoiesis-Stimulating Agents (ESAs) are the primary treatment for anemia in patients with end-stage renal disease on hemodialysis. The narrow hemoglobin target of 10 to 11 g/dL in this population leads to reactive dosing of ESAs and frequent excursions outside of the target range. Time within therapeutic range (TTR) is a novel metric of ESA pharmacodynamics, which has been validated for warfarin in large clinical trials. The purpose of this study was to characterize ESA response in terms of TTR and investigate factors that improve TTR.

Methods: This retrospective cross-sectional study, approved by the local institutional review board, included outpatients with end-stage renal disease on hemodialysis from April 1, 2014 to April 30, 2015. Inclusion criteria were age greater than or equal to 18 years, use of an ESA, and routine laboratory follow-up over the study period. Fifty patients were randomly selected from 165 at the outpatient dialysis center. Data collected included: demographics, comorbidities, anti-hypertensive medications, hospitalizations, laboratory data (hemoglobin, phosphate, albumin, ferritin, transferrin saturation [TSAT]), iron administration, ESA dose and type of ESA, number of dose adjustments, and route of administration. The TTR was calculated for each subject as the number of observed hemoglobin values within the 10 to 11 g/dL range divided by the total number of hemoglobin values over the study period. TTR greater than or equal to 50 percent was defined as a good response. Bivariate analyses characterized the differences between those with TTR greater than or equal to 50 percent compared to TTR less than 50 percent using T-tests, Mann-Whitney U-tests, or Chi-Square tests as appropriate. Logistic

regression models were fit to the TTR greater than or equal to 50 percent parameter. Predictor variables considered for the model included age, sex, ethnicity, co-morbidities, phosphate, albumin, hemoglobin, TSAT, ferritin, average weekly ESA dose, and ESA route of administration. All analysis was completed using SAS with alpha equals 0.05.

Results: Twenty patients had TTR greater than or equal to 50 percent, compared to 30 patients with TTR less than 50 percent. “Good responders” had a mean hemoglobin of 10.68 g/dL (range: 10.16 to 10.93 g/dL; standard deviation: 0.23 g/dL) compared to a mean value of 10.3 g/dL for “poor responders” (range: 8.38 to 13.33 g/dL; standard deviation: 0.87 g/dL) (P equals 0.0041).
Patients with TTR greater than or equal to 50 percent received a mean ESA dosage of 14,825 units per week, compared to 32,839 units per week for patients with TTR less than 50 percent (P equals 0.0110). Good responders had a mean albumin of 4.12 g/dL, compared to a mean value of 3.8 g/dL for poor responders (P equals 0.0467). Patients with hyperlipidemia were 5.13 times more likely to be good responders after adjusting for average weekly ESA dose and mean albumin concentration (P equals 0.0418). Hypertension status, route of ESA administration, and mean hemoglobin concentration all significantly differed between the two response groups in bivariate analyses, but were not significant in the multivariable model. Age, ethnicity, sex, phosphate, TSAT, ferritin, diabetes, coronary artery disease, heart failure, or hyperparathyroidism did not have a significant influence on response status.

Conclusion: Our study demonstrates that TTR for hemoglobin can be used as a measure for responsiveness to ESAs in hemodialysis patients. Subjects with a TTR greater than or equal to 50 percent had a higher mean hemoglobin and less variation in their hemoglobin than patients with a TTR less than 50 percent. Additionally, a multivariable model identified three predictors for a TTR greater than or equal to 50 percent: average weekly dose of ESA, mean serum albumin, and hyperlipidemia status. These factors could be considered when adjusting ESA doses to improve TTR.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 5a-208

Poster Title: Symptomatic constitution of Finnegan scores for infants born in Cabell County, West Virginia and treated for neonatal abstinence syndrome (NAS)

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Purpose: Neonates exposed in-utero to substances such as opioids, benzodiazepines, and cannabinoids can experience withdrawal symptoms after birth, a condition termed Neonatal Abstinence Syndrome (NAS). The Finnegan Scoring System quantifies the presentation of NAS-related symptoms, with higher scores being given for more numerous or severe symptoms. Scores are used to guide pharmacological therapy, primarily methadone initiation and titration, with a 3-score or 8-score average of 8 traditionally being a guiding threshold. This study assessed the symptomatic constitution of Finnegan Scores recorded within the first 168 hours of life for neonates born at Cabell Huntington Hospital and treated for NAS.

Methods: The Marshall University Institutional Review Board (IRB) committee approved this retrospective study. Data was obtained from patient charts at Cabell Huntington Hospital (CHH) in Huntington, WV, namely through the secure Cerner Millennium system. A survey design was utilized to standardize and streamline data collection. The survey was built using Qualtrics Survey Software, provided for by Marshall University. Each patient's NAS Finnegan scoring assessment charts were entered into the survey, with the cutoff being the end of the infant's 8th day of life to ensure that data would be collected through 168 hours after time of birth (TOB), as recorded on the patient's birth documentation. Patients were included in this study if they: 1) were born at CHH between January 01, 2015 and December 31, 2015; 2) were born after 28 weeks gestation; and 3) were diagnosed with NAS and/or received methadone as treatment for NAS. Patients were excluded if they 1) did not meet the preceding criteria, 2) lacked a completed "worksheet," which contained the mother's demographic and substance abuse information, or 3) were transferred out of CHH or discharged within 168 hours after TOB.

Results: 62 patients had a total of 3189 Finnegan scores and 16041 individual symptoms recorded within the first 168 hours after TOB. The mean Finnegan score was 8.02, with a median of 5 symptoms per score. 66.4 percent of symptoms (8850) involved the central nervous system. 94.7 percent of scores included “increased muscle tone,” 84.7 percent included “mottling,” 47.9 percent included “hyperactive moro reflex,” 19.1 percent included “decreased sleep duration,” and 6.0 percent included “excessive high-pitched crying.” 2859 instances of tremors were recorded (89.7 percent of scores), with 80.9 percent being “tremors when disturbed” and 19.1 percent being more-severe “tremors while undisturbed.” The mean tremor value was 2.06 per score. 22.0 percent (5182) of symptoms involved the autonomic nervous system, with 30.5 percent of scores including “nasal stuffiness,” 24.6 percent including “fever,” 13.2 percent including “sneezing,” and 8.4 percent including “respiratory rate greater than 60.” 12.7 percent (2009) of symptoms involved the gastrointestinal system, with 27.4 percent of scores including “excessive sucking,” 17.4 percent including “diarrhea,” 13.3 percent including “poor feeding,” and 3.9 percent including “regurgitation.”

Conclusion: Finnegan Scores primarily consisted of central nervous system (66.4 percent) symptoms, followed by autonomic nervous (22.0 percent) and gastrointestinal symptoms (12.7 percent). 94.7 percent of scores included “increased muscle tone” and 84.7 percent of scores included “mottling,” which together account for 3 points in the protocol used at CHH. Additionally, 89.7 percent of scores included an average of 2 points for tremors. However, multiple factors affect symptom presentation, including nonpharmacologic care, pharmacologic treatment (methadone, clonidine, etc.), infant gender, and fetal substance exposure in-utero. Differences in symptom presentation must be determined in larger retrospective analyses.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5a-209

Poster Title: Effectiveness of a call-back system for follow-up of culture results in patients treated for urinary tract infection in the emergency department of a community hospital.

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Purpose: Urinary tract infections are often treated in the emergency department (ED). Urine cultures are commonly collected from patients even if they are discharged from the ED without requiring admission. In these cases, empiric antibiotic prescriptions are given based on treatment guidelines and local resistance patterns. When resistant cultures return, a process for contacting patients must be in place to allow providers to change antimicrobial therapy. This pilot study evaluated the current process at our institution for follow-up on urine culture results in patients treated for urinary tract infection in the ED and discharged prior to pathogen results.

Methods: A retrospective medical record review of culture-positive patients treated in the emergency department of a 200-bed community hospital from January 1, 2015 to June 14, 2015 was performed. Patients with urinary isolates of greater than 100,000 cfu/ml and intention to treat by prescriber were included. Causative pathogens, antibiotic therapy prescribed, risk factors for drug-resistant pathogens, and drug susceptibilities were recorded. For patients with cultures resistant to prescribed therapy, medical records were reviewed for documentation of call back attempt(s), success/failure, and if change of therapy or course of action occurred. Patients were also classified as community-acquired or healthcare-associated UTI based on presence of specific risk factors for drug-resistant pathogens. Healthcare-associated risk factors included residence in long term care facility or nursing home, presence of an indwelling urinary catheter, immunosuppressive therapy or disease, hospital admission for 2 or more days in the previous 90 days, urologic procedure in the previous 90 days, and chronic hemodialysis in the previous 30 days. Risk factors for drug resistance such as previous

recent antibiotic therapy or history of previous or recurrent urinary tract infections were also collected. Evaluation of risk factors for impact on infection with a drug-resistant pathogen (resistant to empiric therapy prescribed in the ED) was performed and descriptive information about causative pathogens isolated, local resistance patterns, and frequency of various antibiotic agents prescribed was reported.

Results: Of 385 patients screened, 277 were included in the study, with 83.4 percent of patients being classified as community-acquired and 16.6 percent with healthcare-associated UTI. The most common pathogens isolated on urine culture were Escherichia coli (72.5 percent) and Klebsiella species (14.1 percent). Frequently prescribed antimicrobials were nitrofurantoin (36.4 percent) and cephalexin (35.7 percent). Cultures reported pathogens that were resistant to initial empiric antibiotic therapy for 21 percent of the ED-treated population. Attempted call-back to patients with resistant cultures was documented for 79 percent of those. Successful contact with patient was documented for 65.2 percent of call-back candidates. For the patients not initially reached by phone, messages were left for 15.2 percent while 19.6 percent of patients were unable to be successfully contacted. Follow-up calls were performed on an average of 3.9 days after cultures were drawn. Therapy was modified via phone in 52 percent of cases and 6.5 percent of patients were referred to another physician upon call-back. Of note, 13 percent of call-back patients achieved clinical cure, which was determined through directed questioning and no change was made despite culture-reported resistance to the prescribed antibiotic therapy.

Conclusion: Evaluation of the follow-up methods of resistant cultures in ED-treated UTI patients showed inconsistency in practice of how call-backs are performed and documented. A considerable number of patients contacted were left messages or not reached successfully. With effective communication, practitioners were able to determine clinical success or need for therapy modification via phone questioning. An implemented follow-up call-back system with UTI patients discharged from the ED before culture results return can be an effective method for ensuring clinical success but is limited by the ability to consistently contact the patient. Staff education and further study is needed.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 5a-210

Poster Title: Evaluating pharmacist driven smoking cessation interventions in a Southern outpatient HIV clinic

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Purpose: It is well known that patients with HIV infection have higher rates of tobacco use than the general population, and HIV populations have higher use in South Carolina than the national average. Smoking has well described health consequences for HIV positive patients, thus cessation strategies are key. Current clinic cessation interventions are provided by a clinical pharmacist, after physician referral. Non-physician interventions are ideal due to short visit times and many competing priorities during visits. Evaluation of our current smoking cessation program in clinic is necessary, as we consider an opt-out formal mechanism of offering cessation counseling to HIV patients.

Methods: The patients evaluated in this study were engaged in care in 2015 in the outpatient HIV clinic at the Medical University of South Carolina. The inclusion criteria were age greater than 18, HIV positive status, current smoking, and a pharmacist intervention followed by at least one outreach attempt documented in 2015. Patient information was collected via chart review. Information relevant to their HIV, smoking behaviors, and smoking cessation encounters with the clinical pharmacist were collected. We hypothesized that clinical pharmacist interventions would increase the likelihood of patient quit attempts and thereby a successful cessation. Statistical analysis was performed with SPSS (v24), using descriptive statistics, chi-square, and ANOVA tests.

Results: In total, 45 patients met the inclusion criteria. Patients were mostly insured (62percent), median age was 49 years, African American (71percent), and males (69percent). Most were on antiretroviral therapy (93percent), with virologic suppression (< 40 copies/mL, 69percent), and few had CD4 less than 200 (7percent). At baseline, on average, patients were

smoking 13.2 cigarettes/day [range 1-50]. Most patients were prescribed cessation medications (89percent), 16 (35percent) varenicline, 3 (7percent) each for bupropion and nicotine replacement therapy (gum/lozenge), 7 (16percent) for patches, and combination therapy for 11 (24percent). Patients had, on average, 4.98 (range 2-13) total outreach attempts, with an average of 2.87 attempts obtaining contact and an additional 1.56 visits without contact, but a message was left. Overall, 5 (11percent) patients successfully quit smoking. Outreach attempts with contact were associated with successful over unsuccessful quit attempts (mean 4.8 vs. 2.63 visits, p=0.001). Outreach attempts with contact were higher for patients with cessation success over those making a quit attempt, and both over those without a quit attempt (4.8 versus 2.37 versus 1.2 visits, p=0.000). Neither outreach attempts nor baseline cigarettes/day correlated with number of quit attempts. However, few patients had sufficient documentation of formal quit attempts, limiting these two analyses.

Conclusion: Outreach attempts achieving contact were higher for patients with cessation success and those making quit attempts, supporting that more contact and counseling increases the likelihood of cessation attempts and success. This contact may also reflect patients with higher motivation to quit, as they may have been easier to contact. As a result, at a minimum, 3 outreach attempts should be made following the initial encounter to increase contact with patients. We will improve documentation of quit attempts to further evaluate the program's success. Furthermore, to reach more patients, we will implement a pro-active approach to offer cessation within clinic.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 5a-211

Poster Title: Intravenous Acetaminophen Use in Pediatric Patients

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Purpose: Intravenous (IV) acetaminophen is approved for management of fever and acute pain in patients two years of age and older. Safety concerns have been raised due to reported serious iatrogenic dosing errors. Additionally, significant cost difference between oral, rectal and IV preparations necessitated proactive cost-effective use of the IV product. To optimize safe and cost-effective use of IV acetaminophen, Morristown Medical Center developed an order form detailing appropriate use and standardized dosing in pediatric patients. The purpose of this study was to evaluate compliance with the order form, as well as safety and use of IV acetaminophen in pediatric patients.

Methods: The Atlantic Health System institutional review board approved this retrospective chart review. Patients admitted to Goryeb Children's Hospital, 19 years of age and younger, who received at least one dose of IV acetaminophen between September 1, 2014 to June 30, 2015 (period 1) and August 1, 2016 to September 12, 2016 (period 2). The data was collected in two separate time periods due to revisions of the original order form, which were implemented after period 1. Data collected during both time periods included patient demographics, contraindication to oral acetaminophen, rectal acetaminophen and/or IV ketorolac as well as indication for use, number of doses received, dosing and administration interval, effectiveness and adverse reactions. A Clinical Drug Utilization Report generated by Horizon Meds Manager was used as the source of study participants. Potential participants were then verified through chart review to confirm at least one dose of IV acetaminophen was received. Upon analysis of the data collected during period 1, revisions were made to the order form. After implementation of the revised order form, additional patients were evaluated. The primary outcome was to evaluate the percentage of IV acetaminophen use that was per protocol based

on the corresponding order form. Secondary outcomes included description of IV acetaminophen use such as indication, dose, number of doses received per patient and adverse effects.

Results: A total of 100 pediatric patients who received at least one dose of IV acetaminophen were included. The median age of the initial 70 pediatric patients who received doses based on the original form (period 1) was 10 years with the average patient receiving 3.5 doses. Of these patients, 26 percent received IV acetaminophen per protocol. The indications for use were pain (31 percent), fever (38 percent), blood product administration (5 percent) and a combination of the previous three indications (27 percent). The median age of the 30 pediatric patients who received doses based on the revised form (period 2) was 11 years with the average patient receiving 4.4 doses. Of these patients, 40 percent received IV acetaminophen per protocol. The indications for use were pain (53 percent), fever (23 percent), blood product administration (3 percent) and a combination of the previous three indications (20 percent).
The main criteria that were outside order form criteria were no evidence of compromised rectal absorption (34 percent), ability to take oral medications (25 percent) and no contraindication to ketorolac (28 percent). There were no documented medication errors or adverse effects.

Conclusion: Use of IV acetaminophen in the studied pediatric patients was safe. With safety of use shown in the initial data collection period, indications and dosing on the original order form were revised to allow for wider acceptable use and higher doses. Improvement in adherence with recommended uses of IV acetaminophen was seen with the revised order form; however, the majority of use still fell outside of institutional indications. Restricting use of IV acetaminophen in pediatric patients remains a challenge and future directions will focus on enforcing cost-effective use.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5a-212

Poster Title: Evaluating the time-course of Pseudomonas aeruginosa killing in the presence of various azithromycin concentrations

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Purpose: Healthcare-acquired acute bacterial infections present an ongoing challenge due to increasing antibiotic resistance and pathogen virulence. Pseudomonas aeruginosa (PA) is commonly associated with drug resistance and a high degree of virulence. Azithromycin (AZM) is a macrolide antibiotic thought to be predominantly bacteriostatic against PA. Prior studies evaluating the effect of Azithromycin on PA utilized relatively low concentrations of Azithromycin. We hypothesized that concentrations approximating those achieved within immune cells might produce bactericidal activity. The purpose of this experiment was to identify the time course of PA killing over a range of Azithromycin concentrations in a static time-kill model.

Methods: To determine the concentration-killing response for a representative clinical strain of PA (PA99), we performed the following experiment. Bacterial isolates were cultured from frozen stocks onto fresh Luria Berneti (LB) agar and incubated overnight at 37 degrees C. Fresh LB broth was inoculated and bacteria were grown to log-phase overnight at 37 degrees C. Sterile LB broth (3 mL) was then inoculated with PA99 1:100 and various Azithromycin concentrations (Azithromycin = 0, 0.5, 1, 2, 4, 8, 16, 32, 64, 128, and 256 mcg/mL). We removed 100uL aliquots at 0, 2, 4, 8, and 24 hours after inoculation. Aliquots were serially diluted, plated, incubated overnight, and colonies counted to quantify viable colony forming units (CFU)/mL. Data were analyzed using GraphPad Prism 7.

Results: Azithromycin concentrations of 16 mcg/mL or less did not alter PA99 growth at 24 hr post-inoculation. Azithromycin concentrations of 32, 64, and 128 mcg/mL produced some growth defects but these changes in growth were not significantly different from control ($P > 0.05$). The largest and earliest change in CFU/mL was produced by Azithromycin at 256 mcg/mL and this was significantly different from control ($P=0.01$).

Conclusion: PA in vitro growth appears to be non-significantly inhibited by Azithromycin concentrations of 128 mcg/mL or less. However, Azithromycin concentrations approximating those achieved within immune cells (i.e., 256 mcg/mL) appear to significantly inhibit PA growth. Further investigation into the time-course of Azithromycin activity on PA and its role on clinical outcomes is warranted.

Submission Category: Infectious Diseases

Submission Type: Case Report

Session-Board Number: 5a-213

Poster Title: Treatment of chronic hepatitis C and the potential for hepatitis B reactivation in co-infected patients: A case report

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Purpose: This case report reveals the potential for hepatitis B virus (HBV) reactivation following the treatment of chronic hepatitis C virus (HCV) in a co-infected patient using direct acting antivirals (DAAs). The patient was first diagnosed with HCV during a pre-surgery screening, likely acquired via drug use. She reports that the last drug use was approximately 20 years ago. Immunity was found for hepatitis A virus, however, HBV DNA was detected at less than 20 IU/mL, and she did not have hepatitis B E antigen present. She was identified as inactive carrier state for HBV. Patient was found to have HCV genotype 1a and was treatment naïve. Despite a fibrosis stage of F0 and no signs of jaundice, fatigue, or edema, she was at risk for rapid hepatic disease progression due to diabetes and HBV co-infection. Due to her mental stability and social history, she was considered to be a good candidate for HCV treatment. Ledipasvir/sofosbuvir 90/400 mg for eight weeks was initiated. After two weeks of treatment, HCV RNA was still detectable at 50 IU/mL, a decrease from pre-treatment viral load of 670,740 IU/mL, and HBV DNA had increased to 70 IU/mL. During treatment, patient denied experiencing signs of hepatic decompensation such as jaundice or confusion. At the completion of ledipasvir/sofosbuvir, the patient showed an undetectable viral quantification of HCV RNA, but showed signs of HBV reactivation with a viral breakthrough of 2,560 IU/mL. She continues to be monitored for HCV clearance and HBV DNA. Patient did not present with elevated alanine aminotransferase (ALT) or aspartate aminotransferase (AST) at any point before, during, or after her HCV treatment. Several case reports have shown that a relationship between HCV and HBV replication during co-infection exists. For example, actively replicating HCV may suppress HBV replication, HCV replication may be inhibited by a HBV superinfection, or the viruses may have alternating phases of dominance. Additionally, patients with successful HCV clearance following treatment with peginterferon/ribavirin have been shown to exhibit HBV reactivation. As this case report suggests, co-infected patients treated with DAAs may experience reactivation of previously

inactive HBV upon successful HCV clearance. This case supports the importance of close HBV monitoring before, and especially during, the treatment of HCV, however further studies are needed to confirm this inverse viral relationship.

Methods:

Results:

Conclusion:

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5a-214

Poster Title: Assessing the impact of a technician training and competency assessment program in preparation for the implementation of a new electronic health record

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Purpose: On July 1, 2016, the Johns Hopkins Hospital converted its electronic health record to Epic. This transition necessitated significant changes in the workflow for pharmacy technicians. The entire staff received vendor-provided "Go-Live" training through a short, online module and a large-group classroom session lead by trainers provided by the vendor. In addition, the Critical Care & Surgery pharmacy developed a one-on-one training module and individual competency assessment program. The goal of this project was to assess the impact of a pharmacy technician training module and competency checklist in enhancing technician's confidence and comfort with anticipated workflow changes.

Methods: Technicians were first required to have completed all vendor-provided training, after which their confidence level was assessed via survey. The survey assessed the technician's own confidence on a 4-point scale, ranging from Not Very Confident (1 point) to Very Confident (4 points), in being able to successfully utilize six of the major functions on the technician dashboard in Epic. These functions included Reading Labels, Dispense Preparation, Compounding and Repackaging, Order History, Medication Messaging, and Dispense Tracking. After the survey was finished, each technician was trained individually on the same six functions, and their competency was then assessed via a checklist. After the training and checklist were completed, the survey was re-administered to assess the technician's confidence on those six functions.

Results: Nineteen pharmacy technicians, representing 86% of the full-time pharmacy technicians in the Johns Hopkins Critical Care and Surgery Pharmacy, participated in this study. Across all domains, the average change in confidence improved from 2 (Somewhat Confident) to 4 (Very Confident). Increases in median confidence levels ranged by 1-2 points out of 4 total in each individual function. Overall the technicians' self-reported confidence in using Epic increased from a median of 2 (Somewhat Confident) to 3 (Confident). All technicians verbally indicated they were more confident and felt more knowledgeable regarding each of the new functions after completion of the training module and checklist.

Conclusion: In conclusion, a one-on-one training program and competency assessment enhanced technician's self reported confidence level in performing the new functions expected of them associated with the roll out of a new electronic health record. This enhancement of confidence was above and beyond the confidence level established with solely vendor-provided training modules.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 5a-215

Poster Title: Discovering self perceptions of health in a predominantly Hispanic US-Mexico border community

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Purpose: The US-Mexico border has high rates of overweight and obese people with a rate at 71 percent reported for one Far West Texas County. Further, only 11 percent of the county self-reported an intake of at least five fruits and vegetables a day. There is a direct relationship between diet and health. Thus, the aim of this project was to discover the beliefs of a predominantly Mexican-American population regarding their perception of being healthy.

Methods: Pharmacy students administered surveys at events supported by a community-university based program serving a rural US-Mexico border community between the summer of 2015 and the fall of 2016. The surveyors used convenience sampling, and participants completed the (bilingual Spanish-English) survey using an electronic tablet. The survey, based on literature regarding perceptions of health and weight, consisted of 25 multiple-choice questions. The community consisted of predominantly Hispanic participants who live in colonias and economically distressed areas.

Results: A total of 65 adult participants completed the survey, and the majority, 81 percent, of participants were female. Of the participants surveyed, 78 percent somewhat agreed, agreed or strongly agreed when asked if they believed they were healthy. Among the participants, 84 percent found it hard to eat healthy foods every day, did not make healthy eating a priority, or ate whatever they wanted. Of the 79 percent of participants that wanted to lose weight, 43 percent wanted to lose up to 10 pounds and 36 percent wanted to lose more than 10 pounds. When asked what changes participants would like to make, the top three choices were to eat more fruits and vegetables, 66 percent, eat smaller portions, 36 percent, and eat less junk food,

35 percent. Almost all of the participants, 95 percent, were somewhat ready, ready, or very ready to make a change to improve their families' health.

Conclusion: Even though the majority of participants believed they were healthy, about the same percentage wanted to lose weight and a higher percentage found it hard to eat healthy foods every day. The desire by the majority of participants to eat healthier indicates awareness of healthy choices. Seeing as how the majority of the participants were willing to start making changes, the current findings may provide a framework for the community agency to survey a larger population. This could lead to identifying barriers in order to determine feasible interventions to assist this community to practice habits that promote health.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 5a-216

Poster Title: Liraglutide and semaglutide: A mixed treatment comparison meta-analysis of cardiovascular and safety outcomes

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Purpose: Metformin has been associated with macrovascular protection in patients with type 2 diabetes though not all patients can endure metformin or achieve optimal glycemic management on metformin based treatments alone. GLP-1 agonists offer a unique advantage for add-on therapy or insulin alternative, facilitating weight loss and reducing insulin resistance. Semaglutide is administered once-weekly and shares 94% homology to endogenous human GLP-1. Liraglutide is administered once-daily and shares 97% homology to human GLP-1. This analysis indirectly compares and evaluates the cardiovascular outcome data for the two latest relatively long-term GLP-1 agonist trials since head-to-head studies have not yet been planned.

Methods: PubMed was searched to identify longer-term GLP-1 trials with a primary composite of first occurrence of death from cardiovascular causes, nonfatal myocardial infarction, or nonfatal stroke. Two randomized-controlled double-blind trials focusing on liraglutide and semaglutide, were selected: SUSTAIN-6 and LEADER. Bayesian mixed treatment comparisons (MTC) network meta-analysis methods using Markov chain Monte Carlo simulation were used to evaluate direct and indirect effects of treatment. The Aggregate Data Drug Information System (ADDIS; version 1.16.7) was used for network meta-analysis. Network geometry was created in Powerpoint with nodes scaled proportionally to the size of the combined treatment population. Direct pairwise treatment comparisons (connections) were also scaled proportionally to the number of included trials. Data were recorded as odds ratios and credible intervals for the comparison of liraglutide and semaglutide.

Results: SUSTAIN-6 and LEADER trials were identified and abstracted to find 2.1 and 3.5 number of years of GLP-1 treatment and follow-up, respectively. There were 14,991 patients with a mean age of 64 and 13.5 years of type 2 diabetes at enrollment and similar

cardiovascular disease burden. There were more person-years of treatment and follow-up with liraglutide (16,338 vs. 3,461 respectively) as the LEADER trial was longer. Liraglutide and semaglutide were consistently ranked higher than placebo in direct comparisons of the primary composite endpoint and individual cardiovascular endpoints. No statistically significant differences were observed when comparing estimated effect size of both GLP-1 agonists however, indirect treatment comparisons favor liraglutide for reduction of all-cause mortality (OR 1.23; 95% CI, 0.76, 2.01) while semaglutide is favored for reducing primary composite outcome (OR 0.84; 95% CI, 0.46, 1.60) and individual cardiovascular outcomes of nonfatal MI, nonfatal stroke, coronary revascularization, hospitalization for unstable angina pectoris, and nephropathy. Nausea and vomiting prompting discontinuation were observational and were common for both GLP-1 agonists.

Conclusion: Early indirect estimates of treatment effects and preliminary rankings suggest liraglutide may be associated with lower rates of all-cause mortality, though semaglutide may be associated with fewer cardiovascular events. It is important to note there are fewer patient-years of treatment with semaglutide and fewer years to accrue outcome events. Additional head-to-head RCTs and years of follow up will help better estimate effect sizes.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5a-217

Poster Title: Increasing the cost effectiveness of insulin use at an institution while adjusting the repackaging insulin glargine doses in vials

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Purpose: Since insulin glargine is only manufactured in 10ml vials, Tucson Medical Center (TMC) made 3ml vials similar to other insulin types manufactured for institutions. As TMC is fully electronic, each insulin vial must be dispensed and charged to each patient and cannot be shared between patients, which leads to wastage. The purpose of this study is to assess the insulin use at TMC, determine the appropriate size vial to manufacture, and evaluate the economic impact of repackaging 10ml vial of insulin glargine to 1.5ml vials instead of 3ml vials.

Methods: Approximately 900 nurses from varying areas of the hospital including emergency department, adult intensive care unit (ICU), adult medical/surgical, pediatric and pediatric ICU were surveyed on insulin usage at TMC using survey monkey. A follow-up survey would be sent after the intervention to measure satisfaction and effectiveness. Reports were also generated from TMC inpatients to see how many units of insulin were administered as well as the number of vials dispensed during their stay. Based on the average use of insulin glargine, the quantity within the repackaged vials was adjusted for less wastage. Follow- up reports from TMC inpatients were generated after the intervention to assess insulin glargine use. Finally, purchasing reports before and after intervention were collected to validate usage.

Results: There were 182 responses from nurses at TMC. About 80 percent agreed or strongly agreed that insulin waste is a problem. The average use of insulin glargine for the month of October 2015 was about 120 units per patient per admission. Changing of insulin regular or lispro was not determined to be cost effective. TMC reduced the amount to be repackaged

from 3ml to 1.5ml in April 2016 without additional labor and cost. The follow-up survey was received by 60 out of about 900 nurses, in which 93 percent felt that this intervention was effective and 95 percent agreed or strongly agreed to keep the intervention. The average use of insulin glargine per patient per admission for July and August 2016 was 105 units. Also, the purchasing of insulin glargine decreased from an average of 100 vials per month to an average of 66 vials. 360 ml of insulin glargine was saved after the intervention. Overall, this change saved TMC 3,080 dollars every month on average.

Conclusion: Since insulin glargine is not manufactured for institutions at amounts less than 10ml, it was cost effective for TMC to reduce the amount of repackaged insulin glargine from 3ml to 1.5ml for their patient population. This intervention may be applied to other institutions since it requires a simple manipulation of volume change. However, each institution must assess insulin glargine use per patient per admission to maximize cost effectiveness when repackaging this product.

Submission Category: Pharmacokinetics

Submission Type: Evaluative Study

Session-Board Number: 5a-218

Poster Title: Developing liquid chromatography-mass spectrometric method for the nicotine assay to facilitate drug discovery for smoking cessation

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Purpose: Considering its tremendous impact on human health, it would be helpful if there were more than two pharmacological treatments approved for nicotine addiction. Low nicotine plasma concentrations stimulate cigarette consumption, therefore, one therapeutic approach is to inhibit nicotine metabolism to extend the half-life. Previously, we discovered that cinnamaldehyde is an inhibitor of cytochrome P450 2A6, the human nicotine-metabolizing enzyme. The purpose of this project was to develop an in-house liquid chromatography-mass spectrometric (LC-MS) method to evaluate the potency of cinnamaldehyde and related analogs as inhibitors of nicotine metabolism using human liver microsomes and cytosol in the next phase.

Methods: Flow injection analysis was used to maximize the sensitivity of the LC-MS to detect nicotine and cotinine. This was followed by achieving optimal separation between nicotine and its metabolites using a C-18 Kinetex column. Variations in mobile phase composition, flow rate, column temperature were made systematically to obtain optimum separation. Based on previously published method, milrinone was selected as an internal standard for quantification purposes and to account for variability in analyte loss. An extraction method was developed to selectively isolate nicotine and its metabolites for LC-MS detection. Pentane, dichloromethane, diethyl ether, and mixtures of these solvents with isopropyl alcohol were evaluated as extraction solvents for the procedure. Sodium hydroxide, ammonia, and saturated sodium carbonate were evaluated as deprotonating agents for the extraction process. Human liver microsomes, cytosol, NADPH, and nicotine were incubated for 30 minutes at 37 °C with varying reagent concentrations to find the optimum conditions for measuring nicotine metabolism in vitro.

Results: An LC-MS method was developed to detect nicotine and cotinine at clinically relevant concentrations (5-200 ng/mL). Based on flow injection analysis, the optimum sensitivity was obtained with the following mass spec conditions: drying gas flow 12 L/min, nebulizer pressure 55 psi, drying gas temperature 350 °C, and capillary voltage 5000 V. Chromatographic separation was achieved with a gradient flow starting at 90% ammonia solution (2%) and 10% acetonitrile and switching to 65%/35% composition over a 15 minute interval. Good separation was achieved with nicotine and cotinine eluting at 13.6 min and 7 min, respectively. A mixture of ethyl acetate/isopropyl (80/20) provided the most complete extraction of nicotine, metabolites, and the internal standard; this mixture was selected as the extracting solvent for future studies. A saturated sodium carbonate solution was the most effective deprotonating agent. Incubations of human liver microsomes (0.5 mg/mL), cytosol (0.3 mg/mL), and nicotine (50 µM) were identified as the optimal incubation concentrations to generate detectable quantities of cotinine. Both nicotine and cotinine percentage recoveries from the extraction procedure were greater than 80%. Cotinine formation from nicotine metabolism was confirmed by the retention time from LC-MS analysis and comparison to purchased cotinine standards.

Conclusion: : A reliable and reproducible LC-MS method was developed for measuring nicotine and its major metabolite from incubations with human liver microsomes and cytosol. The method is sufficiently sensitive for conducting inhibition studies to identify potential candidates for smoking cessation. Cinnamadehyde and structurally-related analogs will be incubated with nicotine and human liver microsomes with cytosol. Cotinine formation will be measured using this method to identify the most potent inhibitors of nicotine metabolism. The method should also be useful for detecting nicotine and cotinine in serum or saliva samples for an in vivo evaluation of nicotine metabolism and inhibitor studies.

Submission Category: Pediatrics

Submission Type: Descriptive Report

Session-Board Number: 5a-219

Poster Title: Pneumococcal vaccination rates among pediatric end stage renal disease and kidney transplant patients

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Purpose: Children with history of solid organ transplants are classified as immunocompromised and those with end stage renal disease have a higher risk of developing severe infections from Streptococcus pneumoniae. The Centers for Disease Control (CDC) recommend additional pneumococcal vaccinations beyond routine childhood immunizations for high-risk patients. Our goal is to improve vaccination rates and ensure immunologic protection against Streptococcus pneumoniae for pediatric nephrology patients. This quality improvement project reviewed how well the current pneumococcal vaccine schedule is followed for high-risk pediatric patients who have end stage renal disease or who are kidney transplant recipients and are managed at our facility.

Methods: A query was performed using a centralized electronic immunization registry, Oklahoma State Immunization System (OSIIS), to gather immunization records on current pediatric nephrology patients who were managed at our institution. Data were gathered for children with end stage renal disease and for children who received a kidney transplant. Patient vaccination history was compared to the current CDC Pneumococcal vaccination guidelines for those with high risk factors.

Results: Data from 113 pediatric nephrology patients were reviewed. Sixteen had end stage renal disease requiring dialysis and 97 were kidney transplant recipients on immunosuppressive therapy. Patients ranged in age from 1-year to 24-years-old with a mean age of 15.2 years. Seven patients did not have immunization records within OSIIS. Approximately twenty-seven percent (31/113) had their immunization history filed in OSIIS, but data related to pneumococcal vaccinations were not present. It was not known if the missing data were due to

patients' vaccinations not being entered appropriately into the centralized registry or if patients did not receive pneumococcal vaccinations at all. Fifteen percent (17/113) were up to date on their pneumococcal vaccinations while 58 percent (51/113) had not received the CDC recommended Streptococcus pneumoniae immunization doses.

Conclusion: Our findings revealed that a fairly large portion of patients in this high risk group either lacked vaccination records for Streptococcus pneumoniae or their vaccinations history showed incomplete doses of the recommended vaccines. We shared our findings and provided recommendations for catch-up vaccine doses for each child to the pediatric nephrologists within our institution who manages these patients. Improving vaccination rates is one way pharmacists can foster antimicrobial stewardship. Patients who are immunized against pathogens which cause invasive disease are less likely to develop the primary infection thus require less antimicrobial therapy.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Evaluative Study

Session-Board Number: 5a-220

Poster Title: Retrospective Review of the Utilization of Rabies Immune Globulin and Rabies Vaccine in a Community Hospital Emergency Department

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Purpose: Rabies vaccine and immune globulin are commonly prescribed for post-exposure prophylaxis in patients suspected of rabies exposure. In 2015, Peninsula Regional Medical Center (PRMC) spent $60,426 on rabies vaccines (Rabavert® and Imovax®), and $172,075 on rabies immune globulin (HyperRAB S/D®). The purpose of this study was to evaluate if patients at PRMC were being administered rabies vaccine and immune globulin in accordance with 2010 CDC guidelines, indications, and recommendations. The results may determine if a rabies vaccination protocol should be developed in order to improve appropriate patient identification, series administration and perhaps decrease costs.

Methods: Acudose® records were queried for patients who received rabies immune globulin and rabies vaccine between the dates June 2014 – May 2016. Medical record ID numbers were then used to access archived patient profiles in Pulsecheck, PRMC's emergency department monitoring system. Pulsecheck provided details regarding the patient's potential rabies exposure, including a description of the initial diagnosis at triage, history of present illness, and medication administration. 100 patient records were selected (50 from each year) to be analyzed using a random number generator. Primary outcomes measured included the appropriate indication and administration of rabies post-exposure prophylaxis. To be truly indicated to receive post-exposure prophylaxis, the described exposure-scenario in the patient's profile had to meet the qualifications listed in the CDC's 2010 Guidelines. In order for the series to be administered correctly, rabies immune globulin and rabies vaccine had to be given at the correct dose, on the correct days, and via the correct route and site. Secondary outcomes measured included yearly trends in patient populations, types of exposures, costs, and adverse reactions. This protocol was approved by PRMC's internal research review committee.

Results: Out of 100 queried patients: Post-exposure prophylaxis was given when it was not truly indicated in 31 cases. In 45% of cases, animals were not quarantined/tested when they could have been. In 39% of cases, contact with the involved-animal was definitively ruled out prior to administration of post-exposure prophylaxis. In 9% of cases, the health department advised that post-exposure prophylaxis was not necessary. In 4% of cases, the suspected animal was not quarantined for >10 days before administering post-exposure prophylaxis. In 3% of cases, patients received post-exposure prophylaxis >14 days after the initial encounter. Overall, 48,040 units (320mL) of immune globulin and 275 units (110mL) of vaccine were given when post-exposure prophylaxis was not truly indicated. Post-exposure prophylaxis was administered incorrectly in 42/100 cases. Individual cases often contained multiple errors in administration. In 60% of cases, patients did not receive full post-exposure prophylaxis because they never returned for follow-up. In 29% of cases, the vaccine was administered to an incorrect site. In 26% of cases, patients were given follow-up vaccines on an incorrect day. In 12% of cases, an incorrect dose of vaccine was administered. In 7% cases, patients received immune globulin >7 hours after the vaccine had been given.

Conclusion: Based on the results, a rabies post-exposure prophylaxis protocol should be developed to improve appropriate patient identification and series administration. This protocol should simplify the diagnostic process. Animal control should be contacted to capture the involved animal whenever possible. In cases when exposure has been definitively ruled out, measures should be in place to prevent administration of post-exposure prophylaxis. Appropriately identifying patients who are indicated to receive rabies post-exposure prophylaxis would prevent wasting of rabies immune globulin and vaccine, saving PRMC approximately 60,000$ per year. Measures to ensure correct dosing, administration-site and follow-up dates should also be incorporated.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 5a-221

Poster Title: Assessing vancomycin per pharmacy in elderly patients over the age of 74 years

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Purpose: Vancomycin is a glycopeptide antibiotic commonly used to treat gram positive infection, including methicillin-resistant Staphylococcus aureus (MRSA) infection. Pharmacy protocols to dose vancomycin have become more of a common practice and have resulted in more appropriate target trough attainments. The purpose of this study is to evaluate the rates of vancomycin trough target attainment in patients over the age of 74 years and grouped by three different serum creatinine ranges.

Methods: The institutional review board approved this retrospective study. All patients over the age of 74 that received vancomycin with appropriate trough levels from 01/01/2013 to 12/31/2014 were evaluated. Appropriate trough levels were defined as vancomycin levels acquired within 1-hour of the fourth dose. Patients were excluded from the study if they did not meet inclusion criteria, had no vancomycin trough levels drawn, had no vancomycin given, or did not meet the minimum age requirement. The patients were divided into three serum creatinine groups (LowSCr: < 0.8mg/dL, MidSCr: 0.8-0.9 mg/dL, HighSCr: ≥1 mg/dL) for evaluation. The primary outcome of this study was to determine rates of vancomycin trough target attainment based on the vancomycin dosing protocol. The secondary outcome of this study was to assess the time to target trough levels between the groups.

Results: Two hundred and four patients were included in the study. The numbers were divided as follows: LowSCr (n=67), MidSCr (n=91), HighSCr (n=46). The average age of the patients was 85.7 ±5.98 years. Median serum creatinine (mg/dL) by groups were as follows: LowSCr (0.6, IQR:0.5-0.7), MidSCr (0.8, IQR: 0.8-0.9), HighSCr (1.6, IQR:1.03-2.6), $p < 0.0001$. Median

vancomycin (grams/day) doses per group were as follows: LowSCr (1000, IQR: 750-1000), MidSCr (1000, IQR: 937-1375), HighSCr (750, IQR:750-1000), p=0.0005. The number of patients unable to achieve the target trough goals between groups were LowSCr: 61% vs HighSCr: 9%, p < 0.0001, and MidSCr: 48% vs HighSCr: 9%, p < 0.0001. There was no difference in target trough goal attainment between the LowSCr and MidSCr groups (61% vs 48%, p=0.109). Time (days, average ±SD) to target trough goals for each group was: LowSCr (5±3.8), MidSCr (4.1±2.3), HighSCr (3.6±1.8), p=0.14.

Conclusion: There is room for improvement in dosing vancomycin in patients > 74 years old. The patients with serum creatinine levels less than 1.0 mg/dL were less likely to achieve vancomycin trough goals in comparison to patients with serum creatinine 1.0 mg/dL or greater. For patients who achieved vancomycin trough goals, the time to trough attainment did not differ between the two groups. Multiple factors can contribute to the decrease rate of target attainment including patient size, rounding of serum creatinine, inter-pharmacist differences in dosing, and adequate loading doses of vancomycin.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 5a-222

Poster Title: Survey of community pharmacy based clinical trial patient recruitment

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Purpose: Timely patient recruitment is acknowledged as an important aspect of successful clinical trials. According to a study done by Tufts Center for Drug Development, 11% of sites fail to enroll even one patient and 37% do not meet their enrollment goals. Patient education related to clinical trials and provider trust is very important to improve patient recruitment. According to the Meyocks Health Survey and McKesson Study, community pharmacists are the most trusted health care professionals. To improve patient recruitment, patient centered recruitment strategies are needed. My hypothesis is that community pharmacy can be a potential site for clinical trial recruitment.

Methods: A survey was developed based on a literature review and centering on the following five topics: pharmacist willingness to explore clinical trial and share clinical trials information with the patient, pharmacist thoughts on receiving an incentive to screen the patients and proving patient recruitment, and pharmacist thoughts on their relationship with their patients. Eighty community pharmacists in Utah were called and surveyed. Descriptive statistic was gathered on pharmacist opinion.

Results: The response rate for this survey was 71.25%. Of the respondents, 15.78% were not interested in implementing clinical trials into their workflow. Another 21.05% of respondents would be interested in enrolling clinical trials patients. While the remaining 63.15% would be interested only if they were incentivized. Six respondents suggested that clinical trials could work with medication therapy management services. A majority of respondents stated that they know their patient population by names.

Conclusion: Clinical study sites facing difficulties in meeting the growing demands for clinical subjects and more diverse patient populations. Community pharmacist based recruitment program could make a positive change for patient recruitment. We found that majority of pharmacists were willing to involve in clinical trials. Additionally, pharmacist felt that it could be

implemented through Medication Therapy Management. Pharmacist continued to be well trusted by patients and majority of pharmacist stated that they know patient by their name. Pharmacists can rebuild trust and help to bridge the education gap about the benefits and risks of clinical trials.

Submission Category: Small and Rural Pharmacy Practice

Submission Type: Descriptive Report

Session-Board Number: 5a-224

Poster Title: Initiating an international advanced pharmacy practice experiential (APPE) rotation in Ghana for first hand exposure to cultural differences in patient care

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Purpose: In the United States, people of all ethnic and cultural backgrounds are in need of healthcare; however, despite living in a diverse society, many students are not aware of how to accommodate such cultural differences. Therefore, an international Advanced Pharmacy Practice Experience (APPE) was designed to provide students exposure to health care practices and systems in Ghana, while immersed in the cultural, societal, and healthcare differences of a country other than their own. Experiencing another country's practices as students will allow better preparation to provide culturally-competent healthcare as practitioners.

Methods: The Ghana international APPE rotation was approved by the Curriculum Committee of the College of Pharmacy, after which approval was obtained by the preceptor in Ghana, the Director of Experiential Education, and legal department. Once approved, interested second-year students applied for the rotations as an elective experience. Planned activities included working with international collaborative organizations such as USAID Strengthening Health Outcomes through the Private Sector project, government officials at the Food and Drug Authority and Pharmacy Council, clinical pharmacists at 37 Military Hospital and Komfo Anokye Teaching Hospital, and professors, as well as students at Kwame Nkrumah University of Science and Technology School of Pharmacy and University of Ghana School of Pharmacy. Students had the opportunity to observe community pharmacies, hospitals, healthcare in rural locations, and the National Drug information Center conduct patient care in a setting that differed greatly from that offered in the United States. Students were also provided the opportunity to experience historical, environmental, and cultural aspects of Ghana, such as Elmina Castle; a

center for slave trade, Mole National Park and Kakum National Park canopy walk, and Art Centre in Accra. Students experiencing these different settings may help them develop an understanding of how the practices of another country may affect how patients seek care and what they expect from such care.

Results: The charter group consisted of four students, two males and two females, which completed the international APPE rotation in Ghana during two separate rotations in the fall of 2016. These four students were exposed to clinical, government, leadership, societal, cultural, and historical aspects of Ghana. It provided a better understanding of different cultures, how health systems are managed, as well as patient expectations. Over the course of the rotation, students worked in the pharmacy setting where they quickly discovered that a prescription from a physician is not necessary to purchase medications and it is the pharmacist's responsibility to make sure the patient is receiving the correct medication for their disease state. Working with different organizations and government sectors also shed light as to how patients are educated on personal health and what they expect from their healthcare providers. Though what each student took away from this rotation may have differed, they all had the same opportunity to see how a different culture views and practices healthcare, and to take away from this rotation a new view on patients from a different background that they may have in the future.

Conclusion: Students were allowed a breadth of experiences in every aspect of another country's healthcare system, from healthcare governing bodies, the education of their future healthcare providers, international collaborative organizations, local hospitals, and all the way to community pharmacy. This, along with historical and cultural lessons, helps build a better understanding of how patients of another country may differ from those in the United States. With this exposure students can view the needs of patients with diverse cultural backgrounds from a different perspective since this experience would allot them the opportunity to become more culturally aware.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 5a-225

Poster Title: Evaluation of urinary tract infection management in hematopoietic stem cell transplant recipients receiving pneumocystis prophylaxis with sulfamethoxazole/trimethoprim

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Purpose: At West Virginia University Medicine (WVUM), sulfamethoxazole/trimethoprim is recommended both for initial therapy of a symptomatic suspected urinary tract infection as well as pneumocystis prophylaxis in stem cell transplant patients. There is no guidance for how to treat patients who are on prophylactic sulfamethoxazole/trimethoprim and then subsequently develop a urinary tract infection. This review is being performed to identify patients on prophylactic sulfamethoxazole/trimethoprim after hematopoietic stem cell transplant and determine the treatment approach chosen for their symptomatic urinary tract infection.

Methods: A retrospective chart review of the Electronic Medical Record (EMR) of WVUM was performed from January 2011 to December 2015 on stem hematopoietic cell transplant patients who were prescribed a prophylactic course of low-dose sulfamethoxazole/trimethoprim and then had a urine culture obtained. A prophylactic course of low-dose sulfamethoxazole/trimethoprim is defined by West Virginia University Medicine guidelines as a double-strength (800mg/160mg) tablet every MWF or a single-strength (400mg/80mg) tablet daily. Guidelines for urinary tract infection treatment include double-strength sulfamethoxazole/trimethoprim twice daily as the preferred first-line agent for initial therapy of a symptomatic suspected urinary tract infection. Patients were evaluated on the dose of sulfamethoxazole/trimethoprim at the time of urine culture, the results of the urine culture including organisms that grew and their sensitivities, and medication prescribed for management of the urinary tract infection.

Results: SMZ/TMP DS QMWF for PCP prophylaxis was preferred over the SS QD dose in 95% of the patients, which is consistent with program standards. Of the organisms cultured from urine samples of patients suspected of a UTI, SMZ/TMP resistance was high at 85% in total reported susceptibilities; Escherichia coli was found to be resistant to SMZ/TMP in 100% of the strains isolated in these patients. Escherichia coli was the most commonly found gram-negative bacteria followed closely by pseudomonas aeruginosa and klebsiella pneumonia respectively. Bacterial resistance forced treatment augmentation only once in the patients studied, in which case ciprofloxacin-resistant Escherichia coli, once cultured, led to the discontinuation of the ciprofloxacin therapy prescribed for the UTI. Also of note, quinolone resistance was significant at 45%. Although, gram-positive bacteria were less commonly found; streptococcus organisms and enterococcus faecalis were seen most frequently. Greater than half of patients (64%) did not have therapy augmented when already on SMZ/TMP for PCP prophylaxis and developing a UTI. Quinolones were the most frequently prescribed antibiotic (46%) when an augmentation agent was chosen. Consistent throughout each case investigated, current dose and frequency of the existing SMZ/TMP order was continued while treating the suspected UTI.

Conclusion: At WVU Medicine – Ruby Memorial Hospital, for a patient taking SMZ/TMP as PCP prophylaxis who then develops a UTI, most often no change to current therapy is made. Most often Escherichia coli was identified and was resistant to SMZ/TMP. Recommendations should be made to select an alternate therapy to treat UTI's in these patients.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5a-226

Poster Title: Factors associated with nonadherence to antiretroviral therapy in migrants at the Tijuana-San Diego international border

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Purpose: HIV-AIDS is a problem that so far has no cure, but the correct use of antiretroviral therapy (ARVT) can control and prevent virus transmission. In Latin-American three of every four people infected with HIV are on ARVT; but coverage of antiretrovirals is not enough to improve health, it's also necessary to improve adherence, as in patients with HIV-AIDS this varies between 37-83% depending on the sociodemographic characteristics, thus, the purpose of this study was to assess the adherence to ARVT in migrants from the Tijuana (MEX) -San Diego (USA) border and identify the associated factors with it.

Methods: A prospective, cross-sectional, observational study was conducted in 99 migrants with HIV treatment who live in the Mexican side of the Tijuana-San Diego international border. Recruitment of patients was conducted from December 2014 to December 2015 in a care center for patients with sexually transmitted infections and AIDS. Patients of both genders were included only if they had HIV/AIDS infections and where on ARVT, with a time of less than one year of residency in the city of Tijuana. Individuals were excluded from the study if they do not accept to sign the informed consent or if they refused to answer at least one question of the assessment tool
Elimination criteria. All patients were applied a questionnaire which was designed for the collection of the following variables: socio-demographic data, socio-cultural issues, notes by the psychology service, pharmacotherapeutic information and of Drug Utilization Habits (DUH), also it included the Simplified Medication Adherence Questionnaire (SMAQ); where regarded as adherent patient, those who's adherence score was between 95 and 100%. Also were obtained

for each patient from the Mexican office for Antiretroviral Administration, Logistics and Security System (SALVAR in Spanish) at least two determinations of Viral Load (VL) in RNA copies/ml

Results: The average age of patients was 38.8 ± 25.9 years; 76.8% were of male and 23.2% of the female gender; 42.42% were on ARVT based on protease inhibitors (PI) and 57.58% based on inhibitors of reverse transcriptase non-nucleoside (NNRTI), 46.5% were taking more than one tablet of antiretrovirals and 26.3% had concomitant therapies; 55.6% were adherent and 44.4% non-adherent, Women were more adherent with a ratio of 0.565, in men was 0.553; 56% of patients had a history of abandonment of the antiretroviral therapy, 26.3% had concomitant therapy, 17.2% reported self-medication. Factors positively associated with non-adherence were: Alcohol (OR: 1.363; IC95% = 0.583 - 3.186). To take > 1 tablet / day (OR: 1.353; IC 95% = 0.607 - 3.014), use of drugs of abuse (OR: 1.258; IC 95% = 0.557 to 2.842), self-medication (OR: 1.136; IC 95% = 0.398 to 3.238); psychological disorders (OR: 1.867; IC95% = 0.747 - 4.665). Virological control was presented in 58.18% of adherent patients and 36.36% in the non-adherent. As for the presence of virologic failure, the factors with positive association were: self-medication (OR: 5.404; IC95% = 1.443 to 20.234) and the lack of adherence (OR: 1.365; IC95% = 0.615 -3.028).

Conclusion: It was determined that the pharmacotherapy, psychology and habits of the patient are associated with the lack of adherence; It was also observed that the adherence has an impact on the virological control of patients with HIV / AIDS, as was more frequent virological control in adherent patients compared to non-adherents. For this reason, it is essential the inclusion of the pharmacist in the Mexican health system to improve the response to ARVT in patients with HIV / AIDS, mainly through health education programs that enable and enhance good Drug Utilization Habits and therapy adherence.

Submission Category: Pharmacy Law/ Regulatory/ Accreditation

Submission Type: Descriptive Report

Session-Board Number: 5a-227

Poster Title: Significance of implementing complementary alternative medicine (CAM) course into a pharmacy school curriculum

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Purpose: Complementary Alternative Medicine (CAM) use among patients with multiple chronic diseases has progressively expanded over the years. Being easily accessible, patients use CAM as monotherapy or as an adjunct to other medication therapies, thus increasing the complexity of multiple disease state management. Patient care continues to be compromised due to numerous drug-CAM interactions, and increasing safety concerns with the use of CAM. Despite the rise in popularity of CAM, the educational efforts in pharmacy schools are still insufficient. Thus, the objective of this study is to show the importance of CAM education among future pharmacist.

Methods: Extensive literature search was performed using the following sources: PubMed, Cochrane library, Natural Medicine Comprehensive Database, American Journal of Pharmaceutical Education, Center for Disease Control and Prevention (CDC), and Food and Drug Administration (FDA). The articles examined focuses on CAM use among people with multiple chronic conditions, drug-CAM interaction, number of pharmacy schools providing CAM education and top ten supplemental use of CAM products in various disease states.

Results: According to National Institute Health Survey (NIHS 2012) data, more than 25% of American adults have 2 or more chronic conditions. The survey data indicated higher frequency use of multivitamin/multimineral (57.1%), vitamins (42.8%), herbal therapies (22.0%). The NIHS 2012 data also reports the top ten most used CAM including fish oil (18.8 million), Glucosamine (6.5 million), Probiotic (3.9 million), Coenzyme Q10 (3.3 million), Melatonin (3.1 million), Echinacea (2.3 million), Cranberry (1.9 million), Garlic Supplements (1.9 million), Ginseng (1.8

million) and Ginkgo Biloba (1.6 million). These products may affect therapeutic effects of other prescription drugs without prescriber knowledge. For example, melatonin interacts with multiple medications namely anticoagulants, anticonvulsants, antihypertensive and contraceptives. In contrast the use of melatonin among adults doubled from 2007 to 2012.According to a national survey of schools of pharmacy (1997), CAM courses are either offered as an elective or the concepts are incorporated in other courses. A 1999 listing compiled by American Association College of Pharmacy (AACP) indicated that only 29 (33%) schools of pharmacy out of 88 schools offered CAM education. A literature review determined that more recent survey data have not been published on this topic, which demonstrated the need for further research.

Conclusion: The use of CAM is on the ascendency and poses threat to patient safety. The current accreditation and governing body does not enforce CAM inclusion in pharmacy schools curriculum. As such, the knowledge base on CAM products by practicing and future pharmacists are insufficient to appropriately counsel and educate patients on the proper use of such products. Given the utilization and the prevalence of CAM, it is important to implement CAM courses into pharmacy school curriculums so that future pharmacists can have adequate knowledge about CAM products.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5a-228

Poster Title: Assessing knowledge of metabolic syndrome clinical values and willingness to implement health changes among Black men

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Purpose: Black men have the shortest lifespan expectancy along with the highest rates of obesity (47.8%) in the U.S. Concurrently, Black men are at risk for comorbid conditions like metabolic syndrome. In order, to impact health management behaviors, patients need to be knowledgeable regarding relevant clinical values and be willing to take an active role in managing their health. This study's objectives are to assess Black men's: 1) knowledge of relevant metabolic syndrome clinical values; 2) ability to recall clinical values at 3-month follow-up; and 3) willingness and actual help-seeking behavior after a metabolic health screening.

Methods: This research was part of a larger study that employed both quantitative and qualitative methods. Four focus groups of approximately 5-6 adult Black men were conducted. Participants were recruited from community centers, local business, and churches. Prior to the focus groups, participants were surveyed regarding: having metabolic syndrome diagnoses (diabetes, hypertension, dyslipidemia); timeframe of last check of metabolic syndrome lab values (6 categories ranging from: last week to >2 years ago); timeframe of last primary care physician (PCP) visit (5 categories ranging from: 6 months to >3 years); and knowledge of metabolic syndrome values and body mass index (4-5 categories with relevant ranges). Respondents could also indicate that they did not know for any of the questions. After the focus group, the men were screened for diabetes, hypertension, dyslipidemia and obesity. Subsequently they were given wallet cards documenting their values, the clinically accepted normal range and instructing them if they were in or outside of normal values. Three months post focus group, participants were contacted by telephone using a semi-structured interview format. The survey instrument assessed knowledge of relevant values whether they had any follow-up labs or provider visits. Participants were also asked if the focus group discussion

influenced them to see their provider, discuss their health with others or make health behavior changes.

Results: The Black male participants (N=23) were on average 45.2±16.2 years. Regarding the participants' initial clinical knowledge base a majority could not recall their metabolic numbers prior to the focus group. Of the group 68%, 70% and 52% could not recall their cholesterol, blood sugar, or BMI respectively, while 27.3 % and 47.8% could not recall their blood pressure and body fat, respectively. However, upon screening we discovered, the majority of the participants were within normal thresholds for most metabolic values except over 60% of participants had out-of-range BMI and % body fat. Additionally, mean systolic/diastolic blood pressure was 133/82. Of the participants in the follow-up (n=17) approximately 60% recalled their focus group values, approximately 50% either rechecked their metabolic values and/or scheduled an appointment with their PCP and 76% implemented a lifestyle change as a result of the focus group.

Conclusion: Black men have a higher likelihood of lower health management behaviors and outcomes specifically related to metabolic syndrome. This is due, in part, to gender, race/ethnicity, as well as being underserved. Thus, to decrease this health disparity gap, it is important to understand what underserved men perceive as standards for personal health management. In addition, there is a need to understand motivators for self-management and to tailor messages that incorporate their perceptions and promote willingness to seek help related to medication use.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 5a-229

Poster Title: Assessment of a medication safety activity designed to increase the over-the-counter product knowledge of participants at a health fair

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Purpose: There are a wide variety of over-the-counter (OTC) medications available to the public. As more medications become available OTC, it is important for pharmacists and pharmacy students to understand the knowledge gaps that the public has regarding OTC products. This purpose of this project is to assess public knowledge of proper and safe use of common OTC medications with regards to ingredients, dosing, and indications.

Methods: A 6 item survey regarding commonly used OTC medications was administered to assess participant's knowledge of OTC products. Corresponding medication packaging for each question was available for participants to refer to when responding. Additionally, demographic data including, age and gender were collected. Once surveys were completed, pharmacy students reviewed and discussed correct responses with the participants. Following the activity, the survey results were analyzed using numbers and percentages. Study protocol was approved by the University's Institutional Review Board. All participants were asked to sign an informed consent to participate.

Results: A total of 34 participants completed the survey, including 16 males and 18 females with a average age of 49 years old. Results reveal that 20.5% of participants could not accurately select the correct antihistamine that causes the most drowsiness, and more than half of participants could not accurately select the correct dose of acetaminophen for a child given the package directions. Further, approximately a third of the participants did not realize that the purchase of pseudoephedrine requires proper identification at the pharmacy. While

more than half of participants did not know that decongestants may be harmful for patients with uncontrolled high blood pressure, 85% of participants were able to select the correct antacid for pregnant women. The median and mean correct scores on the 6 question survey was a 2 and 2.5, respectively. (minimum 1, maximum 6).

Conclusion: Consumers are not often aware of the safety risks of accessible OTC medications. The survey identified areas of opportunity to provide more education to the public, including drug side effects and appropriate dosing for pediatric medications. It is important to highlight these knowledge gaps, as these medications are readily available to patients. Patients should be reminded that pharmacists are available to assist with questions and concerns.

Submission Category: Leadership

Submission Type: Evaluative Study

Session-Board Number: 5a-230

Poster Title: Impact of a Birkman Method® Intervention on Pharmacy Preceptor and Faculty Self-Awareness and Self-Confidence

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Purpose: The Accreditation Council for Pharmacy Education (ACPE) 2016 Standards requires key elements of faculty and preceptor development and engagement. In response to the increased emphasis ACPE places on development of self-awareness, the South Carolina College of Pharmacy (SCCP) implemented a Birkman Method® assessment and training program for students, preceptors and faculty. A prior study showed that through participation in this program, students experienced an increase in self-awareness. The purpose of this study was to determine the impact of the Birkman Method® intervention on preceptor and faculty self-awareness.

Methods: SCCP rotation preceptors and faculty members were recruited to participate in the Birkman Method® intervention. The intervention involved completing the Birkman Method® assessment, reviewing the results and attending a 2-hour live training from a certified Birkman training consultant. A pre-survey was administered electronically prior to the participant's exposure to the Birkman Method® assessment to gather the baseline self-perception data for each participant. The pre-survey was comprised of several 5-point Likert-base scale questions to determine self-confidence of participants along different parameters and several dichotomous pre-survey questions that mirrored the results of the Birkman results so that the results could be used as a benchmark to determine self-perception accuracy. The preceptors and faculty members attended separate live training sessions so that each session could be tailored to the attendees as preceptors or as faculty members. Following each live training session, attendees were asked to complete a post-survey. During completion of the post-

survey, attendees were monitored and asked not to refer to their Birkman profiles. The pre- and post-surveys were identical with the exception of a question that asked if the participants would be applying Birkman principles in the future. The pre- and post-surveys were compared for each patient to determine changes in self-confidence and self-perception accuracy.

Results: After Birkman testing and training, both faculty and preceptors experienced statistically significant changes in self-perceptions on several parameters, including usual communication style, communication style under stress, behavior style under stress, and communication style needed to prevent stress.Preceptors and faculty also had statistically significant increases in self-confidence on different parameters. Preceptors experienced an increase in self-confidence in the ability to tailor their coaching and leadership style to fit others' needs by an average of 0.63 points on a 5 point likert-based scale ($p=0.0004$). Faculty members experienced an increase in the ability to describe to others how to tailor coaching or leadership styles to best fit their needs by 1.0 point on a 5 point likert-based scale ($p=0.0020$). Both groups had statistically significant increases in self-perception accuracy, which was used as a surrogate for self-awareness changes. With a maximum self-perception accuracy score of 6 points, allocating 1 point for each parameter agreement, faculty members experienced an increase in self-perception accuracy an average of 1.20 points ($p = 0.0020$) and preceptors experienced an average increase of 1.77 points ($p < 0.0001$).

Conclusion: Personal development and enhancing self-awareness are increasingly important for Doctor of Pharmacy (PharmD) programs. Implementation of the Birkman Method® program at South Carolina College of Pharmacy facilitated increases in self-awareness among faculty and preceptors. The longitudinal goals are to create a conversation about personal preferences and drivers of communication and behavior, and to encourage reflection on the impact on patient care. Further analysis will determine longitudinal effects, but these results provide promising indications that through the implementation of a standardized personal development program, PharmD programs can create a culture among students, faculty, and preceptors that is dedicated to increasing self-awareness.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5a-231

Poster Title: Baseline Academic Standards for Resident Applicants

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Purpose: Many resident programs struggle with how to appropriately rank resident candidates based on their academic performance. Colleges of pharmacy that use a pass fail grading system further complicate this task. Some schools offer class rank to help address academic rank, but there is not a standard that compares class rank with GPA for graduate schools.

Methods: A survey instrument was created via google documents containing seven questions related to academic performance of pharmacy students. A link to this survey was emailed to one hundred and thirty four schools, listed on the Accreditation Counsel for Pharmacy Education. The survey was designed to obtain information on grading standards, grade point average, and interquartile range. The survey was available for access from September 1, 2016-September 29th, 2016.

Results: Fifteen institutions responded to the email link. The majority of the institutions that participated were traditional grading based systems using letter grading. Forty one percent of respondents were deans of the institutions, while fifty eight held other positions. The majority of the institutes had median grade point averages of 3.2 or greater. The highest grade point average for graduating students was 3.9 or greater, except for one institution listed 3.2 as the highest grade point average for their graduation students. The lowest grade point average was a 1.5, with majority of the grade point averages between 2.0-2.7.

Conclusion: The range of GPA from 1.5 to 3.9 with an average GPA of 3.2 gives a good range to compare class rank. If the 50 percent class rank mark is set at 3.2, and the top 10 percent class rank would be set at 3.9 or higher with the low 10 percent at 2.0 or lower. While this study

helps compare GPA to class rank, there was still differences in average GPA between collages. A standardized test like the PCOA exam may provide a better national standard to compare academic performance.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5a-232

Poster Title: Concomitant fluoroquinolone and amiodarone induced cardiac events: retrospective cohort study

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Purpose: Levofloxacin, a commonly used fluoroquinolone antibiotic, and amiodarone, an antiarrhythmic agent, are both known to prolong the QT interval. The evidence supporting this concern are limited to case reports and small case series. The purpose of this study was to investigate the impact of the concomitant usage of levofloxacin and amiodarone on QT interval prolongation and the occurrence rate of cardiac events in hospitalized adults.

Methods: All eligible hospitalized patients treated with levofloxacin and amiodarone between January 1, 2012 to August 31, 2015 were included in this retrospective chart review. Inclusion was limited to patients who were at least 18 years of age. Patients receiving amiodarone loading doses immediately upon admission were excluded from the study. Patients were stratified into two groups: concomitant usage of levofloxacin plus amiodarone and non-concomitant usage of levofloxacin and amiodarone. The primary outcome was occurrence of cardiac events, defined as ventricular arrhythmia or cardiac death, identified using validated ICD-9 codes and verified through patient chart review. The secondary outcome was change in adjusted QT interval (QTc) from baseline to post-treatment. The change in QTc interval was compared between groups. In addition, the concomitant group was further evaluated for predictors of primary outcome using logistic regression. All data were summarized using descriptive and inferential statistics.

Results: A total of 240 patients were included in the analysis, 164 of which received concomitant levofloxacin and amiodarone. Patients who received concomitant therapy were 5.4 times more likely to experience a cardiac event versus patients who received levofloxacin or amiodarone alone (12.8 percent versus 2.6 percent; OR equals 5.4, 95 percent CI, 1.24 to 23.81, P equals 0.025). The secondary analysis included 120 patients, 79 of which received

concomitant levofloxacin and amiodarone. There was a mean change from baseline in QTc interval of 32.40 milliseconds (ms) for the concomitant group and -2.17 ms for the non-concomitant group. The mean difference between the two groups was 34.57 milliseconds (95 percent CI, 18.52 ms to 43.69 ms, P less than 0.001). Age and angiotensin inhibitor therapy were identified as risk factors for cardiac events in patients who received concomitant therapy.

Conclusion: A statistically significant increase in cardiac events and QTc interval prolongation was found in patients given concomitant levofloxacin and amiodarone. This drug combination should be avoided.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 5a-233

Poster Title: University of South Alabama Student-Run Free Clinic: Recognizing Mental Health Care Inequalities of the Homeless

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Purpose: The University of South Alabama Student-Run Free Clinic (USASRFC) was established in March 2014 to provide health check-ups, physician referrals, and health education to the homeless population of Mobile, AL. The Clinic operates out of 15 Place service center in Mobile, Alabama. Severe mental illness represents one of the most frequent and least-addressed issues within this patient population. To promote our patients' mental prosperity and ensure we are improving outcomes, we must first quantify the disparities in their access to mental healthcare. Thus, we implemented patient interviews using a structured questionnaire to assess these healthcare disparities.

Methods: We recruited 15 place members utilizing USASRFC to participate in an interview process. Our population consisted of 105 patients that were interviewed. The inclusion criteria consisted of 19+ years old, members of 15 Place. The interviewers were students from the USA College of Medicine and other Allied Health professional programs. The interviews were promoted to the patients through explanation of their needed input to improve our clinical services and the interviewers acquired informed consent prior to the start of the interview. The interview itself was conducted from a structured questionnaire and it was conducted one-on-one in private spaces, and no personal information was included on questionnaires. The data was then compiled and summarized using Microsoft Excel.

Results: We found that our general patient population consisted of mostly uninsured, middle-aged, black males with widely variable durations of homelessness and self-reported general

health statuses. While a minority of our patients expressed need for mental health counseling, there was a strikingly high prevalence of symptoms and behaviors indicating they would benefit from counseling on topics such as depression, frequent stress and chronic cigarette smoking. While patients reported decreased quality of life due to these symptoms and behaviors, many did not seek treatment, citing a variety of reasons demonstrating a lack of accessibility and awareness of such mental healthcare.

Conclusion: The results of this survey have already inspired changes in our clinic to promote the mental wellbeing of our patients, such as collaboration with psychiatrists, group sessions on coping with anxiety and depression, and open discussions on stress management and substance abuse. Moving forward, these data will help us evaluate our progress in improving the mental health outcomes of our patients.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 5a-234

Poster Title: Impact of a pharmacy intern on the transitional care of patients in an outpatient setting

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Purpose: Hospital readmission rates continue to rise due to errors that occur throughout patients' transitions of care. Pharmacy interns can address ambiguity in medication profiles, identify inconsistencies between discharge summaries from a hospital and a patient's current medications, and recognize barriers to medication adherence. This study aims to determine the impact a pharmacy intern has on transitional care of patients in outpatient settings by examining re-admittance rates and the number of medication related problems found. This will be done by comparing results when a pharmacy intern is present during care versus when one is not present.

Methods: The pharmacy intern met with patients and discussed their primary diagnosis during their recent hospitalization, as well as reviewed their discharge plan, past medical history, and social history. The primary objective was to compare the patient's prescriptions at the pharmacy, discharge medications, and self-reported medications. Medication reconciliation was performed and follow up with the patient's pharmacy and doctors was completed as necessary. During this process, any medication related problems (MRPs) were noted and addressed by the pharmacy intern. MRPs included anything that came up during the medication reconciliation that required intervention, such as educating a patient on proper medication use, discontinuing an unnecessary medication, or addressing an adverse event due to use of a drug. Each MRP per patient was recorded. After 30 days had passed following the hospital discharge follow up visit, the patient's medical record was reviewed again to check for any subsequent emergency room visits or hospital readmissions.

Results: A total of 29 patients were observed from the dates 4/29/2016 to 6/22/2016. An intern was present from the dates 5/24/2016 to 6/22/2016. A log was kept for each patient documenting the number of medication related problems they experienced as well as if they were readmitted to the hospital after discharge during this time period. During the dates where an intern was not present (4/29/2016 to 6/22/2016), three observed patients were readmitted. During the dates where an intern was present (5/24/2016 to 6/22/2016), one patient was readmitted. While an intern was present, thirty medication related problems were identified compared to eighteen medication related problems identified without an intern present.

Conclusion: The presence of a pharmacy intern during the transitional care of patients from a hospital to an outpatient or home setting can be positively impacted by decreasing re-admittance rates, and a greater amount of medication related problems can be properly identified for a patient as a result of their interventions. The information that a pharmacy intern can obtain during this patient interview provides an added benefit to the transitional care of a patient, ultimately leading to a decrease in hospital readmission rates.

Submission Category: General Clinical Practice

Submission Type: Case Report

Session-Board Number: 5a-235

Poster Title: Pulmonary arterial hypertension: a case report of unexpectedly severe anemia with endothelin receptor antagonist therapy

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Purpose: Anemia serves as a marker of worsened clinical outcomes in patients with pulmonary arterial hypertension (PAH). Patients receiving endothelin receptor antagonist (ERA) therapy may experience anemia soon after starting treatment. For example, with the ERA ambrisentan an average drop in hemoglobin of 0.82 g/dL was identified during clinical trials that generally stabilized and persisted after a few years of treatment. However, the etiology of anemia in patients receiving ERA treatment is unknown, and a lack of literature exists to evaluate what patient factors may increase the risk of anemia with ERA use. We report a case of a patient with PAH WHO Group 1, Functional Class II-III who experienced approximately a 4 g/dL drop in hemoglobin levels after one year of treatment with ambrisentan. The patient's past medical history included hepatitis C/alcoholic cirrhosis, Type II diabetes, and portal hypertension. The patient has a positive 30-year history of substance abuse, with a patient-reported abstinence since 2009. The patient was diagnosed with PAH in May 2010 after a right heart catheterization (RHC) was conducted which revealed the presence of right atrial pressure (RAP) of 9 mmHg, a mean pulmonary artery pressure (mPAP) of 42 mmHg, and a pulmonary capillary wedge pressure (PCWP) of 6 mmHg. Also reported were pulmonary artery oxygen saturation of 63 mm 62% and a cardiac output of 5.2 liters per minute and a pulmonary vascular resistance of 684 dyne/seconds/centimeters to the fifth power. A nitric oxide challenge was conducted during the RHC with the patient showing no response. His presenting vital signs revealed a temperature of 36.9 degrees Celsius, blood pressure 125/63 mmHg, heart rate 69 beats/min. Baseline renal function was normal, however liver function tests were elevated. Upon diagnosis, the patient was initiated on sildenafil; inhaled trepostinil was added to the treatment regimen approximately one year later. After continued deterioration, the patient was subsequently initiated on ambrisentan in March 2012, with a stable pre-ERA hemoglobin level of 14.3 g/dL. After one month of therapy, hemoglobin levels dropped to 12.4 g/dL. Hemoglobin

levels were measured monthly thereafter and revealed further reduction to 10.5 g/dL, 11.4 g/dL, and 10.9 g/dL for months 2 thru 8. Hemoglobin levels were 10.2 g/dL, 10.6 g/dL, and 10.5 g/dL for months 10, 11, and 12. After one year of ERA therapy, the patient experienced an overall 3.8 g/dL drop in hemoglobin. Levels for hemoglobin showed an average of 9.1 g/dL at year two, and 8.38 g/dL at year 3. On October 19, 2014, the patient's hemoglobin dropped to 6.8 g/dL for which he received a blood transfusion resulting in an increase to 10.3 g/dL. The patient's hemoglobin remained approximately 8-9 g/dL until expiring on February 10, 2015. Overall, the patient experienced an unexpectedly large drop in hemoglobin after initiating ERA therapy; the effect of this dramatic drop on patient outcome is unclear. Throughout ERA treatment, this patient experienced 21 hospitalizations, none of which were documented as being related to PAH. Although this patient had a history of liver disease, no other risk factors for anemia were established and prior to initiating ERA treatment, this patient had a consistently stable hemoglobin level. This case demonstrates the need for further research in this patient population to identify patient factors that may increase the risk of severe anemia with ERA's in the treatment of PAH.

Methods:

Results:

Conclusion:

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 5a-236

Poster Title: Risk factors associated with surgical site infection in pediatric cardiac surgery patients who require delayed sternal closure

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Purpose: In a previous study, our group identified pediatric cardiac surgery patients requiring delayed sternal closure and those less than 1.5 years of age to be at much higher risk of surgical site infection (SSI). Quality improvement attempting to modulate modifiable risk factors may assist in reducing the rate of surgical site infections in this challenging population. In this study, we aim to identify risk factors of surgical site infection in this population with hopes that identification of these factors will lead to quality improvement and continued study.

Methods: This was a retrospective cohort study conducted from April 2011 to April 2016. All pediatric cardiac surgery patients who required delayed sternal closure were included. The primary outcome was the incidence of surgical site infection defined by the CDC/NHSN surgical site infection criteria. Patients meeting the primary outcome of surgical site infection were compared to those not meeting the primary outcome. Demographic and clinical characteristics were compared between these two groups. Bivariate analysis was conducted using the Fisher's exact test for nominal variables and Wilcoxon rank-sum test for continuous variables. The hospital institutional review board approved this study.

Results: During the study period, a total of 805 surgeries were performed on 715 patients. Of these, only 82 patients (10.2%) required delayed sternal closure. Median age at time of surgery was 5 days. Median time till sternal closure was 3.2 days (range 1.1 to 12.2 days). Six patients (7.3%) died within 30 days. A total of 10 patients (12.2%) met criteria for a surgical site infection; this was much higher than the incidence of surgical site infection in patients not requiring delayed sternal closure (1.5%) at our institution ($P < 0.001$). None of the patients developing SSIs died within 30 days. Average time to closure was longer in the group that developed surgical site infections, but this did not reach significance (median 3.1 vs. 3.6 days,

P=0.29). Bivariate analysis identified only patients requiring additional mediastinal procedures to be at higher risk of SSI (unadjusted odds ratio 8.3, P=0.001). Due to low incidence of surgical site infection, multivariate analysis was not able to be conducted.

Conclusion: In this challenging cohort, the incidence of surgical site infection was much higher than in patients not requiring delayed sternal closure. We identified patients necessitating additional mediastinal procedures to be at highest risk of SSI. Further study is needed in order to identify strategies that can reduce surgical site infections in this population.

Submission Category: Small and Rural Pharmacy Practice

Submission Type: Descriptive Report

Session-Board Number: 5a-237

Poster Title: Implementation of electronic prescription label printers during a medical brigade serving remote Ecuadorian villages

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Purpose: Operating medical brigades in remote areas pose unique challenges for healthcare professionals. Limited resources call for the adaptation of available technology to ensure efficient workflow among all providers. The need for an alternative to hand-written prescription labels was identified during prior medical brigades, based on the length of time required to write the label and the risk of transcription errors. This project was designed to show how a standard label printer and accompanying software could be implemented in a remote, resource-limited setting for the design of individualized prescription labels parallel to those used in modern pharmacies.

Methods: Through a partnership with Timmy Global Health, pharmacists, pharmacy students, and various healthcare providers traveled to several villages in Chontapunta, a remote area in the Amazon region of Ecuador to set up and operate temporary public health clinics. Patients from each village registered to participate in clinics by providing basic demographic information and chief complaints, which were recorded using previously designed electronic medical record (EMR) software. Recorded information was made available to all clinicians via a local area connection linking all in-network devices. Patients progressed through each station; registration, triage, labs, examination and then proceeded to the pharmacy station to receive medications based on their diagnoses. Orders submitted by the providers per patient EMR were made available for pharmacy processing after examination. Pharmacy students filled orders using patient EMRs to type into a label template with areas designated for; patient name, EMR number, drug name, dose, directions, quantity and drug expiration date. Adhesive labels were printed and affixed to the appropriate order and verified by the pharmacists.

Results: Over a five-day period, 455 patients were seen in five separate villages. The pharmacists observing pharmacy operation workflow noted significant increases in productivity and efficiency relative to previous brigades that utilized hand-written labels. Label printer implementation reduced the time each order spent in production and verification leading to expedited dispensing to patients, increasing overall clinic efficiency. The potential for transcription errors was also reduced due to the ability to copy and paste patient names from the EMR directly into the label software program for printing. Feedback received from patients during the project suggested that the aesthetic appeal and navigability of the prescriptions dispensed using the prescription label printers improved overall patient satisfaction.

Conclusion: Implementation of electronic label printers in a remote pharmacy practice setting improved pharmacy workflow, increased overall clinic efficiency, and improved patient satisfaction. Future efforts should focus on implementing additional pharmacy resources into medical brigades and evaluating the outcomes of technology implementation in regard to clinic efficiency, patient perceptions, and outcomes of therapy.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Descriptive Report

Session-Board Number: 5a-238

Poster Title: Data-driven strategies for automated dispensing cabinet (ADC) optimization: Examples from Massachusetts General Hospital

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Purpose: Massachusetts General Hospital (MGH) is a 999 bed teaching hospital with 46 inpatient units. Medications in the 118 automated dispensing cabinets (ADCs) on these units are financially "on consignment" when stocked. This creates a financial exposure for the pharmacy that was identified as an area for potential cost avoidance, as medications stored on the unit are more likely to expire unused. At the initiation of this project in October 2015, the total valuation of all medications stored in ADCs was estimated at $1,331,195.42, with some individual cabinets routinely stocking more than $40,000 in medications.

Methods: An ADC inventory report was built in the central automation server and set up to generate overnight once weekly. This report exported to a spreadsheet, and an item-by-item valuation was calculated using average wholesale cost data supplied by the purchasing division. These data were then cleaned and analysed by the authors, enabling the identification of high-valuation items. Further vendor supplied and custom built reports were used to gather item usage data, allowing for analysis of transaction histories and item use as a function of par levels. Based on this information, the authors then targeted items for removal or par level adjustment.

Unused items were considered for complete removal from the ADCs if the items in question were able to be cost-effectively dispensed from the central pharmacy. If the items were used infrequently, usage reports were employed to determine the maximum historical use in a single day, and par levels were reduced accordingly. Emergency medications, such as alteplase and anaphylaxis kits were never removed entirely from the ADCs, however, the par levels were reduced on several floors where usage history and clinical judgement allowed. Dispensing data was used to evaluate pick volumes from central pharmacy to ensure technician workload was not being increased, and that patient-specific unit dose volume was not increasing significantly.

Results: Over ten months, the total valuation of billable cabinets in the hospital was reduced by approximately 35%, or $458,144, with the most recent two months of valuation data having a standard deviation of $6,472.95 (0.4%). Throughout this reduction in ADC inventories, there was no appreciable change in technician or central pharmacist workloads, and no notable instances of medication removal from the units impacting patient care. Some challenges faced during this project resulted from MGH transitioning to a new electronic health record system, during which staff availability was extremely limited. As part of this transition, reporting data was generated by different systems, but without any notable change in inventory data.

Conclusion: Data-driven inventory optimization represents an underutilized area of potential cost avoidance with relatively easy implementation in many hospitals. The methods described here could be easily implemented in any ADC equipped hospital. During the first four months of this project, an average of 2-6 intern/technician hours and 1-2 pharmacist hours per month were spent exclusively on this project. The last six months of data reported involved no more than 2 intern/technician hours weekly, and less than 0.5 pharmacist hours per week, showing a sustained decrease in inventory carrying costs with limited long-term time commitments.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 5a-239

Poster Title: Evaluating antimicrobial prescribing and clinical outcomes associated with carbapenem-resistant and carbapenem-susceptible Acinetobacter baumannii at an academic hospital.

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Purpose: Acinetobacter baumannii is a multi-drug resistant bacteria, which most frequently causes nosocomial infections. It has resistance to at least three different classes of antimicrobials, and as a result has become a challenging organism for appropriate antimicrobial therapy. The therapeutic options to treat A. baumannii infections are scarce and are associated with clinical limitations. This study was designed to evaluate which antibiotics are commonly employed to treat A. baumannii and the resulting clinical impact based on bacterial resistance or susceptibility to carbapenems.

Methods: The institutional review board approved this retrospective study. The study included all hospitalized patients between the ages of 18-89 years old with a positive culture for multidrug resistant (MDR)-carbapenem-resistant (CR)/carbapenem-susceptible (CS) Acinetobacter baumannii who required antimicrobial therapy. The data collection period was from January 1, 2013 to December 31, 2015. Multidrug resistant is defined as an acquired non-susceptibility to at least one agent in three or more antimicrobial categories. Patients were excluded from the study if they did not have a MDR A. baumannii, did not receive antibiotics as treatment, or were younger than 18 years or older than 89 years of age at the time of culturing. Therapy response was categorized by complete response, partial response, and non-response. Non-response included failure, relapse, and death. Time to achieve clinical stability was defined as return of altered mental status and abnormal vital signs to normal baseline values (heart rate ≤100 beats/min, systolic blood pressure ≥90 mm Hg, respiratory rate ≤24/min, oxygen

saturation ≥90% and temperature ≤37.28C). The primary outcomes of this study were evaluating empiric antimicrobial therapy and clinical success associated with MDR-CR and MDR-CS A. baumannii. Secondary outcomes of this study included length of hospitalization, 30-day all-cause hospital mortality, and time to clinical stability.

Results: One hundred and eleven patients were included in the study. The average age of the patients was 58.7±18.7 years. The majority of the bacterial isolates were recovered from the ICU (n=64, 58%). The sources of infection included urine (n=16, 14%), blood (n=4, 3.6%), wound (n=28, 25%), respiratory (n=56, 50%), bone (n=3, 2.7%), and other (n=4, 3.6%). The most common empiric antibiotic was a beta-lactamase inhibitor combination (n=47, 42%) and followed by a cephalosporin (n=17, 15%) or fluoroquinolone (n=17, 15%). The piperacillin-tazobactam was the most commonly prescribed directed therapy in both groups (CS: 28% & CR: 20%), but the ampicillin-sulbactam was utilized more frequently in the CR (9.3%) group than the CS group (4%). The 111 subjects were divided into CS (n=25, 23%) and CR (n=86, 87%). Clinical response (complete+partial) were similar between the groups, CS (72%) & CR (75%), p=0.76. All-cause mortality was similar between the groups, CS (28%) & CR (19%), p=0.31. Total length of hospitalization (days, median [IQR]) was shorter in the CS (11, [4-23]) than the CR (15, [9-35.5]) group, p=0.046. The time to clinical stability (days, median [IQR]) was shorter in the CS (3.5 [2-7.75]) vs CR (5 [2-16]), but did not reach statistical significance (p=0.11).

Conclusion: Beta-lactamase inhibitor combinations are an integral part of the antimicrobial armamentarium against MDR Acinetobacter baumannii. Drug resistance can limit therapeutic options and may play a role in prolonging hospitalization. At our institution, the majority of MDR Acinetobacter baumannii were carbapenem resistant. The significance of drug resistance must be examined further to better develop an understanding of its impact on patient care.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 5a-240

Poster Title: Incidence and relationship of kidney injury and proteinuria in patients receiving an infusion of bevacizumab: a retrospective observational study

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Purpose: Bevacizumab is a vascular endothelial growth factor inhibitor most frequently used as first line therapy for metastatic colorectal cancer. Proteinuria is a common adverse reaction in patients receiving bevacizumab and it is recommended that patients undergo serial urinalysis during therapy. Current literature on the relationship between kidney injury and proteinuria in patients receiving bevacizumab is limited and mainly consists of single patient case reports. In this study, we set out to determine the relationship between kidney injury and proteinuria in patients receiving bevacizumab at an outpatient oncology clinic.

Methods: A computerized database identified the first 50 patients that received bevacizumab between January 1, 2012 and March 31, 2016. Patients were included if they were greater than 18 years of age and received bevacizumab in the predetermined time frame. Patients were excluded if proteinuria occurred greater than 60 days after receiving bevacizumab therapy or if patients were still receiving bevacizumab after the study period end date. In addition to baseline demographics, max serum creatinine, serum creatinine associated with proteinuria, serum creatinine that met the risk, injury, failure, loss, or end stage renal disease (RIFLE) criteria for acute kidney injury (AKI), grade of proteinuria, and dose of bevacizumab received prior to proteinuria were recorded. The primary outcome was occurrence of kidney injury within 60 days of receiving a bevacizumab infusion according to RIFLE criteria. Secondary outcomes included median serum creatinine in proteinuria patients, median dose given to patients prior to proteinuria, average grade of proteinuria, and number of patients with grade 2 or higher proteinuria that received a 24 hour urine collection.

Results: Data was collected on 50 patients, 23 patients met inclusion criteria for analysis. Of the patients with proteinuria 11 were male, 12 female, with a median age of 68. Out of 23 patients, there was a total of 57 occurrences of proteinuria, and 53 recorded serum creatinine values. There were a total of 5 grade 2 or higher proteinuria occurrences. Median serum creatinine in patients with proteinuria was 0.805 milligrams per deciliter and the total patients that met RIFLE criteria for AKI was 1. A linear regression was obtained for both proteinuria occurrence in relation to bevacizumab dose and serum creatinine in relation to proteinuria levels. The coefficient of determination for proteinuria in relation to bevacizumab dose was 0.0191. The coefficient of determination for serum creatinine in relation to proteinuria was 0.0091.

Conclusion: This study demonstrated that there was no relationship between kidney injury and proteinuria in patients receiving bevacizumab based off of a commonly used criteria for measuring kidney injury. There was also no significant relationship between bevacizumab dose and proteinuria occurrence or grade, and no relationship between serum creatinine values and proteinuria occurrence or grade. Based on these results, future studies may be required to determine the necessity of serial urinalysis on patients receiving bevacizumab infusions. The most significant limitations to this study was the small sample size and the utilization of only one criteria for measuring kidney injury.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5a-241

Poster Title: Effect of a vancomycin management program on the number of days of vancomycin therapy before and after implementation

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Purpose: The purpose of this study was to evaluate the effectiveness of a vancomycin management program (VMP) in reducing the number of days of inappropriate therapy with intravenous vancomycin.

Methods: The VMP was implemented in March through December of 2015. A formalized vancomycin management policy was created, which included dosing and monitoring guidelines, improvements in communication between pharmacists and medical providers, competencies for pharmacists, Methicillin Resistant Staphylococcus Aureus Polymerase Chain Reaction nasal screen implementation to facilitate vancomycin de-escalation in pneumonia and bacteremia patients. To measure the impact of the VMP on vancomycin usage, a report was generated for all patients that received vancomycin in the months of February through April in 2014 and 2016. A medication use evaluation was performed to compare days of therapy before and after the VMP was implemented. Patients were included if they received greater than one dose of vancomycin, had a diagnosis of bacteremia, pneumonia, or other respiratory infection. Exclusion criteria included use of vancomycin for surgical prophylaxis, urinary tract infection, cellulitis, obstetrics/gynecology, hospice/comfort care, dialysis, or cancer patients. Also measured, were the number of patients who needed to restart vancomycin based on a positive culture after discontinuation.

Results: The median number of days of vancomycin therapy in the 2014 group were 3.0 days (n=28) and in the 2016 group were 2.5 days (n=27). No patients needed to be restarted on vancomycin due to positive cultures.

Conclusion: Results of the VMP showed a decrease in median number of days of vancomycin therapy.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5a-242

Poster Title: Retrospective review of proton pump inhibitor use in cystic fibrosis patients initiating lumacaftor-ivacaftor (Orkambi) treatment

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Purpose: Proton pump inhibitors (PPIs) are often used in patients with cystic fibrosis to assist with gastroesophogeal reflux disease (GERD) symptoms or improve pancreatic enzyme therapy efficacy. Upon FDA approval in 2015, many patients have been initiated on lumacaftor-ivacaftor therapy for cystic fibrosis (CF) treatment. Lumacaftor is a cytochrome P450 enzyme inducer and may decrease serum concentrations ofPPIs, leading patients to experience breakthrough GERD symptoms or malnutrition due to inefficient absorption of nutrients. The purpose of this study was to analyze local practice in PPI dosing with concomitant lumacaftor-ivacaftor use in an effort to determine a more standardized PPI dosing regimen.

Methods: The institutional review board approved this retrospective chart review. Patients 12 years of age and older who were prescribed lumacaftor-ivacaftor and a concomitant PPI between July 2, 2015 and July 26, 2016 were enrolled in the study. Patients younger than 12 years of age, patients not taking a PPI at the start of lumacaftor-ivacaftor initiation, patients who started lumacaftor-ivacaftor prior to FDA approval, and patients who discontinued lumacaftor-ivacaftor therapy within 30 days were excluded from the study. Electronic medical records were reviewed for those patients meeting inclusion criteria to collect data related to patient demographics, PPI demographics, adjunctive acid suppressants used, and reported efficacy and adverse effects. The primary objective was to determine the impact of lumacaftor-ivacaftor on the efficacy of PPIs. Secondary objectives were to quantify the need for adjunctive acid suppression, to describe complications of concurrent use, and to quantify the need for higher doses of PPIs after lumacaftor-ivacaftor initiation. Data were evaluated using descriptive statistics.

Results: Of the 60 patients who met the inclusion criteria, the CF clinical pharmacist recommended to adjust PPI dosage based off of patient symptoms in 54 (90%) of the patients, whereas empiric adjustment was recommended in 6 (10%) of the patients. Of the symptom-based recommendations, 39 (65%) of the patients did not need any PPI therapy adjustments, while 15 (25%) of the patients adjusted PPI dose due to breakthrough symptoms. Of the empiric dose adjustment recommendations, 2 (33.3%) of the patients did not make any adjustment, 1 (16.67%) of the patients made an adjustment based off of breakthrough symptoms, and 3 (50%) of the patients followed the empiric recommendation. Out of both groups of patients, 41 (68.33%) of the patients were well controlled on their starting PPI dose and only 16 (26.67%) of the patients required an adjustment. The other 3 (5%) of patients were well controlled on their empiric adjustments. The most common side effects experienced were reflux/heartburn (33.3%), abdominal pain (31.67%), and loose or oily stools (28.3%). 17 (28.3%) of the patients required additional therapy to assist with side effect management. The most common recommendations for adjunctive therapy were polyethylene glycol (52.9%), calcium carbonate (23.5%), and ranitidine (17.6%).

Conclusion: The addition of lumacaftor-ivacaftor treatment to cystic fibrosis patients already receiving PPI therapy led some patients to require a PPI dose adjustment. However, the majority of the patients did not require any adjustments. In order to maintain patients on the lowest effective PPI therapy, dose adjustments should be performed on an as-needed basis when patients experience breakthrough symptoms.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5a-243

Poster Title: Study of Penicillin Tolerance in Streptococci

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Purpose: Group B streptococcus are opportunistic and gram positive bacteria. They are usually found in both digestive and reproductive tracts. Group B streptococcus can cause serious infection in neonatal, maternal, and immunocompromised adults. Penicillin G has been used as a choice of therapy for these infections; however, there are numerous reports demonstrated of failed treatments. Penicillin tolerance is one of the reasons for ineffective therapeutic treatment in some patients with Group B streptococcus infection. The purpose of this study is to measure penicillin tolerance in 2 lab strains of Streptococcus and characterize them as susceptible or tolerant to penicillin G.

Methods: In this study, we examined two different Group B streptococcus strains, Streptoccus. agalatiae strains A909 and O90R by examining their tolerance levels to the Penicillin G regimen as they are usually exposed to in vitro therapy. MBC: MIC ratio and cell lysis assay via optical density measurements and colony counts were used to classify either strain as a penicillin tolerant or susceptible strain.
Tolerance using the MIC: Group B streptococcus strains A909 and O90R were exposed to different Penicillin G tolerance and performed colony count to determine the lowest 90% killing of antibiotic concentration from original inoculums (MIC90).
Measuring Penicillin induced lysis: Penicillin induced lysis was conducted to observe the cell cultures response to 100xMIC90 Penicillin G using OD600

Results: After 24 hours of penicillin exposure, Group B streptococcus A909 strains demonstrated more of a rapid decline in survival rate compared to 09OR strains. There were greater incidences of bacterial growth after 48 and 72 hours of penicillin exposure seen in 09OR than A909. Higher OD600 were obtained from O90R than A909 after "22 hours" of penicillin treatment indicating that O90R tolerant strains are subjected to less cell lysis than A909 susceptible strain.

Conclusion: Group B streptococcus A909 showed decreased colony counts at low penicillin G concentration levels while these same doses did not whittle down Group B streptococcus O90R counts, but needed higher penicillin G concentrations to achieve the same effect. Based on the MBC: MIC ratio and the lysis observed, we determined that Group B streptococcus O90R is a Penicillin G tolerant strain while Group B streptococcus A909 can be classified as a penicillin G susceptible strain.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 5a-244

Poster Title: Provider adherence to guideline recommended prescription of beta blockers for patients with reduced ejection fraction heart failure

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Purpose: The 2013 ACCF/AHA guidelines recommend beta blockers (BB) as first line agents for patients with structural heart disease. The 2016 QUALIFY Trial revealed that BB are commonly under-utilized and under-dosed in outpatient adults with heart failure. Beta blockers were prescribed for over 80% of patients in QUALIFY but less than 15% of those on BB therapy were at recommended target dose. This study assessed prescriber adherence to guideline recommendations for BB prescription in patients with reduced ejection fraction (≤40%) heart failure (HFrEF) in an academic-based internal medicine clinic.

Methods: The Institutional Review Board approved this study. This is a descriptive, retrospective observational study of outpatients from a single academic based internal medicine clinic at the University of North Carolina Medical Center. Patients included in the data analysis were ≥ 18 years of age with a diagnosis of HFrEF and a documented visit in the University of North Carolina Internal Medicine Clinic between January 2015 - July 2016. Patients enrolled in hospice, receiving palliative care, or who were pregnant during the study period were excluded. The primary endpoint of this study was a composite of the following: 1) Proportion of patients prescribed to target doses of guideline recommended beta blockers and 2) Proportion of patients not prescribed to target doses of a guideline recommended agent due to contraindication to initiation or titration of a beta blocker. Secondary measures looked at the general prescribing patterns of all BB therapies and contraindications to initiation or titration of these agents. Contraindications assessed in the analysis were co-morbidities, intolerable side effects, bradycardia, and hypotension. Patient demographics, total number of clinic visits in the

preceding 12 months, current BB prescription (including specific agent and dose), and potential BB clinical contraindications were collected and assessed from the electronic health record. Data were analyzed using descriptive statistics including counts, proportions, means, and interquartile ranges.

Results: 157 patients were included with a mean age of 63 years, a mean ejection fraction of 29.7%, and an average of 3.9 visits to the internal medicine clinic in the preceding 12 months. 60 patients (38.2%) patients were prescribed guideline recommended BB therapy or had a clinical characteristic limiting treatment with BB agents, and thus met the definition for the primary endpoint. Of these 60 patients, 12 patients (7.6%) were prescribed target dose, guideline recommended BB therapy. The other 48 patients (30.6%) met the criteria for contraindication to beta blocker therapy initiation or titration, and therefore were included in the primary outcome, due to one of the following: diagnosis of COPD, 2nd/3rd degree heart block, HR < 55, and SBP ≤ 80mmHg. 134 (85.3%) patients were on any BB therapy, with 115 (73.2%) patients prescribed any dose of a guideline recommended BB.

Conclusion: This study demonstrates low prescriber adherence to guideline-recommended beta blocker therapy with just 38.2% of patients meeting the definition for the primary study endpoint. Moreover, the majority of patients were included in the primary measure due to one or more contraindications to BB therapy. These findings reflect the outcomes of previous trials and suggest an opportunity for improvement of both guideline recommended BB prescription and BB dose titration for patients with HFrEF in this clinic.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 5a-245

Poster Title: Implementation of Interprofessional Experiential Education between Pharmacy and Nursing Students

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Purpose: The purpose of this experience between pharmacy and nursing students was to explore the foundational knowledge of interprofessional teamwork while on Advanced Pharmacy Practice Experiences (APPEs) and nursing clinical rotations. While gaining knowledge about their different health professions, students collaborated during morning medication passes, patient presentations, and nursing topic discussions to better understand the healthcare field as a whole and overall impact of a more integrated interprofessional collaboration providing better patient care.

Methods: The interprofessional education experiences took place at Providence Portland Medical Center (PPMC) and Providence St. Vincent Medical Center (PSV), two large tertiary teaching hospitals located in Portland, Oregon. Three Pacific University APPE students and six University of Portland advanced clinical nursing students participated at PPMC while three APPE students and ten clinical nursing students were at PSV, making it a total of six pharmacy students and sixteen nursing students. The student groups included one pharmacy student per two nursing students in PPMC, and one pharmacy student per about three nursing students in PSV.

The student groups at PPMC were assigned two medication pass activities, followed by three interdisciplinary patient presentations, and two nursing topic discussions. For the student groups in PSV, each pharmacy student was assigned a patient and, based on the obtained information from medication pass experience and data in the electronic medical record, three patient presentations were delivered by pharmacy students and three presentations were

delivered by nursing students from their perspective and experience. A faculty member from each program oversaw all activities, presentations, and discussions.

Results: Two interdisciplinary sessions, each of which were a total of four hours, were held one week apart. Each session consisted of a medication pass activity on Tuesday morning (two hours), followed by patient presentations and topic discussions on the following Wednesday afternoon (two hours).
The medication pass activity was led by nursing students. Pharmacy students observed the workflows of removing patient medications from Pyxis, drawing up medications in syringes (such as insulin), manually crushing medications, entering medications into the patient's medication administration record (MAR), and observing the challenges nurses face with administering medications.
The presentation involved each profession first clinically reviewing a predetermined patient and then discussing the case to the group. This activity allowed each profession to see how different healthcare providers studied and dissected a patient profile under a different professional lens. Each session concluded with Q&A between nursing and pharmacy to recognize each other's roles in the healthcare field and/or topic discussions (such as in health literacy). During these sessions, it became apparent that while many concepts and routines between nursing and pharmacy are unfamiliar to the other profession, the challenges that occur during both medication distribution and administration are very relevant for all.

Conclusion: Although different professions approach patient cases in different ways, the common purpose is to provide the best and most efficient care for patients. With healthcare shifting to an interdisciplinary approach, it is important to understand the fundamentals of other healthcare professions and how to effectively collaborate. Through this interprofessional experiential education, we have expanded our understanding of the importance of interdisciplinary communication and teamwork and its importance in providing exceptional patient-centered care. In the future, it is essential to continue to expand this interprofessional experience for pharmacy and nursing students to understand each other's approaches to care and challenges therein.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 5a-246

Poster Title: Effectiveness and safety of indomethacin for decreasing chest tube duration after coronary artery bypass graft surgery

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Purpose: Early removal of chest tubes in coronary artery bypass graft (CABG) patients is a factor that positively affects length of hospital stay. Indomethacin is sometimes used in one community hospital to reduce chest tube output via reduction in inflammation in an attempt to shorten chest tube duration. Nonsteroidal anti-inflammatory drugs, including indomethacin, are contraindicated in the setting of CABG due to a boxed warning regarding increased risk of cardiovascular thrombotic events. The aim of this study was to determine if the use of indomethacin in CABG patients is safe and effective in shortening the duration of chest tube placement.

Methods: This was a retrospective chart review of patients in a 348 bed community hospital receiving indomethacin therapy after CABG surgery. The records of all adult patients receiving CABG surgery between 2010 and 2015 were systematically screened for receipt of at least one dose of indomethacin while chest tubes remained inserted. Charts with admit diagnoses of cardiac arrest or stroke were omitted from review. Identified subjects were individually matched based on demographics, medical history, and concomitant cardiac surgeries. Data collected included patient comorbidities, daily chest tube output, duration of chest tube placement, and concomitant medications. The primary outcome measure was change in time from first dose of indomethacin until removal of chest tubes compared with duration of insertion of chest tubes in control patients. The secondary outcome measure was total duration of chest tube insertion. Safety endpoints included occurrence of thrombotic events, TIMI bleeding in the setting of CABG, or death. Descriptive statistics were utilized. This study was approved by the institutional review board.

Results: Sixteen patients received indomethacin and were eligible for inclusion. They were matched 1:1 to 16 patients not receiving indomethacin. Two of the patients in the indomethacin group received heart valve replacement at time of CABG and were able to be matched only on sex and type of valve replaced. The median age was 55 years in the indomethacin group and 56 years in the control group. Twenty-four subjects were male. Indomethacin was associated with a shorter duration of chest tube insertion when comparing time from first dose of indomethacin to chest tube discontinuation with duration of insertion in control. The median decrease in duration of chest tube insertion in the indomethacin group was 14.5 hours. The median total duration of chest tube insertion in indomethacin and control patients was 214.3 and 91.2 hours, respectively. No patients experienced thrombotic events, bleeding, or death during admission.

Conclusion: Indomethacin decreased chest tube insertion times, however the clinical impact of this reduction is uncertain. Although it has shown to be safe in this cohort study, more studies are needed to determine if indomethacin has a place in the setting of CABG surgery.

Submission Category: Automation/ Informatics

Submission Type: Evaluative Study

Session-Board Number: 5a-247

Poster Title: Know Your Numbers: Implementation of a Community Health App

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Purpose: Mobile health applications (apps) are growing in popularity as health promotion tools that encourage user self-management of chronic conditions. A free mobile health app, Know Your Numbers (KYN), was developed to assist community members to track their health numbers. Know Your Numbers programs aim to increase public awareness of health numbers, such as blood pressure, glucose, and cholesterol values. Student pharmacists have the capability to bridge technology with healthcare by incorporating KYN into patient-care events. The study objectives were to analyze frequency of app usage and perceptions of community members towards health numbers, pharmacists, and health apps.

Methods: Health numbers were defined as blood pressure, glucose, and cholesterol readings. The KYN app's features included health number logs, a patient advocacy survey, disease-state information, and upcoming health fair event notifications.
The target population for app users was underserved communities within Atlanta, Georgia. Student pharmacists recruited study participants through community clinic and health fair events. Community members 18 years or older with any Android device of versions 5.1 or lower were eligible for study enrollment. App usage, defined as a user logging health numbers, checking upcoming events, or answering a questionnaire about their health numbers and attitudes towards pharmacists was tracked for 56 days, then the post-survey was administered. This study utilized a pre- and post-survey study design to compare perceptions before and after use of the KYN app, utilizing a 4-point Likert scale, with 1 being "strongly agree" to 4 being "strongly disagree". Eligible participants completed a 22-item pre-survey, divided into five domains that assessed user demographics (5), medical history and insurance status (3),

understanding of health numbers (5), health app usage/non-usage and perception (5), and perceptions of the pharmacy profession (2). Both surveys were incentivized with gift-card raffles. Data was analyzed using SAS 9.3 using descriptive statistics and paired t-tests for matched pre- and post-surveys. This study was approved by the Mercer University Institutional Review Board.

Results: Thirty-three community members were enrolled into the pilot study. The average age was 53.8 plus or minus 11.5 years old. The majority of participants were African-American (93.9 percent) and earned less than 50,000 US dollars in household income annually (56.7 percent). Thirty-three percent of the participants had two or more comorbidities, and 34 percent did not have a primary care physician. Only 6.06 percent of users reported having previously used a mobile health app. On average, participants had 3.98 interactions per week with the app. Before using the app, 84.8 percent of users had felt comfortable using a health app; however, only 9.0 percent used one regularly. After the app pilot study, 100 percent of users felt comfortable using a health app, and 88.9 percent used one regularly ($p=0.44$, $p=0.0001$). There was a statistically significant increase in the number of users who strongly agreed or agreed that a health app had helped them to meet their health goals (24.4 percent to 100 percent, $p=0.0006$). More than 90 percent of participants agreed in both the pre- and post-survey that it is important to check their health numbers regularly and that they trust their pharmacist. The post-survey response rate was 27.2 percent.

Conclusion: The KYN app pilot study introduced an underserved community to the value of mobile health apps. These findings support the benefits of the KYN health app in its usability and in helping users meet health goals and regularly self-testing. Further development of the beta version in areas of expanding operational system compatibility and improved aesthetics is warranted. Also, a longer study period would address the sustainability of app use. Know Your Numbers is an emerging technological tool that promotes chronic disease self-management and the representation of the pharmacy profession.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 5a-248

Poster Title: Incorporating a student co-director position as an interprofessional education experience to assist with integration of behavioral health services into an interprofessional team-based primary care clinic

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Purpose: Interprofessional (IP) team-based health care is an important delivery model to improve healthcare quality. Offering students authentic interprofessional education (IPE) experiences in practice-based settings is important to train future healthcare professionals. In IPE and team-based healthcare, it is important to integrate behavioral health. While current data shows 20-40% of primary care patients have behavioral health needs, no information exists about using IPE to integrate behavioral health services into primary care. This study evaluated the role of initiating student co-director positions into a primary care practice model, called the Interprofessional Teaching Clinic (IPTC), and improvements in depression screening and patient outcomes.

Methods: Four interprofessional students, including medical, pharmacy, occupational therapy, and doctoral clinical psychology, were selected for an extracurricular IPE experience as the IPTC student co-directors from May 2015-2016. The role of the student co-directors in this study was to guide and assist IP clinical rotation students with completion and documentation of depression screenings for patients receiving primary care in the IPTC. Student co-directors were available in clinic daily to provide assistance to IP students by guiding a huddle at the start of clinic and serving as a resource for maximum utilization of behavioral-health consultation and services. From January 1, 2015 through June 30, 2015, 493 patients were seen in the IPTC and provided outcomes for the baseline to six-month comparisons. A subset of 311 out of these 493 participants were seen again between July 1, 2015 and December 31, 2015, and provided outcomes for the six-month to twelve-month comparisons. Participants were screened annually

for depression with a verbal administration of the Patient Health Questionnaire (PHQ) 2 and 9, documented in the electronic health record (EHR). A PHQ 2 score over 3 triggered administration of the PHQ 9 and consultation with clinical psychology students and preceptors. A positive PHQ9 triggered follow up and, when appropriate, a mood disorder diagnosis was documented in the EHR. A retrospective analysis was conducted and SAS software was used for statistical analysis.

Results: The mean age of patients in this cohort was 45.6 years old, the majority being female (75.7%) and private insurance holders (51.7%). Self-pay patients and Medicare and Medicaid holders were also represented. At baseline, the annual PHQ screening rate was 9.13% with a prevalence of depression at 22.5%. The baseline to six-month comparisons showed an increased depression screening rate with PHQ of 39.41% (+30.6%, $p < 0.0001$) and an increased prevalence of depression at 26.37% (+3.87%, $p < 0.0001$). The six-month to twelve-month comparisons showed a further increase of PHQ screening rate of 74.28% (+25.73%, $p < 0.0001$) and a further increase in prevalence of depression of 31.51% (+5.14%, $p=0.1797$). Overall, an increase of 56.33% from baseline was observed for patients who were screened annually for depression, and an overall increase of 9.01% was observed for depression prevalence within the IPTC.

Conclusion: The purpose of screening for depression annually in primary care settings is to provide appropriate treatment for otherwise undiagnosed depression. With the addition of the role of student co-directors within IPTC, the outcomes from integrating behavioral health within IPTC increased significantly within twelve months. This enhancement of behavioral health integration not only provided student co-directors with an opportunity to see the importance of psychology within an IP team-based primary care setting but also significantly improved the overall care of patients within this clinic.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 5a-249

Poster Title: Evaluation of analgesia and sedation management in patients admitted to the neuroscience intensive care unit requiring prolonged mechanical ventilation

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Purpose: Current guidelines for the management of pain, agitation, and delirium in adult patients in the intensive care unit (ICU) recommend an analgesia-first approach to sedation management. Implementation of sedation protocols has been associated with favorable clinical outcomes such as decreased duration of mechanical ventilation and decreased ICU length of stay. However, this recommendation derives from studies in surgical and medical ICU populations, making it difficult to extrapolate to patients with primary neurological illnesses. The purpose of this study is to evaluate current analgesia and sedation practices in a neuroscience ICU population, identify patterns in care, and determine areas for improvement.

Methods: We performed a retrospective analysis of patients 18 years of age or older admitted to the neuroscience and neurosurgical ICU with primary neurological illnesses. Brigham and Women's Hospital's electronic medical record system was utilized to identify patients from December 2015 to August 2016. We included patients who were mechanically ventilated for a minimum of 48 hours. We excluded patients whose primary care team was a hospital service other than neurology or neurosurgery. Outcome measures included provider choice of continuous sedation and analgesic agents and total doses of sedatives and analgesics administered while the patient was mechanically ventilated. Frequency and magnitude of pain during mechanical ventilation was assessed using the critical care pain observation tool (CPOT), depth of sedation was assessed using the richmond agitation-sedation scale (RASS), and development of ICU-delirium using the confusion assessment method for the ICU (CAM-ICU). Additional outcomes measured were duration of mechanical ventilation, incidence of re-

intubation, percentage of patients requiring a tracheostomy, patient ICU length of stay, hospital length of stay, and in-hospital mortality.

Results: 134 patients were included with a mean age of 59.4 years old. In total, 67.9% of patients were admitted to Neurology service and 32.1% to Neurosurgery. Propofol was utilized in 100% of patients, with midazolam administered concurrently in 14.2% of patients. The mean propofol dose was 18,188 mg over a mean of 5.4 days. The mean dose of midazolam was 623 mg over a mean of 3.4 days. The mean hospital length of stay was 16.7 days and mean ICU length of stay 11.8 days. Patients were mechanically ventilated for a mean of 6.7 days. Approximately 21.6% of patients required reintubation, 22.4% of patients required a tracheostomy and in-hospital mortality rate was 25.4%. On average, 29.1 + 19.4 RASS scores were collected per patient while intubated, with a median RASS score of – 2 (IQR -3.3 to -1.2) . An average of 2.4 CPOT scores were documented per day of mechanical ventilation per patient, with 71.1% of CPOT scores being 0 while 17% were > 2. In total, 94% of patients exhibited severe pain at least once while intubated. Thirty three patients (24.6%) were documented to have a positive CAM-ICU at any point during the period of mechanical ventilation.

Conclusion: We found in the neuroscience patient population at our institution, the primary sedative utilized was propofol and primary continuous analgesic agent administered was fentanyl. Most patients had light-moderate sedation during mechanical ventilation. Approximately 17% of CPOT scores documented indicated that the patient was in severe pain. Delirium was prevalent in our patient population as well. Future quality improvement initiatives should focus on the use of analago-sedation for mechanically ventilated patients who suffer from a primary neurological illness to optimize patient outcomes.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Descriptive Report

Session-Board Number: 5a-250

Poster Title: Feasibility of point-of-view camera use to quantify workload in a sterile compounding hospital setting

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Purpose: The Denver-metro area has seen a 7.5% population growth rate since 2010. As the primary Children's Hospital in the area, we have seen increased patient demands and a 2-fold increase in medication dispenses, as a result. To adequately match this increased workload, we sought to develop a method to evaluate how accurately our technician hours, as measured in full-time equivalent (FTE) hours, met the time requirements to prepare and dispense medications in our primary sterile compounding clean room.

Methods: Data was compiled over the course of March 1, 2016 - March 31, 2016, which consisted of all compounded sterile preparations completed at Children's Hospital Colorado Main Campus. Medication dispenses were tallied using Tableau Business Intelligence software, in conjunction with medication order tracking from Epic Software Systems. Based on this compiled medication list, we began a testing phase using a head mounted camera rig to record clean room technician activity, in the pharmacy department's primary sterile compounding room. We obtained multiple sets of time trials across various shifts and test subjects, in order to record the time it took to prepare individual medication orders, from task initiation to completion. This interval was defined as acquiring a medication label to completion and presentation for pharmacist double-check. Using these time intervals, we calculated average times for each medication sampled. These averages were then multiplied by medication counts from Tableau, to approximate the total time spent preparing each medication, during March. Medications were then classified into one of 20 discrete categories, such as controlled substance continuous. We also took median values for each medication, due to incomplete distributions in our medication samples. From these final counts, we compared whether our employee FTE's adequately matched the time needed to meet medication demands.

Results: Technician FTE units were calculated, for the month of March and totaled 1,209 total hours. These hours were compared to the total time of the top 120 medications dispensed (e.g. - Vancomycin, ranitidine, fluid bags with additives), over the same time period. The total medication preparation time, was found to exceed the total employee time of 1,209 FTE hours. Even though this finding seemed to be counter-intuitive, it was explained by the fact that our pharmacists were not solely relegated to a double-checking responsibility. They are were also involved in preparing medications, along with technicians, which made up for difference in FTE time and medication preparation time. Beyond the scope of our current analysis, real-time pharmacy technician FTE's are also needed for tasks such as USP 797 requirements for 2016 standards of operation. This limited our ability to accurately match real time workflow, as technicians don't always complete tasks without interruptions, as they did for these time trials.

Conclusion: In order to retain our high standards for meeting optimal patient care, these findings justify the need for adjusting technician FTE units to match the growth of in-hospital medication needs. Furthermore, this process helped to develop a framework for a basic method of evaluating medication dispense volume and employee FTE capacity, for matching further population and medication fluctuations. For future studies, an economic approach and analysis would help determine whether our current system is more or less cost-effective than employing additional technician FTE's to match growing demands.

Submission Category: Oncology

Submission Type: Descriptive Report

Session-Board Number: 5a-251

Poster Title: Role of miRNA in the regulation of ATF5

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Purpose: Activating Transcription Factor 5 regulates survival, proliferation, and differentiation of cells, and is involved in homeostatic cellular stress response. Normally, ATF5 gets degraded, due to post-translational modifications, and has a short half-life; however, as observed in MCF7 breast cancer cells, ATF5 gets upregulated under cellular stress. While ATF5's role in stress response is apparent, cellular regulation of ATF5 is not fully understood. MicroRNA (miRNA), which contribute to the regulation of gene expression at the translational level, may play a role in the regulation of ATF5 expression levels, as miRNA expression is altered during cellular stress in a variety of diseases.

Methods: We evaluated the role and ability of specific miRNA in the downregulation of ATF5 in breast cancer cell lines. The initial miRNA candidates selected for evaluation in ATF5 regulation were miRNAs 129-5p, 433-3p, 193b, and 520b, and they were identified using methods such as TargetScan, miRanda, and other in silico modeling programs. Luciferase assays were used to validate the selected miRNA candidates. The role of these miRNA in the regulation of ATF5 was studied through the analysis of protein expression levels. Cells were cultured and seeded for transfections using precursor miRNA, followed by incubation in various stress conditions, such as heat stress, oxidative stress, and serum and amino acid deprivation. The expression levels of ATF5, under the various physiological conditions, were then measured (qualitatively) via Western Blot analysis.

Results: Data show that the selected miRNA play a role in regulating ATF5 expression, and are effective for downregulating the expression of ATF5 at the translational level. This has been observed in MCF10A mammary epithelial cells undergoing transformation via induction of

estrogen receptor (ER-Src), where miRNA 520b was shown to downregulate the expression of ATF5.

Conclusion: These data identify an aspect of ATF5 regulation, which is one pathway that affects cellular homeostasis. By gaining a better understanding of how ATF5 is regulated, and by being able to alter it's response to cellular stress, we may be able to better understand, and identify targets for treatment, in a variety of malignancies, such as glioma, and ovarian and breast cancers.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 5a-253

Poster Title: Evaluation of appropriate monitoring of diabetic patients on ACE-I or ARB therapy within a federally qualified health center

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Purpose: Diabetes is the leading cause of chronic kidney disease (CKD). Angiotensin converting enzyme inhibitors (ACE-I) and angiotensin receptor blockers (ARBs) are commonly prescribed to diabetic patients because of their kidney protectant effects. Due to their activity in the kidneys, monitoring renal function in addition to other agent specific parameters should be performed at least annually during treatment with an ACE-I or ARB, if not sooner. Our purpose is to evaluate our monitoring compliance of our diabetic population who are also receiving an ACE-I or ARB.

Methods: The goal of this study was to evaluate ACE-I and ARB monitoring of diabetic patients at Virginia Garcia Memorial Health Center, a federally qualified health center in Hillsboro, OR. Patients were included if they were diagnosed with type 1 or 2 diabetes and were also receiving either an ACE-I or ARB. Pertinent data including age, sex, prescription medications, date of ACE-I or ARB initiation, date of last serum creatinine lab draw, and serum creatinine value was collected. For this observational study, data was retrospectively collected from February 2005 to July 2016. The data was then evaluated to determine the percent of patients who received appropriate ACE-I or ARB lab monitoring within specific time periods from time of prescription.

Results: Of the 5,087 diabetic patients included, 2,433 patients were excluded due to lack of ACE-I or ARB treatment. Among the 2,654 diabetic patients initiated on either an ACE-I or ARB, 100% of patients had lab monitoring performed within 5 years, 84% within 3 years, 49% within 2 years, 32% within 1 year, and 16% within 6 months.

Conclusion: Considering that diabetes is the leading cause of CKD, renal monitoring becomes increasingly important particularly during treatment with an ACE-I or ARB. In our study, most patients underwent monitoring within the last 2 years of treatment. In order to ensure patient safety and medication efficacy, it is important to follow and enforce appropriate monitoring recommendations.

Submission Category: Pain Management

Submission Type: Descriptive Report

Session-Board Number: 5a-254

Poster Title: Cannabinoid use for chronic neuropathic pain treatment

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Purpose: The Department of Health and Human Services recognizes that opioid abuse has reached epidemic levels in the US. In 2014 opioid abuse was the leading cause of accidental death. With at least half of the overdose deaths in the US involving prescription opioids, the US Attorney General has declared that prescription opioids are the gateway drugs to heroin, not marijuana. Simultaneously, the benefits of medical marijuana have led to legalization in roughly half the country. Although research is limited, cannabinoids could offer a safe alternative to opioids for pain management that benefits patient care and combats this growing epidemic.

Methods: Using Pubmed, articles were found that studied various forms of cannabis use for chronic neuropathic pain treatment. In one study conducted by the McGill University Health Center, 23 adults with chronic neuropathic pain were randomly assigned to receive cannabis over four 14-day periods. Patients inhaled doses through a pipe three times daily with daily average pain intensities and side effects recorded. In a second single group, double-blind, placebo-controlled, crossover study using smoked cannabis conducted by researchers from the University of California San Diego, participants with refractory HIV-associated distal sensory predominant polyneuropathy were observed over 7 weeks. On selected study days participants were dosed 4 times a day under the supervision of a study nurse. Participants were titrated to a target dose affording the best achievable pain relief without adverse side effects while their pain levels were measured using the Descriptor Differential Scale at pretreatment baseline and the end of each treatment week. In a third randomized, double-blinded, placebo controlled crossover study conducted by the University of California San Diego, 16 participants with diabetic neuropathy were exposed to a placebo or varying strengths of THC. Over 4 single dosing sessions, pain was monitored and cognitive testing was performed.

Results: In the study by McGill University, 21 participants completed the trial. On an 11 point scale of average pain intensity, participants receiving the highest concentration of THC (9.4%) averaged 5.4 versus 6.1 for participants receiving the placebo (p value = 0.023, 95% CI 0.02-1.4). Participants receiving THC also reported higher quality sleep than those receiving the placebo. In the second study on HIV-related neuropathy, 28 participants receiving cannabis reported a 3.3 point difference in DDS pain scores over the placebo. The proportion of participants achieving at least a 30 percent pain relief compared to the placebo were 0.46 (95% CI 0.28, 0.65). The third study included 16 participants with diabetic neuropathy, using a 10 point pain scale, average pain scores were 0.44 higher for placebo than in the lowest concentration dose of cannabis. There was a difference of 0.42 points when the placebo was compared to medium dose and 1.2 points when compared to high dose. The statistical difference was insignificant between low and medium doses (p = 0.92) with an average pain score difference of 0.73-0.75 between high and medium/low doses (P < .001), indicating a dose dependent relationship. Side effects were minimal in all studies reviewed.

Conclusion: The scheduling of marijuana as a schedule I drug has significantly limited the size, duration, and scope of research concerning its use for medical purposes. The size of all the studies reviewed was a seriously limiting factor. However, the data they provide shows that cannabinoids may have efficacy in pain management and that further study is warranted. Currently, as more states legalize medical marijuana it is being used inconsistently without clear guidelines or safety data. The current opioid epidemic and limited research data indicate that cannabinoid rescheduling and further research should be a priority in neuropathic pain management.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5a-255

Poster Title: Implementing pharmacy intern driven follow-up counseling and quality assurance program for discharge prescription bedside delivery program in a health system community pharmacy

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Purpose: Reduction in hospital readmission is important to assure quality care. A discharge prescription bedside delivery program reduces the proportion of prescriptions that are not filled upon discharge. However, there still may be misunderstanding and noncompliance after discharge. This project was designed to follow-up with patients who had previously received discharge prescriptions to address any concerns they may have encountered since returning to home. In addition, the project was created to assess the satisfaction of patients with the bedside delivery service to ensure ideal execution of the program.

Methods: Student pharmacist interns at a health system community pharmacy conduct a follow-up encounters via phone call to patients who received discharge prescriptions through the bedside delivery program at least 2 days prior to the date of the phone call. All counseling will be performed under the supervision of a pharmacist. Primary outcomes addressed will include whether or not the follow-up counseling provided patients with new knowledge and understanding about their medication regimen, the number of potential drug therapy problems avoided as a consequence of the follow-up encounters, and whether or not patients were satisfied with the bedside delivery service. Secondary outcomes will include the percentage of patients who did not initially have questions but gained new knowledge from the counseling and the proportional categories of the potential drug therapy problems prevented.

Results: The results of this study will demonstrate the impact of follow-up phone call counseling. Results will show the number and percentage of patients receiving new information through these encounters. The project will also show the number and type of drug therapy problems avoided. Finally, the results will demonstrate the percentage of patients satisfied with the bedside delivery service.

Conclusion: While delivery of discharge prescriptions to the patient's bedside before leaving the hospital is a strategy to reduce readmissions, a second component to readmission reduction is adherence after reestablishment at home with the prescription medications. This project will work to increase patient understanding with the potential to prevent drug therapy problems that can result in readmission. In addition, it will help to optimize the program for future implementation.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5a-256

Poster Title: Levels of evidence for pharmacogenomic dosing recommendations at an integrated behavioral health center

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Purpose: Pharmacogenomics is the study of the genetic variation of drug-metabolizing enzymes, transporters, and receptors and how these impact drug responses. Pharmacogenomic testing has the potential to improve patient outcomes by allowing prescribers to customize therapy to a patient's specific genetic profile to increase success of therapy and decrease adverse drug reactions. Early adopting institutions have initiated pharmacist-lead pharmacogenomic services that use single-gene and/or panel-gene tests to inform patient care decisions.

Methods: Pharmacogenomic testing was initiated at an integrated behavioral health center in October 2015. The test utilizes a proprietary algorithm to assess commonly prescribed medications and supplements given the patient's specific genetic profile. The results provided to clinicians list medications that have clinically significant dosing recommendations and those that do not. Patients that received pharmacogenomic testing and were prescribed a medication with clinically significant recommendations were included in the analysis. The level of evidence (classified as level 1a/b, 2a/b, 3, or 4) for each drug-gene pair labeled as clinically significant was determined by using the reference single-nucleotide polymorphism number for the associated drug-gene pair using the Pharmacogenomics Knowledgebase website. The Pharmacogenomics Knowledgebase is a pharmacogenomics resource that encompasses clinical information (dosing guidelines and drug labels), potentially clinically actionable gene-drug associations, and genotype-phenotype relationships.

Results: A total of 151 medications with clinically significant pharmacogenomic dosing recommendations were assessed. Depending on the gene modification, some medications did not have any available evidence in the Pharmacogenomics Knowledgebase website, whereas others had varying levels of evidences depending on the recommendation type (toxicity/adverse drug reaction, metabolism/pharmacokinetic, and dosage). Most medication-gene recommendations were level 2b (37.1 percent) or 3 (30.5 percent), while level 1a recommendations accounted for 14.6 percent. The sample included 80 patients with varying ethnicity (56 Caucasian, 14 Hispanic, 4 African American, 1 Asian, 2 other, and 3 not provided). A chi-square test was performed to see if there was any relation between ethnicity and drug-gene recommendation level of evidence. A p-value of 0.99 illustrated that there was no relationship between patient ethnicity and dosing recommendation level of evidence.

Conclusion: Levels of evidences are ranked by the Pharmacogenomics Knowledgebase based on the amount of evidence available for the significance of a drug-gene pair. Out of all of the drug-gene pairs represented as clinically significant by the pharmacogenomic testing panel, a majority of them showed a level 2b or 3, indicating these recommendations do not have guidelines for implementation and are based on limited evidence. This information can be used to help the testing site to critically evaluate the results of the testing, and potentially come up with an internal evidence based practice to better interpret patient test results.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5a-257

Poster Title: Evaluation of aripiprazole use at a non-teaching community hospital

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Purpose: Aripiprazole is an atypical antipsychotic with an oral tablet formulation FDA indicated for the treatment of various disease states, most prominently bipolar I disorder, schizophrenia, and adjunct treatment of major depressive disorder. Aripiprazole and its active metabolite dehydroaripiprazole have an elimination half-life of approximately 75 and 94 hours, respectively, allowing for once daily dosing. This drug use evaluation will evaluate anticipated cost savings based on a proposed therapeutic interchange to once daily dosing and converting orally disintegrating tablets to regular tablets. Additional cost savings analysis will compare the cost of prepacking aripiprazole versus current practice of purchasing unit dose aripiprazole.

Methods: This drug use evaluation is categorized as a cost savings initiative, and therefore does not require review by the Institutional Review Board. Order data for all oral aripiprazole formulations was collected for January 2015 through December 2015. Investigators collected the following data: order start and end times, formulations, strengths, frequencies, and cost of acquisition for each strength and formulation. Doses administered two times daily and three times daily were converted to once daily dosing. Orally disintegrating tablets were changed to regular tablets, as the regular tablet formulation can be crushed for easier administration in patients who cannot swallow. Total acquisition cost was calculated using the total length of therapy and the frequency of the dose, multiplied by the cost per tablet. Additional cost analysis compared the cost of unit dose aripiprazole tablets to the cost of locally prepacking from a bulk bottle. This analysis included the cost of technician and pharmacist labor in addition to the acquisition cost per tablet and materials for prepacking. Technician time was calculated at a rate of 0.25 dollars per minute, assuming 5 minutes for 30 tablets, and 7 minutes for 100 tablets. Pharmacist time was calculated at a rate of 1.00 dollar per minute, assuming 2 minutes

to check prepacking regardless of number of tablets. Material cost was calculated at a rate of 0.08 dollars per tablet.

Results: Over the evaluation timeframe, there were 3,963 tablets of oral aripiprazole dispensed. Of these, 908 tablets were two times daily orders, and 66 of these were three times daily orders. Converting orally disintegrating tablets to regular tablets in addition to converting all doses to once daily dosing resulted in an 11 percent decrease in acquisition costs. The analysis also found that the cost of prepacking one tablet is 16 percent of the cost of purchasing one unit dose tablet. Changing from unit dose to locally pre-packed tablets would result in an 80 percent decrease in total cost.

Conclusion: In conclusion, converting two times daily and three times daily aripiprazole regimens to once daily dosing identified a potential cost savings opportunity. Orally disintegrating tablets are significantly more expensive than regular tablets, and are utilized for patients that have difficulty swallowing. The authors concluded that switching these tablets to regular tablets to be crushed into food identified an additional cost savings opportunity. Prepacking aripiprazole tablets as opposed to purchasing unit dose tablets showed a significant decrease in cost, as this is a high-cost, low-utilization medication at this institution.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5a-258

Poster Title: Anaphylaxis severity in relation to the delay of epinephrine administration in Maryland schools (2012-2016)

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Purpose: Delayed epinephrine administration is a risk factor for fatal anaphylaxis. Requirement of more than 1 epinephrine dose signals more severe anaphylaxis. However, a report of 95 reactions, 18 requiring more than 1 epinephrine dose, showed that delayed administration in food-induced anaphylaxis was not a risk factor for receipt of multiple doses. Our objective was to explore relationships between administration delay and requirement of a second epinephrine dose in anaphylaxis cases occurring in Maryland schools.

Methods: School personnel reported anaphylaxis events occurring in Maryland schools across 4 academic years (2012-2016). Reports included demographics, symptoms, dosing, and outcomes. Reports were excluded if they did not contain information regarding delay or use of a second dose. Delay was defined as epinephrine administration time greater than 5 minutes from symptom onset. Non-normally distributed continuous variables are reported as median plus/minus interquartile range (IQR). Statistical analysis included descriptive statistics, Chi Square test for categorical variables and Wilcoxon Rank Sum test for non-normally distributed continuous data.

Results: 799 reports of anaphylaxis were received between 2012 and 2016. 427 reports were included in this analysis. Anaphylaxis occurred most frequently in students (95.8 percent) than in staff. Patients were age 12 (plus/minus 6) years, female (57.6 percent), white (37.9 percent), African American (35.5 percent) and Latino ethnicity (19.4 percent). A second epinephrine dose was administered in 24 (5.6 percent) patients and 127 (29.7 percent) had an administration

delay (greater than 5 minutes from time of anaphylaxis symptom onset). No delay (less than or equal to 5 minutes) was reported in 70.3 percent. Median time between anaphylaxis symptom onset and epinephrine administration was 2 (plus/minus 8) minutes with mode=0 (43.3 percent) and range of 0-140 minutes. Time between symptom onset and epinephrine administration in those requiring a second epinephrine dose was 3 (plus/minus 9) vs. 2 (plus/minus 8) minutes in those without a second dose (p=0.3460). There was no significance between administration delay (greater than 5 minutes) and requirement for a second dose (p=0.3921).

Conclusion: In this study of anaphylaxis reports across 4 academic years in Maryland schools, the majority of epinephrine was administered within 5 minutes of anaphylaxis onset. Although some patients received administration with lengthy delays (up to 140 mins) from symptom onset, there was no association between administration delay and requirement for multiple epinephrine doses. Prompt recognition of anaphylaxis and close access to epinephrine can shorten delays and prevent potential negative outcomes. Schools should make additional efforts to reduce administration delays when epinephrine is indicated.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5a-259

Poster Title: Assessment of liposomal bupivacaine's effectiveness in controlling post-operative opioid consumption and pain

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Purpose: The purpose of this study is to evaluate liposomal bupivacaine's (LB) effectiveness in decreasing post-operative opioid use across various procedures at Erie County Medical Center. Secondary outcomes include evaluating LB's effect on decreasing pain score. Due to its unique formulation, LB sustains therapeutic levels up to 72 hours post-infiltration. The longer duration has the potential to reduce length of stay post-operatively and increase patient satisfaction compared to standard of care without LB.

Methods: This study is a retrospective, cohort chart review. Subjects were identified through an inquiry of billing records and the electronic medical records. Data collected included: baseline demographics, pain scores and opioid use measured in morphine equivalents; serum creatinine levels; Charlson Comorbidity Index; hospital location prior to and after surgery; surgical procedure; surgery duration; type and duration of anesthesia; time to extubation; time spent in the post-anesthesia care unit; dose and time of liposomal bupivacaine administration; type, dose, and time of opioid used peri-operatively; and post-operative pain scores. Opioid consumption and pain scores were evaluated at the following pre-determined time intervals: 1, 2, 4, 6, 12, 18, 24, 48, 72, and 96 hours post-operative. Surgical types include orthopedic; cardiothoracic; bariatric; ear, nose, and throat; dermatologic; breast; ophthalmologic; and general surgery.

Results: Nine hundred and fifty patients meet the inclusion criteria (489 LB, 461 standard of care). There were no significant differences in baseline characteristics including age, sex, body mass index, baseline serum creatinine, Charlson Comorbidity Index, or type of surgery. Cumulative opioid consumption was significantly less during the first 24 hours (38.2 milligrams of morphine equivalents versus 56.72 milligrams of morphine equivalents, p equals 0.0048) in LB group compared to standard of care. Cumulative opioid consumption was no different at 48 hours in either group. Pain scores were significantly different at 1 hour post-operative (2.49 versus 2.95, p equals 0.0156) in the LB group compared to standard of care. The benefit was lost at 2 hours post-operatively, however. At 6 hours post-operative, there was a significant decrease in pain scores (4.47 versus 5.54, p equals 0.0048) in the LB group compared to the standard of care.

Conclusion: LB provides a small statistically significant change in pain scores compared to standard of care for only 1 hour post operatively. In addition, it also provides a decreased consumption of opioids through the first 24 hours postoperatively of approximately 19 milligrams of morphine equivalents. After these time points, however, the benefit of using LB is lost compared to standard of care. The utilization of LB versus standard of care is only beneficial regarding pain control for approximately 24 hours post-operatively.

Submission Category: Pain Management

Submission Type: Case Report

Session-Board Number: 5a-260

Poster Title: Methadone, an option for complex refractory pain syndromes with a neuropathic component

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Purpose: The complexity of managing chronic pain, the controversy, and the related abuse potential of opioids have led to the necessity of implementing new strategies to control pain, reduce opioids abuse, and most importantly improve the quality of life of patients. This case illustrates the benefit of using methadone to control complex nocioceptive pain with a neuropathic component. A 58-year-old Caucasian male presented to the comprehensive pain clinic with the complaint of lower back and bilateral knee pain. Patient's pain started at work and was described as shooting, stabbing, sharp, and aching. His pain was typically worst in the afternoon during inactivity. In addition, because of his job as an HVAC technician, he was required to lift heavy objects which resulted in escalating pain intensity. Previous pain management techniques included spinal injections, chiropractic manipulation which were not successful. Moreover, the escalating doses of opioids were ineffective. At the clinic, patient was prescribed Morphine capsule ER 60 mg TID, Oxycodone capsule, 10 mg PO Q6H PRN and Ativan o.5 mg PO daily. After 17 months of escalating opioid doses, therapy and follow-up, he returned to the clinic with further complaints of lower back pain. He reported experiencing numbness of the skin, arms, and intermittent episode of stinging sensations in left great toe. Treatment was initiated with the addition of trazodone, klonopin, tizanidine and loratidine. Despite this, his condition worsened and the pain intensity did not improve. Additional history revealed that with his medication regimen, he experienced excess sleepiness at his job and unfortunately was terminated. At this point to help alleviate his pain the pharmacist recommended that his MS Contin regimen should be switched to methadone, and a baseline ECG was ordered. A month later, MS Contin was discontinued, Oxycodone was then used as breakthrough, and methadone was initiated at 5 mg PO BID. At the follow-up two weeks after the initiation of methadone, patient reported feeling better with a pain improvement of greater than 30%. As a result, he increased his physical activity, creating extra pain. Methadone dose was increased to 10 mg in

AM, 5 mg at Midday, and 10 mg QHS; the breakthrough dose was also increased, and Gabapentin was initiated. Two months later, he reported significant pain relief, and was asked to continue with his current therapy as directed. Currently patient's pain score is 3/10 with 90% relief, and more importantly, the use of clonazepam is reduced. This case illustrates the tremendous benefit of utilizing methadone in patients with complex neuropathic pain refractory to traditional pain strategies. Although the patient using methadone is not completely pain free, the quality of life is improved, the use of breakthrough mediation is reduced, and more importantly, the use of benzodiazepine is decreased. Because of the new CDC guideline requirement for healthcare providers to reduce the use of opiates, polypharmacy, and the abuse of medications by patients, the recognition of this medication in the management of neuropathic pain by healthcare providers will not only save lives, but will decrease healthcare cost and adverse reactions. However further investigation is needed to show the benefit of methadone in a larger scale of patients.

Methods: N/A

Results: N/A

Conclusion: N/A

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 5a-261

Poster Title: Defining precision medicine and its impact on clinical pharmacists

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Purpose: Precision medicine is defined as an innovative approach that takes into account individual differences in a person's genes, environment and lifestyle to create a personalized therapeutic intervention for that patient. Clinical pharmacists could use precision medicine to be at the forefront of healthcare delivery. They could analyze patients' genetic tests in order to prescribe the most adequate medications while working with patients to reduce the impact of harmful environmental factors and educating patients about appropriate lifestyle changes. Our goal is to clarify misconceptions about precision medicine and inform clinical pharmacists about new, possible roles.

Methods: Relevant research concerning precision medicine was identified by searching databases for primary literature. A total of 6 research databases, including PubMed and Embase, were searched for publications from 1990 to 2016, with key articles obtained primarily from Hein Online, Elsevier and the Journal of American Pharmacists Association. In order to ensure that relevant studies were not missed, the search terms remained broad. These were "precision medicine or individualized medicine or personalized medicine", plus "pharmacist", plus "hospital", plus "legislation" anywhere in the title or abstract. Articles researched were restricted to the English language. In PubMed, precision medicine, individualized medicine and personalized medicine were all synonyms. PubMed defined precision medicine as clinical, therapeutic and diagnostic approaches to optimal disease management based on individual variations in a patient's genetic profile. The term "precision medicine" was added to PubMed in 2010. In Embase, the preferred term was personalized medicine, but precision medicine and individualized medicine were used as synonyms. The term "precision medicine" was added to Embase in 2011.

Results: The field of precision medicine is growing extensively and is now transitioning into daily practice among clinical pharmacists. However, precision medicine still requires adequate funding and pharmacists need proper training with pharmacogenomic testing and analysis of results. Several organizations may refuse to invest in this area until benefits have been demonstrated. Additionally, existing barriers such as data collection, participant consent, time, commitment to the program and lack of confidence of healthcare professionals may prevent engagement in precision medicine services.

Conclusion: Precision medicine can improve patient care by identifying risk factors of individuals susceptible to develop a certain disease. Furthermore, it could also be useful in the prevention of disease progression. Precision medicine has short term and long term goals. Its short term goals primarily focus on treating cancers while its long term goals concentrate on treating a wide range of diseases. Along with sufficient resources and funding, sustained commitment, time and energy and adequate training of healthcare professionals, precision medicine can reach its full potential to give individuals a chance at better health.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5a-262

Poster Title: RGS4 is a positive and selective modulator of the antidepressant-like effects of fluoxetine

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Purpose: Conventional treatments for depression increase serotonin (5-HT) levels with selective serotonin reuptake inhibitors (SSRIs). Despite their widespread use, SSRIs may cause unwanted side effects, and take weeks to months for therapeutic benefit. This implicates the need for improved understanding of mechanisms regulating mood and antidepressant drug action. The purpose of this study was to test our hypothesis that endogenous regulator of G protein signaling (RGS4) is a positive modulator of the antidepressant-like effects of SSRI fluoxetine in vivo.

Methods: Evidence suggests that the antidepressant actions of serotonin are modulated by endogenous regulators of G protein signaling (RGS) proteins. However, there is limited information characterizing the nature of this regulation and the specific RGS proteins that influence SSRI drug action in vivo is not yet known. In this study, mice homozygous for the genetic deletion of RGS4 (homozygous recessive) were compared to wild-type littermates following administration 10 mg/kg intraperitoneal injection of SSRI fluoxetine (Prozac; FLX) using mood-related behavioral assays, including the tail-suspension test (TST), novelty-induced hypophagia (NIH) test, locomotor activity (LA) test, and the social defeat stress and social avoidance test. Desipramine (Norpramin; DSP), a selective inhibitor of norepinephrine (NE) reuptake, was used to assess the selectivity of drug-induced antidepressant-like behaviors. Chronic isolation stress (single housed mice for 10 days) was compared to non-stress (group housed mice) and used to determine the role of RGS4 in regulating the mood-altering effects of stress. Immobility times in the tail-suspension test (TST) were used to measure antidepressant-like phenotype.

Results: Genetic deletion of RGS4 had no effect on basal antidepressant-like and locomotor behaviors. In the tail-suspension test, fluoxetine (10 mg/kg, twice daily) significantly reduced immobility scores in wild type mice compared to vehicle-treated littermates (98 plus or minus 21 sec versus 168 plus or minus 12 sec, p less than 0.001) but was ineffective in mice with RGS4 homozygous genetic deletion (141 plus or minus 11 sec versus 161 plus or minus 11 sec, p equals 0.462). In contrast, the antidepressant-like effects of desipramine (10 mg/kg, twice daily) were unaltered by RGS4 expression. Similar effects were observed following chronic (21 days) administration of fluoxetine and desipramine (10 mg/kg, twice daily) in the novelty-induced hypophagia test. Fluoxetine significantly reduced drinking latency times in RGS4 wild type mice compared to vehicle controls (577 plus or minus 110 sec versus 284 plus or minus 50 sec, p equals 0.037) but had no effect in RGS4 homozygous recessive littermates (392 plus or minus 134 sec versus 454 plus or minus 101 sec, p equals 0.720). In contrast, the antidepressant efficacy of desipramine in the novelty-induced hypophagia test was identical between RGS4 wild type and RGS4 homozygous recessive mice.

Conclusion: These data suggest that RGS4 is required for the antidepressant-like effects of fluoxetine but not for the antidepressant-like effects of desipramine. These findings point to RGS4 as a positive and selective modulator of the antidepressant-like effects of serotonin reuptake inhibitors. When subjected to chronic isolation stress, RGS4 homozygous recessive mice developed antidepressant-like phenotypes whereas non-stressed RGS4 homozygous recessive mice exhibited basal behaviors similar to both non-stressed and stressed RGS4 wild type littermates. Furthermore, RGS4 expression differentially influences the antidepressant-like behaviors following chronic stress. These data establish a role for RGS4 in the regulation of mood-related behavior in vivo.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5a-263

Poster Title: Impact of binge alcohol consumption on morning-after blood alcohol concentration

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Purpose: Based on the Center for Disease Control, the overall prevalence of binge drinking (greater than 4 drinks for women, greater than 5 drinks for men) among U.S. adults is over 17 percent. People typically consume 7.9 drinks per occasion over 4 times per month. As such, the Federal Aviation Regulations restricts crewmembers from having a blood alcohol concentration (BAC) over 0.04 percent and a BAC over 0.03 percent is thought to affect concentration. Avoiding medication errors is an important aspect of a pharmacist's job. Whether a night of heavy drinking would significantly impact BAC the following morning needs better understanding.

Methods: This is a pilot proof-of-concept project. The primary endpoint is the BAC the morning after a night of heavy alcohol consumption. A young healthy volunteer will consume at least 5 shots to reach a BAC level 0.1 percent and maintain a BAC of 0.1 percent for 2 hours of the night. The initial amount to consume will be estimated using the Widmark formula. BAC will be measured using a standard device at baseline, at the end of 5 shots, towards the end of 2 hours and the morning after. Subject will then sleep for 7-8 hours and wake up before 10 o'clock in the morning the following day. Fluid and food intake will be controlled and documented for the day leading up to the trial and controlled during the trial. Data will be reported using descriptive statistics.

Results: A 29-year-old Caucasian male, otherwise healthy, weighing 175 pounds (height 6 feet) volunteered for this pilot assessment. He consumed 5 shots (1.5 fluid ounces each) in the first 30 minutes with another 2 shots 30 minutes apart to maintain a BAC level above 0.1 percent. The BAC at baseline, 30 minutes shots and 2 hours was 0.0 percent, 0.113 percent and 0.134

percent respectively on the night of alcohol consumption. As such, the volunteer vomited after and suspects the last shot may not have been fully absorbed. The following morning BAC was 0.043 percent. A severe headache was experienced but resolved following 400mg of ibuprofen administration.

Conclusion: Our results indicate that the BAC is elevated the morning after a night of heavy alcohol consumption. Future studies would be warranted to assess the impact of morning-after BAC post binge drinking on job functionality and error rate from pharmacists. Bearing in mind the frequency of binge drinking, measures to improve the metabolism of alcohol and counter the associated symptoms would be beneficial.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 5a-264

Poster Title: Characterization of fentanyl use in therapeutic hypothermia versus targeted temperature management

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Purpose: The purpose of this study was to compare the use of fentanyl in survivors of cardiac arrest who were cooled to either 33 degrees Celsius or 36 degrees Celsius. The intent was to characterize the amount of fentanyl administered to each cohort to determine whether one group required more fentanyl administration than the other. The null hypothesis was that there is no difference in the quantity of fentanyl administered between the two cohorts.

Methods: This was a retrospective, cohort study at an academic medical center. The study included patients cooled during a 14 month period prior to and after the update in the institutional cooling after cardiac arrest protocol: from February 2013 to March 2014 the therapeutic hypothermia (TH) cohort was cooled to 33 degrees Celsius and from August 2014 to September 2015 the targeted temperature management (TTM) cohort was cooled to 36 degrees Celsius. The primary outcome was the average amount of fentanyl used per cohort (TH vs TTM) from hospital admit time to 96 hours. This study was approved by the University of Washington institutional review board.

Results: This study assessed 250 total patients, 126 patients were cooled using the TH protocol and 124 patients were cooled using the TTM protocol. Patients were excluded if they had an inpatient cardiac arrest and/or were not given fentanyl. Conclusively, 86 patients from the TH group and 75 patients from the TTM group were given fentanyl during the first 96 hours following hospital admission. There was no difference in the average amount of fentanyl (mcg)

administered per patient between the two cohorts: 1341.3 mcg (SD=1974.4) for TH vs 1401.9 mcg (SD=1974.4) for TTM (p=0.8625).

Conclusion: This study found that there was no difference in the amount of fentanyl administered to the TH and TTM patient cohorts during the measured time frame. Further research is recommended in order to better understand the analgesic needs of patients cooled following cardiac arrest.

Submission Category: Small and Rural Pharmacy Practice

Submission Type: Evaluative Study

Session-Board Number: 5a-265

Poster Title: Impact of an international medical brigade on student pharmacists' professional development

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Purpose: International medical brigades are a unique opportunity for health care professionals to develop important skills while helping patients in need. Student pharmacists, in particular, can benefit from this type of experience as they are in a critical period of building and advancing their clinical skills. The purpose of this study was to evaluate the perceived impact of a medical brigade on student pharmacists.

Methods: A ten question survey was taken by students two weeks prior to the medical brigade to Tena, Ecuador, asking individuals to answer questions on a five point Likert scale. These questions related to how well they can deliver patient-centered care, work with a team of health professionals, and apply didactic material outside of the classroom. The individuals then participated in a 10-day medical brigade to during which 455 patients across five different remote Ecuadorian villages were evaluated and treated. Throughout brigade, students worked in a variety of roles including triaging patients, taking a history of present illness, scribing for physicians, and working in the pharmacy to dose, intervene, and dispense medications. Upon return, students had two weeks after the medical brigade to take the same survey in an effort to access how those categories had been impacted by their service trip. All surveys were kept anonymous and data were not analyzed until both pre-trip and post-trip surveys had been completed.

Results: Following the medical brigade all questions had an improved score compared to the pre-trip survey. Of the ten questions asked, six had a score increase greater than 10 percent and two of those questions had a statistically significant higher score in the post-trip surveys. Student pharmacists before the trip felt neutral about their ability to provide medical care in a foreign country and after the trip each student agreed that they felt comfortable doing so (mean equals 3.42 vs. 4.14, p equals 0.046). Additionally, students' understanding of the roles of other healthcare professionals was significantly improved with all students having a strong comprehension by the end of the trip (mean equals 4.29 vs. 5.00, p equals 0.008). Finally, all student pharmacists agreed that the experience contributed to their development as a health care professional and that the information gained during the brigade could not have been learned in a didactic setting.

Conclusion: Students who participated in a medical brigade to Tena, Ecuador, achieved improved confidence in their ability to care for patients in a unique clinical setting. Given the opportunity, participation in a medical brigade can expand the knowledge and clinical skill set of student pharmacists beyond what is taught in the classroom to enhance their professional development.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5a-266

Poster Title: Effects of over the counter omega-3 fish oils in modulating inflammatory responses

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Purpose: The omega-3 fatty acids, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), are needed to generate anti-inflammatory and inflammation resolving mediators within the body. Pharmacists could benefit from comparative studies that explore the differing ratios of omega-3-fatty acids. In this study, we evaluated the inflammatory response induced by lipopolysaccharide (LPS) in RAW264.7 macrophages after treatment with different concentrations of fish oils. The purpose of this study is to determine whether there is a change in production of inflammatory mediators such as nitric oxide, interleukin 6 (IL-6), and tumor necrosis factor alpha (TNF-alpha) in LPS activated macrophages when treated with fish oil.

Methods: In this study, RAW264.7 mouse macrophages were grown in tissue culture plates to optimal confluency and used to assess inflammatory response. The cells were plated in triplicate and assigned to the following groups: 1) no treatment, 2) fish oil alone, 3) LPS alone, and 4) fish oil and LPS. Collected samples were assayed using three methods: Griess, enzyme-linked immunosorbent assay (ELISA), and Western Blot. A western blot was performed to separate proteins and the membranes were then incubated with labeled antibodies and developed to reveal the presence of inducible nitric oxide synthase (iNOS). The ELISA assay was utilized to measure the expression of inflammatory cytokines, IL-6 and TNF-alpha. Lastly, nitrite production concentration was determined using the Griess assay.

Results: Treatment with fish oil showed reduced production of LPS induced nitric oxide. Samples treated with fish oil displayed lower expression of iNOS activity and resulted in decreased expression of the inflammatory cytokine IL-6. Fish oil treatment did not show a significant reduction in the expression of TNF-alpha in LPS-activated macrophages.

Conclusion: There were observed changes in the expression of inflammatory cytokine IL-6 when RAW264.7 cells were induced for inflammatory response and treated with different concentrations of fish oil. There were minimal changes in the expression of TNF-alpha in cells treated with fish oil. Further investigation is needed to compare other brands of fish oil supplements in terms of anti-inflammatory responses. Future direction in OTC product comparison will allow pharmacists to better help patients choose a more effective product.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5a-267

Poster Title: Evaluation of availability and access to antidotes and reversal agents in a tertiary care medical center.

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Purpose: Administering an antidote within the appropriate amount time to a poisoned or overdosed patient is often critical to patient outcomes. It is therefore necessary to ensure appropriate medications are available in appropriate quantity, with proper drug information and ability to dispense. This project focused on the systematic assessment of antidote and reversal agent availability and accessibility at Houston Methodist Hospital (HMH), as proposed in the Institute for Safe Medication Practices 2016-2017 Targeted Medication Safety Best Practices for Hospitals.

Methods: Consensus guidelines published in 2009 were compared with the Texas Poison Control Center (TPCC) antidote chart to determine which products are considered time critical antidotes and reversal agents. A previous version of the antidote chart for Houston Methodist Hospital was used as a baseline to determine hospital needs. The current maximum and minimum stocking levels were assessed through inventory review, then compared to the amount needed to treat one 100 kg patient for 24 hours to determine if the current inventory par levels met the recommended amount for patient treatment. Additionally, select reversal agents were assessed to determine if clinical decision support guidance was available for each item.

Results: A total of fifty-four antidotes were assessed. Ten antidotes were removed from the list based on conventional use in the hospital, such as naloxone and lorazepam. Eleven antidotes were determined not to be currently stocked at Houston Methodist Hospital. All thirty-three

remaining antidotes are accessible through the Houston Methodist Hospital central pharmacy with a select few that can also be accessed from an automated dispensing cabinet.
The 2009 national consensus guideline recommended twenty-four antidotes to be stocked at institutions that provide emergency services. Of those, the TPCC recommendations included twenty of these items, or eighty percent. The four that were not included, were determined not needed. However, twelve antidotes recommended by the TPCC were not mentioned on the national consensus guidelines.
Of the thirty-eight antidotes recommended by the TPCC, the Houston Methodist Hospital baseline chart included eighty percent of the recommendations. The eight medications that were not included in the references were polyethylene glycol, syrup of ipecac, antivenin snake: micrurus fulvius, botulism antitoxin, dextrose in water, regular insulin, lipid infusion, and hyperbaric oxygen. In addition, six antidotes recommended by Houston Methodist Hospital were not mentioned on the TPCC chart including benztropine, bromocriptine, L-carnitine, cyproheptadine, dantrolene, and ethanol.

Conclusion: A comprehensive antidote chart was created to identify opportunities to improve Houston Methodist antidote availability. This reference chart includes information on antidotes, their use, sufficient quantity and designated location. Compared to the TPCC, Houston Methodist has three antidotes that are currently not in inventory and five without appropriate indication. Alternate therapies or medications have been implemented to treat conditions in place of these missing antidotes. For example, syrup of ipecac is a gastrointestinal irritant that induces emesis to treat overdoses. Although this antidote is found on the TPCC, Houston Methodist has other therapies available, such as activated charcoal.

Submission Category: Clinical Services Management

Submission Type: Evaluative Study

Session-Board Number: 5a-268

Poster Title: Interventions made by student pharmacists during in-room patient visits at an interprofessional student-run free clinic: A pilot study

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Purpose: As Doctor of Pharmacy students progress in their curriculum, it is expected that their ability to make clinically-appropriate recommendations improves. This study seeks to determine the impact the current professional year of student pharmacist has on their ability to contribute to an interprofessional student health care team at a student-run free clinic. The pilot study will use this information for the purpose of improving the number and quality of recommendations made by all student pharmacists.

Methods: This study is an observational prospective cohort approved by the Campbell University Institutional Review Board. Student teams worked together in caring for patients at a university student-run free clinic and consisted of a first-year osteopathic medical student (MS1), second-year osteopathic medical student (MS2), and student pharmacist (first [P1] through fourth [P4] year). Teams go into patient rooms and interview patients, determining their full medical history, primary problem for the visit, and preliminary plan. Care plans developed by student pharmacists and student physicians are presented by the team to an attending, generally a supervising volunteer physician. At the end of each clinic night, each pharmacy student is asked to complete a survey documenting all interventions they made that night for each patient they saw. Interventions were counted and categorized based on type. The primary outcome measure is the number of accepted interventions among student pharmacists in their P1 through P4 year. Secondary outcomes include the rate at which interventions made by each professional year are accepted by the attending physician, category of interventions made by each professional year, percentage of prescriptions with errors

received at the in-clinic pharmacy, and the number of interventions students make based on the number of times they volunteered at the clinic. Descriptive statistics were used to asses the results.

Results: A total of 56 students volunteered for the free clinic during the period of May 3, 2016 to August 30, 2016. Of these, 40 students completed the intervention survey at the end of the night; 7 were P1s, 3 were P2s, 19 were P3s, and 11 were P4s. Clinic was held once weekly for a total of 18 clinic days during the study period, and an average of 3 students volunteered each week. A total of 72 interventions were made. In evaluating the professional year of student volunteers and the number of recommendations that were accepted per student: 0.4 recommendations per P1 student were accepted, 1.3 per P2 student, 1.4 per P3 student, and 3.2 per P4 student. The most common type of intervention made by the pharmacy student was therapeutic selection.

Conclusion: In the pilot phase of this study, there was a positive correlation between accepted interventions and professional year. Student pharmacists from all professional years impacted interprofessional student teams with accepted recommendations. While there was limited representation from P1 and P2 students, P4 students had more accepted recommendations than other years and made a larger impact. Pairing P4 students with students in other professional years or including them in a mentor role may improve recommendations within the clinic.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5a-269

Poster Title: Development of hypertonic saline policy and optimization of the electronic medication record

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Purpose: Hypertonic saline administered intravenously is commonly used to treat severe hyponatremia and to alleviate high intracranial pressures in brain injury. Increasing severity of these conditions are associated with high morbidity and mortality, requiring immediate treatment. Hypertonic saline, if monitored improperly, can result in adverse events such as sodium toxicity and irreversible osmotic demyelination syndrome. The need to standardize the use and monitoring of hypertonic saline to provide guidance to healthcare professionals has led to the development of a hypertonic saline policy and optimization of the electronic medication record.

Methods: Methods implemented to form a hypertonic saline policy and enhance the electronic medication record include a literature review that focused on hypertonic saline use within guidelines and related primary literature; in addition, experienced clinical pharmacists, physicians, and nurses within the healthcare system was formed to provide formal review before approval. Meanwhile, the electronic medication record format was revised to include pertinent and detailed information that align with the policy and provide guidance. The inclusion of appropriate prescribing information was added to be utilized by both the providers and the pharmacists.

Results: The hypertonic saline policy include required and recommended labs necessary to maintain appropriate monitoring, including but not limited to BMP, regular sodium monitoring, and serum osmolality. Vital signs and neurological exams performed at a range of 1 to 4 hours to monitor patient improvement or decline. Hypertonic saline is recommended to be

administered through central line. Should the need of hypertonic saline arise and central intravenous access is unavailable, suggestions regarding peripheral venous administration are outlined. Each provider is to establish patient-specific sodium goals for every 24 hours throughout the duration of hypertonic saline use. In the event of over-correction, the nursing staff is to halt the infusion and contact the provider for further direction.

Conclusion: Hypertonic saline is important to treat conditions that can lead to significant morbidity and mortality. In order to prevent adverse events, proper administration and monitoring must be implemented. To attain these, standardization of use along with recommendations to guide therapy through the development of a hypertonic saline policy and medication record optimization were completed. Future directions include plans to provide the hospital staff with continuing education that will foster greater understanding with the risks associated from erroneous ordering and monitoring. Meanwhile order sets specific to disease states can be developed to further enact appropriate medication monitoring and administration.

Submission Category: Clinical Services Management

Submission Type: Descriptive Report

Session-Board Number: 5a-270

Poster Title: Collaborative practice competition

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Purpose: The purpose of this project was to bring health care students from different professions together to collectively and collaboratively practice interdisciplinary "rounding", apply clinical knowledge and skills, and exercise soft skills for effective communication and leadership development.

Methods: The competition is designed to simulate a collaborative rounding experience. An interprofessional team of students is first given a part of a patient case. Then one of the team members interacts with a standardized patient (standardized patients who are made up of the judges who are faculty members from the different schools participating) to gather more information such as labs, medication history, family history, and past medical history. The team is then able to evaluate the patient to perform their parts and together diagnose and develop a patient care plan by looking at the patient as a whole. The team presented their care plan to the judges. After the judges have submitted the scores, an award ceremony followed. The event is a competition graded based on the interaction with the patient, verbal/powerpoint presentations, and the written care plan. Standardized resources were provided to all teams. A standardized grading rubric was provided to judges and standardized patients.

Results: A total of twenty-four participants, twelve volunteers and 12 judges/standardized patients joined together to participate in this unique interprofessional competition.Twenty-four students actively participated in the competition. The students were composed of both pharmacy students from Manchester University college of pharmacy, nursing students, and nurse practitioner students from IPFW nursing program. All participants indicated that they were more confident and less anxious going into a rotational environment. All judges judged according to the standardized rubrics created for the event. Six of the 12 judges disagreed on

the judging procedure they wanted to be able to deliberate and offer feedback to the groups in person rather on the score sheets. Time of the event needed to be extended to accommodate for the judge's wishes. We learned that students are more comfortable presenting powerpoint presentations rather than verbal presentations. All judges and faculty advisors felt that this competition was a great innovative way to practice clinical skills, network with other healthcare professionals, and develop respect for each healthcare profession. All students felt that this experience helped build their confidence, competence, clinical skills, and communication skills with other healthcare professionals before practicing in the real world or on rotation.

Conclusion: The CPC has proven to be unique, successful and beneficial for a first-time event. All judges and advisors felt that this competition was a great innovative way to practice clinical skills and professionalism with other healthcare professionals. All students felt that this experience helped develop their confidence and multiple clinical skills with other healthcare professionals before practicing in the real world or on rotation. Many professional schools have contacted us to participate in the next competition. We look forward to expanding and share our experience with other schools to help better prepare their students for rotations or residencies.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5a-271

Poster Title: Use of Standardized Bowel Regimen Protocol to Improve Quality of Care for Pediatric Patients on Opioids

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Purpose: A known side effect of opioids is constipation. Approximately 40% of patients experience constipation related to opioid therapy for non-cancer pain. Opioid-induced-constipation can be severe and affect quality of life and length of hospital stay. Hospital discharge processes mandate admitted patients on opioids must have produced at least one bowel movement before discharge. Gastrointestinal motility disturbances can be mitigated using a combination of supportive therapeutic laxative classes.

Methods: Patient data was collected from the pediatric hematology-oncology and pediatric hospitalist service units at Banner University Medical Center at Diamond Children's Medical Center. Pre-intervention patient data was collected to establish baseline frequency of types of bowel regimen medications prescribed. The intervention consisted of a pediatric bowel regimen badge drug card distributed to physicians and residents, which provided key-dosing information based on different pediatric age groups. Post-intervention patient data was collected and used to compare the frequency of bowel regimens prescribed and the average length of hospital stay. Both t-test and Chi-squared tests ($\alpha \leq 0.05$) were used to assess the overall clinical outcome of this intervention. Additionally, a follow-up survey was created to assess whether the badge cards were utilized by prescribing physicians and residents.

Results: Fifty-six pediatric patients were eligible to be included in the study in both the pre-intervention and post-intervention groups. The mean duration of hospitalization showed a shortened duration of hospitalization after the intervention, although it was not statistically significant (pre: 8 ± 4.9 days, post: 5.8 ± 8.3 days, p-value: 0.09). The number of patients who were prescribed a bowel regimen post-intervention was marginally higher at 58.9%, compared to the pre-intervention group at 55.3%, but values were not statistically significant. The number of patients who produced a bowel movement after the bowel regimen was taken for post-intervention patients was marginally higher at 28.6%, compared to pre-intervention of 25% of patients (p = 0.4). A follow-up survey revealed that residents who received the intervention found the bowel regimen badge cards to be useful, but improvements to portability and a smaller size could have led to increased on-hand availability and increased use.

Conclusion: This study emphasized the importance of adjunct prescription of opioids and bowel regimens in pediatric patients. Although findings are not statistically significant, standardized bowel regimen badge cards can serve as reminders to the importance of preventing opioid-induced-constipation. Limitations of the study included inconsistent or missing documentation of bowel movements in EPIC charts by nursing staff, lack of financial expense data of bowel regimens on length of hospital stay, missing documentation of non-pharmacological interventions such as prune juice, and inherent variation in patient disease states that vary the number of opioid medications and bowel regimens prescribed.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5a-272

Poster Title: Evaluating the effect of dates of approval within therapeutic areas on pharmacy benefit managers' exclusion lists

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Purpose: Pharmacy benefit managers (PBMs) have become an integral part of the healthcare system. The purpose of PBMs include maximizing drug effectiveness while minimizing drug costs to patients and prescribers. PBMs accomplish this by managing formularies, performing drug utilization reviews, and mail order claims. Additionally, exclusion lists were introduced, first by CVS Health in 2012, followed by Express Scripts (ESI) in 2013. Since the creation of exclusion lists, both PBMs have annually increased their exclusion lists. This research aims to analyze the relationship between FDA approval dates of medications by therapeutic category on these exclusion lists for CVS Health and ESI.

Methods: A systematic review of approval dates was conducted for drugs listed on the 2017 exclusion lists of CVS Health and Express Scripts as published by Pembroke Consulting. Drugs from both lists were organized by the following therapeutics areas: Cholesterol and Hypertension; Central Nervous System; Dermatological; Diabetes and Weight Management; Eyes, Ear, Nose, Throat, and Respiratory; Gastrointestinal, Urological, Obstetrics, and Gynecology; Hematology and Oncology; Hepatitis; Inflammatory Conditions and Immunosuppressants; and Endocrinology and Supplements. Drugs that did not have regulatory timelines available on the Drugs @ FDA website were removed from the analysis. The years and months between date of approval and the time of analysis (September 1, 2016) were extracted for the remaining drugs, and a statistical analysis was done within the therapeutic categories for both PBMs, individually and combined.

Results: There are 129 combined drugs on the exclusion lists for the top two PBMs. 69 drugs were analyzed from ESI, and 34 drugs were analyzed for CVS Health. 7 drugs appeared on both lists. No drugs were analyzed from ESI in the Cholesterol and Hypertension category nor from CVS Health in the Dermatological or Inflammatory Conditions and Immunosuppressants category. For ESI, Hematology and Oncology drugs had the longest average time on market at 16.97 years. For CVS Health, Cholesterol and Hypertension drugs had the longest average time on market at 25.83 years. Hepatitis drugs had the shortest average time on market for both ESI and CVS Health at 3.88 years and 1.38 years, respectively. Overall, ESI's exclusion list had a shorter average time on market at 9.67 years compared to CVS Health's exclusion list, which had an average time on market at 12.55 years.

Conclusion: While there are many factors that are considered when evaluating a drug's placement on an exclusion list, the length of time on the market, especially in the context of certain therapeutic areas, appears to influence PBM decision making differently. ESI is more apt to exclude newer drugs than CVS Health except in the case of Hematology and Oncology products. Both PBMs excluded relatively new drugs in the Hepatitis category, which indicates a comparable decision making process in evaluating those medications.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Descriptive Report

Session-Board Number: 5a-273

Poster Title: Increasing formulary compliance through changes to the non-formulary review process at the Johns Hopkins Hospital

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Purpose: The acquisition and utilization of non-formulary medications can increase costs and decrease patient safety due to lack of integration within medication use systems and policies. The hospital policy encourages pharmacists to provide formulary alternatives when available for non-formulary orders. However, if the cost of the medication was less than a specific threshold (500 dollars per dose) there was no formal review or approval process in place. A second level pharmacist review process for non-formulary medication orders was implemented to decrease non-formulary use and understand the volume and resource needed to implement a non-formulary approval process.

Methods: Pharmacists that receive a non-formulary order evaluate and discuss alternatives with the prescriber. If following the initial discussion the non-formulary medication is still requested for use, the medication order is escalated to a non-formulary pharmacist reviewer. These reviewers serve as an additional layer of review and track the outcome of the encounter. These outcomes were manually logged in an excel document by the reviewers. The outcomes tracked included, endorse, do not endorse, do not endorse: changed, do not endorse: discontinued, verified off hours: would endorse and verified off hours: would not endorse. The non-formulary reviewer encounters were tracked and collected for 20 weeks. Non-formulary dispensed data was used to evaluate overall impact on non-formulary orders dispensed. The report was pulled from our pharmacy electronic health system on a monthly basis. Dispensed data was also pulled and reviewed the 6 months prior to implementation.

Results: After six weeks of the second level pharmacist review process, there was a 30 percent decrease (approximately 1,000 orders per month to approximately 700 orders per month) of non-formulary orders dispensed. The non-formulary reviewer data was collected for 20 weeks from April 25th 2016 through September 9th 2016. Within 6 weeks of implementation, 385 orders were escalated to a process. Of these orders, 45 percent were converted to a formulary alternative after additional review and discussion with the non-formulary reviewer. The outcome of each non-formulary request was categorized into reported outcomes categories including: endorse, do not endorse, do not endorse: changed, do not endorse: discontinued, verified off hours: would endorse and verified off hours: would not endorse. The reported categories were broken down into their reported outcomes category and also by therapeutic area. There were 13 unique therapeutic areas that were identified with complementary and alternative medications, analgesia, cardiology and gastrointestinal therapeutic areas having the highest number of medications. The data was also analyzed to identify high use non-formulary medications with no formulary alternatives so they could be taken through the formulary review process. The full 20 weeks of data has just been collected and is being analyzed.

Conclusion: The goal of this initiative was to improve patient safety and decrease overall cost by decreasing the use of non-formulary when clinically appropriate. The implementation of the pharmacist second level review for non-formulary medication orders significantly decreased the number of non-formulary medications dispensed overall. The positive results from the first 6 weeks of data supported moving forward with a second level review process. The data collected is being used to support the establishment of a formulary approval process for all non-formulary medications.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 5a-274

Poster Title: Effects of pharmacist-directed motivational interviewing on behavioral change in patients with diabetes in a medically underserved rural community pharmacy setting

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Purpose: Motivational Interviewing (MI) is a patient centered and goal oriented counselling technique used in various settings to empower patients to better manage their health. MI, originally applied in addiction counseling, has been extended for use in chronic disease management. Expanding their horizons by offering their knowledge and experience in improving patient outcomes, pharmacists have adopted MI techniques in counselling individuals with diabetes. This collaborative approach allows patients to be their own advocates of change. The purpose of this quality improvement study is to assess the effects of pharmacist-directed MI in individuals coping with diabetes.

Methods: 308 patients, including men and women aged 18 and older, with pre-diabetes, type 1 diabetes, or type 2 diabetes enrolled in an AADE™ accredited diabetes education program at Apple Discount Drugs, a community pharmacy, during 2014 and 2015. This patient education curriculum is part of a framework of patient centered diabetes self-management education (DSME) programs. The AADE7™ program identifies seven self-care behaviors that include healthy eating, being active, monitoring, taking medication, problem solving, reducing risk, and healthy coping. Aggregated data on patients applying each one of the seven AADE7™ self-care behaviors was analyzed to measure patient outcomes. Descriptive statistics including percentage change, mean, minimum, maximum, mode, and median were used to characterize data. For those who completed the diabetes education program, aggregate patient outcome was assessed by measuring changes in A1C, BMI, weight, foot and dilated eye exams. BMI was calculated using the National Heart, Lung, and Blood Institute (NHLBI) BMI Calculator. The primary measure of patient outcome was a change in baseline A1C and BMI measured 12-

months following initiation of the AADE7™ program. This study was exempted under category four of the Institutional Review Board.

Results: Out of 308 patients who participated in AADE7™ Self-Care program, the number of patients who signed up for each category included 88 (healthy eating), 69 (being active), 34 (monitoring), 22 (taking medication), 26 (problem-solving), 92 (reducing risks), and 46 (healthy coping). Patients who achieved their goals in each of these behavioral change categories were 71.59% (healthy eating), 71.01% (being active), 85.29% (monitoring), 63.64% (taking medication), 73.08% (problem-solving), 73.91% (reducing risks), and 76.09% (health coping). The average reduction in baseline A1C and BMI was 0.66 and 2.91, respectively.

Conclusion: Implementation of pharmacist-directed motivational interviewing as part of the AADE7™ Self-Care diabetes education program provides a noticeable and significant improvement in patient outcomes as measured by changes in A1C and BMI. This is demonstrated by improved medication adherence, therapeutic outcomes, as well as behavioral change in patients with diabetes who participated in this program. Community pharmacists are often the most accessible health care professionals for rural residents. This study showed how much patients with chronic health conditions could benefit from pharmacist-directed support programs.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 5a-275

Poster Title: When pink is not your color: Evaluating the risk factors associated with novel synthetic opioid U-47700

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Purpose: Recent emergence of deadly exposures to the novel synthetic opioid U-47700, otherwise known as “pink” or “pinky”, have created a national disturbance among both law and drug enforcement agencies. Media reports and public warnings have been issued regarding adverse events in connection with this psychoactive substance. Although U-47700 is relatively unknown, harboring limited scientific data, it is fairly inexpensive and easily obtained online. Pharmacists are often relied upon to understand and address the imminent health risks posed by harmful designer drugs. This evaluation was performed to identify the risk factors, and appropriate care management, involved with the ingestion of U-47700.

Methods: Pharmacists trained in drug information and the evaluation of novel compounds were consulted in this report. A literature search was performed utilizing PubMed, EMBASE, and the Cochrane Library from January 1st, 2015 to current for case reports, case series, and media reports related to U-47700. Drug potency and adverse effect comparisons were made with commonly employed opioids currently used in practice. Data for U-47700 case reports in the state of Utah were analyzed for comparative measure to national findings. Published reports of naloxone reversal and supportive care were assessed in U-47700 overdose cases.

Results: U-47700 is selective for the mu receptor, showing 7.5 times the binding affinity of morphine. 16 out of 20 deaths due to overdose of synthetic opioids in postmortem casework tested positive for U-47700 from October 2015-March 2016. Of these 20 cases, only one did not involve the ingestion of other illicit and/or prescriptions substances along with U-47700 . Unknown doses were found in 2 fatal case reports. Unlike other opioids, U-47700 is detected in

the serum. In 4 published reports of naloxone reversal, one patient recovered with 0.4mg IV, other opioids were also present in the urine.

Conclusion: U-47700 is a novel, selective opioid agonist that produces significant respiratory depression and mortality in untreated overdose. Naloxone doses required to reverse toxicity remain unknown, however repeated dosing has demonstrated reversal. U-47700 poses an imminent hazard to public safety. More research, along with appropriate education, is needed in order to curb the misuse of “pink”.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 5a-276

Poster Title: Calcinosis relating to tissue hypoxia in the setting of systemic sclerosis

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Purpose: Systemic sclerosis (SSc) is a rheumatic disease characterized by autoimmunity, vasculopathy, and fibrosis. Calcinosis is a frequent complication, where calcium crystals deposit in the subcutaneous tissue, most commonly in the fingertips. The vasculopathy in SSc is characterized by small blood vessel damage coupled with insufficient neoangiogenesis, causing decreased density of small blood vessels, multiple regions of tissue hypoxia, activation of hypoxia-inducible factor-1 (HIF-1), activation of osteoclasts and bone resorption, and we hypothesize that it may have a role in development of calcinosis as well.

Methods: An extensive literature review was performed examining the link between hypoxia and calcinosis. There is limited data published on calcinosis, and even less published on calcinosis and hypoxia. This necessitates evaluation of other disease states which cross over with SSc, and using established associations with calcinosis to elucidate the mechanisms involved.

Results: Key associations have been noted between calcinosis and acro-osteolysis, digital ulcers, osteoporosis, and pulmonary arterial hypertension. These manifestations are each related to hypoxia and/or HIF-1, providing support of its role in calcinosis. HIF-1 is induced by nearly all cell types and controls genes involved in angiogenesis, metabolism, differentiation, and apoptosis/apoptotic resistance, ultimately aiding in short-term cell survival. This protein also has a role in activation of osteoclasts and bone resorption. Calcinosis in SSc is dystrophic (occurs under conditions of normal serum calcium and phosphorous). Therefore, we hypothesize that the calcium in calcinosis is due to enhanced bone resorption by action of HIF-1. Ultrastructural and crystallographic analysis of calcinosis revealed that the major constituent of the deposits is hydroxyapatite, a main inorganic component of bone, providing further

evidence that the source of the calcium is the bone. In an unpublished case report, a patient with SSc and pulmonary fibrosis was prescribed treprostinil, a potent vasodilator, for management of her pulmonary arterial hypertension. After approximately 6 months of therapy, the patient presented to her rheumatologist noting that she had dramatic improvement in her calcinosis, confirmed on imaging. These data provide some evidence supporting the relationship between hypoxia and calcinosis in Scleroderma.

Conclusion: Vasculopathy in SSc results in the creation of a microenvironment in the digits which is hypoxic, hypothermic, favors bone resorption, and favors calcium deposition. Chronic hypoxia and induction of HIF-1 is responsible for enhanced bone resorption, which is the suspected source of the calcium in calcinosis. Therefore, examination of bone mineral density and degree of hypoxia going in the digits may be a predictor for calcinosis.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5a-277

Poster Title: Appropriateness of medication in a pediatric hospital of Mexico

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Purpose: In Mexico health services are implementing the process suitability of the medication. When assessing the pharmacotherapy adverse drug events (ADEs) medication errors (MEs) are common. These have a greater incidence in the processes of prescription and transcription. Although the MEs are frequent, most do not cause harm. However, should be monitored in any institution of health to prevent ADEs and promote the proper use of medicines in the patients. The purpose of this work is to show the results of the follow-up to the process of prescription and pharmacist intervention in the prevention of ADEs in a pediatric hospital.

Methods: This was a prospective, cross-sectional study open with the information contained in the medical prescriptions generated in the hospital specifically in the ambulatory surgery center, the period March 2015 to March 2016. Where the pharmacist made an analysis of the information contained in the leaves of medical prescriptions to be generated for each patient in the hospital, in regard to medication indicated, dose, route of administration, dosage form, therapeutic duplicity, allergies, drug interactions, possible adverse reactions to drugs, among others. The MEs were classified by its type, medication process and gravity. The intervention was made by the pharmacist. Finally, we documented the prevalence of error prevented and consequently of MEs.

Results: We evaluated 191 sheets of medical indications, of which the total number of surgeries practiced were orthopedics (63%), lip and palate (27%), plastic surgery (18%) and other surgeries (1%). Found 1,142 medication errors. The most common were by: drug interactions (12%), a dose greater than the indicated (10%), medication contraindicated (36%), allergies to medication (2%), duplicity therapeutics (2%), and errors of omission (38%). Of the latter, the

most common omissions are: the dose per weight (45%), route of administration (23%), duration of therapy (19%), pharmaceutical form (5%), dosing interval (4%) and dose (4%). From the MEs found, 97% are prevented by the timely intervention of the pharmacist.

Conclusion: When assessing the sheets of medical indications were found 1,142 MEs in the stage of prescription. Medication errors were in the following order omission errors (38%), medication contraindicated (36%), drug interactions (12%), among others. Of the errors detected in the service 97% were prevented by the timely intervention of the pharmacist.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5a-278

Poster Title: Justification for an emergency department cumulative antimicrobial susceptibility report and treatment algorithm for community-acquired Escherichia coli urinary tract infections

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Purpose: Escherichia coli (E. coli) is the most common uropathogen associated with urinary tract infections (UTIs) in the emergency department (ED). Empiric use of fluoroquinolones (FQ) is common for UTIs. However, resistance rates are on the rise with warnings of FQ use associated with tendon damage, central nervous system effects, QTc prolongation, impaired glucose homeostasis, and collateral infections. Knowledge of uropathogens and their sensitivities towards antibiotics is essential for successful empiric treatment selection. The purpose of this study is to justify the need for an ED cumulative antimicrobial susceptibility report (CASR) and use of empiric FQ-sparing agents.

Methods: A single center, retrospective cohort study of patients in the ED at RUSH University Medical Center (RUMC) was conducted between February 2016 and August 2016. The inclusion criteria were age 18 years or older, diagnosis of community-acquired acute uncomplicated urinary cystitis or pyelonephritis, and urinary culture with growth of E. coli. Data points collected included diagnosis, microbiological susceptibility reports, and antibiotic prescribed for empiric treatment. Patients with repeat UTIs had only their first visit included. Results from the ED CASR were compared to the hospital-wide (HW) CASR for E. coli. Findings were assessed to develop an empiric treatment algorithm for community-acquired acute uncomplicated urinary cystitis and pyelonephritis in the ED. Statistical validity and development of the CASR was in accordance with the Clinical and Laboratory Standards Institute, M39-A04 guidelines. The investigators aimed to include 151 E. coli urinary isolates assuming a difference of 10 percent (85 percent versus 95 percent susceptibility for a given agent) for E. coli resistance between the

ED and HW CASR; a statistical power of 0.8 and an alpha of 0.05. This study was submitted to the appropriate Institutional Review Boards for approval.

Results: Two hundred and twenty three UTIs in the ED from February to August 2016 were initially evaluated, identifying 184 urine cultures (83 percent) with E. coli as the primary pathogen. Of these 184, 154 unique cases of adult community-acquired acute uncomplicated urinary cystitis (n equals 94, 61 percent) and pyelonephritis (n equals 60, 39 percent) met inclusion criteria. Susceptibility rates for E. coli isolates used for the ED CASR (n equals 154) and the HW CASR (n equals 886) were compared. The following antibiotics showed significant difference in percent susceptible (p value less than 0.05): ampicillin (ED 63 vs. HW 44), ampicillin/sulbactam (ED 69 vs. HW 49), cefazolin (ED 80 vs. HW 62), ceftriaxone (ED 99 vs. HW 88), cefepime (ED 99 vs. HW 90), aztreonam (ED 99 vs. HW 89), levofloxacin (ED 90 vs. HW 65), trimethoprim/sulfamethoxazole (ED 84 vs. HW 67), gentamicin (ED 96 vs. HW 90), and tobramycin (ED 96 vs. HW 88). Resistance rates for nitrofurantoin and trimethoprim/sulfamethoxazole did not exceed 20 percent in our ED. Fifty three percent of cases were prescribed a FQ, followed by nitrofurantoin (24 percent), beta-lactams (12 percent), and trimethoprim/sulfamethoxazole (6 percent).

Conclusion: Significant differences were identified between the ED and HW CASR specific for E. coli in patients with acute uncomplicated urinary cystitis and pyelonephritis. Over half of the treated UTIs included in our study received a FQ. FQ-sparing agents such as nitrofurantoin and trimethoprim/sulfamethoxazole remain susceptible according to our ED CASR. Results from our ED CASR will help guide the development of an empiric treatment algorithm for E. coli associated community-acquired UTIs and justifies the use of fluoroquinolone-sparing agents as first or second-line treatment options.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5a-279

Poster Title: Use of Vaxchora (PXVX0200) as an active immunization against cholera: Evaluation of clinical trials

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Purpose: As there are a growing number of travelers from the US to over 50 cholera endemic countries, vaccination for cholera has become important. However, there has not been a vaccine that was approved by FDA until Vaxchora, the only cholera vaccine licensed for use in the US from June 2016. The purpose of this study was to evaluate whether Vaxchora satisfies the need for a prophylaxis of cholera that requires only one dose while still maintaining safety and efficacy.

Methods: FDA approved three different phase 3, randomized, double-blind, and placebo-controlled group studies. For each study, patients completed informed consent and screening procedure, and met inclusion criteria and not exclusion criteria before randomization. The first study assessed efficacy and safety of a single dose of PXVX0200 against Vibrio cholera O1 E1 Tor Inaba at 10 days or at 3 months post vaccination in healthy volunteers aged 18-45. The primary outcome was the occurrence of moderate or severe diarrhea to assess the vaccine efficacy. The secondary outcome was evaluating effect of vaccination on disease severity. The second study demonstrated the consistency of three different production lots of the vaccine. Patients who participated in this study were also aged 18-45 and each individual was scheduled for at least three visits for screening. The primary outcome was to assess vibriocidal activity against the classical Inaba biotype of Vibrio cholera with pre-specified the two-sided 95 percent CI around each pairwise ratio of GMTs being within 0.67 to 1.5. The third study assessed the equivalence in immune response of PSVX0200 in older adults aged 46-64. The primary outcome was assessing seroconversion by vibriocidal antibody against Vibrio cholera O1 E1 Tor Inaba at 11 days after vaccination with lower limit of the CI being within 10 percentage of the rate in young adults.

Results: In the first study, the single dose of PXVX0200 demonstrated vaccine efficacy of 90.3 percent with 95 percent CI (68.8 percent to 99.2 percent) at 10 days against moderate or severe diarrhea and it demonstrated vaccine efficacy of 79.5 percent with 95 percent CI (51.1 percent to 96.3 percent) at 3 months against moderate or severe diarrhea. In the second study, the two-sided 95% CI for each pair of lots was within the pre-specified CI interval of 0.67 to 1.5. In the third study, 90.4 percent of older adults had seroconverted by traditional Inaba vibriocidal antibody with 95 percent CI (86.4 percent to 93.5 percent). The lower limit of the two sided 95 percent CI on the difference in seroconversion between older and younger adults were -7.2 percentage points which was within the pre-specified margin range. All the primary outcome were met for the three studies and non-inferiority of the vaccine efficacy for individuals aged 45-64 versus those aged 18-45 has met for the third trial.

Conclusion: Based on the three trials, Vaxchora (PXVX0200) has proven efficacy and safety against vibrio cholerae serogroup O1 in adults aged 18-64 traveling to cholera-affected areas and shown the lot consistency of the vaccine. Additionally, Vaxchora offers a better dosing regimen by requiring a single dose compared to previous vaccines which required two doses. The limitation of the studies was that the safety and efficacy of Vaxchora have not been established in individuals living in cholera-affected areas and immunocompromised individuals. Furthermore, long term safety and benefits regarding control of cholera should be studied to assess overall clinical relevance.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5a-280

Poster Title: Evaluation of hepatitis C genotype prevalence and their treatment approach at a healthcare system

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Purpose: Hepatitis C virus (HCV) has high degree of genomic variability and rapid mutations. It chronically affects up to an estimated 180 million people globally. It is the principal cause of death from liver disease in the United States. Due to the varied genotypes and subtypes, treatment response for HCV is unpredictable at best. Until recently, interferons and ribavirin remained the main stay of therapy. The purpose of this study is to assess the genotype prevalence of HCV at healthcare system and analyze the current treatment approach and outcome considering the advent of new drug regimens.

Methods: The institutional pharmacy and therapeutics committee approved the evaluation of drugs used for treatment of hepatitis C. A report of patients that were being treated for hepatitis C infection was obtained for a period of one year. A total of 88 patients were identified and evaluated with regards to the drug regimen and the outcome measures were documented. The following data were collected for each patient; gender, race, weight, HCV genotypes, tests including liver biopsy, assessment of tolerability, side effects, safety of each drug regimen, cost, duration of therapy, drug regimen changes and reasons for change. In addition to data collected above, the efficacy or treatment response using rapid virological response (RVR), early virological response (EVR), sustained virological response or null responders were documented. Cost analysis of the various drug regimen and potential cost savings were performed. An assessment of the cost for treating side effects of each drug regimen such as interferon and ribavirin was documented. Also, the impact of patient assistance program in treating HCV was evaluated.

Results: Of the 88 patients, 29 were Black, 22 were Caucasian, 20 were Hispanics, 8 were Asian, and 8 were unidentified. There were 38 subtypes 1a, 8 subtype 1b, 16 subtype 2b, 9 subtype 2 unknown, and 17 subtypes 3a. Hepatitis score for biopsied patients showed 15 patients with mild scores, 10 moderate scores, and 2 with severe scores. Sixty-four of patients evaluated were naïve patients. Fifteen patients had failed interferon with ribavirin while one patient was on a repeat therapy of ribavirin and sofosbuvir. Another patient was on a repeat treatment with ribavirin, interferon and sofosbuvir while eight patients had failed some undocumented therapy. Sixty percent patients achieved a rapid virological response (RVR) at four weeks. By 12 weeks of treatment 74 percent (65) of the patients had undetectable levels of HCV. By the end of treatment of 12 or 24 weeks, 11 percent (10) were unable to achieve detectable levels. The treatments of 4 of these 10 patients were discontinued due to side effect. Fifteen percent (13) had unknown HCV levels upon completion of their regimen. All of the 88 patients were treated with medication obtained from patient assistance program therefore was cost free to the institution.

Conclusion: Significant advances have been made in the treatment of HCV infection when you take into account the use of the new highly expensive class of drugs with different mechanism of actions and less side effects. Of the six main hepatitis C genotypes, subtype 1a was the most prevalent at out institution. The use of the new drugs decreased the duration of therapy and caused few less side effect compared to old drug regimen. The use of patient assistance program has afforded our institution to treat this fatal infection without incurring cost.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 5a-281

Poster Title: Evaluating the value of the Rothman Index (RI) in predicting and reducing hospital readmission

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Purpose: Hospital readmission is a major issue in the United States healthcare system today, with most hospitals failing to identify high risk patients. The Rothman Index is a clinical tool used by hospitals that summarizes a patient's data, allowing physicians, nurse practitioners, and pharmacists to track a patient's status. The purpose of the study done at Yale-New Haven Hospital was to evaluate whether the Rothman Index effectively predicts patients who are at high risk for readmission, which would then allow healthcare providers to make interventions that would reduce readmission rates as well as costs.

Methods: Utilizing information from the hospital EMR system, the Rothman Index automatically generates a single score every hour using 26 clinical elements which include vital signs, laboratory values, and nursing assessments. RI score ranges from 0 to 100, with lower scores indicating poorer condition. Data on patients' RI scores at discharge and their frequencies of readmission were collected from 2,700 patients during a 5 month period. Readmission information was used to rank the Rothman Index scores into 4 categories containing patients at highest risk (RI < 70), medium risk (RI = 70–79) , low risk (RI = 80–89), and lowest risk (RI > 90). Data analysis was done to determine the statistical association between high risk groups and the likelihood of readmission within 30 days.

Results: Using the 4 risk categories established by researchers, the study found a correlation between the Rothman Index and readmission rates. Patients in the highest-risk category, with a Rothman Index less than 70, had a 20% readmission risk. Meanwhile, the risk for readmission was only about 10% for patients placed in the lowest-risk category, which corresponds to a Rothman Index of 90 or greater. Comparing the two risk categories, researchers determined

that within 30 days of discharge, patients placed in the highest risk category were two and a half times more likely to be readmitted than patients in the lowest risk category, and the correlation was statistically significant.

Conclusion: The Rothman Index is a helpful clinical tool that promotes efficient patient care in hospitals. Through earlier detection of patients at high risk for readmission, the Rothman Index can initiate communication among healthcare professionals to provide more effective interprofessional care to patients which would ultimately lead to reduction of hospital costs. The Rothman Index adds value to all areas of the hospital, including the clinical pharmacist, who could use the Index to optimize treatment options for these patients and provide interventions through counseling and medication planning at discharge.

Submission Category: Pharmacokinetics

Submission Type: Evaluative Study

Session-Board Number: 5a-282

Poster Title: Defining humanized dosing strategies of cefepime.

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Purpose: Treating bacterial infections is becoming increasingly difficult with rising antibiotic resistance, necessitating higher concentrations of broad spectrum antibiotics to be used. Cefepime is a broad spectrum cephalosporin used in Gram negative bacterial infections. Neurotoxicity is a known dose limiting side effect; however, little is known about the actual cause of the neurotoxicity. Thus animal models, such as the rat model, are important to understanding the exposure-toxicity relationship. We are developing a humanized exposure scheme to mimic human exposure profiles in the rat.

Methods: Male and female Sprague Dawley rats (~300g) were used for the experiments. Clinical grade cefepime was infused in a step-wise decreasing rate intended to mimic human exposure profiles (i.e. 1 gram given over 30 minutes). Exposure profiles were determined from internally held data on both human and rat pharmacokinetics for cefepime. Simulations were performed in Monolix (Lixoft, Antony, France). The cefepime was infused to the rat through a dedicated venous jugular catheter, blood samples were obtained from the contralateral catheter. Rats were connected to an infusion system that allows for free movement in the cage. Blood samples were obtained at 30, 60, 150, 240, 330, and 360 minutes, with normal saline replacing withdrawn volume. Plasma was prepared, and cefepime levels were determined using a validated high performance liquid chromatography assay. Data were modeled in Monolix using a 2-compartment structural model, and pharmacokinetic parameters were calculated in Stata V.14 (Stata Corporation, College Station, Texas).

Results: Two rats have successfully completed the protocol. A simulation of mean human exposure profiles for cefepime 1 gram given over 30 minutes resulted in an area under the concentration curve of 102.01 mg*h/L (time 0 to Tmax) and a Cmax of 58 mg/L. Infusion schemes in the rat of 200 mg/hr (1 hr), 100 mg/hr (1.5 hr), 66.7 mg/hr (1.5 hr), 46.7 mg/hr (1.5 hr) and 33.3/hr (0.5 hr) resulted in a similar profile. Rat pharmacokinetic parameters were: area under the concentration curve of 98 mg*h/L (time 0 to Tmax) and a Cmax of 65 mg/L.

Conclusion: Humanized profiles of cefepime are possible in a rat model.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Descriptive Report

Session-Board Number: 5a-283

Poster Title: Student pharmacist efficiency in reducing medication reconciliation errors in the emergency department

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Purpose: Medication reconciliation is an essential step to admitting patients from the emergency department (ED). By completing this service, the hospital ensures patients continue therapy with all current medications, have complete medication history on record, and decrease the likelihood of adverse drug events. Hospitals with comprehensive medication reconciliation programs have been shown to decrease patient medication errors, adverse events, and readmissions. The purpose of the study was to evaluate student pharmacists' ability to correct medication history errors after focused medication reconciliations completed by other healthcare professionals in the ED. Student pharmacists interviewed and completed full medication reconciliation sessions with patients.

Methods: A retrospective study analysis was conducted on data gathered between July 2013 through June 2016. Student pharmacists' impact was evaluated by the number of discrepancies they identified during medication reconciliation sessions. These were classified in three categories: addition of medications, removals of discontinued or incorrect medications, and clarifications of medications such as frequency or dose changes compared to histories completed by previous staff members. Student pharmacists left a note with recommendations and any actions taken on the patient medication lists with a chart note. These chart notes were reviewed and co-signed daily by ED pharmacists. While all notes were reviewed, approximately 20 percent of student pharmacists' notes were randomly audited for accuracy by a licensed pharmacist throughout the study period. These audits served as the data pool evaluated during this study.
Primary outcomes aimed to quantify and qualify student pharmacists' changes to medication lists in the ED. Secondary outcomes quantitatively assessed the time it took for individual student pharmacists to complete medication reconciliation sessions over the course of the study period.

Results: Primary outcomes found student pharmacists made at least one change to an average of 82.5 percent of medication histories they reviewed. There were 1,286 additions, 1,553 removals, and 2,396 clarifications with an average of 0.5 errors per medication reviewed. A total of 11,999 medications were analyzed. An average 2.5 changes per patient was made ranging from 0 to 9 additions, 0 to 11 removals, and 0 to 28 clarifications. The number of discrepancies increased linearly with the number of medications the patient was taking. Secondary outcomes found student pharmacists spent an overall average of 22.9 minutes on each medication reconciliation review session. The average time spent on each session decreased from 26.2 minutes to 20.0 minutes from the program's initiation. The length of time for medication reconciliations increased related to the number of patient's medications. Additional findings discovered the more medication reconciliation sessions that a student pharmacist completed, the lower their average time spent per session.

Conclusion: Student pharmacists identified many medication reconciliation history errors in the ED. They were able to identify 1 error for every 2 medications, even after nurses or prescribers completed and updated patient medications. Student pharmacists had both the time and knowledge to focus on obtaining accurate and complete medication reconciliation in the ED. Moreover, they were able to perform more sessions in less time, with the same accuracy, as the number of completed sessions increased. Student pharmacists' services can be utilized with patients to ensure the safe and effective continuation and initiation of medication therapies during their inpatient hospital stay.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5a-284

Poster Title: Validity of exceptions used in cost-saving clinical algorithms

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Purpose: Drug-drug interactions are preventable medication errors that increase mortality. We analyzed clinical algorithms developed by SinfoníaRx—a telephone based ambulatory care pharmacy that provides Medication Therapy Management (MTM) for Medicare Part D enrollees and commercial health plans. This healthcare company uses clinical algorithms to check for cost-saving opportunities, dose optimization, guideline-based interventions, adherence issues, drug-drug interactions, drug-disease interactions, and duplicate therapy. These algorithms are programmed to not recommend drugs that can interact with patients' current medication lists during the medication reconciliation process. The objective of this study was to evaluate the validity of the drug-drug interactions used by these algorithms.

Methods: In this quality improvement project, we identified errors of 'commission' and 'omission' in SinfoníaRx's exception list of 326 drugs for the following four drug classes: bisphosphonates, overactive bladder medications, nondihydropyridine and dihydropyridine calcium channel blockers. A drug exception was defined as the presence of a drug that makes the SinfoníaRx recommendation inappropriate, such as a drug-drug interaction with concomitant medications. When a patient meets a drug exception, SinfoníaRx's algorithm will not populate the cost-savings recommendation for the patient. The medications that SinfoníaRx recommends to patients were inputted into four reputable clinical resources: Micromedex, Facts and Comparisons, Lexicomp, and Medscape, LLC. The results were then compared against drugs that comprise SinfoníaRx's list of exceptions to determine if drug-drug interactions were present. Drugs included in SinfoníaRx's list of exceptions, but not noted in the four clinical resources were labeled 'errors of commission'. Key drug interactions missing from SinfoníaRx's

list of exceptions were deemed 'errors of omission'. Error rates were calculated by taking the total amount of errors in each class of medications and dividing by the total number of medications present on the exception list. For errors of omission, the denominator used was the total number of exceptions including the new drugs to be added.

Results: Among the 326 drug exceptions evaluated, there were nine bisphosphonates, 105 overactive bladder medications, 198 nondihydropyridine calcium channel blockers, and 14 dihydropyridine calcium channel blockers. Descriptive statistical analysis yielded a zero percent commission error rate for the bisphosphonates, overactive bladder medications and dihydropyridine calcium channel blockers. The nondihydropyridine calcium channel blockers had a commission error rate of 0.5 percent. The omission error rates were 10 percent, 6.2 percent, and 39.1 percent for the bisphosphonates, nondihydropyridine calcium channel blockers and dihydropyridine calcium channel blockers, respectively. The overactive bladder medications had an omission error rate of zero percent. The identified errors were reviewed by SinfoníaRx's clinical committee and adapted into their formal clinical algorithms.

Conclusion: With the reduction of drug interactions and other medication-related problems, medication therapy management services have the potential to alleviate financial burden on patients, increase adherence, and improve patient outcomes. The percentage of errors identified within each of the four clinical algorithms demonstrates the need for ongoing review to ensure appropriateness and patient safety. One limitation of the study included different severity ratings among the four clinical resources that may have led to inter-rater bias. It is crucial that SinfoníaRx continuously review its evidence-based data to ensure that their algorithms are accurate.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5a-285

Poster Title: Healthcare curriculum influences on mental illness stigma; Focused interventions and MHFA certification improves student perceptions

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Purpose: Healthcare professionals' lack of training in the treatment of psychiatric patients, coupled with the obstacle of stigma, prevents patients from seeking and receiving appropriate care. The purpose of this study is to assess if targeted course interventions and Mental Health First Aid USA Certification can improve student stigma toward mental illness.

Methods: This quasi-experimental study was approved by the University of New England (UNE) Institutional Review Board. Twenty third-year (P3) pharmacy students were surveyed using the Opening Minds Scale for Healthcare Providers (OMS-HC) before and after completing the two-credit elective course "Treatment of Psychiatric Patients." The development of this elective was driven by a previous IRB approved study in 2013 at UNE which utilized the OMS-HC to evaluate stigma in healthcare students (95/79 pharmacy, 47/38 nursing, 12/11 social work) pre and post didactic psychiatric coursework. These 2013 findings showed no statistical improvement of stigma, and therefore a need for more focused training. The elective course addressed the negative social impact providers can impose on patients and the barriers it creates for proper treatment. This course was the first to include 8-hour training for Mental Health First Aid USA Certification from the National Council for Community Behavioral Healthcare and NAMI Maine. The course also included a panel of speakers through NAMI to discuss living with a mental illness, a book review of an autobiography by a woman with schizophrenia, a review of neurobiology causing psychiatric illness, and focused topic reviews in primary psychiatric disorders (schizophrenia, mood disorders, dementia, substance abuse, child and adolescent disorders, and ethical dilemmas in psychopharmacology relating to cognitive performance enhancing medications).

Results: Change in stigma was measured both pre and post didactic psychiatry coursework for pharmacy, nursing and social work students. This didactic coursework influenced no significant statistical changes in all three majors. Students enrolled in the psychiatric pharmacy elective course demonstrated statistically significant decrease on each question of the survey (p< 3.558x10-3 - to 2.29 x 10-8). Pre-coursework survey results from the twenty pharmacy students demonstrated a mean total score of 37.00 (±5.32, range 28-45). When compared to post-course survey results, the mean total score decreased to 26.05 (±4.62, range of 17-32), thus demonstrating statistical significance (p=1.429x10-10).

Conclusion: A mental health diagnosis carries many social implications that negatively affect patients' access to quality care. Healthcare providers should be more aware of the barriers patients endure to ensure their own personal stigma does not compromise patient treatment. Previous research suggests didactic curriculum does not likely reduce stigma toward mental illness. The impact of a focused elective on how to best treat psychiatric patients statistically improved attitudes for personal disclosure and attitudes toward people with mental illness. This suggests that focused psychiatric interventions have a positive impact on reducing stigma, making implementation into pharmacy curriculum an essential consideration.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 5a-286

Poster Title: Providing diet/nutrition education in patients prescribed statins

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Purpose: Guidelines for the treatment of hyperlipidemia have always emphasized lifestyle modifications in addition to pharmacological interventions. The use of statins to treat hyperlipidemia has decreased serious cardiovascular events and their use has expanded with changes to the guidelines. Recent studies show that statin users are not adhering to a proper diet which suggest a lack of diet/nutrition education counseling by physicians.

Methods: Cross sectional study design using the 2006-2010 NAMCS, with a total study population of 2,370 patients. Primary objective is to determine if there is an association between the year of visit and the proportion of patients provided diet/nutrition education counseling. Secondary objective is to determine if there is an association between the year of visit and the proportion of patients provided exercise education counseling. Tertiary objective is to determine if there is an association between the proportion of patients provided diet/nutrition education counseling and each of the following variables: year, age, race, sex, ethnicity, BMI, geographic region, primary care physician, MSA, diabetes and hypertension. Quaternary objective is to determine if there is an association between the proportion of patients provided exercise education counseling and each of the following variables: year, age, race, sex, ethnicity, BMI, geographic region, primary care physician, MSA, diabetes and hypertension. Perform a chi-square test of homogeneity for primary/secondary objectives. Perform a chi-square test of association for the tertiary/quaternary objectives and include any variable with a $p < 0.2$ in a multivariate logistic regression. Sample size estimate of 3,620 patients and have an 89% chance to detect as little as a 5% difference between the groups.

Results: For the primary analysis, 30.8% of patients in the study population for the years 2008-2012 received diet/nutrition education counseling, compared to 39.1% of the patients in the study population for the years 2006-2007 (OR 0.69 [95% CI 0.46-1.04], p=0.08). For the secondary analysis, 24.8% of patients in the study population for the years 2008-2010 received exercise education counseling compared to 24.6% of patients for the years 2006-2007(OR 1.01 [95% CI 0.65-1.57], p=0.97). For the tertiary analysis, the only variables that were significant were Region West vs. Northeast, Region South vs. Northeast and receiving a diagnosis of diabetes. For the quaternary analysis, Sex (OR 0.72 [95% CI 0.56-0.93]) and diabetes diagnosis (OR 1.86 [95% CI 1.31-2.65]) were found to be significant in the multivariate model.

Conclusion: Our study found a lack of diet/nutrition & exercise education counseling, as less than half of the statin using population is receiving proper education counseling. This may help explain the poor dietary habits of statin users explained in previous studies. There is a need for more educational resources to properly educate physicians on providing diet/nutrition education counseling. If physicians are unwilling or unable to provide proper counseling, greater interprofessional collaboration among healthcare professionals can help fill this gap.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5a-287

Poster Title: Evaluation of students' perceptions of physical assessment videos

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Purpose: Physical assessment (PA) training should be incorporated into PharmD curriculum as part of accreditation standards and to continue advancing pharmacy practice. Since many pharmacy preceptors do not perform physical exams, students on experientials do not always get hands-on training. To help students become proficient in performing physical exams, student-produced videos covering vitals, HEENT, cardiac, pulmonary, abdominal, musculoskeletal, and neuromuscular examinations were created to supplement instruction. The purpose of this study was to assess students' perceptions of these videos and their confidence in PA and evaluate if student perceptions correlated to predictors in performance on a PA written exam and practicum.

Methods: This IRB-approved study included P1 students during 2015-2016. P2 Students produced 7 PA videos and posted them on Blackboard for P1 students viewing during 2 semesters (fall and spring) in which PA is taught in curriculum. P1 Students take their comprehensive PA practicum and written exam in the spring of 2016. P1 students Student perceptions were assessed via a post-course survey utilizing a 4-point Likert scale (A = strongly agree; D = strongly disagree). A non-investigator, linked the survey responses to individual student performance (written exam and practicum) via random ID numbers. Statistical analysis included chi square for categorical data and linear regression for continuous data.

Results: Of 112 P1 students, the average score on the written exam was 88% and the average score on the practicum was an 81%. Every student completed the survey and 106 students watched at least one PA video. Of the 106, 79% reported they could not have achieved the same results without the PA videos. Over 80% of students agreed/strongly agreed on 10 of 12 survey items assessing increased perceived confidence in PA skills including abdominal, neuromuscular, musculoskeletal, HEENT, and pulmonary exams, in addition to obtaining vitals and using cardinal techniques: inspection, auscultation, and palpitation. The most viewed video was the abdominal examination, viewed by 98 students. Students who use PA skills at work or rotations were more likely to score above average on the written exam (P=0.03). Students who watched the PA videos two or more times were more likely to score above average on the written exam than students who watched the PA videos once or not at all (P=0.005). There were no statistically significant predictors for the practicum scores.

Conclusion: Student-produced PA videos were well received by students. Students who watched the videos twice or more and students who utilized PA skills outside of the classroom were more likely to score above average on the written examination.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 5a-288

Poster Title: Evaluation of appropriateness of carbapenem usage and the incidence of multi-drug resistant microorganisms for potential carbapenem restrictions by antibiotic stewardship program (ASP)

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Purpose: Since the implementation of an Antimicrobial Stewardship Program (ASP) at an acute, teaching hospital, the overall antibiotic usage decreased significantly. However, a recent antibiotic utilization report showed a higher usage of ertapenem in comparison to other hospitals regionally and nationally. Furthermore, inappropriate usage of meropenem was thought to be increasing, prompting the ASP to consider restricting carbapenems. This study was designed to evaluate the appropriateness of meropenem and ertapenem prescriptions and to assess the prevalence of multi-drug resistant (MDR) microorganisms including extended spectrum beta-lactamase (ESBL) producing gram-negative bacilli to determine the need to restrict carbapenems.

Methods: Daily anti-infective list from Allscript was used to collect patients who received at least one dose of meropenem or ertapenem between August 15 to September 16, 2016. Patients were excluded if they received a carbapenem in the emergency department and was not continued after admission. Chart review was performed prospectively. Demographics data included age, gender, weight, and comorbidities. Risk factors for antibiotic resistance were collected such as place of residence, recent history of hospitalization and antibiotic use. The location of the patient and the prescribing physicians were noted to identify a particular prescribing pattern in a service. Criteria of appropriateness of the indication for empiric use was derived from clinical practice guidelines such as surgical prophylaxis and febrile neutropenia from the Infectious Diseases Society of America. Other criteria included history or documentation of ESBL or MDR microorganisms, clinical failure after a prolonged exposure of broad spectrum antibiotics or recommendation by infectious disease specialist or ASP. Length

of therapy was collected and de-escalation was documented based on the microbiologic outcome and clinical response.

Results: During 5 weeks, there were 86 carbapenem orders. Of 49 ertapenem cases, average age was 60 years (19-94). About half of the patients had co-morbidities, primarily diabetes, pulmonary, and renal impairment (50, 42, and 33 percent, respectively). Most came from home, but 35 percent received antibiotics recently. Majority of usage was appropriate (96 percent), and the most common indications were intra-abdominal infection or surgery (43 and 16 percent, respectively). Seven patients had a history of an ESBL organism. Average length of therapy was 3.4 days (1-14). De-escalation was made in 14 patients, but delayed in 8 of those patients. Of 37 meropenem patients, average age was 67 years (26-91). Seventy percent of patients had co-morbidities, primarily diabetes and renal impairment (42 percent, both). About half of the patients had recent history of hospitalization or antibiotic use (43 and 51 percent, respectively). Eighty-six percent received meropenem appropriately. The most common indication was severe sepsis, unresolved on broad spectrum antibiotics (49 percent). Seven patients had histories of ESBL or MDR organism, but there were 2 new cases of MDR Pseudomonas aeruginosa and ESBL E. coli. Average length of therapy was 4.8 days (1-20). De-escalation was made in 26 of potential 28 patients.

Conclusion: While the appropriate usage was high in ertapenem, there was a delay in de-escalation. Meropenem was prescribed appropriately less often and the length of therapy was longer, suggesting the need to not only restrict the usage but to develop appropriate criteria. Furthermore, the high prevalence of ESBL and MDR microorganisms demand the judicious use of carbapenems. The ASP will present the findings to the staff as well as the appropriate usage guideline. Finally, both meropenem and ertapenem orders will be reassessed by the ASP after 72 hours for opportunities to de-escalate more timely.

Submission Category: Leadership

Submission Type: Descriptive Report

Session-Board Number: 5a-289

Poster Title: Assessment of student leadership effectiveness in an interprofessional collaborative program to reduce falls in older adults

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Purpose: The inter-professional collaborative practice (ICP) core competencies underpin the student-led Senior Awareness and Fall Education (SAFE) program. The SAFE program conducts assessments led by physical therapy, pharmacy, nursing and kinesiology students to determine fall risks in older adults. In December of 2014 pharmacy students were integrated into SAFE inter-professional teams. Two student leaders were appointed to 1) develop a SAFE-specific online video that reinforced ICP core competencies, 2) serve as student preceptors for incoming pharmacy students; and 3) assess medications with fall risks. The purpose of this study is to assess pharmacy students' leadership effectiveness in improving the SAFE program.

Methods: A script for an online training video was developed in collaboration with California Health Sciences University and the Department of Physical Therapy and School of Nursing at California State University of Fresno. This SAFE-specific online video was created which focused on 1) risk factors for falls and 2) ICP core competencies on roles and responsibilities, team work, communication, and values and ethics. All new students to the SAFE program were encouraged to attend an ICP orientation and simulation workshop prior to the SAFE screening program with all involved disciplines. During the ICP orientation, the pharmacy student leaders trained the new pharmacy students to the roles and responsibilities of the pharmacist and the use of resources to review medications with potential fall risks. On the day of screening, the pharmacy student leader served as a team captain to assure effective team performance. A Likert scale of 1 = strongly disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly agree was used in the

survey questionnaire to assess leadership effectiveness. The study received IRB exemption approval.

Results: A total of 19 pharmacy students participated in the SAFE orientation and simulation workshop as well as the SAFE screening. Eighteen pharmacy students completed the post-activity survey for the most recent SAFE balance screening, a 94.7% response rate. A total of eight students reported as first timers to the SAFE program. Sixteen of the 18 students (88.9%) either agreed or strongly agreed that the video enhanced their understanding of the pharmacy student's roles, responsibilities, and scope of practice at the screening program. All students either agreed or strongly agreed that the SAFE student leaders communicated effectively to first-time pharmacy students to improve inter-collaborative group processes in assessing a client's risk for falls. Sixteen of the 18 students (88.9%) either agreed or strongly agreed that the SAFE student leaders exhibited leadership that enhanced their confidence to interview older adults and assess medication risk for falls to the new pharmacy students in the SAFE program. All students either agreed or strongly agreed that the SAFE student leaders enhanced team work and dynamics, served as a helpful resource to identify medications with fall risks, and advanced values of professionalism on the day of screening.

Conclusion: The opportunity to serve as SAFE student leaders has contributed to the development of leadership and professionalism. More importantly, the contribution in the development of educational resource tools, such as the online training video, and train the trainer program has significantly improved the quality and sustainability of an outpatient inter-professional collaborative program to reduce fall risks in older adults.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Case Report

Session-Board Number: 5a-290

Poster Title: Student pharmacists' perspective on the use of marijuana in and out of the medical setting

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Purpose: Marijuana has become a controversial topic among the medical community. Currently twenty-five states, the District of Columbia, Guam, and Puerto Rico that have approved the use of medical marijuana. As the use of marijuana becomes more prevalent in society it is important that student pharmacists are prepared for any questions that they may receive.
A survey was sent out to the pharmacy students of the University of Maryland Eastern Shore (UMES) School of Pharmacy and Health Professions. The program is a three year program, this survey was sent by email and participation was voluntary. This survey contained 16 questions, collecting information about the student's demographics, their history with marijuana, their political perspective in regards to societal problems, and to assess their clinical knowledge of marijuana. One hundred and fifteen students completed the survey. Of these participants, forty were from the first year class (P1), thirty-four were from the second year class (P2), and forty-one were from the third year class (P3).
The majority of the students in this survey (82.6 percent) agreed that the School of Pharmacy should include training about the risks and benefits of medical marijuana. Eighty percent of students also agree that the School of Pharmacy should include training of how to counsel a patient on the use of medical marijuana.
Most of the third year students (63.4 percent) stated that a patient should clinically fail other prescription drugs first, while only 25 percent of the P1 students and 17.6 percent of the P2 students agreed (p less than 0.05). Interestingly the P2 class had the highest rate in favor of legalization of marijuana for medical use (P1 equal to 65 percent, P2 equal to 91 percent, P3 equal to 73 percent; p less than 0.05), although the majority of all students were in favor the legalization.
It was interesting to see that even if a student knew someone who had abused marijuana to the point where it negatively impacted that person's life or if they knew someone that had been arrested because of marijuana, it did not have an effect on if they thought marijuana should be legalized for medical use or decriminalized for recreational use.

There was also no significant relationship between whether a student described themselves as liberal, moderate, conservative, or libertarian in regards to social issues and whether they thought that marijuana should be decriminalized for recreation or legalized for medical use. The majority of students thought that marijuana should be legalized for medical use regardless of their political philosophy. The split was more even when they were asked if marijuana should be decriminalized for recreational use, but there was not any relationship seen with political philosophy.

The Drug Enforcement Agency (DEA) currently lists marijuana as a Schedule I drug, meaning that is has high potential of abuse and that it does not have an accepted medical use. However, more states continue to legalize the use of medical marijuana and decriminalize the recreational use. Therefore it is necessary that pharmacy school prepare their students to be able to counsel on the use of medical marijuana.

Methods:

Results:

Conclusion:

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Descriptive Report

Session-Board Number: 5a-291

Poster Title: Development of a structured approach to assess the competency management needs for a health-system pharmacy

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Purpose: In order to select a sustainable competency assessment framework for the health-system pharmacy, an internal needs analysis was conducted to determine what features and characteristics of a competency management system (CMS) would be most beneficial for the users. Specific requirements were identified, which allowed stakeholders to evaluate the commercially available competency management systems based on the organizations' needs.

Methods: A needs analysis was conducted by interviewing the leadership and key stakeholders throughout the organization. Questions focused on how the organization currently manages competency assessments and operational problems. Strategic, operational, and technical drivers were identified and used as guideposts to ensure that the selection criteria and defined requirements align with the organization's goals and priorities. The identified requirements were organized into three categories: functional, technical, and cost. Functional requirements described what the system must be able to do from a competency management perspective. Technical requirements characterized how the system would fit into the existing infrastructure. Cost requirements identified budget considerations, constraints and expectations. Technical standards and constraints were considered as well. A set of vetting criteria was established to exclude non-qualifying products. Vendors were contacted when further description about a product's ability to support each vetting criterion was required.
The strength of a vendor's customer base and financial position were analyzed to determine the level of vendor support for the product and the likelihood that they would continue to improve their product through research and development. Customer references, live demonstrations and a trial version of the CMS products under consideration were requested. Questions posed to customer references were formulated to encourage illustrations of

potential problems and to gauge vendor responsiveness after implementation. For the public companies, financial reports were checked.

Results: The clearly defined and documented requirements, identified through the needs analysis, formed the basis of the CMS selection criteria. The evaluation of the available products was improved through the revising of our requirements to reflect clear, discrete and thoroughly characterized needs rather than a solution. Prioritizing the requirements and focusing on specific user functions within the CMS helped stakeholders decide how well each product met each of the detailed requirements. Stakeholders who were involved in the evaluation activities seemed to have more ownership of the resulting decisions.

Conclusion: A funnel approach was used to narrow the dozens of product options down to the several that best matched the defined requirements. The live demonstrations and access to trial versions provided evidence of a product's capabilities to help either validate or disprove vendor promises. The key element of this approach was the acquisition of buy-in and support from primary stakeholders.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 5a-292

Poster Title: Evaluating the outcome of pharmacy speaker events on student perceptions of the evolving role of pharmacists

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Purpose: The Roseman University of Health Sciences chapter of the Student College of Clinical Pharmacy introduced an initiative from August 2014 to September 2016 with the core purpose of educating students about clinical pharmacy specializations. To increase knowledge and disseminate information about emerging pharmacy career opportunities, the chapter established a guest speaker series. The series consisted of presentations by healthcare professionals practicing in specialized fields of pharmacy in the Las Vegas metropolitan area. The purpose of our study is to measure the impact of the series on students' awareness, interest, and knowledge of career advancement in pharmacy.

Methods: The chapter hosted 17 presentations, featuring pharmacists and physicians practicing in specialties including cardiology, ambulatory care, clinical pharmacy education, community pharmacy, and academia. The guest speaker events were open to any P1, P2, or P3 student at the Roseman University of Health Science Henderson campus. Attendance was recorded for each event. Students who participated in at least one guest speaker event were asked to complete a survey by September 15, 2016. The study excluded students who did not attend a guest speaker presentation. The survey consisted of ten questions using a measured Likert-type scale, assessing baseline knowledge of clinical pharmacy, student benefit, variety of specializations, quality of presentations, and additional questions regarding interest in residency programs. Subsequently, the data was analyzed to determine the end result of the guest speaker series on awareness, interest, and knowledge of various clinical pharmacy specialties.

Results: Students who participated in the series attended some or all of the lectures. Of the 259 students who participated, 196 (76 percent) students completed the survey. The majority of students indicated the presentations provided more insight into clinical pharmacy, with 59 percent reporting average baseline knowledge of clinical pharmacy prior to attending. Additionally, 66 percent agreed the topics presented will help them decide a professional path in clinical pharmacy. Furthermore, 87 percent of students agreed that the information that was presented benefited them, while 81 percent “strongly agreed” their knowledge of pharmacy would benefit from the implementation of a residency/fellowship education program.

Conclusion: Through the application of structured guest speaker events, our chapter gave student pharmacists the opportunity to gain information regarding career opportunities and promote students to pursue careers as clinicians. Our results demonstrate that attending these guest speaker events improved students’ knowledge regarding post-graduation opportunities in clinical pharmacy. We conclude the series provided student pharmacists with beneficial awareness of clinical pharmacy specialties and students are more likely to pursue postgraduate training.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5a-293

Poster Title: Evaluation of the use of Ceftaroline or Daptomycin or Vancomycin

Primary Author: Richard Lee, University of Washington, Washington; **Email:** richwlee@uw.edu

Purpose: The purpose of this drug use evaluation (DUE) is to evaluate the usage of antibiotics used to treat methicillin-resistant staphylococcus aereus (MRSA) and other resistant organisms. CHI Franciscan and MultiCare use a range of antibiotics to treat resistant organisms based on patient factors. To save costs and maximize care we will investigate the usage of Vancomycin in comparison to Daptomycin and Ceftaroline. The objective of this drug use evaluation (DUE) was to help assess proper medication selection to help the Pharmacy & Therapeutics (P&T) committee review the appropriateness of medication selection.

Methods: A sample retrospective case control cohort was followed from April 2015 – Feburary 2016 involving 77 patients. Patients were examined in regards to their antibiotic treatment regimens via investigative chart reviews. Patients were de-identified and anonymized. Information regarding medication name, medication dose, dosage form, dosing interval, order changes, admission date, provider, indication, culture, duration of therapy, and length of stay were analyzed. Patient records were reviewed to determine if treatment was successful, if patients had adverse drug reactions or drug allergies, and to understand the rational for drug selection. Data was analyzed for trends and a literature review of the 3 medications in this study were conducted.

Results: 77 patient charts with active orders for either Ceftaroline and or Daptopmycin were reviewed. When categorized by length of stay versus duration of therapy a high incidence of longer average length of stays and longer duration of therapy was evident in patients treated with both Ceftaroline and Daptomycin. When categorized by infectious disease provider the trend of a greater use of Daptomycin was evident in comparison to Ceftaroline. A review of the various indications compared to treatment options again reflected a greater incidence of Daptomycin use across all major categories such as bacteremia, bone/joint infection, endocarditis, SSTI, and UTI. Upon review of the use of Daptomycin and Ceftaroline by indication Daptomycin was used exclusively for UTI infections. Furthermore, Ceftaroline was never used for the treatment of endocarditis. The number of patients that actually had MRSA were

consistent at about 30% for both patient groups which involved those treated with Ceftaroline and those treated with Daptomycin. However, the 3rd patient group treated with both ceftaroline and daptomycin had a higher rate of MRSA.

Conclusion: Overall based on qualitative analysis of patient information, the use of alternative agents to Vancomycin were appropriately considered. Factors such as allergy, kidney function, and efficacy were all considered appropriately by ID providers. There are cost considerations in mind, for example Daptomycin costs almost twice as the daily cost of Ceftaroline. A further analysis of why Daptomycin was selected over Ceftaroline or vice versa should be studied in greater depth while considering most cost effectiveness analysis. This further evaluation can help guide future therapy with a cost effectiveness approach to provide clinical sound cost effective pharmaceutical care.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 5a-294

Poster Title: Description of home-based medication therapy management services in an interprofessional transitional care program aimed at reducing 30-day hospital readmissions

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Purpose: Since the establishment of the Hospital Readmission Reduction Program (HRRP), preventing 30-day unplanned hospital readmissions is crucial for reimbursement by Centers for Medicare & Medicaid Services. Published reports have shown pharmacist interventions after hospital discharge are associated with a smaller incidence of medication errors 30 days after hospital discharge, but most of these reports include pharmacists making follow-up phone calls. No published reports have described home-based pharmacy services as a part of transitional care programs designed to reduce unplanned 30-day hospital readmissions. This project describes the inclusion of a pharmacist as a part of an interprofessional transitional care team.

Methods: Safe Transitions for the Elderly Patient (STEP) is a transitional care program for Medicaid-eligible adults at least 50 years of age who have been recently discharged from the hospital in Tarrant County, TX. Enrolled patients receive an intake home visit from a medical provider within the first 72 hours after discharge which includes referral to other STEP providers (e.g. pharmacists, physical therapists and social workers). Patients on high-risk medications, who are believed to be non-adherent to medications or need short-term medication management were referred to the pharmacist (0.3FTE) for home-based medication therapy management (MTM) services. All patient encounters are documented in an electronic health record (EHR). Risk stratification scores were calculated by including the total sum of each the following parameters: problem meds, psychiatry, polypharmacy, health literacy, patient support, prior hospitalization, and palliative care. High risk stratification scores were defined as those with 5 having or more risk factors. Descriptive statistics were used to characterize the study population. Pearson's chi-square was used to examine the association between categorical variables. Results with a p value less than .05 were considered statistically

significant. Patients enrolled in the STEP program during the time pharmacists provided services were included in this analysis (August 2014 to January 2015 and October 2015 to July 2016).

Results: A total of 366 patients were enrolled in STEP during the specified time frame with 79 being seen by the pharmacist. The mean ages in those who were and were not seen by the pharmacist were 63.4 years (range 50-92) and 66.5 years (range 50-98), respectively (p=0.02). The majority of the patients seen by the pharmacist were women (72%, n=57), which was not significantly different than those not seen by the pharmacist (p=0.44). The median number of medications in those who were and were not seen by the pharmacist were 15 (range 3-38) and 11 (range 1-32), respectively (p=0.0002). Of the patients seen by the pharmacist who reported race/ethnicity, 35.4% identified as Black or African American (n=28). The proportion of all STEP patients with calculated risk stratification score was 93% (n=342). The proportion of patients with high risk stratification scores for those who were and were not seen by the pharmacist were 49% and 57%, respectively (p=0.22). The most common discharge diagnoses for patients seen by the pharmacist were heart failure and COPD exacerbations. Hospital readmission rates were not found to be significantly different in those who were seen by the pharmacist versus those who did not (10%, 14%, p=0.34).

Conclusion: Hospital readmission rates were not significantly different between those patients who were seen by a pharmacist as part of a home-based interprofessional transitional-care team versus those who were not. Overall hospital readmission rates were low for both groups. In this program, patients who saw the pharmacist were more likely to be younger and be taking more medications than those who did not see the pharmacist. Patients who saw the pharmacist did not have significantly higher risk stratification scores than those who did not see the pharmacist. More research is needed to demonstrate the benefit of home-based pharmacy transitional care services.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 5a-295

Poster Title: Reduction of time to tissue plasminogen activator as a result of pre-hospital lab draws by the Emergency Medical Services.

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Purpose: Tissue plasminogen activator (tPA) is beneficial when given within 4.5 hours of acute ischemic stroke onset, giving patients an increased likelihood to recover without any significant disability within a 3-month time period. Delays in diagnosis and laboratory data can place patients outside the tPA window. In an attempt to shorten time to tPA administration, some emergency medical services (EMS) companies have begun drawing blood for labs in the ambulance. The aim of this study is to determine if laboratory draws inside the ambulance shorten the time to tPA administration.

Methods: This study is a retrospective chart review of patients admitted to a 348 bed community hospital for acute ischemic stroke who received tPA. Patients were included if they were greater than 18 years old, who arrived at the hospital via EMS, have had an ischemic stroke with a clearly defined time of onset, and have met the inclusion criteria for tPA. Each patient's past medical history was obtained and a definitive diagnosis of hypertension or diabetes was used for data collection as well as any past or present history of smoking to assess risk factors for stroke. Patients were excluded if they arrived with rapidly improving symptoms signaling a transient ischemic attack, if they did not have a definitive ischemic stroke diagnosis, and/or if they had the stroke on site and did not have the opportunity to arrive via EMS vehicle transport. The primary outcome was to determine if receiving labs in the EMS significantly reduced door to needle time compared to receiving labs in the emergency department. The secondary outcome was to determine if there were better health outcomes, as determined by discharge NIH scores, in patients receiving tPA within a shorter amount of time due to getting labs in an ambulance. Safety outcomes were adverse events related to tPA, such as

angioedema, intracranial hemorrhage and anaphylaxis within 24 hours. Descriptive statistics were utilized.

Results: Thirty-two patients met inclusion criteria with one patient suffering a repeat stroke making two visits in the past year. Data was only available for 30 of the emergency department visits. The mean age and door to needle time (DTN) were 58.8 years-old and 77.5 minutes respectively. Hypertension, diabetes and smoking history were present in 78.1 percent, 43.7 percent, and 30 percent of patients, respectively. Of those who came by ambulance and data was collected, only 36.6 percent (n equals 11) had labs drawn in route to the hospital. The average DTN for those with labs drawn in the EMS was 77.7 minutes. From the remaining 63.3 percent (n equals 19), the average DTN for the patients who had labs drawn at the hospital was 86.3 minutes. During the study, two patients expired from hemorrhage complications of tPA.

Conclusion: EMS lab draw in patients suspected of acute ischemic stroke was associated with a 8.6 minute decrease in door to needle time compared to patients who had labs drawn at the hospital. The clinical significance of this reduction is small.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 5a-296

Poster Title: Expression of constitutive RSK1 and phosphorylated RSK1 in breast cancer MDA-MB231 and MCF-7, and prostate cancer PC3 and DU-145 cell lines

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Purpose: The purpose of this study was to determine if the breast cancer cell lines MDA-MB231 and MCF-7 as well as the prostate cancer cell lines PC3 and DU-145 express both constitutive RSK1 and phosphorylated RSK1 (pRSK1) as a specific drug target in cancer cell therapy. The 90kDa ribosomal S6 kinases (RSK) are serine/threonine kinases that are expressed in a variety of cancers and have been implicated in regulation of cell growth, proliferation and motility.

Methods: MDA-MB231 and MCF-7 are human breast cancer cell lines and were derived from invasive ductal carcinoma. PC3 and DU-145 are derived human prostate cancer cell lines. Protein extracts from the breast cancer (MDA-MB231 and MCF-7) and prostate cancer (PC3 and DU-145) cell lines were prepared and probed by Western blot analysis using constitutive RSK1 (Cell Signaling) and pRSK1 (Epitomics) antibodies.

Results: Constitutive RSK1 and pRSK1 were expressed in the breast cancer MDA-MB231 and MCF-7 as well as the prostate cancer PC3 and DU-14 cell lines. The results show that these enzymes are present in different cell lines of breast and prostate cancer, and thus are potential targets for cancer cell-mediated therapy.

Conclusion: Breast cancer MDA-MB231 and MCF-7 as well as the prostate cancer PC3 and DU-14 cell lines express both constitutive RSK1 and pRSK1. As the RSK family regulates cell growth and proliferation drugs, inhibiting these kinases may reduce the growth of these breast and prostate cancer cell lines. Further research is necessary to evaluate the inhibitory properties of these enzymes to establish their role in the future of cancer treatment.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5a-297

Poster Title: Improving Healthy Lifestyle Attitudes With F.I.G.H.T Nights

Primary Author: Mariam Khan, University of Arkansas for Medical Sciences, Arkansas; **Email:** mkhan2@uams.edu

Purpose: Patients participated in F.I.G.H.T. Nights. These sessions were designed to improve patients' health and wellness through educational seminars, cooking and exercise demonstrations. The goal of the study is to identify barriers that hinder changes in lifestyle and areas for increased education through our F.I.G.H.T Nights.

Methods: F.I.G.H.T. Nights was created to encourage healthy lifestyles in patients by equipping them with the proper tools and educational resources. During each night, patients' participating completed an anonymous pre- and post-survey to assess their attitudes and knowledge regarding their eating habits, exercise, and other obstacles to improve their health and wellness. This was done to track quality improvement for healthy lifestyle changes over the timeframe of the event as well as the benefits of conducting F.I.G.H.T. Nights for all attendees. Demographic information including age, income, and education level are collected.

Results: To date, 27 patients have completed pre- and post-surveys with the anticipation of more patients completing surveys during additional F.I.G.H.T. Nights throughout this year. The results from our pre/post survey's thus far show that most of our participates had little to no knowledge that their current diet was not healthy. As a result of Fight Night more than 70% of our participates had a better understanding of healthy eating and 81% wanted to work out at least 3-4 times/week.

Conclusion: Using the results of the surveys from F.I.G.H.T. Nights, the program can be better tailored to the needs of patients. Additionally, unique insight will be gained to further understand what health care provided interventions could motivate patients to live a healthier lifestyle. Overall we wish to find ways to help lessen the disparity between learning about living a healthy lifestyle and actually acting upon living a healthy lifestyle. Our F.I.G.H.T Nights have provided us the opportunity to be accessible to our patients in a way that is both practical and feasible.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5a-298

Poster Title: Medication-use evaluation of concomitant psychostimulant and benzodiazepine prescriptions at a veteran affairs healthcare system

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Purpose: Benzodiazepines are often used to treat common comorbidities of adult attention deficit hyperactivity disorder (ADHD) including anxiety and insomnia. While effective for both conditions, benzodiazepines' adverse reactions such as sedation, cognitive impairment and risk of dependence often defers their application to second-tier therapy after other alternatives have failed. Inappropriate regimens of psychostimulants and benzodiazepines increase the risks of adverse reactions. This medication-use evaluation will evaluate the appropriateness of concomitant stimulant and benzodiazepine prescriptions within a rural veterans affairs healthcare system, and identify patients where further investigation and pharmacist intervention may be warranted to improve therapeutic outcomes and patient safety

Methods: This project was approved by the Pharmacy and Therapeutics Committee prior to implementation. Current outpatient prescription data was extracted to identify patients with concurrent psychostimulant and benzodiazepine prescriptions between 3/1/2016 to 6/30/2016. Retrospective electronic medical chart review was conducted to review the initial start dates of both stimulant and benzodiazepine prescriptions, the initial prescribers of both substances, the indications for which a stimulant and benzodiazepine were prescribed, dosing and frequency of both prescribed substances, as well as co-morbid conditions that warranted special treatment considerations such as substance use disorders. Medical history and progress notes were reviewed to identify whether the patient had a failed trial of non-controlled medications to treat anxiety or insomnia before a benzodiazepine was prescribed. All patients were included in the analysis. Medication appropriateness index was employed as a supporting tool for this medication-use evaluation

Results: At the completion of chart reviews, 13 patients were identified to have concurrent stimulant and benzodiazepine prescriptions/orders. Twelve patients were prescribed methylphenidate or amphetamines to treat ADHD; one patient was prescribed modafanil for treatment of fatigue associated with Multiple Sclerosis. Methylphenidate, dextroamphetamine, amphetamine-dextroamphetamine combo were found to be equally prescribed and accounted for 92 percent of psychostimulant prescriptions. Modafanil accounted for the other 8 percent of the total prescribed stimulants. Benzodiazepines were prescribed to five patients with diagnosis of insomnia, to four patients with diagnosis of anxiety, and to three patients to treat both insomnia and anxiety disorder. Commonly prescribed benzodiazepines included clonazepam and lorazepam, which accounted for 54 percent and 15 percent of total number of benzodiazepine prescriptions, respectively. Diazepam and temazepam were equally prescribed; and together, they accounted for 16 percent of prescribed benzodiazepines. Zolpidem prescriptions for the treatment of insomnia in ADHD patients were also included in this study, which made up the other 16 percent of benzodiazepine prescriptions. Out of the 13 patients, five patients did not have a previous trial of a non-benzodiazepine alternatives. Eleven patients were started on stimulants and benzodiazepines by the same prescribers. The prevalence of appropriate stimulant-benzodiazepine regimen was 38 percent.

Conclusion: The result of this evaluation was presented to the Pharmacy and Therapeutic Committee. Clinical education will be provided to prescribers and pharmacists on the recommendation of current practice guidelines toward non-pharmacologic approaches and safer alternative treatment for insomnia and anxiety disorders. Interventions will also focus on preventing the prescribing cascade of controlled substances, whereby a benzodiazepine is prescribed to treat insomnia as an adverse reaction to a stimulant prescription. Using a multidisciplinary approach, appropriate treatment regimen will be formulated to enhance therapeutic outcomes and patient safety.

Submission Category: Geriatrics

Submission Type: Descriptive Report

Session-Board Number: 5a-299

Poster Title: Impact of student led medication reviews on adherence and comprehension of medication therapy in geriatric patients

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Purpose: Brown bag medication reviews serve as a means of medication therapy optimization and reconciliation. Brown bag events allow student pharmacists to apply their pharmacy knowledge to better patient outcomes and advance the role of pharmacists as medication experts. Brown bag events hosted by Student College of Clinical Pharmacy at Roseman University of Health Sciences function as an integral member of the community through outreach and involvement. The purpose of this study is to evaluate patients' adherence and comprehension of medication therapy before and after a brown bag medication review in a geriatric setting.

Methods: Student pharmacists conducted patient interviews. During patient interviews student pharmacists assessed disease states, identified medication interactions and adverse effects, and ensured proper medication usage by providing comprehensive brown bag medication reviews, under pharmacist supervision between November 2014 to May 2016. The study included patients from 5 senior communities within Clark County of Southern Nevada. Patients were given a survey before and after each medication review. This survey was used to assess patients' knowledge of therapy, adherence, chronic medical conditions, number of visits with their primary care provider yearly, and number of current medications. Therapies reviewed consisted of prescription medication, over-the-counter medication, herbal supplements, vitamins, and medical supplies.

Results: Surveys from 78 patients were assessed. Average age of patients was 68 years old (59 - 79 years old) with an average of 8 medications per patient. Before medication review, 40 percent and 54 percent reported knowledge of and adherence to therapy respectively.

Following review, percentages of knowledge and adherence increased to 85 percent and 75 percent respectively. Furthermore, 30 percent of participants reported annual visits with their provider while 58 percent reported 2 or more visits yearly. Patients with hypertension and diabetes reported 2 or more visits yearly. Patients with memory loss and arthritis reported not visiting their primary care provider in over one year. Patients were also surveyed for being first time participants of student led medication reviews. Additionally, 75 percent of patients reported being first time brown bag medication review participants and 15 percent reported having their medications reviewed in the past year.

Conclusion: Student pharmacists participating in brown bag events present a great opportunity to impact senior communities. Brown bag events led to an increase in both patients' adherence and knowledge about their medication therapy. Since elderly patients are more at risk for complications due to chronic disease states, brown bag medication reviews can decrease this risk by reducing inappropriate medication therapy, medication duplication, polypharmacy, medication adverse effects, and fall risks. To optimize patient care, interventions made during each brown bag event can be communicated with the patient's primary care physician. This can improve disease state management and decrease adverse drug reactions.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Descriptive Report

Session-Board Number: 5b-001

Poster Title: Implementation of a clinical pharmacist in the emergency departments of Puerto Rico hospitals

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Purpose: The pharmacy profession has evolved from dispensing medications to offering clinical pharmacy services to different institution departments, including the emergency department. The objectives are to review the role of the pharmacist within the emergency department on the literature and published data, assess the need of an emergency pharmacist in Puerto Rico hospitals, and contribute ideas on how to implement clinical pharmacy services in the emergency department of hospitals in Puerto Rico.

Methods: A search on Elton B. Stephens company database (EBSCO), Ovid, PubMed, and Latin American and Caribbean Health Sciences Literature (LILACS) was conducted. The articles were selected by title and abstract according to their relevance to the topic. After applying the inclusion criteria, articles were classified to different categories qualitatively by the types of interventions done by the pharmacists. Also, an electronic survey was distributed by email to different health care professionals of hospitals in Puerto Rico.

Results: From 47 articles that were chosen, 26 met the inclusion criteria. Articles were classified under: service modalities, training for pharmacist, cost and medication error avoidance when implementing pharmacy services, pharmacist responsibilities and roles, time to receive services in the emergency department , among others. Data collected from the survey showed that 7 of 12 (58.3 percent) of the respondents institutions' had direct clinical pharmacy services in the emergency department. A total of 6 of 12 (50 percent) respondents totally agree that having a pharmacist in their institution's emergency department is necessary. Another 4 of 12 (33.3

percent) totally agree that having a pharmacist at their institution's emergency department is viable.

Conclusion: A review of the literature revealed that pharmacists play an important role in the emergency departments. The addition of a clinical pharmacist to the emergency department of the hospitals in Puerto Rico could be beneficial for the institutions and the patients. The implementation can be done by phases in order to facilitate the transition.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5b-002

Poster Title: Impact of antimicrobial stewardship intervention on duration of therapy and patient outcomes for the treatment of community-acquired pneumonia (CAP)

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Purpose: CAP is the eighth leading cause of death in the United States. Traditionally, antibiotic duration for CAP treatment was 7-14 days, however, ATS/IDSA guidelines recommend short-course therapy (5 days) if patients are clinically stable and rapidly defervesce. There is minimal data evaluating compliance with guidelines and stewardship intervention impact on antibiotic duration. Additionally, ATS/IDSA guidelines list respiratory fluoroquinolones and cephalosporins as treatment options but are associated with higher risk of Clostridium difficile infection (CDI). At University of Michigan Health System (UMHS), CAP guidelines were updated to minimize high-risk CDI antibiotic use and provided therapy duration recommendations consistent with ATS/IDSA guidelines.

Methods: A single-centered pre-post quasi-experimental study, approved by the institutional review board, was completed at UMHS in Ann Arbor, MI with the primary goal of decreasing excessive antimicrobial duration of antibiotic therapy, without adversely affecting patient outcomes. Secondary objectives included evaluating the use of high-risk CDI antibiotics, and associated CDI rates. Adults (18 years or greater) diagnosed with CAP and admitted to a general medicine unit were cohorted into two groups: pre-intervention group (November 2014 - April 2015) and intervention group (November 2015 - April 2016). Patients with other pneumonia diagnosis, complicated pneumonia, and positive respiratory culture not consistent with CAP were excluded.
Pre-intervention data was collected using ICD-9 codes for pneumonia and reviewing patient charts. Stewardship intervention consisted of education to physicians about updated UMHS

CAP guidelines and verbal recommendations through prospective audit and feedback. Patients in the intervention group were identified real-time through daily stewardship team review (Monday-Friday), which made recommendations on antibiotic selection and duration of therapy.
It was determined that a sample size of 300 to yield 80% power was needed to assess the impact of stewardship intervention on duration of antibiotic therapy. Comparison of the pre- and post-intervention cohort was performed using unpaired t-test for continuous data and two-tailed Fischer's exact test for categorical data. P-values less than 0.05 was considered significant.

Results: There were 334 patients included: 169 patients in the pre-intervention group and 165 patients in the post-intervention group. Stewardship intervention reduced the total duration of antibiotic therapy from a median of 8 days to 6 days ($p < 0.0001$). Prior to intervention, 14.2% of the patients received the appropriate duration of antibiotic therapy compared to 57.0% in the post-intervention group ($p < 0.0001$). Ceftriaxone significantly decreased in the post-intervention group ($p < 0.0001$) and an increase use of amoxicillin/clavulanate and amoxicillin/sulbactam ($p < 0.0001$) was seen during hospitalization. In addition, there was a decrease in discharge prescriptions for cefpodoxime and levofloxacin and an increase in prescriptions for amoxicillin/clavulanate after the antimicrobial stewardship intervention ($p < 0.0001$). 30-day mortality rates, 30-day readmission rates and CDI rates did not differ between the pre- and post-intervention groups.

Conclusion: Antimicrobial stewardship effectively reduced the duration of antibiotic days of therapy from 8 days to 6 days post-intervention, without adversely impacting outcomes. Additionally, stewardship team intervention reduced the utilization of high-risk CDI antibiotics of levofloxacin and ceftriaxone.

Submission Category: Pharmacy Law/ Regulatory/ Accreditation

Submission Type: Evaluative Study

Session-Board Number: 5b-003

Poster Title: Analysis of students' self-assessment of performance on an interprofessional team

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Purpose: In order to meet the increasingly complex demands of the healthcare industry, the practice model is moving away from the traditional physician-centered team to the team-based model of the Patient Centered Medical Home. Interprofessional education (IPE) helps foster this collaborative environment by having students of different professions learn about, from, and with each other. An IPE course was implemented at the University of Michigan to help develop teamwork skills on interprofessional teams. This study evaluated how student self-assessed performance on an interprofessional team changed after the semester-long course.

Methods: Students from dentistry, medicine, nursing, pharmacy, and social work were assigned to a team for the semester, with each team having at least four disciplines represented. Teams rotated through a series of discipline-specific modules where they worked together to solve patient care cases. All enrolled students were included in the analysis, with the exception of two who opted out (n=255). At baseline and the end of the semester, students completed two questionnaires, the Pollard scale, which assesses individual contributions to the team, and the Team Development Measure (TDM), which assesses team functioning. Students also completed an end of semester open-ended reflection in which they identified areas where their team performed well, struggled, and what they learned about teamwork.

Results: The majority of students (170, 74.6%) had a baseline positive self-assessment of individual contributions to the team. After a semester of TBCDM 188 (82.6%) reported positive self-assessment. The test of proportions showed a non-significant shift towards improved positive self-assessment (p=0.2). Of the 35 teams, most were at developmental stages four (building clarity of goals, 29%) or five (cohesiveness established, 54%) at baseline. Stages increased for 46% of teams, while 37% had no change and 17% saw a decrease. There was a significant increase in the proportion of teams with a TDM stage of six (communication

established) or greater (p = 0.01). Analysis of end of semester TDM reflections for common themes contributing to change in TDM score failed to yield any definitive patterns.

Conclusion: A semester of IPE improved the stage of development for the majority of teams and increased the percentage of students' with a positive self-assessment of communication and teamwork skills. Strategies utilized in TBCDM appear to help improve students' ability to function on an interprofessional team.

Submission Category: I.V. Therapy/ Infusion Devices/ Home Care

Submission Type: Descriptive Report

Session-Board Number: 5b-004

Poster Title: Building Bridges in Transitions of Care: Pharmacist-led Home Care Services in Puerto Rico

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Purpose: Almost one in five Medicare patients discharged from a hospital are readmitted within 30 days.1 In the home, health care providers can observe a patient's medical and social issues, such as challenging living conditions. 2 Implementing a post discharge home based medication management service, has proven to improve patient knowledge as well as the continuity of patient care during the transition from hospital to home, and reduce hospital readmissions.

Methods: To assess the need and the feasibility of a transitions of care service in Puerto Rico we conducted stakeholder interviews and a literature search using Embase, Medline, Pubmed, International Pharmaceutical Abstracts and CINAHL Complete. Based on this initial market and literature research, we developed a pilot project for the implementation of a post-discharge pharmacist home visit service as a transitional care method in Puerto Rico. Our primary objective is to decrease the rates of hospital readmissions within 30 days of discharge. Our secondary objectives are to improve patient adherence and reduce medication related problems. During the post-discharge home visit, the pharmacist will complete a medication reconciliation, Comprehensive Medication Review (CMR), address patient education and adherence, among others.

Results: After the visit, the pharmacist will create a recommendation list for the patient and his providers and will follow up with the patient at week 1 and week 4. Our main marketing strategy will be direct pitching presentations in potential customer institutions. We will network

through healthcare and professional associations, personal contacts, professional meetings, healthcare conventions in the island and healthcare professional referrals.

Conclusion: With our service, we are building a bridge between the hospital bed and the patient's home, creating a path to recovery and well-being, guided by the ultimate medication expert: the pharmacist.

Submission Category: Automation/ Informatics

Submission Type: Descriptive Report

Session-Board Number: 5b-005

Poster Title: Systematic review of validated methods for identifying metabolic syndrome using administrative claims data

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Purpose: Metabolic syndrome is common in the United States affecting nearly 34 percent of the US population. It is characterized by any of three risk factors: large waistline, high triglyceride level, low HDL cholesterol level, high blood pressure, or high fasting blood sugar. It is also related to being overweight and obese. The risk for heart disease, diabetes, and stroke increases proportionally to the number of metabolic risk factors present. The purpose of this study was to perform a systematic review of published articles that have validated algorithms to identify metabolic syndrome cases using an administrative claims data.

Methods: Systematic review was conducted following the standards guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Statement. PubMed and Medline (Ovid) search was performed to identify citations applicable to metabolic syndrome. Level 1 abstract reviews and level 2 full-text reviews were performed to find research articles that used claims and administrative database to identify metabolic syndrome as outcome of interest, including validation estimates of the coding algorithms.

Results: Abstracts and articles were reviewed by three study investigators to determine their relevance based on predetermined criteria. The initial search strategy identified 393 abstracts through electronic databases. Out of the 393 abstracts, 17 articles were selected for full text review. The 17 studies that were identified used non-validated algorithms to identify metabolic syndrome. The selected articles showed considerable difference in sample, setting and methods.

Conclusion: There is no evidence about the validity of algorithms to identify metabolic syndrome in an administrative claims data. More research should be designed for assessing the predictive power, sensitivity and specificity in validation studies to test algorithms for identifying metabolic syndrome using administrative claims.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 5b-006

Poster Title: College Students' Interest and Knowledge of At-Home Genetic Testing

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Purpose: The use of direct-to-consumer personal genomic testing kits has been controversial. 23andMe, the first device of this kind, was ordered by the FDA to discontinue marketing as a health-related genetic testing kit in 2013 due to concerns about how patients would interpret their results. The purpose of this project was to determine the interest in, as well as knowledge and interpretation of, information provided by these devices in a college population.

Methods: A survey was administered to students at the University of Mississippi. Students who had purchased 23andMe or had genetic testing performed in the past were excluded. Incomplete surveys were also excluded. Baseline characteristics of participants and their responses were analyzed using descriptive statistics.

Results: 286 surveys were collected. 11 surveys were excluded because they were incomplete and 9 were excluded because the student had previously undergone genetic testing. 266 surveys were included in the final analysis. 80% (n=213) of students had never heard of at-home genetic testing devices, but 76% (n=201) expressed interest in taking a test of this sort. 74% (n=196) answered that they would be “very likely” to see a healthcare professional if they tested positive for a gene that increases their risk of developing a disease. Conversely, only 18% (n=48) answered that they would be “very likely” to see a healthcare professional if they found out that they tested negative for the same gene. After taking the survey, 74% (n=196) were interested in learning more about at-home genetic testing devices.

Conclusion: Most students had limited knowledge of at-home genetic testing devices prior to this survey, but were interested in learning more after completing the survey. Most students indicated that they would be likely to see a healthcare professional if they tested positive for a

gene that could predispose them to certain diseases, but that they would not be likely to do so if they tested negative for the gene.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 5b-007

Poster Title: Use of direct oral anticoagulants in patients with impaired renal function

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Purpose: Warfarin has been the mainstay therapy for prevention of thromboembolic events in patients with atrial fibrillation (afib). However, the use of direct oral anticoagulants (DOACs), such as dabigatran, rivaroxaban, apixaban, and edoxaban, is rising for this indication. Despite increased cost, patients may prefer the reduced monitoring associated with these agents. Unlike DOACs, warfarin does not require renal dosage adjustments. However, most DOACs aren't yet sufficiently evaluated for safety in this population. The purpose of this analysis is to review the safety and efficacy of DOACs in patients with renal impairment and describe considerations based on patient preference and cost.

Methods: A literature search using Medline (1996- September week 1 2016) was conducted using terms dabigatran, rivaroxaban, apixaban, and edoxaban. These were combined separately with chronic kidney disease, renal impairment, cost effectiveness, patient preference, quality of life, or adherence. Seventeen case reports and trial sub-analyses were investigated and evaluated, as well as eight articles regarding cost effectiveness and quality of life. A clinical consensus was determined utilizing of the results of each article.

Results: There are several studies and published case reports evaluating the efficacy and/or safety of dabigatran in the renally impaired population. Patients with renal impairment taking dabigatran experienced major bleeding at doses of 150mg, but less with the 110mg dose. Rivaroxaban 10mg once daily had similar efficacy in patients on hemodialysis as 20mg daily in healthy patients. Further data indicates that elderly patients, regardless of renal function, using rivaroxaban have a greater bleeding risk compared to those taking warfarin. Apixaban 2.5mg twice daily in patients with renal impairment was associated with decreased major bleeding

compared to warfarin in one sub-analysis. Another trial showed apixaban 2.5mg and 5mg twice daily decreased risk of stroke and embolism in patients with stage 3 chronic kidney disease (CKD) without significant differences in adverse events compared to aspirin. Studies suggest edoxaban 15mg once daily is safe and effective in patients with reduced renal function. Patient satisfaction studies suggest that many patients are interested in DOACs due to fewer provider visits and dietary restrictions. Barriers to switching included safety and efficacy and cost. Numerous cost–effectiveness studies have been completed to assess the burden of these agents and indicate all DOACs studied are cost-effective compared to warfarin.

Conclusion: Evaluated case reports and data from sub-analyses indicate dabigatran may be associated with increased bleeding risk in patients with renal impairment. Rivaroxaban 10mg has been associated with increased bleeding in elderly patients with decreased renal function and thus should be used with caution. Studies indicate that apixaban 2.5mg for patients with stage 3 CKD is safe and effective. Finally, edoxaban 15mg once daily is overall safe in severely renally impaired patients. Considering the enhanced interest amongst patients in the use of DOACS, providers must balance recommending safe and effective therapy with patient preference and economic burden for patients with afib.

Submission Category: Small and Rural Pharmacy Practice

Submission Type: Evaluative Study

Session-Board Number: 5b-008

Poster Title: Community pharmacy patients' knowledge of acetaminophen and its associated adverse effects

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Purpose: Acetaminophen-containing products are in the top-selling category of over the counter medications. However, the danger of acetaminophen is pressing, in that 48 percent of all acute liver failure diagnoses are attributed to acetaminophen. Recent studies have been performed that assess patients' knowledge of acetaminophen and its dangers in clinic and hospital settings. However, few studies assess patients' knowledge of the detrimental effects of acetaminophen in the community pharmacy environment, where acetaminophen products are easily accessible. The aim of this study is to assess patients' general knowledge of acetaminophen and its adverse effects at Rhodes and Robby Drugs in Pelahatchie, Mississippi.

Methods: Adult patients were given concise 5-question surveys assessing their knowledge of acetaminophen and its associated adverse effects as they picked up their prescriptions. Each patient that was willing to participate was given a brief consent form to review prior to completing the survey. Patients who could not speak English, who were under the age of 18, or who claimed that they were not able to read were excluded. The surveys were administered over a 3-day period to ensure that the minimum goal of 70 survey respondents was achieved. The completed surveys were reviewed and descriptive statistics were used to analyze the data. The demographics of the surveyed patients were analyzed as well as the proportion of each question answered correctly.

Results: Surveys from 72 patients were completed and included in the data analysis. Of the 72 participants, 79 percent were female, 21 percent were male, 19 percent were African American, and 81 percent were Caucasian. The average age of the participants was 49 years. Survey questions regarding the indications of acetaminophen as well as concomitant alcohol use were answered correctly by over 94 percent of participants. However, survey questions pertaining to maximum dosage, organ toxicity, and toxicity symptoms were answered correctly by 18, 68, and 86 percent of participants, respectively.

Conclusion: The results of this study indicate that patients of Rhodes and Robby Drugs in Pelahatchie, Mississippi are familiar with acetaminophen indications and the effects of concomitant alcohol use. However, they are generally unfamiliar with the appropriate dosing and toxicity of acetaminophen. A larger study with a more diverse patient population is needed to further explore patients' knowledge of the adverse effects of acetaminophen. Although it was a geographically limited study, the results clearly indicate the need for additional education to community pharmacy patients regarding acetaminophen and its appropriate dosages, dangers, and adverse effects.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 5b-009

Poster Title: Society's perception of the flu vaccine

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Purpose: Only 46 percent of Americans received the flu shot in 2013. In Mississippi specifically, only 40 percent of the population received the flu shot. Only 32 percent of adults aged 18-64 received the flu shot in 2013, and the low rate of vaccination could be due to negative perceptions of the flu vaccine. The purpose of this study was to assess society's perceptions of the risks and benefits of the flu vaccine so that pharmacists can be more knowledgeable about how to discuss the importance of the flu vaccine with patients.

Methods: A survey-based prospective observational study was conducted. The survey was designed to assess participants' perception of the risks and benefits of the flu vaccine. Age and gender questions were included in the survey to collect demographic information. A nine-question survey was administered through Facebook using Qualtrics survey software in January of 2016. Participants had to be 18 years of age or older and had to be Mississippi residents. Descriptive statistics were used and reported as percentages.

Results: A total of 255 surveys were completed. Eighty-six percent of participants believe the flu vaccine to be safe, while 14 percent of participants do not believe it to be safe. Fifty-four percent of participants believe the flu vaccine prevents the flu, while 46 percent do not believe the vaccine prevents the flu. When asked if the flu shot makes people sick, 27 percent of respondents said yes and 73 percent of respondents said no. 25 percent of participants said they would get their child vaccinated against the flu this year while 17 percent of participants said they would not get their child vaccinated against the flu this year. When asked if they would receive the flu shot this year, 63 percent of participants said yes and 37 percent said no.

Conclusion: This study suggests that while there are many people who perceive the flu vaccine to be beneficial, there are several people who do not believe it is beneficial and even some who believe the vaccine to be harmful. The results suggest a need for pharmacists to educate patients on the ample benefits and minimal risk of the flu vaccine. A strength of the study is

that the goal number of surveys to be completed was 80, and a total of 213 surveys were completed. A limitation was that 85 percent of the respondents were female.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 5b-010

Poster Title: Implementing an antimicrobial stewardship program in a community hospital

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Purpose: The growing cases of antimicrobial resistance is a major public crisis. New resistance mechanisms are emerging and spreading globally, threatening our ability to treat common infectious diseases, resulting in prolonged illness, disability, and death. As a means of battling this ongoing dilemma, an antimicrobial stewardship program (ASP) is adopted by many hospitals. However, due to lack of resources, implementing an ASP is especially difficult for some community hospitals. With the new antimicrobial stewardship standard mandated by The Joint Commission (TJC), the purpose of this project is to uncover plausible ways of implementing ASP in a community hospital.

Methods: Guidelines for Implementing an Antimicrobial Stewardship Program (ASP) were reviewed and a multidisciplinary committee was formed. Items listed in the guidelines as tasks of an ASP were discussed within committee. A policy for an ASP in a community hospital was developed. A budget for an ASP in a community hospital was formulated. Tasks were divided into priority groups based on factors. Factors included already in place, satisfies TJC requirement, ease of implementation, and presence of tools to complete task. A computerized method for tracking the ASP tasks specific to individual patients was developed.

Results: The ASP consists of seven core elements required by TJC. This includes leadership commitment, accountability, drug expertise, action, tracking, reporting and education. The ASP committee has selected specific actions to meet these core elements. Actions include developing facility-specific guidelines for common ID syndromes and using organization-approved multidisciplinary protocols, targeting antibiotics with high association of Clostridium difficile, implementing pharmacokinetic monitoring and adjustment programs for aminoglycosides and vancomycin, implementing programs to increase appropriate transition of parenteral to enteral therapy, implementing guidelines and strategies to reduce antimicrobial

use to the shortest effective duration, developing an annual antibiogram, selecting routine antimicrobials to be tested for susceptibility in conjunction with the microbiology lab, using rapid viral testing for rapid diagnosis, doing dosing/frequency adjustments, incorporating adjustments to laboratory tests for appropriate monitoring and assessing adjunct therapies. Antimicrobial use is evaluated through monitoring and reporting the amount of antimicrobials administered per patient day. ASP actions are tracked electronically and reported to the staff. Educational materials on antibiotic use are provided to practitioners, patients, and caregivers.

Conclusion: TJC ASP requirements are ambiguous in specifying what tasks need to be performed to meet the required core elements. This allows the hospital-based ASP creativity to design ASP actions that are feasible for the site. In the case of community hospitals, implementing ASP can be done by creating organization-approved multidisciplinary protocols and guidelines and taking action on improvement opportunities identified by ASP.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 5b-011

Poster Title: Evaluating the safety and efficacy of immunosuppressive therapy in patients with Crohn's disease (CD) undergoing gastrointestinal surgery

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Purpose: The contribution of pre-operative exposure to immunosuppressive medications (biologics, azathioprine, and 6-mercaptopurine) on post-operative complications after surgery for CD remains controversial. There is even less understanding of the safety of immunosuppressive medications used post-operatively. The primary objective of this study was to assess 30-day post-operative infection rates in patients who received any immunosuppressive therapy (biologics, azathioprine, or 6-mercaptopurine) within 30 days after surgery compared to patients who received immunosuppressive therapy after 30 days post-operatively.

Methods: This was an institutional review board approved retrospective cohort study in adult Crohn's Disease patients (at least 18 years of age) that have undergone gastrointestinal surgery during hospitalization at the University of Michigan Health System between January 2012 and December 2014. Patients who received post-operative exposure to any immunosuppressive therapy (biologics, azathioprine, or 6-mercaptopurine) were included in the study. Patients were excluded if they had poor clinical records documenting 30-day post-operative clinical outcomes. Patients were divided into two groups: early treatment versus delayed treatment. The early treatment group included patients who received any immunosuppressive therapy within 30 days after surgery and the delayed treatment group included patients who received any immunosuppressive therapy greater than 30 days after surgery. Data points collected and evaluated included baseline characteristics, surgical procedure, immunosuppressive medications, post-operative infection, length of stay, readmission rate, and hospital mortality.

The primary outcome was 30-day post-operative infection rate. Secondary outcome included 30-day readmission rate.

Results: Fifty-five patients were included in the early treatment group and 39 included in the delayed treatment group. Patient characteristics (age, race, gender), comorbidities, pre-operative infection rate, prior antibiotic use, and type of gastrointestinal procedure were similar between groups. There was a significant difference between early versus delayed groups in patients taking any immunosuppressive therapy prior to surgery (94.5 percent versus 79.5 percent, respectively; p equals 0.047). More patients received azathioprine prior to surgery in the early group (66.7 percent versus 12.1 percent, respectively; p less than 0.001); however, there was no difference in patients receiving 6-mercaptopurine (7.4 percent versus 9.1 percent, respectively; p equals 1), steroids (28.3 percent versus 48.5 percent, respectively, p equals 0.058) or biologic (72.2 percent versus 88.2 percent, respectively; p equals 0.11). There was no significant difference in elective versus emergent surgery between groups (p equals 0.1). There was no difference in 30-day post-operative infection rate between groups (27.3 percent versus 12.8 percent, respectively; p equals 0.126). Additionally, there was no difference in 30-day readmission rate between groups (20 percent versus 28.2 percent, respectively; p equals 0.355) or in hospital length of stay (6.84 days versus 9.46 days, respectively; p equals 0.128).

Conclusion: Use of immunosuppressive therapy (biologics, azathioprine, or 6-mercaptopurine) within 30 days versus greater than 30 days of surgery did not result in a difference in 30-day post-operative infection rate. There was a significant difference between the early and delayed groups in patients taking immunosuppressive therapy prior to surgery, but the impact of this difference on clinical outcomes remains unknown at this time. Future studies on this subject should be prospective, include a larger number of participants, and further analyze the relationships between pre- and post-operative immunosuppressive therapy and post-operative complications.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 5b-012

Poster Title: Residency showcase implementation of video, group discussion, and keynote speaker to extend outreach and opportunities beyond state lines

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Purpose: South Dakota State University College of Pharmacy annually hosts a residency showcase for pharmacy students to attend. This is an opportunity to learn about the residency application process and to speak with local South Dakota pharmacy residents and residency program directors (RPDs). While the showcase is traditionally local, advances to the program were made with the goal of extending outreach to include information for residencies in-state and out-of-state. To accomplish this, video presentations from residents across the United States, as well as handouts with a question and answer section were added to the event.

Methods: To assess the effectiveness of the showcase, surveys were implemented to gain attendees' perspectives as a means to improve future showcases. The showcase was prepared, hosted, and evaluated by four pharmacy students and mentored by an American Pharmacists Association - Academy of Student Pharmacists faculty advisor. The event included a PowerPoint presentation by a former Veteran Affairs resident and faculty member to discuss the application process and how to prepare for a residency interview. The event progressed with two video submissions from out-of-state residents discussing their experiences. Attendees were also given an additional handout of resident responses to student requested survey questions. Lastly, students were given a chance to break out into groups and discuss residencies one-on-one with RPDs and residents from local programs. After the showcase, 50 students and 21 pharmacist, including residents and RPDs, were emailed post-event surveys to provide input on the effectiveness of the showcase and make suggestions for improvement. The surveys included both Likert scale questions and short answer response sections.

Results: The survey results suggest the residency showcase was well received. The addition of information from residents in programs outside of South Dakota was a welcome addition to the program. Regarding the addition of the video interviews, 68.75 percent of pharmacists agreed that out-of-state resident video interviews where a good addition to the event. While students and residents saw it as a beneficial addition to the program, results indicated that one video would be enough and more videos should be available online for viewing. The small group activity was chosen in the post-event survey by 46.67 percent of students to be the most helpful or informative part of the showcase. Multiple comments provided feedback in favor of providing set times to rotate between small groups to gain different perspectives. Attendees also suggested set questions be provided to residents and RPDs to stimulate conversation, and that a panel of residents should be interviewed first before breaking out into groups.

Conclusion: The annual residency showcase was a successful event in a number of areas. Survey results completed by students, residents, and RPDs provided overall positive responses with constructive feedback. The addition of resident information from out-of-state locations was well received. The post-event survey data provided applicable information which can be used in reformatting the small group discussions as well as resident question and answer sessions with the goal of improving the residency showcase.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 5b-013

Poster Title: Satisfied patients and pediatricians: Results from a cross sectional survey study

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Purpose: We examined and compared patient satisfaction towards their pediatricians and primary care physicians (PCPs), and characterized factors associated with higher patient satisfaction in these two groups.

Methods: A random coefficient model with random slope and intercept was fit to the data, with patient satisfaction as a function of pediatrician/other PCPs, covariates, and physician random effects. Effect heterogeneity was assessed by allowing slope to vary as a function of covariates. Mediation analysis using the random coefficient model was conducted to calculate average total effect, average natural direct effect, and average indirect effect of pediatrician/other PCPs on satisfaction mediated by waiting/visit times.

Results: A total of 5,327 pediatricians and 33,726 other PCPs were rated by 9,577 and 85,301 people respectively. Pediatricians had higher predicted satisfaction ratings than PCPs (total effect equals 4.8 ,95-percent CI 3.7 to 5.9), with population averaged means of 82.2 (0.54) vs 77.4 (0.13). The direct effect was 3.9 (2.8 to 5.0) and indirect effect 0.9 (0.9 to 0.9), suggesting part but not all of the total effect can be explained by pediatricians having decreased waiting/visit times leading to increased satisfaction. Predictions by subgroup suggested pediatricians have lower ratings than PCPs for first visit, but higher ratings for all other covariate strata considered. Having longer waiting times, and decreased visit times coincided with closer mean ratings between pediatricians and PCPs.

Conclusion: Pediatricians scored higher patient satisfaction ratings than the combined group of other primary care physicians. Patient satisfaction for pediatricians with lower waiting times and longer visit times was higher compared to other primary care providers with lower waiting times and longer visit times.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-014

Poster Title: Phytochemical comparison between Chinese (smooth) and Indian (rough) cultivars of Momordica charantia (bitter melon or gourd).

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Purpose: Bitter melon has been used in Asia and surrounding countries for glycemic control. However, the components of bitter melon are not fully understood. The purpose of this study is to determine the phytochemical constituents in various anatomical parts of the fruit in two prominent cultivars of Momordica charantia. An Indian bitter melon cultivar derived dietary supplement (one with a 2011 expiration date and another with a 2018 expiration date) was also analyzed and compared to the fresh fruit.

Methods: Two different cultivars of bitter melon were analyzed: Chinese bitter melon (smooth) and Indian bitter melon (rough). Fruits were purchased from a local market in Winchester, Virginia and dissected into outer peel, rind, pulp, and seed. Plant tissue was cut into thin slices and air dried at room temperature inside a chemical fume hood. Dried plant material was extracted in 30 volumes (w/v) of 70% methanol for 20 min at 70°C following 2 minutes of ultrasonication. Following centrifugation (10,000xg for 10 min) a 20 µl of the supernatant was analyzed via high-performance liquid chromatography (HPLC: Shimadzu 20AD with a UV-vis photodiode array detector utilizing a C18 analytical column). Juice for vitamin C analysis was freshly squeezed using a garlic press and was analyzed within 5 minutes. The Indian bitter melon cultivar was manufactured by Solaray Inc., Park City, UTAH

Results: The Indian (rough) cultivar contained much higher levels of phytochemical constituents compared to the Chinese (smooth) variety. Most prominent constituents were found in the seed and juice of both plants. Vitamin C was prominent in the expressed juice of both plants. The Solaray dietary supplement (Indian cultivar) HPLC profile resembled the seed extracts of the fresh dried Indian cultivar. The 2018 expiration date supplement was found to have ~ 10x higher constituent levels compared to the 2011 expiration date supplement.

Conclusion: The Indian (rough) cultivar had a much higher level of phytochemical constituents compared to the Chinese (smooth) cultivar; therefore, would likely have greater medicinal value. The seed appears to contain an important constituent in the bitter melon fruit. Stability appears to be an issue in that expired dietary supplements of bitter melon may have lost most of their medicinal activity.

Submission Category: Clinical Services Management

Submission Type: Evaluative Study

Session-Board Number: 5b-015

Poster Title: Understanding patient perspectives with self-care in heart failure

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Purpose: Self-management of a low-sodium diet, fluid restriction diet, and weight are the critical component of heart failure treatment. There's an uptrend of hospitalization with congestive heart failure in the older population. The purpose is to assess a better understanding of heart failure patients with their self-management with sodium, fluid, and weight.

Methods: The institutional review board approved this qualitative descriptive study. A survey was distributed at the University of Michigan Health System in Ann Arbor, MI after the heart failure patients have concluded their appointment. Each of the one-on-one interview sessions was approximately 15 to 30 minutes in length, which included a total of 12 questions about sodium restriction, fluid restriction, and weight management. The primary outcome was the understanding of patient's heart failure self-management, which the data will be managed through NVivo 10.0, a qualitative software used for coding and analysis. The audiotapes were transcribed verbatim and later the transcripts were re-examined and verified by both interviewers. Two coding sessions were done to assure consistency, kept annotations, notes and left an audit trail.

Results: There were 33 out of 34 respondents to the survey. Certain populations with low-sodium and fluid restriction diet needed help from their healthcare team to follow the diet, 51.35 percent and 41.41 percent, respectively. Additionally, the population has each of their own regimens in keeping track with their sodium and fluid restriction, 67.65 percent and 75.00 percent, respectively. Still, patients struggle with their sodium and fluid restriction diet, 81.82 percent and 66.67 percent, respectively. The most common struggle was beyond their control once outside their home. Overall, the respondents reported they weigh themselves daily and having an innovative scale would be beneficial.

Conclusion: The study should aid in a better understanding of patient's current self-management of heart failure treatment and further promote innovative strategies for improving the quality of care of patients.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-016

Poster Title: Quality of life and pharmacoeconomic comparisons of chemotherapy regimens in pediatric rhabdomyosarcoma

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Purpose: Pediatric rhabdomyosarcoma is a soft tissue, skeletal muscle, malignant tumor. Vincristine, dactinomycin, and cyclophosphamide (VAC) chemotherapy has been the treatment standard for those with intermediate-risk disease. This therapy has also been associated with increased incidence of febrile neutropenia. One chemotherapy alternative is VAC-VI (vincristine, dactinomycin, and cyclophosphamide alternating with vincristine and irinotecan). While an outcome study has been established, no previous study has compared pharmacoeconomic and quality of life benefits of these two therapies. The study purpose was to identify if VAC-VI treatment for pediatric rhabdomyosarcoma had greater pharmacoeconomic and quality of life benefits as compared to VAC treatment.

Methods: This retrospective case series study began in October 2015 and was completed in August 2016. The study included all patients up to age 17 who had been treated for rhabdomyosarcoma with a VAC or VAC-VI therapy protocol on or before October 2015. Patients must have been treated at Blair E. Batson Hospital for Children in Jackson, Mississippi. Non-English speaking patients were excluded due to potential inability to complete the survey portion. It was approved by the Institutional Review Board of the University of Mississippi Medical Center. A retrospective chart review was utilized to document doses and costs of chemotherapy, number of hospital and clinic visits, readmissions, doses of filgrastim, and distance traveled to study site. The Epic electronic health record was utilized along with paper chart supplementation. For quality of life analyses, the validated KINDL Oncology questionnaire was mailed to all living study patients. This survey utilized a likert scale response system to determine patient physical, mental, social, and educational well-being. Descriptive statistics and Student's t-test for the comparison of two means were used for data analysis. Statistical significance was achieved at a two-tailed p-value of less than 0.05.

Results: Fifteen patient met study criteria. Average hospital readmission days were 2.17 with VAC and 2.8 with VAC-VI (p equals 0.703). Readmission rates were 40 percent (VAC) and 60 percent (VAC-VI). Filgrastim analyses showed average total cost of $34,329 per patient (VAC) and $27,285.51 (VAC-VI) (p equals 0.6049). Travel costs averaged $20.93 per patient (VAC) and $31.68 per patient (VAC-VI) (p equals 0.3661). Total costs of therapy averaged $99,044.59 per patient (VAC) and $114,692.67 per patient (VAC-VI) (p equals 0.6231). One KINDL questionnaire was returned, therefore data is unable to be statistically analyzed.

Conclusion: We were unable to show pharmacoeconomic benefit of VAC-VI therapy as compared to standard VAC therapy, and quality of life conclusions could not be determined. Further studies are warranted to make substantial conclusions, and these studies should include larger populations. If validated, both therapies may become standard treatments for pediatric rhabdomyosarcoma. Currently, one should consider patient-specific factors in determining appropriate therapy, which may include such elements as distance from the treatment site. While statistical and clinical significance could not be determined, the study could be modeled in order to compare other drugs from both pharmacoeconomic and quality of life perspectives.

Submission Category: Pharmacy Law/ Regulatory/ Accreditation

Submission Type: Evaluative Study

Session-Board Number: 5b-017

Poster Title: Examining first year pharmacy students' satisfaction in using a virtual program to learn medication dispensing in a laboratory setting

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Purpose: There is significant variation in the amount and type of experience related to pharmacy practice that students have prior to entering a professional pharmacy program. The purpose of this study was to determine whether the use of a virtual simulation program (MyDispense) focused on medication dispensing could create an engaged learning environment for all students within a course construct where previous background experiences directly impact engagement and learning.

Methods: First year (n=85) pharmacy students at the University of Michigan College of Pharmacy enrolled in Pharmacy Practice Skills I (PPS1), in the Fall 2015 semester were taught medication dispensing primarily using a virtual online medication dispensing program. Each week, students were required to complete two modules and had access to six optional, non-graded practice modules. These modules correlated with the topic being taught the week of, and emphasized the skills the students need to know by the time they attend their required recitation session. Exercises were designed to provide students with immediate, formative feedback on their performance. At the end of the semester, students completed an online survey that collected information about their previous pharmacy experience and used open- and closed-ended questions to assess their perceptions of the use of the virtual medication dispensing program. To interpret the results, descriptive statistics and a thematic analysis was performed.

Results: Forty-two (49.4%) students responded to the survey administered at the end of the semester. The majority of students—both with (88.9%) and without (84.0%) prior pharmacy experience—found virtual simulation to be a helpful tool for learning about medication

dispensing in the outpatient setting, including the topics of: preparing a medication label (with prior pharmacy experience: 74.1%, without prior pharmacy experience: 95.2%), analyzing a prescription (88.9%, 100.0%), identifying and preventing medication errors (81.5%, 100.0%), using drug information resources (96.3%, 95.2%), accepting new prescriptions over the phone (85.2%, 90.4%), transferring prescriptions (40.7%, 71.4%) and analyzing patients' medication profiles (74.1%, 76.2%). Unlike the other components of the program, transferring of prescriptions was not as well received by students, especially those with prior paid pharmacy experience. The most common elements of PPS1 that students reported helped them to learn medication dispensing were MyDispense and other hands-on laboratory practice. Areas for improvement include decreasing technology issues and ensuring that practice exercises are consistent with the material presented in other sections of the course.

Conclusion: Incorporation of the virtual simulation program resulted in positive feedback from students. Due to the high percentage of satisfaction associated with use of the program, it will continue to be used during future semesters of the course. This program will be incorporated into other courses in the curriculum in order to reinforce and teach skills related to dispensing medications.

Submission Category: Pediatrics

Submission Type: Case Report

Session-Board Number: 5b-018

Poster Title: Extended interval tobramycin pharmacokinetics in a pediatric patient with primary ciliary dyskinesia

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Purpose: This case report provides unique information regarding aminoglycoside dosing in pediatric patients with primary ciliary dyskinesia (PCD). Due to the rarity of PCD, treatment regimens have not been defined and are often extrapolated from cystic fibrosis (CF) guidelines. A 10-year-old female with PCD was admitted to our institution after several months of worsening lung function. Her FEV1 was 41% predicted on admission, which was lower then her baseline three months prior of 64% predicted. On admission, her blood urea nitrogen (BUN) and serum creatinine (SCr) were 10 mg/dL and 0.37 mg/dL, respectively. She was started on levofloxacin 250 mg IV (7.3 mg/kg/dose) every 24 hours and tobramycin 320 mg IV (10.3 mg/kg/day) infused over 30 minutes every 24 hours due to concern for Pseudomonas aeruginosa infection.

Pharmacokinetic monitoring was performed after her second dose to ensure efficacy and safety of tobramycin. Tobramycin concentrations were obtained approximately 2 and 8 hours after the start of the infusion in order to calculate the elimination rate constant (Ke), volume of distribution (Vd), maximum concentration at the end of the infusion (Cmax), 24-hour trough (Cmin), and area under the curve (AUC0-24h). The target ranges for management of gram-negative pulmonary infections are an extrapolated serum Cmax of 20-30 mg/L and an extrapolated serum Cmin of less than 1.0 mg/L, with an AUC0-24h of 80-110 (mgxhr)/L. In pediatric patients without CF, Vd and Ke have been reported as 0.24 ± 0.08 and 0.32 ± 0.06. For patients with CF, the Vd and Ke have been reported as 0.33-0.45 L/kg and 0.292-0.413 hr-1, resulting in an initial tobramycin starting dose of 10 mg/kg/day.

Pharmacokinetic analysis of her initial tobramycin dose of 10.3 mg/kg/day revealed subtherapeutic extrapolated serum concentrations (Cmax: 18.8 mcg/mL, Cmin: 0.0053, AUC0-24h (58.86 (mg x hr)/L, Vd 0.51 L/kg, Ke 0.346 hr-1). Her dosage was subsequently increased to

12.8 mg/kg/day. After the dosage increase on day of treatment four, the patient's FEV1 showed an increase to 58% predicted. Repeat pharmacokinetic analyses were performed on tobramycin 12.8 mg/kg/day and extrapolated peak and trough concentrations (Cmax: 27.6 mcg/mL, Cmin: 0.0035 mcg/mL), AUC0-24h (75.35 (mg x hr)/L, Vd 0.38 L/kg, Ke 0.385 hr-1) were found to be within goal ranges. Our patient had a higher Vd and similar or greater Ke than reported in studies from non-CF patients, indicating a treatment approach similar to that of a CF patient was warranted.

On the fifth day of treatment, respiratory cultures revealed moderate Haemophilus parainfluenzea, beta-lactamase positive. Tobramycin was continued for the duration of therapy due to clinical improvement. At the time of the final pharmacokinetic analysis (day 11 of treatment), her BUN was 13 mg/dL, SCr was 0.45 mg/dL, and FEV1 was 80% predicted. The patient was discharged after completing 12 days of IV tobramycin and levofloxacin therapy with significantly improved lung function and no adverse events (e.g., renal insufficiency) experienced from treatment.

This was the first case report of aminoglycoside pharmacokinetics in a pediatric patient with primary ciliary dyskinesia. The administration of higher than normal doses (up to 12.8 mg/kg/day) of extended-interval tobramycin was needed in this patient to achieve serum concentrations appropriate for treatment.

Methods:

Results:

Conclusion:

Submission Category: Pharmacokinetics

Submission Type: Evaluative Study

Session-Board Number: 5b-019

Poster Title: Comparison of the frequencies of cytochrome P450 2D6 polymorphisms between Mexican and Caucasian populations

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Purpose: Polymorphisms in the cytochrome P450 2D6 (CYP2D6) gene can affect the metabolism of a large number of medications including many tricyclic antidepressants, serotonin reuptake inhibitors, neuroleptics, beta-blockers, and antiarrhythmics. These genetic variations can result in diverse therapeutic outcomes for patients. It is known that these genetic polymorphisms can occur at different frequencies in diverse populations. The aim of this study was to analyze and compare the frequencies of the most common single nucleotide polymorphisms in the CYP2D6 gene in Caucasian and Mexican populations.

Methods: The Shenandoah University Institutional Review Board approved this cross sectional study. The samples were from previous studies with informed consent to genotype for genetic variations in drug response. Subjects were self-identified as Mexican or Caucasian. The samples were genotyped for CYP2D6*2, *4, *6, *10, *17, *29, *39, and *41 variant alleles. All genotyping was performed by allelic discrimination using real time PCR 5' nucleases on an Applied Biosystems QuantStudio 6 Flex. Pearson's chi-square test and Fisher's exact test were used to compare genotype and allele frequencies between the two groups. A p-value less than 0.05 was considered to be statistically significant.

Results: A total of 235 Mexican and 230 Caucasian samples were analyzed. The frequency of the CYP2D6*2, *4, *10, and *41 variant alleles was significantly lower in the Mexican group compared to the Caucasian group. The frequencies of these variant alleles are as follows: CYP2D6*2 was 23.5% in the Mexican group compared to 33.8% in the Caucasian group (p <

0.001); CYP2D6*4 was 2.4% in the Mexican group compared to 20.5% in Caucasian group ($p < 0.001$); CYP2D6*10 was 8.1% in the Mexican group compared to 22.2% for the Caucasian group ($p < 0.001$); and CYP2D6*41 was 4.2% in the Mexican group compared to 9.3% in the Caucasian group ($p=0.002$). There were no statistically significant differences between the two groups for CYP2D6*6 ($p=0.143$), CYP2D6*17 ($p=0.124$), CYP2D6*29 ($p=0.624$), and CYP2D6*39 ($p=0.676$).

Conclusion: From this study, the frequencies of CYP2D6*6, *17, *29 and *39 were not different between the two populations, but there was a significantly lower frequency of CYP2D6*2, *4, *10, and *41 for Mexicans compared to Caucasians. These differences could affect the way Mexicans metabolize medications that are CYP2D6 substrates compared to Caucasians. However, other CYP2D6 variant alleles that are less common in Caucasians may exist at higher frequencies in Mexicans. Further studies should evaluate other CYP2D6 variant alleles not examined in this study.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 5b-020

Poster Title: Topoisomerase I Inhibition increases G-Quadruplex Formation and Modifies Promoter Activity

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Purpose: G-quadruplex (G4) is abundant in promoter regions close to the transcription initiation site. It often prevents transcription, and are often found in oncogene promoters. Stabilizing it by compounds, such as TMPyP4, can downregulate oncogenes and suppress tumor growth. MYC and kRAS are found in 80% and 30% of cancers, respectively. G4s form because of negative superhelicity induced by torsional stress generated during transcription. Topoisomerase I alleviates torsional stress and SN-38, the active moiety of Irinotecan, is a strong inhibitor. This study examined the cooperative activity of SN-38 and TMPyP4 on MYC and kRAS promoter G4 structures and subsequent transcriptional activity.

Methods: Human Epithelial Kidney (HEK293) cells, seeded at 1 x 105 cells/well in 24-well plates, were transfected with Renilla plasmid (250 ng) and firefly luciferase plasmids (500 ng) containing the promoter of either MYC (Del4) or kRAS (FL). Transfected cells were then treated with either SN-38 alone (2 hr), TMPyP4 alone (46 hr) or a combination of the two agents concurrently or with varying sequential order. The dual-luciferase assay (Promega) was used to measure luciferase expression/activity from both the renilla and the firefly luciferase plasmids. Dunnett's test compared the various conditions to the control, and a one-way ANOVA determined if any of the conditions yielded significant results.

Results: For the kRAS- plasmid, the SN-38 alone condition (for 2 or 48 hr) showed there was an increase in plasmid activity of 10 – 44%; TMPyP4 alone (46 – 48 hr) had a decrease in plasmid activity by up to 75%, as compared to the control. Sequentially adding SN-38 for 2 hr and then P4 for 46 hr decreased plasmid activity to 13.5% compared to the control; for comparison, estimations from the individually treated conditions predicted only a 70% decrease in promoter

activity. For the MYC- plasmid, no such cooperative activity was noted with topoisomerase I inhibition.

Conclusion: Pre-treating kRAS-, but not MYC-, promoter driven luciferase plasmids with topo I inhibiting SN-38 positively effected the activity of G4-stabilizing TMPyP4. Future works will examine this cooperative activity in cells and with a larger array of G4-stabilizing compounds, particularly those selective for individual promoter structures. Topo I and G4-targeted combination therapy is a promising avenue for drug development with selective downregulation of key oncogenes.

Submission Category: Pediatrics

Submission Type: Descriptive Report

Session-Board Number: 5b-021

Poster Title: Evaluation of the implementation of an electronic venous thromboembolism risk assessment tool in pediatric patients

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Purpose: Despite increasing trends in the incidence of pediatric venous thromboembolism (VTE) there are no current standards for pediatric VTE risk assessment in healthcare institutions. The purpose of this study was to evaluate the implementation of an electronic standardized venous thromboembolism risk assessment tool and chemoprophylaxis recommendations for pediatric patients. The primary goal of this study was to gain a better understanding of the relationship between patient specific risk factors and risk scores in pediatric patients.

Methods: Pediatric patients aged 13 to 17 years admitted to the University of Michigan C. S Mott Children's Hospital from July 1, 2015 to December 31, 2015 had a provider assessment of VTE risk within 24 hours of admission via the electronic medical record. A notification within the electronic medical record alerted providers to enter patient related risk factors, and a VTE total risk factor score was calculated. A high-risk score, greater than or equal to 5, created a Best Practice Advisory recommending the VTE Prophylaxis Pediatric Order Set. The order set included recommendations for agents and dosing for chemoprophylaxis, as well as an opt out option for chemoprophylaxis. VTE events were counted and compared for pediatric patients with a high-risk VTE risk score, greater than or equal to 5, and for pediatric patients with a low to moderate-risk VTE risk score, less than 5. The frequency and type of VTE risk factors recorded in the electronic medical record were counted. Additionally, the frequency and types of chemoprophylaxis ordered through the VTE Prophylaxis Pediatric Order Set were counted.

Results: There were 998 patients 13 to 17 years old admitted to C.S. Mott Children's Hospital between July 2015 to December 2015. 779 patients received a pediatric VTE risk assessment and 199 patients did not. Among the patients' risk assessed, 603 were given the risk assessment

within the first 24 hours of admission and 196 of the patients assessed were given the assessment after the first 24 hours of admission. The risk scores ranged from 0 to 13. 775 patients received a low to moderate-risk score less than 5 and 24 patients received a high-risk score greater than 5. The most frequent risk score reported was 0 and the mean risk score for each age group was below 1.1. The most frequent risk factors reported were surgery, disease, and mobility-related. Of the 998 admitted pediatric patients, 1 patient in the low to moderate-risk group had a reported VTE event. In the low to moderate-risk score group, there were 31 orders (4 percent of patients) for chemoprophylaxis and in the high-risk score group, there was 1 order (4 percent of patients) for chemoprophylaxis. The most frequent chemoprophylaxis prescribed was enoxaparin.

Conclusion: There was high compliance to the administration of the VTE risk assessment in pediatric patients 13 to 17 years old. The majority of patients received a low risk score less than 5. Overall, there was a low frequency of documented VTE events. The most frequent risk factors reported were surgery, disease, and mobility-related. The rates of chemoprophylaxis orders were similar in the low to moderate risk and the high-risk group. There was a low frequency of documented VTE events. Currently, this pediatric VTE risk assessment was not predictive of actual pediatric VTE events.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-022

Poster Title: Medication use evaluation of fosaprepitant in the Sidney Kimmel Comprehensive Cancer Center at Johns Hopkins Bayview Medical Center

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Purpose: National consensus guidelines recommend the use of antiemetic agents as prophylaxis for chemotherapy-induced nausea and vomiting (CINV), including combinations of 5-HT3 receptor antagonists, dexamethasone, olanzapine, and NK1 receptor antagonists. The utilization of these regimens results in improved quality of life for patients, especially for those receiving highly-emetogenic and moderately-emetogenic chemotherapy regimens. The purpose of this study was to describe and assess the use of fosaprepitant according to national consensus guidelines, at Johns Hopkins Bayview Medical Center (JHBMC), and to evaluate the cost-effectiveness of alternative CINV prophylaxis regimens with respect to a fosaprepitant-based regimen.

Methods: In this single-center, retrospective chart review, all adult patients who received intravenous fosaprepitant at the Sidney Kimmel Comprehensive Cancer Center (SKCCC) in JHBMC between December 1, 2015 and July 1, 2016 were screened for inclusion using electronic medical records. Patients were included if they had an Eastern Cooperative Oncology Group Performance Score (ECOG PS) 0-2, or Karnofsky Performance Score (KPS) 60-100 percent. Patients were excluded if they were enrolled in an investigational trial, were not treated at JHBMC, were treated with an ineligible chemotherapy regimen, had an ECOG PS greater than 2 or KPS less than 60 percent, or did not receive intravenous fosaprepitant. The data was aggregated into a spreadsheet for analysis. The primary outcomes were to describe the use of fosaprepitant at SKCCC at JHBMC, and to assess the use of fosaprepitant for appropriateness as determined by national consensus guidelines for CINV. Secondary endpoints included a cost-analysis of the current usage of fosaprepitant at SKCCC at JHBMC, and the cost-

benefit of using an aprepitant- or olanzapine-based regimen per national consensus guidelines. This project is currently pending institutional review board approval.

Results: Three hundred and eleven patient charts were reviewed. Sixty-eight patients met inclusion criteria, and 66 charts (97 percent) were deemed to have utilized fosaprepitant appropriately per national consensus guidelines for CINV. Of these included charts, 38 (58 percent) were used in highly-emetogenic chemotherapy regimens and 28 (42 percent) were moderately-emetogenic chemotherapy regimens.
The total cost of fosaprepitant-based antiemetic prophylaxis regimens over a 6-month period at SKCCC in JHBMC was 52,992.72 dollars. On average, each patient received 3 doses of fosaprepitant over 3 cycles during the 6-month period, where the average total cost of a 6-month regimen is as follows: fosaprepitant-based regimen is 792.33 dollars, aprepitant-based regimen is 1,831.76 dollars, olanzapine-based regimen with palonosetron is 472.39 dollars, and olanzapine-based regimen with ondansetron is 15.02 dollars. This information is derived from regimens endorsed in national consensus guidelines.
In a six-month period, SKCCC at JHBMC has the potential to save 52,002.72 dollars using an olanzapine-based regimen with ondansetron, or 21,815.64 dollars using an olanzapine-based regimen with palonosetron. The cost to SKCCC increases, however, to an additional 67,921.92 dollars if an aprepitant-based regimen for CINV prophylaxis is used.

Conclusion: The majority of fosaprepitant-based antiemetic regimens were used appropriately at the SKCCC at JHBMC per national consensus guidelines for CINV, but there may be a more cost-effective option, an olanzapine-based prophylaxis regimen, for select patients. Based on group purchasing organization (GPO) pricing, an aprepitant-based regimen is the least cost-effective option. By transitioning from a fosaprepitant-based regimen, JHBMC can potentially incur a savings of approximately 98 percent when switching to an olanzapine-based regimen with ondansetron.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-023

Poster Title: Pharmacoeconomic evaluation of an enoxaparin assistance program

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Purpose: In December of 2013, the pharmacy department at St. Dominic Hospital, located in Jackson, MS, began an enoxaparin assistance program. By offering this service, the hospital hopes to reduce overall healthcare expenditures and lower readmission rates. The purpose of this study is to assess St. Dominic's enoxaparin assistance program by evaluating if 5-days of enoxaparin bridge therapy with warfarin is enough to achieve a therapeutic INR level (2-3), while also evaluating re-admission rates for this group of patients.

Methods: A retrospective single-center analysis of patients enrolled in an enoxaparin assistance program was conducted from August 2013 to March 2016 at St. Dominic Hospital. Patients included in this study were required to be on both enoxaparin and warfarin, for the purpose of bridging to a therapeutic INR level. Exclusion criteria included patients that were not on warfarin, or patients who lacked initial data. Twelve months of data was collected, including: patient demographics, enoxaparin evaluation, 30-day readmissions, and INR/therapeutic attainment. Both descriptive and inferential statistics were used for data analysis.

Results: Of the 125 patient charts reviewed, only 88 patients were enrolled in this study (mean age, 53.45 years; 65.9% female; mean weight, 94.94 kg; 61.3% African American; 38.6% noninsured), with 68 (77.2%) returning for follow-up visits. The most common enoxaparin indication was DVT treatment (27.3%). Enoxaparin therapy averaged 5.43 days at a dispensed dose of 98.94 mg. There were 27 (30.7%) patients re-admitted within 30 days post discharge, mostly [19 (21.6%)] related to the original enoxaparin indication. Only 44 of the 68 patients had complete data. Sixteen (23.5%) reached therapeutic INR values after using enoxaparin bridge therapy compared to 28 (41.2%) patients who did not reach a therapeutic INR level.

Conclusion: Among patients using enoxaparin for the purpose of bridging to warfarin, 5 days is not enough time to achieve a therapeutic INR level, as indicated by the large percentage of readmission rates related to the original enoxaparin indication. Based on the results in this study, more than 5 days of bridge therapy is needed to reach therapeutic INR levels; however, further studies are needed to determine how many days are necessary.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 5b-024

Poster Title: Hospital admission rates seen with bipolar disorder patients receiving psychotherapy

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Purpose: Bipolar disorder (BPD) causes severe shifts in mood, activity levels, and ability to perform activities of daily life. It affects about 5.7 million adult Americans. Successful treatment depends on a combination of factors. Pharmacotherapy alone is often not enough to keep a bipolar patient well. A combination of pharmacotherapy and psychotherapy proves to be the best way to treat BPD. Lower hospitalization rates were seen with patients who participated in combination treatment versus pharmacotherapy alone. The aim of this study is to determine hospital admission rates among diagnosed BPD patients receiving a combination of psychotherapy and pharmacotherapy versus pharmacotherapy alone.

Methods: Patients were at least 18 years old, diagnosed bipolar disorder I or II, and seen at Communicare Oxford clinic were included. Patients hospitalized for problems not related to bipolar disorder were excluded. Data from June 2014- June 2015 were collected via retrospective chart review. Descriptive statistics and Chi square tests were used for data analysis.

Results: A total of 83 patients were included in the study. Twenty-three were hospitalized for problems related to bipolar disorder. Of the 23 patients, 17 were currently on combination therapy and 6 on pharmacotherapy alone. There was no difference in hospitalization rates between the combination and pharmacotherapy alone groups (p value equals 0.79). Of the 83 patients, 17 had insurance and 51 uninsured. There was no difference between the insurance and uninsured groups in terms of hospitalization rates (p value equals 0.12).

Conclusion: Hospitalization rates did not correlate with use of combination therapy or pharmacotherapy alone. Payment status did not affect whether patients received combination therapy or pharmacotherapy alone.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 5b-025

Poster Title: Individualized prediction of endoxifen concentration during tamoxifen treatment

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Purpose: Endoxifen concentration, which may predict efficacy of tamoxifen treatment, is primarily determined by CYP2D6 activity with a minor contribution of additional clinical and genetic parameters including CYP2C9 and CYP2C19. The objective of this study was to use an independent dataset to assess the accuracy of an endoxifen prediction algorithm previously published by Teft et al. and create a new algorithm that includes all associated clinical and genetic variables.

Methods: Analysis was conducted in a previously enrolled cohort of 500 women 18+ years old with estrogen receptor positive breast cancer taking tamoxifen 20 mg/day ≥ 4 months and not on moderate or strong CYP2D6 inhibitors. Clinical parameters, endoxifen concentrations, and genotype were determined at time of enrollment. Pearson correlation coefficients assessed the association between predicted endoxifen using the Teft algorithm and observed endoxifen. Univariable regression models were used to identify clinical and genetic variables associated with endoxifen concentration to build a multivariable prediction algorithm.

Results: There was a weak, but highly significant, association between the actual endoxifen concentration and that predicted by the Teft algorithm ($r=0.24$, $p < 0.0001$). Our final endoxifen prediction algorithm included weight (Beta coefficient=-0.07, $p=0.048$) and genotype-predicted activity of CYP2D6 (Beta coefficient=6.06, $p < 0.0001$), CYP2C19 (Beta coefficient=1.55, $p=0.042$), and CYP2C9 (Beta coefficient=2.39, $p=0.042$).

Conclusion: The Teft algorithm does not yield a sufficiently strong prediction for observed endoxifen for clinical use. A new predictive algorithm was developed that could be useful to inform individualized tamoxifen dosing if endoxifen concentration is validated to be a biomarker of tamoxifen efficacy.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 5b-026

Poster Title: Evaluation of a chronic care management program in the ambulatory care setting

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Purpose: The purpose of this study was to describe the patient population of the CCM program in a family medicine practice, evaluate the effectiveness of the CCM program by determining the difference in the number of hospital stays and emergency department (ED) visits needed for patients before and after enrollment in a CCM program, and evaluate the change in clinical status of chronic diseases before and after enrollment in a CCM program.

Methods: A retrospective chart review was conducted for patients enrolled in the CCM program at a family medicine practice. A list of all patients enrolled in the program was printed. Of the total 136 patients, ninety-five patients were selected at random for chart review. Enrolled patients were excluded only if records were incomplete. Information regarding patient age and gender, number and type of high-risk chronic disease states such as heart failure, diabetes, COPD, or cerebrovascular disease, type of insurance, number of hospital/ ER visits before and after enrollment in the CCM program, length of stay, new and discontinued medications, pharmacy interactions, and clinical status of chronic disease states was gathered. Descriptive statistics were used to describe the population of patients and a independent t-test was used to determine differences before and after enrollment in the CCM program. Statistical significance was set at $p < 0.05$. The project was approved by the Shenandoah University IRB.

Results: The population of the CCM program included 57.9% females and patients with an average age of 78 (+ 10.1). Patients had an average of 7.52 disease states (including diabetes 42.1%, 16.8% COPD, and 28.4% with an indication for anticoagulation) and 8.86 medications. In the 12 months prior to enrollment in CCM, the average hospital admission per patient was 0.74 with 42.7% of patients having at least one hospitalization. Mean hospital admission per patient after enrollment decreased, but was not statistically different (0.58, $p=0.399$). There was no

significant difference in hospitalizations for patients previously hospitalized before CCM enrollment compared to those who had not had a hospitalization in the 12 months prior (p=0.313). In the 12 months prior to enrollment in CCM, the average ED visit per patient was 0.41 with 30% of patients having at least one visit. Mean ED visit per patient decreased, but was not statistically different after enrollment (0.30, p=0.456) with only 24 patients utilizing the ED. The mean A1c was significantly lower (7.3% versus 7.6%) after participation in the CCM program (p= 0.079). Given limited data, monitoring parameters such as INR levels, bleeding events and spirometry were not evaluated.

Conclusion: While patients currently enrolled in the CCM program had significant past medical history for chronic diseases and high medication utilization, they had a limited number of hospital and ED visits prior to enrollment. Therefore, it is not surprising that enrollment in the CCM program did not impact the rate of hospitalization and ED visits overall for the time period studied. Patients were relatively well controlled prior to CMM enrollment for some chronic diseases like diabetes, although significant improvement in A1c was still seen. Results shows that patients who may benefit significantly from this program may not have been enrolled.

Submission Category: Oncology

Submission Type: Descriptive Report

Session-Board Number: 5b-027

Poster Title: Impact of pharmacy staff led medication reconciliation in patients receiving outpatient cancer treatment: a pilot study.

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Purpose: The optimization of medication therapies in patient care is an important component in the pharmacy department's scope of practice. Medication reconciliation can be a useful tool in determining any discrepancies and improving patient care through optimization of drug therapy. Patients receiving chemotherapy may experience many toxicities associated with their regimens potentially due to unoptimized medication regimens. This project was designed as a pilot study in order to determine the impact of a pharmacy led medication reconciliation at an oncology infusion center.

Methods: Patients receiving outpatient chemotherapy or sandostatin were identified and given the option of having a medication reconciliation completed by a pharmacy student. Medication, dosage strength, route and frequency were reviewed for all current medications found in the electronic health record (EHR) and any patient reported medications. Patients were asked about their pain status, chemotherapy-induced nausea and vomiting and changes in bowel movements. Drug-drug interactions were identified via a drug reference resource. Patient questions or concerns and any identified interventions were discussed with the oncology pharmacist, nursing staff and oncology physician. Interventions were quantified based on a scale of relative importance. Scaled interventions were categorized into: medication recommendations, medication education, medication discrepancies, or 'no recommendation'. Medication recommendations were considered high impact, and given 1 point. Medication education was considered moderate impact, and given 2 points. Medication discrepancies were considered low impact, and given 3 points. No recommendations were considered zero impact, and given 4 points. Medication recommendations included changes/additions/discontinuations in drug therapy and were first approved by the pharmacy staff prior to being discussed with the

patient. Patients were assigned a unique identifying number. A separate log of the identification number and patient name were kept in case there was a need for further information. All information was kept confidential and unidentifiable. Results of the study were compared to published literature.

Results: Eleven identified patients elected to be interviewed. Ten patients required interventions from the pharmacist. Five patients received medication recommendations from the pharmacist which were categorized as high impact interventions. Three patients required further education regarding their medication use and were categorized as moderate impact interventions. Ten of the patients required updates to their EHR which were categorized as low impact interventions. Only one patient did not require any intervention from the pharmacist and was categorized as no recommendations. The patients expressed that they were confident in the pharmacy staff's ability to recognize potential issues and put their care as priority.

Conclusion: Medication reconciliation has been shown to be effective in optimizing medication therapy in patients receiving treatment in an outpatient oncology treatment center. Specifically, a pharmacy staff led medication reconciliation can be found to have high impact in improving patient care in this setting.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 5b-028

Poster Title: Retrospective analysis of peri-operative administration of intravenous acetaminophen and post-operative opioid use in pediatric tonsillectomies and adeno-tonsillectomies

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Purpose: Tonsillectomy or adeno-tonsillectomy is a high-risk outpatient surgery due to the patient population, primarily children, and the potential for airway complications. The risk for airway complications is further increased by the use of post-operation opioids for pain control. Acetaminophen, another component of the standard pain regimen, may have potential opioid-sparing effects. This study aims to investigate whether peri-operatively administered intravenous acetaminophen reduces the quantity of opioids needed for pain control.

Methods: This study was a secondary retrospective analysis of pediatric patients ages 4-17 in the University of Michigan Health System who had a tonsillectomy or adeno-tonsillectomy between May 2011 and December 2015. Individuals were placed into one of two cohorts based on peri-operative pain regimen: IV acetaminophen or other, which included oral acetaminophen use or no acetaminophen use. Primary outcome looks at the difference in the mean of total morphine equivalents taken in each group. Secondary analysis included the mean of morphine equivalents taken intra-operatively and in the PACU.

Results: A total of 186 patients met eligibility criteria. Of those, 115 received IV acetaminophen and 71 patients were in the other cohort which was composed of 46 patients who received no acetaminophen and 25 patients who received oral acetaminophen. Groups were similar with respect to gender, weight, and BMI. The only significant differences were that there were more patients in the IV acetaminophen group with obstructive sleep apnea, and less patients in the IV

acetaminophen group with additional doses of acetaminophen in the PACU. Between cohorts no difference in the amount of morphine equivalents taken intra-operatively or in the PACU was found. But, there was significantly less total morphine equivalents taken by the IV acetaminophen group (P= 0.016).

Conclusion: Intravenous acetaminophen has the potential to reduce the mean morphine equivalents utilized for pain control in pediatric tonsillectomies or adeno-tonsillectomies compared to oral acetaminophen use or no acetaminophen use. Further studies are needed to determine the opioid-sparing effects of intravenous acetaminophen over oral acetaminophen.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Evaluative Study

Session-Board Number: 5b-029

Poster Title: Retrospective analysis of icatibant use for the treatment of angioedema at a six-hospital health system

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Purpose: Icatibant is a bradykinin B2 receptor antagonist which is Food and Drug Administration approved for the treatment of acute angioedema due to hereditary angioedema (HAE). There is data supporting icatibant use off label for the treatment of angiotensin-converting enzyme inhibitor (ACE-I) induced angioedema. Icatibant has shown to be highly efficacious in resolving these types of angioedema; however, the acquisition cost is over 8000 dollars per dose. The purpose of this medication use evaluation was to evaluate the utilization of icatibant following formulary approval for the treatment of HAE and ACE-I induced angioedema across a six hospital health system.

Methods: The institutional review board (IRB) categorized this evaluation as a quality assurance/improvement activity exempt from IRB oversight. All patients who received icatibant at any hospital within the system between 7/1/2015 and 6/10/2016 were included. Each electronic medical record (EMR) was reviewed for provider notes, medication orders, medication administration, allergies, flow sheets, and respiratory vital signs. Airway symptoms were recorded and defined as noted difficulty breathing or swallowing. Traditional therapy was defined as any combination of antihistamines, corticosteroids, and epinephrine. Icatibant use was divided into three categories: indicated, possibly indicated, and not indicated. Indication criteria were determined based on current health system restrictions and defined prior to evaluating each EMR. Current restrictions include prescribing limited to emergency medicine, intensive care unit, and hospitalist providers for patients with severe airway restriction that may or will require intubation related to HAE or ACE-I induced angioedema. Icatibant was indicated if the patient's condition met current restrictions. It was not indicated if the EMR explicitly noted that the patient's respiratory status was improving prior to icatibant

administration, swelling was not progressing and the patient did not have difficulty breathing, or if there was another likely cause of the angioedema, other than ACE-I use or HAE. It was possibly indicated if the patient did not fall into either of the other two categories. Descriptive statistics were utilized to analyze the results.

Results: A total of 15 patients received icatibant at three different facilities within the health system. All doses of icatibant were ordered in the emergency department (ED) and 13 of 15 doses (86.7 percent) were ordered by physicians, while the remaining two orders (13.3 percent) came from a resident and physician assistant. Two patients had confirmed or suspected HAE. Of 13 patients treated for suspected ACE-I induced angioedema, two cases were deemed to be due to a medication other than an ACE-I. Twelve of 13 patients (92.3 percent) presented with some tongue swelling and six (46.2 percent) had edema in multiple locations. Five of 13 patients (38.5 percent) presented with difficulty breathing and six (46.2 percent) did not experience airway symptoms. Nine of 13 patients received traditional therapy prior to icatibant. Four of 13 (30.7 percent) patients required intubation as a result of their angioedema. ACE-I were added as an allergy in the EMR for nine of 13 cases (69.2 percent). Based on the indication criteria, icatibant was indicated in seven cases (46.7 percent), not indicated in five cases (33.3 percent), and possibly indicated in three cases (20 percent).

Conclusion: The majority of icatibant uses were determined to be possibly or not indicated, which resulted in a large cost to the health system. The five cases deemed to be inappropriate resulted in a direct medication cost of over 40,000 dollars. Recommendations included the addition of required indications when ordering icatibant, requiring ACE-I addition to the allergy list following ACE-I induced angioedema, and restricting use to patients who have HAE or who are taking an ACE-I where the angioedema has no other probable cause and is progressing, not responsive to traditional therapy, or where icatibant may prevent intubation.

Submission Category: Critical Care

Submission Type: Descriptive Report

Session-Board Number: 5b-030

Poster Title: Prothrombin Complex Concentrate Usage in a Large Academic Medical Center: A Case Series

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Purpose: The purpose of this case series is to determine prothrombin complex concentrate (Kcentra) usage over the last calendar year, July 2015 to July 2016. This study aims to report similarities and variances in pre and post dose international normalized ratio, drug dose used, concomitant vitamin K administration, side effects, and indication.

Methods: This is a case series detailing 10 cases of Kcentra administration at the University of Mississippi Medical Center. Pharmacy electronic health records from July 2015 to July 2016 were accessed. University of Mississippi Medical Center generated a list of patients who have received Kcentra over the past calendar year. Pharmacy records of these particular patients were accessed using the University of Mississippi Medical Centers' online database to determine the following: international normalized ratio at baseline, concomitant Vitamin K administration, weight-based dose of Kcentra given, international normalized ratio post dose, side effects after or during administration, and indication for use. These items were collected and documented using a data collection form in which variances and similarities were then analyzed.

Results: Ten patient electronic health records were included in the analysis. International normalized ratio at baseline ranged from the lowest, 2.09, to the highest 5.99. The average baseline international normalized ratio was 3.288. The international normalized ratio post dose ranged from the lowest, 1.3, to the highest 2.97. The average post dose international normalized ratio was 1.994. Kcentra dosage varied ranging from the lowest dose of 680 units to the highest dose of 3,840 units. The average Kcentra dose administered was 2,399 units. Vitamin K was administered concurrently with Kcentra to 50% of patients (n=5). There were no

documented side effects from Kcentra administration. Indication for use varied across all 10 patients with the most common indication being hemorrhage.

Conclusion: Kcentra is often used at the University of Mississippi Medical Center in trauma situations. Administration of concurrent vitamin K should be a goal of therapy when Kcentra is used. However, only 50% of patients in the last calendar year received concurrent vitamin K at the University of Mississippi Medical Center demonstrating a need for education for all healthcare providers. All patients in this analysis who were given Kcentra did experience baseline international normalized ratio reduction and did not report any documented side effects. The results of this analysis demonstrate Kcentra's effectiveness and safety in a large academic medical center.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5b-031

Poster Title: Barriers to venothromboembolism prophylaxis: A retrospective analysis of patients admitted to a community hospital that experienced hospital-acquired venothromboembolic events

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Purpose: Venous thromboembolism (VTE), specifically pulmonary embolism (PE), remains the most preventable cause of hospital death. In addition to the pain and risk of bleeding which coincide with VTE treatment in the acute period, further consequences for the patient and provider can include increased length of stay, readmission, recurrent VTE, mortality, increased medical bills, and denied reimbursement. Additionally, appropriate prophylaxis for VTE is administered at suboptimal rates, for reasons which vary among institutions. The purpose of this study is to identify barriers to appropriate VTE prophylaxis therapy in a community hospital and to identify interventions to improve appropriate VTE prophylaxis.

Methods: Data from August 2015 through June 2016 were collected retrospectively from the electronic medical record. All patients were identified with ICD-10 codes I26: “Pulmonary Embolism” and I82: “Other Venous Embolism & Thrombosis.” Diagnoses were confirmed with positive imaging results via duplex ultrasound or computed tomography angiography. Patients less than 18 years old, with VTE present on admission, or with superficial thromboses were excluded from the study population. VTE risk scores at time of admission were calculated using two validated risk assessment models (RAMs). Bleeding risk was then calculated as well using two validated RAMs. Patients with a “high VTE risk” score by either RAM were then assessed for appropriate thromboprophylaxis from admission to time of VTE development. To determine the ability of multiple healthcare team members to use the RAMs, a pharmacy student, pharmacist, nurse, and physician individually rated each patient. Kappa scores were calculated to assess inter-rater reliability. Appropriate prophylaxis was defined according to the most recent American College of Chest Physicians Guidelines for Prevention of VTE in Nonsurgical Patients as well as the VTE-6 Inpatient Quality Measure dictated by The Joint Commission.

Finally, barriers to prophylaxis were identified and analyzed manually in a categorical and descriptive fashion.

Results: Eighteen patients developed a hospital acquired (HA-) VTE during the study period (PE 22 percent, upper extremity deep vein thrombosis (DVT) 44 percent, lower extremity DVT 39 percent). All patients were at high risk for VTE at admission according to at least one RAM score. The majority of patients (94 percent) received appropriate prophylaxis within 24 hours of admission. However, only 44 percent of patients received appropriate prophylaxis throughout their admission. The most common barriers to appropriate prophylaxis (33 percent) were either active bleeding or perceived bleeding risk, which resulted in missed doses for each of the patients. Of these patients, two of six had bleeding risk scores of low to moderate, indicating that they could still benefit from chemoprophylaxis according to guidelines. Five patients (28 percent) had prophylaxis held for invasive procedures, and two of these patients did not resume prophylaxis in a timely manner (within 24 hours). Two patients (11 percent) missed doses due to patient or family refusal. Finally, eight patients (44 percent) had subtherapeutic prophylaxis for various reasons including perceived contraindications and use of mechanical prophylaxis rather than chemoprophylaxis.

Conclusion: This analysis identified several barriers to VTE prophylaxis and areas of potential improvement in patient care. One intervention that could impact VTE rates would be to institute a formal protocol for VTE and bleeding risk assessments as well as providing appropriate chemo- or mechanical prophylaxis orders according to risk levels, and instructions regarding holding and restarting prophylaxis around invasive procedures. Until such an intervention can occur, provider and staff education as well as pharmacist and/or student monitoring may improve the level of appropriate VTE prophylaxis and possibly decrease incidence of HA-VTE events at this institution.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 5b-032

Poster Title: Assessment of thrombosis based on time in therapeutic range after left ventricular assist device placement

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Purpose: Left ventricular assist devices (LVAD) serve as circulatory support for patients with heart failure. Complications associated with their use include pump thrombosis requiring chronic anticoagulation that increases risk of bleeding. It is not known whether time within the therapeutic international normalized ratio (INR) range for patients with LVADs on warfarin therapy is associated with improved outcomes. The goal of this study is to assess the relationship between time in therapeutic range (TTR) at different time periods prior to suspected or confirmed pump thrombosis for patients with LVADs on chronic warfarin therapy as well as patient parameters associated with pump thrombosis.

Methods: A retrospective case-control study was conducted at an academic medical center to evaluate adult patients aged 18-89 on chronic warfarin therapy with INR monitoring after LVAD implantation. Exclusion criteria included patients with implantable devices other than HeartMate II (Thoratec Corp., Pleasanton CA), HeartMate III, or HeartWare (HeartWare Inc., Framingham, MA) continuous-flow LVADs. Patients were assessed for lactate dehydrogenase (LDH) greater than 600 IU/L and documentation of suspected or confirmed pump thrombosis. The thrombus group consisted of patient characteristics, including TTR, during 3 months leading up to the pump thrombosis. Patients served as their own controls using TTR data from 6 months to 3 months prior to the pump thrombosis for a non-thrombus associated comparison (control group). The two groups were compared based on a standardized 2 to 3 INR goal range. The primary outcome was change in TTR between the thrombus and control group. Secondary outcomes included differences in patient characteristics as well as outcomes between the

groups. A separate analysis was completed using a standardized 0 to 1.99 time below range (TBR).

Results: A total of 24 were patients were included in the study. All patients were implanted with a HeartMate II device. The mean difference in TTR between the groups 1 month prior to event was -0.0575 percent (95 percent CI, -0.1796 to 0.0646, P equals 0.3385). The mean difference in TTR 2 months preceding the event was 0.0389 percent (95 percent CI, -0.0911 to 0.1688, P equals 0.5422) and 3 months prior to the event was 0.0475 (95 percent CI, -0.0562 to 0.1512, P equals 0.3528). The mean difference in TBR between the groups 1 month prior to event was 0.0140 (95 percent CI, -0.1168 to 0.1449, P equals 0.8259). The mean difference in TBR 2 months preceding the event was -0.0610 (95 percent CI -0.1863 to 0.0644, P equals 0.3250) and 3 months prior to the event was -0.0671 (95 percent CI, -0.1676 to 0.0335, P equals 0.1808).

Conclusion: Percent times below and in therapeutic INR range did not differ leading up to pump thrombus compared to a thrombus-free time period. The time period for thrombus development is unknown, and it is possible that the 3 month period chosen is not an adequate time interval to differentiate thrombus and non-thrombus time. Further investigation is needed to compare the differences in antiplatelet medications, pump settings, and other risk factors during these time periods.

Submission Category: Automation/ Informatics

Submission Type: Evaluative Study

Session-Board Number: 5b-033

Poster Title: What to do next? Insights about the factors, logic, use, and validity of clinical pharmacy work prioritization tools

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Purpose: The aim of this study is to understand which factors drive clinical pharmacy work prioritization tools, how those factors were selected, how pharmacy informatics experts think about the prioritization factors, logic, and use of these tools, and the degree to which these tools have been validated.

Methods: This study employed a mixed approach using both quantitative and qualitative methods. Before initiating this study, our research protocol was reviewed by the Institutional Review Board of the University of Michigan and it was determined that this study involved research on organizations and not human subjects research. Nevertheless, all interviewees were consented and all interview data was anonymized. Pharmacy informatics experts were selected for recorded telephone interviews (tele-interviews) using purposive sampling. A detailed interview guide was developed and used to elicit subjects' thoughts during the tele-interviews. The interview guide also included a series of open‐ended questions and some specific requests for demographic and descriptive facts. Interviews were transcribed and analyzed using qualitative data analysis software. Interview responses were coded and then those codes were iteratively analyzed to develop 12 themes about clinical pharmacy work prioritization tools.

Results: Nineteen tele-interviews were included in our study. Thirty different prioritization factors applied to clinical pharmacy work were described, including 10 patient-specific factors (e.g. acuity, renal function), 12 different therapeutic categories of medications (e.g. antibiotics, anticoagulants), and 8 potential interventions (e.g. patient education, medication

reconciliation). The use of these thirty individual prioritization factors varied widely among institutions. With respect to assessment of the validity of these tools, 2 (10.5%) and 3 (15.8%) of the tools were assessed for content and criterion-related validity, respectively, with some tools evaluated for more than one type of validity. No tools were assessed for construct validity. Qualitatively, 12 themes about the factors, logic, use, and validity of clinical pharmacy work prioritization tools emerged: (1) Pharmacist consensus‐based design, (2) Complexity of logic, (3) Not a substitute for clinical judgment, (4) Importance of automated lists, (5) Not comprehensive, (6) Maintenance, (7) Intuitive, non-standardized factor weights (points), (8) Tension between a task-oriented versus a patient-oriented practice, (9) Comfort, (10) Motivators for tool use, (11) Practice mirror, and (12) Challenge of validation. A majority of subjects provided comments that indicated that prioritization factors required continual reviewing and updating to remain relevant in clinical pharmacy work prioritization.

Conclusion: A group of pharmacy informatics experts believe that clinical pharmacy work prioritization tools are complex and hard to maintain, are not comprehensive, and that pharmacists should use them only as aids and not substitutes for clinical judgment. Our research provides a glimpse into existing validation processes and identified that pharmacy informatics experts find tool validation challenging due to a lack of knowledge and resources. While many subjects perceived their tools as valid, there is a general lack of empirical evidence to support these beliefs.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5b-034

Poster Title: Multidisciplinary approach to improve utilization and cost savings of PCR respiratory pathogen testing in a large community hospital

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Purpose: Polymerase Chain Reaction (PCR) technology for precise detection of infectious pathogens has the potential to improve antibiotic stewardship through accelerated de-escalation of therapy, rapid identification of pathogens, and detection of resistance genes. However, its place in therapy is uncertain due to high costs of testing, absence of pathogen susceptibility information, and lack of physician confidence in utilizing results. The purpose of this study was to improve utilization and cost savings of PCR respiratory pathogen testing in a large community hospital.

Methods: This single center, retrospective chart review consisted of two medication use evaluations (MUE). All patients with an order for a complete or basic PCR respiratory panel were included in the study. Patients were excluded if the patient was discharged or deceased prior to result reporting or if there was an insufficient specimen quantity to perform the test. Each patient was evaluated for appropriate respiratory panel collection site and antibiotic regimen changes within 48 hours of respiratory panel results. The first MUE was conducted from October to December 2015 and evaluated how the PCR respiratory panels were being utilized initially in antibiotic decision-making. A multidisciplinary approach to improving how these respiratory panels were ordered and utilized included the expertise of clinical laboratory supervisors, information technology technicians, pharmacists, Infectious Diseases (ID) physicians, and the Chief Medical Officer (CMO) of Huntsville Hospital. Three primary interventions were enacted as a result of this first review, including restricting comprehensive respiratory panel ordering to ID physicians, taking PCR respiratory panels off of all order sets, and eliminating nasal swabs as a source option for PCR respiratory panels in the clinical

information system. A second MUE was conducted from May to August 2016, and re-evaluated the utilization and costs of PCR respiratory panels following these interventions.

Results: The total number of respiratory panels ordered decreased substantially from 462 respiratory panels ordered pre-intervention (three months) compared to 195 post-intervention (four months). From the panels that met inclusion and exclusion criteria, the number of basic respiratory panels ordered increased from 13 percent pre-intervention to 87 percent post-intervention. The decline in number of total respiratory panels ordered and in the percentage of complete respiratory panels ordered saved an average of 13,225 dollars monthly. Respiratory panels were ordered to be collected on an inappropriate source 8 percent of the time by non-ID physicians and 3.5 percent by ID physicians. This was a substantial decrease from 77 percent and 34.5 percent, respectively, compared to pre-intervention analysis. This resulted in a cost reduction of approximately 3,500 dollars monthly spent on inappropriate testing sites. The primary respiratory panel collection site shifted post-intervention, with 90.5 percent of panels taken from nasopharyngeal swabs or sputum. Appropriate action was taken following the results 42.9 percent of the time by non-ID physicians and 48.1 percent of the time by ID physicians, which is a slight decrease from the 50 percent and 52.6 percent, respectively, of pre-intervention actions.

Conclusion: PCR respiratory panels allow the potential to de-escalate antibiotic therapy sooner compared to traditional culture results. Careful restrictions on panel ordering have helped ensure appropriate use and cost containment from this expensive test. Restrictions on collection site have effectively eliminated a majority of inappropriate PCR respiratory panel ordering and could save up to 42,000 dollars annually. Elimination of PCR respiratory panels from order sets and restrictions of complete respiratory panel ordering to ID physicians could potentially save 160,000 dollars annually. Future directives include eliminating nasopharyngeal swabs as a collection site and continuing restriction of complete respiratory panels to ID physicians.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 5b-035

Poster Title: Assessing the potential need for pharmacist intervention based on discharge summary errors

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Purpose: According to the National Quality Forum, 21 billion dollars are spent each year on medication errors, with 7 million errors being preventable. Discharge errors are thought to account for 12 percent of preventable errors. The goal of this study was to determine the number and types of medication errors on discharge summaries and after visit summaries to establish a need for pharmacist review.

Methods: A random sample of patients discharged from Sentara Virginia Beach General Hospital (SVBGH) and Sentara Norfolk General Hospital (SNGH) between the dates of August 1-18, 2016 were included. Discharge summaries were reviewed for pre-determined types of errors. These errors included incorrect dose, incorrect medication, incorrect frequency, missing information, missing medications, no indication, and duplicate medications. Errors on high alert and high readmission medications were collected. High alert medications were defined as new anticoagulants and new hypoglycemic agents. High readmission medications were defined as antiplatelet agents (excluding aspirin), anticoagulants, oral hypoglycemics, insulins and long-acting opiates. Errors were also stratified based on presence of a medication history taken by a pharmacy technician during the hospital admission. Readmission within 30 days was examined and stratified based on discharge and after visit summary errors. Lastly, discrepancies between the patient's discharge summary and after visit summary were examined.

Results: A total of 136 patients were included in the study (59 from SVBGH and 77 from SNGH). Overall, 47.8 percent of patients had at least one medication error on the discharge summary. Patients who did not have a medication history taken on admission had a higher percentage of errors compared to patients who did have a medication history taken. Additional discrepancies were found between discharge and after visit summaries.

Conclusion: The percentage of medication errors found on discharge summaries indicates pharmacist involvement could play an important role in reviewing discharge orders prior to printing the after visit summary. This has the potential to reduce errors, readmissions and patient harm upon discharge.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5b-036

Poster Title: Clostridium difficile infection: Treatment guideline adherence and impact on clinical cure

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Purpose: Clostridium difficile infection (CDI) is one of the primary leading causes of hospital-associated gastrointestinal illnesses. Many risk factors have been identified for CDI such as extended inpatient hospitalization, exposure to antimicrobials, and use of acid-suppressing medications. Previous studies have shown that guideline-concordant therapy reduces CDI complications, recurrences, and mortality. The purpose of this study was to assess practitioners' adherence to CDI guidelines and its impact on clinical cure.

Methods: The institutional review board approved this retrospective, chart review study of 131 adult patients with a positive fecal Clostridium difficile toxin test between December 1st, 2014 and November 30th, 2015, at Sanford University of South Dakota Medical Center in Sioux Falls, South Dakota. Patients were classified by disease severity to mild-moderate, severe, severe-complicated, first recurrence, and second or later recurrence CDI according to the Infectious Diseases Society of America/Society for Healthcare Epidemiology of America (IDSA/SHEA) and the American College of Gastroenterology (ACG) guidelines. Therapy compliance to guidelines was assessed using disease severity and the medication administration record to further classify each case as sub-therapeutic treatment (ST), therapeutic treatment (TT), or over-treatment (OT). Clinical cure was defined as no need for therapy escalation, diarrhea free for 2 consecutive days, and survival to discharge. Bacteriologic cure was defined as a negative Clostridium difficile toxin or bacteriologic test during hospital stay or upon discontinuation of antibiotic therapy. Clinical cure was also stratified based on severity of CDI. Clinical cure and severity were also evaluated for a relationship with ATLAS scores, a bedside scoring system for

CDI using 5 characteristics (age, treatment with systemic antibiotics, leukocytes, albumin, and serum creatinine).

Results: The two primary outcomes were treatment guideline adherence based upon severity of CDI, and clinical cure based upon treatment guideline adherence. The primary outcome of treatment vs. severity resulted in a statistically significant negative correlation ($r = -0.399$, p-value < 0.05); this means as severity decreased the risk of over-treating the infection increased. The primary outcome of clinical cure for ST vs. TT had an odds ratio (OR) of 1.8, and OT vs. TT was 1.08 with p-values of 0.203 and 0.873, respectively. Secondary outcomes included assessing the relationship between CDI severity and the outpatient/inpatient use of proton pump inhibitors (PPI's), histamine 2 receptor antagonists (H2RA's), probiotics and antibiotics. These were not shown to have a relationship with severity of CDI. ATLAS scores were shown to have a direct relationship with severity (p-value = 0.002), but no relationship with clinical cure.

Conclusion: In our study, it was shown that practitioners were more likely to over-treat less severe cases of CDI. Outpatient and inpatient probiotics, antibiotics, H2B and PPI's were not shown to have a relationship with CDI severity. ATLAS scores correlated with a higher CDI severity, but not clinical cure rates.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-037

Poster Title: Mobile apps for individuals with intellectual and developmental disabilities

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Purpose: Several mobile apps for medication management exist; however, few have been specifically designed for individuals with intellectual and developmental disabilities (IDDs). This project aimed to 1) identify existing smartphone apps designed as medication management tools and and compare their features and 2) evaluate the visual appeal, importance and usability of features of existing medication management apps, specifically to be used in a population of young adults with IDDs. The ultimate goal was to identify mechanisms to improve medication self-management by individuals with IDDs.

Methods: A systematic review was conducted to identify existing medication management apps. Apps were examined to categorize their features and identify the most common features shared among apps. Based on these results, a questionnaire was designed to target the three most common features and ask about other potential features. The Delphi technique was used to garner consensus among experts, identified based on their experience with IDDs. Experts participated in up to three rounds of the questionnaire. The questionnaire consisted of four modules designed around each of the three most common features plus a module for additional features. Each module included multiple questions including rank order of screen shots assessing visual appeal and Likert scale assessing importance of features. In addition, open-ended questions for additional comments and choosing the most and least important additional features for inclusion in an app were also included. Consensus was defined as greater than 90%, 80% and 75% for rounds 1, 2 and 3, respectively. The results were analyzed after each round and those items which achieved consensus were removed. Visual appeal was determined via highest rating, whereas importance and usability were determined via consensus. Additional features were ranked by the number of individuals selecting that feature.

Results: The most common features among medication management applications were medication lists, medication reminders and medication administration reports. Rounds 1, 2 and 3 gathered responses from 30, 24 and 21 experts, respectively. A preferred visual design was identified for each of the three most common, based on cumulative rankings from all three rounds of the questionnaire. No features achieved consensus for exclusion, however, many features achieved consensus for inclusion. The additional features identified as most important included a record of known drug allergies, the ability to share medication information from the app with provider, family, friends and caregivers, emergency contact list and prescription refill reminders. The additional features most likely to be utilized by patients and caregivers were the ability to share medication information from the app with provider and prescription refill reminders. The top three most important additional features were pharmacy automatic refill mechanism; ability to share medication information from the app with the provider; and ability to share medication information from the app with family, friends or caregiver. The top three least important additional features were a link to an official drug information resource; privacy settings and password protection; and prescription refill reminders.

Conclusion: Although several mobile apps for medication management exist, few to none are specifically designed for individuals with IDDs. It is important to prioritize features for inclusion in order to provide a simple, easy to use, but comprehensive app. Visual appeal, importance and usability of features should also be considered. An ideal medication management app would be tailored to the needs of its intended population and, ultimately, promote independence and improve health of individuals with intellectual and developmental disabilities.

Submission Category: Infectious Diseases

Submission Type: Case Report

Session-Board Number: 5b-038

Poster Title: Treatment of methicillin-susceptible Staphylococcus aureus bacteremia with ceftriaxone

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Purpose: Methicillin-susceptible Staphylococcus aureus (MSSA) comprises approximately half of all S. aureus isolates identified and is implicated as the leading cause of hospital-acquired infections. Standard of care therapies (SOCT), including anti-staphylococcal penicillins and cefazolin, display high treatment success. However, use is limited by frequency of dosing, allergies, and clinically relevant nephrotoxicity. Ceftriaxone represents an alternative to these agents with infrequent dosing, and no renal impairment. The hypothesis of this retrospective case series is that ceftriaxone will be as effective for the treatment of MSSA bloodstream infections as SOCT.

Methods: Electronic health records were reviewed retrospectively at the University of Mississippi Medical Center in Jackson, Mississippi for all adult inpatients with a positive blood culture for MSSA between February 2015 and January 2016. Adult inpatients with positive MSSA blood cultures who received ceftriaxone for ≥ 48 hours were included. Exclusion criteria were receipt of vancomycin or concomitant systemic antimicrobials with in vitro activity against MSSA, polymicrobial infections, and pregnant patients. Additional data collected included demographics, source/site of infection, treatment regimen, and clinical outcomes. The primary endpoint was clinical cure, defined as normalization of white blood cell count and temperature within 7 days of the first positive blood culture and clearance of bloodstream infection within 7 days. Descriptive statistics were utilized.

Results: A total of 74 patients were screened; 15 patients were included. The most frequent reasons for exclusion were definitive SOCT or vancomycin therapy. Eleven patients received SOCT prior to ceftriaxone while 4 patients were initiated on ceftriaxone. Clinical and microbiological cure were observed in 6/15 (40%) and 10/15 (67%), respectively. Clinical failure due to leukocytosis at day 7 occurred in 5/9 (56%) patients. Only 1 patient was readmitted with an MSSA infection, which was subsequently eradicated within 4 days after initiation of ceftriaxone therapy.

Conclusion: Ceftriaxone appears to be a reasonable alternative treatment for prevention of recurrence or readmission for MSSA bacteremia when given initially or when prescribed for outpatient usage after SOCT.

Submission Category: Preceptor Skills

Submission Type: Descriptive Report

Session-Board Number: 5b-039

Poster Title: Survey of students' perception of SOAP note writing in advanced pharmacy practice experiences (APPEs)

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Purpose: Clinical pharmacists commonly document their interventions via SOAP note. Student pharmacists are expected to translate SOAP writing skills taught in didactic courses to clinical scenarios during their APPE rotations. It is unclear if the subject material students learn in the first three years of the curriculum is comparable to the activities performed during the fourth year, and if the use of a standardized grading rubric would aid in student documentation. A standardized SOAP note grading rubric was collaboratively developed by 10 ambulatory care faculty members in April 2015 to assess student performance when writing SOAP notes in a clinical setting.

Methods: Fourth year student pharmacists completing primary care rotations were surveyed at the end of their APPEs to determine their comfort level and confidence with writing SOAP notes. Throughout each primary care rotation, students were asked to write three comprehensive SOAP notes and were graded using the standardized rubric, which students were provided at the beginning of the rotation block. The survey also collected data to help determine the usefulness of the rubric. The survey was developed using the Auburn University Qualtrics tool which was also utilized to analyze the responses. The study was approved by the Institutional Review Board (IRB) Auburn University.

Results: The survey was sent to 135 students who completed primary care rotations from May 2015 – April 2016; 83 (61.5%) opened the survey and 53 (39.3%) answered all questions. Roughly half of students believed the rubric correlated well with concepts in earlier courses

throughout the curriculum in the first-third professional years (49.1-66.0%). The majority of students (88.7%) felt they had a clear understanding of the expectations for SOAP notes after reviewing the rubric, and 92% felt more confident in their ability to write SOAP notes after the rotation block had ended.

Conclusion: On clinical pharmacy rotations, student pharmacists are expected to know how to write comprehensive SOAP notes. Although the response rate was less than 50%, the results of this study demonstrated that the use of a grading rubric improved student perception of their ability to document clinical information using SOAP notes on primary care APPEs.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 5b-040

Poster Title: Student pharmacists' level of confidence providing diabetes self-management education (DSME) prior to entering advanced pharmacy practice experience rotations

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Purpose: Due to the prevalence of diabetes in the United States, fourth year pharmacy students will likely encounter and educate patients with diabetes during their advanced pharmacy practice experience rotations. The purpose of this study was to assess the confidence of third year pharmacy students at an established, public four-year pharmacy school in their knowledge regarding DSME skills. The study also involved determining lack of exposure to aspects of DSME and students' opportunities to counsel diabetic patients. Results from the Doctor of Pharmacy class of 2018 were analyzed alone and then compared to previous results from the class of 2017.

Methods: The institutional review board approved the release of a voluntary, anonymous survey to be conducted via email to third year pharmacy students. The survey consisted of four multi-part questions that assessed DSME using numerical ranges, select all that apply, and ranking scales based on confidence level, which ranged from not confident to very confident. One question consisted of students' confidence level in DSME knowledge in various categories. One question assessed lack of exposure to DSME in pharmacy school. Two questions assessed exposure to patients with diabetes and opportunities to provide DSME. Students had approximately two weeks to complete the survey. The initial email containing the survey was sent in September, with two reminder emails sent one week and one day prior to survey closure. At this point in time, students had been exposed to diabetes education in skills labs and an integrated pharmacotherapy course.

Results: Forty-five third year student pharmacists graduating in 2018 completed the survey compared to thirty-five students surveyed the previous year. For the majority of categories, students felt confident or very confident, reflecting 64 to 100 percent of responses. Categories containing the most very confident responses, greater than 50 percent, were “Storage and Disposal of Insulin Pens and Needles,” “Self Monitoring Blood Glucose,” “Glucose and HbA1C Goals,” “Signs, Symptoms, and Treatment of Hyperglycemia,” “Exercise Recommendations,” and “Preventative Care.” Students were least confident with categories including “Mechanism of Action,” “Healthy Coping,” “Diabetic Foot Care,” and “Administration of Diabetes Medications.” Outcomes were similar with previous results. Students indicated least exposure to “Healthy Coping,” “Referring to Ophthalmologist and Podiatrists,” and “Footcare and Preventative care.” During weekly introductory pharmacy practice experience, students reported managing care for 0.11 type 1 diabetes patients and 1.26 type 2 diabetes patients, on average. Comparing the two classes, approximately 82.9 percent in the 2018 class and 74 percent in the 2017 class had five or fewer opportunities to provide DSME to patients seen during weekly introductory pharmacy practice experiences. 70.3 percent of the 2018 class and 86 percent of the 2017 class had five or fewer opportunities outside of school.

Conclusion: More than half of students reported feeling confident or very confident in all fifteen DSME categories. Most often students were least confident in DSME areas in which they lacked educational exposure. Surveying third year pharmacy students helps to identify areas of comfort and lack of exposure with regard to DSME. This data may be helpful from an academic standpoint for adjusting DSME targeted curriculum for better preparedness prior to entering their advanced pharmacy practice experience. One limitation of the study was less than one-third of the 2018 class completed the survey.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 5b-041

Poster Title: Overall Cost Comparison of Children Receiving Methotrexate for Acute Lymphoblastic Leukemia

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Purpose: Treatment regimens for Acute lymphoblastic leukemia (ALL) often contain inpatient high-dose Methotrexate(HD-MTX) therapy or outpatient Cappizzi Methotrexate(C-MTX). Delayed clearance has been identified as one of the major contributing factors for toxicity, often leading to increased financial costs. The purpose of this project is to compare the medical costs of C-MTX and HD-MTX and further compare the medical costs of HD-MTX standard clearance to HD-MTX delayed clearance.

Methods: A retrospective review of electronic medical records along with a questionnaire measuring direct medical costs was performed for pediatric patients, ages 2 to 18 years old, who received either HD-MTX or C-MTX for ALL at the University of Mississippi Medical Center. The total cost for each patient included intravenous fluid costs, cost of methotrexate therapy, additional costs for delayed clearance, cost of hospital stay or office visit, and estimated cost of travel. These were calculated for each patient and descriptive statistics along with a student's t-test were used to analyze the data.

Results: A total of 16 patients(4 HD-MTX standard clearance, 6 HD-MTX delayed clearance, 4 C-MTX, 2 both C-MTX and HD-MTX) met inclusion and exclusion criteria. The average total cost of therapy for HD-MTX was $12,930 compared to $1,740 for the C-MTX patients ($p < 0.002$). The mean total cost of therapy for patients with standard clearance was $10,084 compared to patients with delayed clearance $15,775 ($p= 0.220$).

Conclusion: This study demonstrates that on average the use of C-MTX compared to HD-MTX may lead to lower financial costs, regardless of standard or delayed clearance in pediatric patients treated for ALL.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5b-042

Poster Title: Tenfovir alafenamide compared to tenofovir disoproxil fumarate in the management of Human Immunodeficiency Virus with a focus on safety

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Purpose: Tenofovir disoproxil fumarate (TDF) is the most commonly recommended nucleoside reverse transcriptase inhibitor (NRTI) used in HIV/AIDs treatment regimens. However, data suggests TDF has been associated with decreased bone mineral density and renal toxicities, potentially through a mechanism of high circulating plasma levels. Tenofovir alafenamide (TAF) is a recently Food and Drug Administration approved tenofovir prodrug derivative with a 90 percent reduction in plasma tenofovir concentration. The purpose of this study is to determine whether TAF is non-inferior to TDF in the virological suppression of HIV in treatment naive HIV patients and its impact on renal function and bone density.

Methods: Respective institutional review boards approved these two phase 3 double blind, non-inferiority clinical trials. Men and women 18 years or older who provided informed consent were enrolled if they were treatment naive, HIV infected with an RNA viral load of at least 1,000 copies per mL, and an estimated glomerular filtration rate of at least 50 mL per min. Patients were excluded if positive with hepatitis B surface antigen, hepatitis C antibody or a new AIDS-defining illness within 30 days of screening. Patients were randomly assigned in a 1 to 1 ratio to receive a once daily combination tablet containing 150 mg elvitegravir, 150 mg cobicistat, 200 mg emtricitabine, and 10 mg tenofovir alafenamide (ECF TAF) or 300 mg tenofovir disoproxil fumarate (ECF TDF). The primary outcome measures was the proportion of patients with plasma HIV 1 RNA less than 50 copies per mL at week 48 and pre-specified renal and bone endpoints. There were four key safety endpoints including: spine mineral density, hip mineral density, and treatment emergent proteinuria changes. It was determined that a sample size of at least 840 patients in each study would provide 95 percent power to establish non-inferiority between the two treatment groups.

Results: Combined primary outcomes concluded ECF TAF was non-inferior to ECF TDF at week 48, 800 patients (92 percent) vs 784 patients (90 percent) with plasma HIV 1 RNA less than 50 copies per mL, respectively (adjusted difference 2.0 percent, 95 percent CI -0.7 to 4.7). Safety endpoints showed significantly less proteinuria (median percent change -3 vs 20; p less than 0.0001), significantly smaller decrease in spine bone mineral density (mean percent change form baseline -1.30 percent vs -2.86 percent; p less than 0.0001) and significantly smaller decrease in hip mineral density (mean percent change form baseline -0.66 vs -2.95; p less than 0.0001) in patients given ECF TAF combination therapy at week 48. Adverse effects were comparable between the two groups.

Conclusion: ECF TAF in treatment naive patients was shown to be non-inferior to ECF TDF. Patients in the ECF TAF treatment group experienced significantly less bone and renal adverse effects. Innovative medication therapies for patients infected with the HIV has shifted from merely maintaining a low viral load to providing better quality of life and minimizing comorbid risks. Further studies are needed to evaluate TAF impact on patients with advanced disease and those co-infected with hepatitis B.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-043

Poster Title: Retrospective analysis of 4-Factor Prothrombin Complex Concentrate administration across a six-hospital health system

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Purpose: Four-Factor Prothrombin Complex Concentrate (4F-PCC) is indicated for rapid reversal of acute life-threatening bleeds or need for urgent surgery. Dosing errors with 4F-PCC may result in severe adverse effects, such as prolonged bleeding or venous thromboembolic events. Utilizing 4F-PCC to reverse bleeding without an indication results in unnecessary hospital costs. The primary objective of this analysis was to determine appropriateness of 4F-PCC usage with respect to indication and dose as defined by hospital guidelines and a maximum dosing weight of 100 kg. This study also examined the percentage of 4F-PCC administrations entered through the order set.

Methods: The institutional review board (IRB) categorized this analysis as a quality assurance/quality improvement activity exempt from IRB oversight. Electronic medical records were utilized to identify patients that received 4F-PCC from any hospital within the system from May 3, 2015 to May 6, 2016. A total of 295 4F-PCC administrations were identified. Patients were divided into two groups by body weight: those weighing greater than or equal to 100 kg and those weighing less than 100 kg. All patients weighing greater than or equal to 100 kg were included and a random selection of the patients weighing less than 100 kg were chosen. Indication, INR just prior to administration of 4F-PCC, and use of other reversal agents were recorded for all selected 4F-PCC administrations via examination of provider notes, labs, medication administration record, and problem lists from the corresponding hospital encounter. The hospital system's evidence-based Reversal of Life Threatening Bleeding guideline was utilized to assess appropriateness. A margin of 250 units was applied to all 4F-PCC administrations when determining dose appropriateness to account for the variability of Factor

IX units in each 4F-PCC vial and pharmacists' ability to round to the nearest vial. For patients weighing more than 100 kg, a maximum weight of 100 kg was used to determine dosing appropriateness. Data was analyzed using descriptive statistics.

Results: A total of 155 administrations were evaluated, which included 74 administrations for patients weighing greater than or equal to 100 kg and 81 administrations for patients weighing less than 100 kg. Based on hospital guidelines, 102 out of 155 (66 percent) administrations had an appropriate indication, while 28 of 155 (18 percent) administrations were inappropriate because the patient was not prescribed an anticoagulant. The remaining 25 (16 percent) administrations were inappropriate because 4F-PCC was not the first line agent for reversal of heparin, enoxaparin, or antiplatelet agents. Examining administration of additional reversal agents, 124 of the 155 (80 percent) administrations also received vitamin K even though only 82 of 155 (53 percent) administrations were for reversal of warfarin. When 4F-PCC was ordered for reversal of heparin, enoxaparin, or antiplatelet agents, only 8 of 32 (25 percent) administrations received other indicated reversal agents before 4F-PCC. Of the 102 administrations with an appropriate indication, 54 (53 percent) administrations were appropriately dosed, including 34 administrations for patients less than 100 kg and 20 administrations for patients greater than or equal to 100 kg. Of the total 295 4F-PCC administrations identified, only 34 (12 percent) orders utilized the order set.

Conclusion: Despite existing guidelines and a readily available order set, a large number of 4F-PCC doses were administered without an appropriate indication. Mandatory use of the order set could improve both appropriateness of indication for use and appropriateness of dose based on body weight. Use of the order set should also reduce the use of vitamin K in bleeding reversal for medications other than warfarin. Future research should examine the impact of requiring all 4F-PCC orders to go through an order set and an evaluation of venous thromboembolic rates following 4F-PCC administration.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5b-044

Poster Title: Student pharmacist evaluation of penicillin allergies in a veteran's health care system

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Purpose: As many as 25 percent of all patients report an allergy to an antimicrobial drug. In particular, approximately 15 percent of patients report an allergy specifically to a beta-lactam antibiotic, with penicillin being most common. Clinicians often mistake penicillin intolerances for true allergies due to inadequate documentation in the medical record. Improper documentation of such allergies can result in the use of less appropriate antibiotic therapy and increased health care costs. This quality improvement project was designed to determine the accuracy of true penicillin allergies within the health system.

Methods: This quality improvement project was approved by the institutional review board. Patients with a documented penicillin allergy were identified through the information technology department of the health system. A student pharmacist performed a chart review for each patient to determine sex, race, age, allergic reaction, and any additional comments on the allergy listing. Patients were then categorized into the following severity categories: “true allergy”, “adverse reaction”, or “no reaction listed”. A true allergy was defined by reactions including hives, rash, urticaria, anaphylaxis, shortness of breath, dyspnea, etc. Adverse reactions included events such as nausea, vomiting, anxiety, dizziness, etc.

Results: The study population included a total of 3,256 patients: 2,756 men and 500 women. Caucasians and African Americans comprised 56.5 percent and 37.6 percent, respectively. Nine hundred and three patients (28 percent) did not have a documented reaction, and thus could not be assessed. True allergic reactions to penicillin were reported in 2,057 of the 2,353 patents with a reaction listed (87.4 percent). Reactions such as rash, urticaria, hives, and anaphylaxis were documented in 1,102 patients (46.8 percent), 341 patients (14.5 percent), 251 patients (10.7 percent), and 85 patients (3.6 percent) of the subset of the population with a listed

reaction, respectively. Of the 2,353 patients with a documented penicillin allergy, 296 patients (12.6 percent) actually experienced an adverse reaction as opposed to a true allergy. Some examples of adverse reactions listed included 110 patients (4.7 percent) with nausea and/or vomiting, 6 patients (0.3 percent) with drowsiness, and 5 patients (0.2 percent) with anxiety.

Conclusion: Most patients reporting an allergy to penicillin did report true allergic reactions. However, few were considered serious or life threatening, with simple rash being most common. More than one quarter of patients reporting an allergy to penicillin did not have a documented reaction, making appropriate antibiotic selection difficult in these patients. Efforts are currently underway within the health system to clarify these allergies. Chart reviews were helpful in identifying patient profiles with missing reaction data for the documented penicillin allergy. Identifying and correcting these gaps may allow for more appropriate antibiotic therapy in future clinic or hospital visits.

Submission Category: Geriatrics

Submission Type: Descriptive Report

Session-Board Number: 5b-045

Poster Title: Evaluation of pharmacist-led interventions in a long term care facility (LTCF)

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Purpose: To examine the benefit of a clinical pharmacist and pharmacy student team at a long-term care facility (LTCF). To review medication related interventions and evaluate the clinical relevance of those interventions.

Methods: One pharmacist and several pharmacy students provided weekly chart reviews over a five year period. Results of each chart review were then verbally reported to the physician team. All patients 65 years of age or older residing in the facility for at least 4 weeks were included. A specified data collection form was used to review all patient charts. Interventions regarding indication, dosing (including renal and hepatic), monitoring, adverse reactions, drug interactions, allergies, nutrition status, Beers criteria, fall risk, and omitted therapy were recorded.

Results: A total of 623 patient charts were reviewed. The following interventions were identified and found to be clinically relevant: 889 major drug interactions were identified and adjustments recommended; 1113 renal dose adjustments were recommended; 4 hepatic dose adjustments were recommended; 753 labs related to drug monitoring were recommended; 178 adverse reactions were identified; 1324 medications were identified as potentially inappropriate medications per Beers criteria; 791 medications were found to increase fall risk; 576 patients were found to have omitted therapy for 1 or more disease states.

Conclusion: Although there were limitations to this retrospective analysis, the results of this study demonstrate that a clinical pharmacist and pharmacy student team improve the management of medication therapy. The pharmacy team provides a consistent approach to medication therapy management, and is an asset that should be utilized in caring for patients in LTCF.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5b-046

Poster Title: Evaluating the effect of employee training modules on medication errors in adult foster care homes

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Purpose: Due to mental disabilities, some patient populations are unable to provide care for themselves, and are reliant on the care of either family members or direct care staff. Providing care sometimes requires the use of multiple medications, which presents increased potential for medication errors. Baseline medication knowledge is required by the direct care staff in order to pass medications safely and efficiently to ensure the best therapeutic outcomes for a patient. This study investigated if medication training for direct care employees can improve medication error rates for mental health patients who cannot administer their own medications.

Methods: A pre/post-analysis study design compared medication error rates in patients with mental/physical disabilities residing in adult foster care (AFC) homes four months before and after a medication training intervention. Direct care staff members responsible for medication administration of the facility participated in the study per request of their employer. Prioritization of training is based on the number of errors that have occurred in all facilities contracted with the CMH in the past. An IRB exempt status was attained due to de-identified data collected by the principal investigator. Incident reports (IRs) submitted by the AFC homes participating in the study were evaluated. A voluntary questionnaire was distributed at the end of the session to determine baseline characteristics of the direct care staff. Medication errors were defined as any IR submitted regarding incorrect drug therapy, and are categorized in the following manner: wrong dose, wrong time, wrong medication, wrong patient, medication destroyed, and missed dose. The primary investigator monitored the total number of IR reports turned into the primary investigator over the course of four months. It was determined the sample size needed to maintain a p-value < 0.05 and a power of 80% was 150 error reports.

Results: 123 incident reports were submitted within the pre/post four-month timeframe. From these reports 87 medication errors met the study criteria. There was a statistically non-significant increase in the number of reported medication errors in the four-month period after the educational intervention compared to the four-month period prior to the educational intervention. The most common error in both the pre and post intervention groups was a missed dose (83.3% and 82.2% respectively).

Conclusion: Based on these analyses, the training session had no effect on the reduction of errors post intervention. A closer look at the types of errors made help guide future studies to show that not all medication error types can be corrected via the educational process. Rather changes may be required in the medication management process used in individual homes, suggesting a standardization protocol for medication administration for AFC patient populations.

Submission Category: Pain Management

Submission Type: Descriptive Report

Session-Board Number: 5b-047

Poster Title: Use of Mu Opioid Antagonists and Pharmacological Punishers in the Development of Abuse-Deterrent Opioid Analgesics

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Purpose: The number of deaths attributable to prescription opioids has more than quadrupled over the last decade, with many of these deaths due to misuse of these medications. To combat this epidemic, the United States Food and Drug Administration (FDA) released guidance to inform the evaluation and labeling of abuse-deterrent formulation (ADF) opioids with a decreased liability for abuse. Among the categories outlined in the guidance, the "aversion" strategy appears to be the most underutilized. The current review will focus on the effects of adding potentially aversive pharmacological agents to opioid analgesics, in terms of both abuse liability and therapeutic efficacy.

Methods: Peer-reviewed articles pertaining to the effects of mu opioid antagonists and pharmacological punishers on both the abuse-related and antinociceptive effects of opioids were reviewed. Findings from basic science investigations of the effects of mu opioid antagonists and pharmacological punishers on the abuse-related and therapeutic effects of opioids were also considered.

Results: Two major classes of ADF opioids meet the FDA guidance's definition of aversion: 1) Mu opioid receptor agonist/antagonist medications, and 2) mixtures that contain agents that can produce aversive effects at sufficient doses (i.e., punishers). Agonist/antagonist medications are commonly used, but these drugs only have the potential to produce aversive effects under limited circumstances. The antagonist portion of the medication is intended to precipitate withdrawal in opioid-dependent individuals if used through the intravenous or intranasal route, but this effect does not always occur. Notably, the therapeutic efficacy of these medications seems to be largely unaffected by the addition of the antagonist if

administered through the oral route. Although there currently are no FDA-approved opioid analgesics that use a pharmacological punisher to discourage dose escalation, this strategy has been applied to prevent abuse of an anti-diarrheal opioid (i.e., Lomotil® (diphenoxylate hydrochloride and atropine sulfate)). Several classes of drug punishers have been shown to be effective in reducing the abuse-related effects of opioids, with varying impacts on therapeutic efficacy observed between punishers.

Conclusion: ADF opioids that use the agonist/antagonist approach have been demonstrated to be effective in treating pain while reducing the likelihood for abuse in certain situations. However, the agonist/antagonist approach is not an effective deterrent of oral misuse (i.e., consuming more opioid than prescribed), which is the most common route of abuse among prescription opioid abusers. A major challenge in the development of opioid analgesics with pharmacological punishers involves appropriate dosing of the punisher. The balance between adequate punishing effectiveness and patient tolerability appears to be delicate, and more work is needed to characterize the feasibility of this strategy.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 5b-048

Poster Title: Evaluation of insulin glargine in critically ill patients receiving nutrition support

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Purpose: Hyperglycemia frequently occurs in critically ill patients receiving specialized nutrition support and has been associated with increased morbidity and mortality. Most guidelines recommend a target blood glucose (BG) range of 140 to 180 mg/dL for critically ill patients. Continuous intravenous (IV) insulin infusions are recommended to treat hyperglycemia in critically ill patients, although insulin glargine, a long-acting basal insulin, is often employed to achieve target BG without initiating a continuous IV insulin infusion. The aim of this study is to evaluate the efficacy and safety of insulin glargine in critically ill ICU patients who are also receiving specialized nutrition support.

Methods: This was a retrospective study approved by the institutional review board. Electronic medical records were used to identify all patients who received insulin glargine in the medical-surgical or cardiovascular intensive care units (ICU) between February 1, 2015 and August 1, 2016. Patients who received concomitant insulin glargine and nutrition support with either enteral nutrition (EN) or parenteral nutrition (PN) for at least 3 days were included. Patients less than 19 years of age or who received overlapping insulin glargine and nutrition support outside of the ICU setting were excluded.
Data were collected for up a maximum of 7 days while receiving concurrent insulin glargine and nutrition support therapy. Efficacy of insulin glargine was evaluated by the number of hours spent in the hyperglycemic range (BG greater than 180 mg/dL). Safety was evaluated by determining the number of patients who experienced at least one incidence of mild hypoglycemia (BG 40 to 69 mg/dL) or severe hypoglycemia (BG less than 40 mg/dL) and the number of hours spent in either of the hypoglycemic ranges. Additional endpoints assessed included the type of nutrition support, incidence of infection during ICU stay, mean BG, and

mean daily doses of glargine and supplemental insulin. Non-nominal data were expressed as mean plus or minus standard deviation.

Results: A total of 42 patients receiving concomitant insulin glargine and nutrition support were enrolled for study. The mean age of patients was 68.4 plus or minus 10.1 years. Most patients received nutrition support with enteral nutrition (88.1 percent), had a diagnosis of Type 2 diabetes mellitus (97.6 percent), and had an infection (92.9 percent). Patients received a mean insulin glargine daily dose of 18.3 plus or minus 12.1 units per day, with 19.7 plus or minus 13.8 units of supplemental insulin. The mean blood glucose (BG) was 185.8 plus or minus 38.6 mg/dL. Hyperglycemia (BG greater than 180 mg/dL) occurred in 97.6 percent of patients and patients spent 12 plus or minus 6.6 hours per day in the hyperglycemic range. Hypoglycemia occurred in 9 patients (21.4 percent), with 8 patients (19 percent) experiencing mild hypoglycemia (BG 40 to 69 mg/dL) and 1 patient experiencing severe hypoglycemia (BG less than 40 mg/dL).

Conclusion: The results of this study indicate insulin glargine inadequately controls BG in ICU patients receiving nutrition support therapy, as patients spent approximately half of the day in the hyperglycemic range and a fifth of patients experienced hypoglycemia. Due to these findings, consideration of increased institutional usage of continuous IV insulin infusions rather than insulin glargine to attain glycemic control in this patient subset is warranted.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5b-049

Poster Title: Who knows when to dispose; the storage and handling of commonly administered vaccinations

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Purpose: Pharmacists in the United States have become more involved with vaccine administration in recent years. The stabilities of these products are frequently called into question during administration and storage. This project was designed to collect and provide information to pharmacists regarding the stability of some commonly administered vaccines, including details that are not fleshed out in the product's package insert. Package inserts often do not include stability guidelines aside from ideal storage temperatures, whether or not the product can be frozen, and if the product should be protected from light.

Methods: Stability information of CDC-approved vaccines was collected from manufactures. Data collected included product stability when stored outside the recommended temperature, light, or radiation requirements. Additionally, information was gathered regarding the percentage of vaccinations that were returned to the manufacturer for a myriad of reasons, including questionable stability due to handling etiquettes

Results: Fourteen manufacturers were contacted regarding the twenty-four individual vaccinations and their guidelines. Additional details regarding storage and handling were obtained for these vaccinations, as well. Each manufacturer was able to provide a detailed summary of the handling protocols, as well as discarding parameters for the vaccination(s).

Conclusion: Storage specifications of vaccines should be addressed on a case-by-case basis, as not all vaccinations require the same handling protocols. By increasing pharmacists' knowledge of data regarding vaccine storage, pharmacists can guarantee the safety and efficacy of their

vaccination stock, as well as reduce the associated medication and monetary waste from improper storage or lack of storage information.

Submission Category: Pharmacokinetics

Submission Type: Evaluative Study

Session-Board Number: 5b-050

Poster Title: The association of cytochromes P450 and transporter genetic variation with steady-state endoxifen concentration

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Purpose: Bioactivation of tamoxifen to endoxifen is primarily mediated by CYP2D6, however, substantial endoxifen variability is unexplained by CYP2D6 activity. Most pharmacogenetic research has focused on CYP2D6 and common SNPs in a few candidate genes. Our objective was to conduct a comprehensive assessment of the effect of genetic variation in tamoxifen-relevant enzymes and transporters on steady-state endoxifen concentrations.

Methods: 302 breast cancer patients receiving tamoxifen 20 mg/day for at least four months, without impaired kidney or liver function and not concurrently taking a moderate or strong CYP2D6 inhibitor were enrolled. Germline DNA collected at enrollment was genotyped for CYP2D6 on the Roche Amplichip and for 191 SNPs in 36 genes on the iPLEX ADME PGx Panel by Agena Bioscience. Metabolic activity phenotype was predicted from genotype data for CYP1A1, CYP1A2, CYP2A6, CYP2B6, CYP2C19, CYP2C8, CYP2E1, ABCC2 and ABCG2. Univariate associations were analyzed using linear regression, and then adjusted for CYP2D6 diplotype and other covariates.

Results: In univariate analysis, increasing CYP2C8 activity was associated with higher endoxifen concentrations ($p=0.023$, $\beta= 0.22$, 95% CI: ±0.40). Increasing CYP2C19 activity had a similar trend after adjustment for age, weight and CYP2D6 diplotype ($p=0.069$). In a multivariable model, CYP2C8 and CYP2C19 contributed independently to endoxifen concentration, despite known linkage disequilibrium ($D'>0.9$, CYP2C8, $p=0.018$; CYP2C19, $p=0.089$).

Conclusion: CYP2C8 and CYP2C19 activity are associated with endoxifen concentration in tamoxifen treated patients. Further research is needed to identify additional predictors of endoxifen concentration to guide individualized dosing to improve treatment efficacy.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5b-051

Poster Title: Retrospective evaluation of high-dose piperacillin-tazobactam and cefepime dosing on clinical outcomes in patients with Gram-negative bacteremia or pneumonia in the intensive care unit

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Purpose: Gram-negative bacteria are responsible for life-threatening infections, especially in patients in the intensive care unit. These infections are commonly treated with two broad-spectrum antibiotics: piperacillin-tazobactam and cefepime, a penicillin/beta-lactamase inhibitor and fourth generation cephalosporin, respectively. Effective treatment with these drugs requires sufficient time above the minimum inhibitory concentration (MIC) to eradicate pathogenic organisms. A high-dose schedule is one method to optimize time spent above the MIC, but these regimens have not been extensively studied. This study evaluated high-dose versus standard-dose regimens of piperacillin-tazobactam and cefepime on clinical outcomes for the treatment of Gram-negative bacteremia and pneumonia in critically ill patients.

Methods: This retrospective, observational cohort study was conducted at the University of Michigan Health System (UMHS) and approved by the Institutional Review Board. Subjects 18 years or older who were hospitalized in the medical intensive care unit (ICU) or surgical ICU between January 1, 2010 – September 1, 2015 with a positive Gram-negative respiratory or blood culture were included. Additionally, subjects must have received piperacillin-tazobactam or cefepime for at least 72 hours. Patients were excluded if their infection was resistant to piperacillin-tazobactam or cefepime, they had a history of cystic fibrosis, were transferred to UMHS after 72 hours at an outside institution, or there was insufficient clinical evidence of pneumonia despite a positive sputum culture. Patients who received piperacillin-tazobactam 4.5g every 6 hours or 3.375g every 4 hours, cefepime 2g every 8 hours, or a renally adjusted equivalent dose as outlined in the study protocol were assigned to the high-dose experimental group; all others were included in the control group. The primary outcome was 30-day all-cause

mortality. Secondary outcomes included 30-day re-hospitalization, recurrence of an infection caused by the same organisms as the original infection, length of hospital stay, length of ICU stay, and new or worsened altered mental status during antibiotic treatment. The primary and secondary endpoints were analyzed using the chi-square test and Student's t test.

Results: This study included a total of 214 patients (31 patients in the high-dose group and 181 in the standard dose group). For the primary endpoint, the 30-day all-cause mortality was significantly lower in the standard dose group (14.9% vs. 41.9%, p=0.0003). There were no significant differences between high-dose and standard dose treatment in regard to 30-day re-hospitalization (0/31 vs. 1/181 patients), recurrence of index infection (no patients in either group), and ICU length of stay (6.7 vs. 8.9 days, p=0.103). The average length of hospital stay was significantly shorter in the high-dose group (17.03 vs. 23.4 days, p=0.01), while new or worsened altered mental status while on piperacillin-tazobactam or cefepime was significantly greater in the high-dose group (29% vs. 8%, p=0.0008).

Conclusion: This study showed that using high-dose piperacillin-tazobactam or cefepime did not reduce 30-day all-cause mortality in ICU patients with Gram-negative bacteremia or pneumonia, as compared with standard dosing. In addition, utilizing a high-dose regimen may potentially cause or worsen altered mental status.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 5b-052

Poster Title: Impact analysis of interventions by fourth-year student pharmacists and a clinical practice faculty in internal medicine resident clinics

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Purpose: To assess possible cost savings from interventions conducted and logged over a four-year period by fourth-year pharmacy students during advanced pharmacy practice experiences in an outpatient internal medicine resident clinic.

Methods: Students at this outpatient clinic provide medication counseling and reconciliation services, pharmacotherapy recommendations to resident physicians, and see patients for individual appointments. Under the supervision of a pharmacy faculty member and with IRB approval, all clinical interventions documented in the Quantifi web-based system by pharmacy students from 2012-2016 were retrospectively analyzed. The amount of dollars saved per intervention category was provided by the Quantifi web-based system.

Results: In the four-year study period, 47 pharmacy students documented 2,077 interventions. The most frequently documented interventions were chart review (44%), patient medication history (21.5%) and medication reconciliation (17.5%). Patient medication history was the individual intervention category associated with the greatest cost avoidance over the four years, totaling to $68,391. Medication reconciliation was a close second, totaling to $55,692 in potential cost savings. The total estimated cost savings for all interventions documented was $151,684.

Conclusion: In an outpatient clinic setting, interventions completed by fourth-year pharmacy students had a significant impact on cost avoidance in relation to patient care. Pharmacy students are capable of preforming a wide range of clinical interventions that can be directly associated with cost savings, especially medication history and reconciliation services. It should

be noted that some interventions completed during the study period may not have been logged, giving the potential for even larger total cost savings than seen in this analysis. This data could be useful to help expand the role of fourth-year pharmacy students in outpatient clinic rotation practice sites.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 5b-053

Poster Title: Retractions in pharmacy literature

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Purpose: Research article retractions can occur in pharmacy literature. There is no database documenting retracted articles in the pharmacy literature and this could cause retracted articles and thus, referencing of incorrect data in research. Assessing the number of retractions in current literature would help determine the need for such a database and educate on which journals are less reliable due to having a high percentage of retracted articles.

Methods: The 2016 list of American Association of Colleges of Pharmacy (AACP) Core Journals was obtained and it was determined which were available in PubMed. The journals were then divided into groupings determined by AACP. Each journal was searched using a specific procedure in the time span of four days. The number of published articles and retractions were recorded for each journal and the percentage of retractions per journal was calculated by dividing the number of retractions by the total number of articles in PubMed for that journal. The total number of retractions for each grouping was calculated by using the sum of the total number of retractions per each journal in the grouping and the retraction percentage was taken by calculating the mean of the individual journals' retraction percentages. Retraction notices were obtained and the reason for retraction was recorded and marked as one of seven different categories. These categories were misconduct (MC), honest error (HE), duplicate publication (Dup), plagiarism (Pl), unethical research (UR), or withdrawn, no reason given (WNR). The percentage of each reason for retraction was calculated by dividing the total number of retractions in a specific category by the total number of retracted articles.

Results: A total of 281 journals were searched on PubMed from August 15th through August 18th and 274 (97.5%) journals were included in the study. The remaining 7 journals were not found in the PubMed database. All journals were divided into 66 groupings per AACP Core Journal listings. A total of 2,501,634 articles were found through the PubMed search for each of

the AACP Core Journals available. The investigation yielded 547 retractions [0.022%]. Many journal groupings tied for the lowest retraction percentage [0%] while Pulmonology yielded the highest retraction percentage [0.1941%]. Phytotherapy Research scored the highest retraction percentage for an individual journal [0.28%]. There were 182 articles retracted due to MC [33.27%], 202 articles retracted due to HE [36.75%], 68 articles retracted due to Dup [12.43%], 29 articles retracted due to PI [5.30%], 52 articles retracted due to UR [9.51%], and 9 articles retracted due to WNR [1.65%]. There were 5 [0.91%] retracted articles that could not be accessed and were not placed into any of the reason for retraction categories. These articles were still included in the total number of retractions when calculating the percentage for reason for retraction because a retraction notice was indicated in the PubMed Search.

Conclusion: This analysis found a small number of retractions in the AACP Core Journals indexed in PubMed and it is not likely to affect most research. There were no specific journals identified as more unreliable compared to others. While some do have higher retraction percentages, this can be attributed to factors other than the quality and reliability of the journal. Even with these results, it still is important for retracted articles to be tracked and identified as they can ruin the validity of the literature if referenced.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-054

Poster Title: Evaluation of the use of intravenous immunoglobulin (IVIG) in a community hospital setting

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Purpose: IVIG is a medication derived from human plasma that contains immunoglobulin G (IgG). Although primary FDA approved indications of IVIG are primary humoral immunodeficiency (PI) and immune thrombocytopenic purpura (ITP), studies have supported its use for various off-label indications. In November 2015, Bon Secours St. Mary's Hospital's Pharmacy & Therapeutics (P&T) committee approved a change to using ideal body weight (IBW) for IVIG dosing. The objective of this study is to assess different indications for IVIG usage at St. Mary's Hospital, adherence to the P&T-approved dosing protocol, and cost savings associated with the change to dosing based on IBW.

Methods: The study was a retrospective, single-center, chart review of patients who were treated with IVIG at St. Mary's Hospital in Richmond, Virginia. IVIG administration records from November 1, 2015 through July 31, 2016 were obtained from the electronic health record. The following data was collected: patient age, gender, total body weight (TBW), height, indication for IVIG usage, dose, frequency of administration, and ordering provider service. The primary endpoint was frequency of IVIG indication. The secondary endpoints were ordering provider service, percent of orders that adhered to the P&T-approved dosing protocol, and cost savings associated with the dosing protocol. Patients were included if they were greater than 2 months old and received IVIG during the designated study period. Patients who received doses of IVIG over multiple admissions as part of one longitudinal dosing regimen were counted as one patient.

Results: A total of 39 patients met inclusion criteria. The most common indications for IVIG usage were ITP (31%), Kawasaki disease (13%), and dermatomyositis (13%). Other indications included Guillain-Barre Syndrome (10%), myasthenia gravis (8%), juvenile dermatomyositis (5%), possible viral myocarditis (2.5%), polymyositis (2.5%), small fiber neuropathy (2.5%),

necrotizing myopathy (2.5%), inclusion body myositis (2.5%), hypogammaglobulinemia (2.5%), and hemolytic disease of the newborn (2.5%). The indication of the other 2.5% was unclear due to lack of information. All of these indications are supported by current literature except for necrotizing myopathy. The most common specialties of the ordering providers were rheumatology (28%), pediatrics (28%), hematology/oncology (13%), and neurology (13%). TBW was used for 56% of the orders and IBW was used for 41% of the orders. The weights used for the other 3% of orders were unspecified. In adults, 67% of the orders were dosed using IBW, whereas in pediatric patients, only 6% of the doses were ordered using IBW. The transition of dosing from TBW to IBW has resulted in cost savings of approximately $88,000 annually. Adherence to the protocol of using IBW for all orders could potentially lead to additional cost savings of approximately $12,000 annually.

Conclusion: The most prevalent indication for IVIG use at St. Mary's Hospital was ITP. Overall, only 41% of the orders were dosed using IBW despite the P&T approved protocol that recommends all IVIG orders use IBW. Using IBW could potentially lead to additional cost savings of $12,000 annually. Therefore, to increase protocol adherence, further education will be provided to all pharmacists and providers with specialties that commonly order IVIG.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5b-055

Poster Title: Pharmacist post-discharge telephone follow-up for high-risk veterans transitioning from hospital to home: a pilot project

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Purpose: Effective transitions of care models have shown reductions in hospital readmissions, emergency department visits, and mortality. It is estimated that 50% of all hospital related medication errors and 20% of adverse drug reactions are due to lapses in communication at discharge. Many factors may increase patient vulnerabilities during care transitions, such as multiple medication changes, multiple co-morbidities, or declining cognitive function. This pilot identified high risk veterans for pharmacy post-discharge telephone follow-up by a pharmacy student and pharmacist.

Methods: Patients discharged from acute and general medicine units were screened daily by a pharmacy student and pharmacist. Patients were categorized according to risk factors to include advanced age (>75 years old), three or more medication changes upon discharge, a diagnosis of dementia or heart failure, and/or a high CAN (Care Assessment Needs) report score. The CAN report provides a composite score of 0-99 dependent upon number of diagnoses, number of emergency department visits and inpatient discharges over the last 2 years. Following initial screening of daily discharges, the student conducted an in-depth electronic chart review of inpatient progress notes, admission, discharge, and active medication lists for accuracy and potential discrepancies, fall risk and anticholinergic burden, where applicable. These findings were reviewed with the pharmacist to formulate a tentative plan prior to calling the patient. During the telephone call, the following elements were discussed and reviewed with the patient: medication management system at home, adherence, a medication review to include potential discrepancies identified during chart review, fall risk assessment, and potential anticholinergic side effects. An electronic progress note describing discharge medication changes, an up to date medication list, and any identified discrepancies and relevant information was entered by the student and approved by the pharmacist.

Interventions and patient concerns were relayed to the primary care provider (PCP) team for follow-up.

Results: Twenty patients received an in-depth telephone call. Fourteen patients had a medication discrepancy upon review of key medication lists. Discrepancies upon review were defined as drug omission from the discharge plan, drugs with no active order (expired med or drug not ordered at discharge), drug commission, and errors in dosing, frequency, or directions. Eighteen patients had at least one discrepancy identified during interview. Discrepancies upon interview were defined as the patient taking an extra medication, not taking an active medication, or taking a medication differently than prescribed. PCPs were alerted for questions, discrepancies, or telephone interventions for 14 patients.

Conclusion: Medication discrepancies were frequently identified in patients screened. CAN scores may be beneficial in identifying high risk patients for post-discharge intervention. This pilot provided additional evidence for resource allocation within the pharmacy department to support transitions of care and the discharge process.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-056

Poster Title: Racial disparities relating to health-system utilization behaviors and medication use among older adults with cancer

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Purpose: The total cancer incidence in the United States is projected to increase approximately 45 percent from 2010 to 2030, driven by cancer diagnosed in older adults and minorities. However, previous literature shows that non-white cancer patients experience delayed treatment initiation and worse outcomes compared to white cancer patients across several types of cancer. This study was designed to examine racial disparities in self-reported health outcomes, cancer screening, and adverse medication events (AMEs) among older cancer patients using a nationally representative data sample.

Methods: This retrospective, observational, longitudinal study used publicly available data from the 2006 and 2008 Health and Retirement Study (HRS) and from the 2007 Prescription Drug Study (PDS) which was administered to a subset of HRS respondents. HRS is a longitudinal study launched by the University of Michigan in 1992 (supported by the National Institute on Aging and the Social Security Administration) that surveys a representative sample of approximately 20,000 Americans over age 50 every two years. The number of individuals who responded to both HRS and PDS and who indicated receiving cancer treatment in the 2006 numbered 157. Race was analyzed by comparing Caucasian to African-American groups. Chi-square tests were used to compare the two defined racial groups' frequencies on six dependent variables: self-reported health, cancer improvement, whether the individual had seen their doctor for cancer, whether the individual had received a mammogram or prostate exam (appropriate to their sex), and whether the individual experienced an adverse medication event. Four models of sequential logistic regression were performed to determine whether the effect of race on self-rated health persisted, when controlling for demographic factors including age, sex, number of prescription medications and cancer change (same or worse, better).

Results: The respondents from HRS included in this study were predominantly Caucasian (91.1 percent), non-Hispanic (96.2 percent) individuals with a median age of 77. Many subjects had one or more chronic conditions in addition to their cancer and were taking an average of 5.78 drugs, with a mean monthly cost of $54.95 out-of-pocket for the medications. A greater proportion of Caucasian subjects reported very good to excellent health compared to African-American subjects (26.6 percent vs 14.3 percent in 2006, P equals 0.049; 28.4 percent vs 21.4 percent in 2008, P equals 0.005). When controlling for demographic factors, African-American respondents were 2.79 times more likely than Caucasian respondents were to indicate poorer health status in either year, although this difference was not statistically significant (P equals 0.39 in 2006, P equals 0.35 in 2008). The number of prescription medications was a significant factor in predicting self-rated health in 2008, with individuals taking five or more medications reporting 2.7 greater odds of poorer health status (P equals 0.04). No significant differences based on race were observed regarding cancer change within the last two years, cancer screening with a mammogram or prostate exam, seeing a doctor for cancer care, or adverse medication events.

Conclusion: An analysis of longitudinal data among older adults with cancer showed disparities with regards to self-rated health for African-Americans compared to Caucasians. Health-related factors such as number of medications, perhaps an indicator of disease severity, played an important role in self-rated health.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 5b-057

Poster Title: Comparison of leukopenia in pediatric heart transplant patients receiving low dose and standard dose trimethoprim/sulfamethoxazole for Pneumocystis jiroveci pneumonia prophylaxis

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Purpose: The International Society of Heart and Lung Transplantation (ISHLT) recommends trimethoprim/sulfamethoxazole after heart transplant to prevent Pneumocystis jiroveci pneumonia (PJP), but the guidelines do not include recommendations for pediatric dosing. Pediatric dosing has been extrapolated from pediatric oncology data. This dosing has been associated with leukopenia, which is undesirable in the transplant patient and can lead to modifications in the immunosuppressant regimen. Ongoing studies in the pediatric oncology population have shown an improved side effect profile with lower doses of trimethoprim/sulfamethoxazole. However, this has not been demonstrated to date in the pediatric heart transplant population.

Methods: This retrospective review included pediatric heart transplant patients at C.S. Mott Children's Hospital transplanted between January 1, 2008 and December 31, 2014. The University of Michigan Health System Institutional Review Board approved all methods of this review. The study evaluated whether trimethoprim/sulfamethoxazole doses based on trimethoprim 2.5 mg/kg once daily twice per week (maximum of trimethoprim 80 mg daily) effectively prevented PJP infection and lowered rates of leukopenia when compared to trimethoprim 5 mg/kg once daily two to three times per week (maximum of trimethoprim 160 mg daily). Data collected included demographics of the patients, dose and frequency of trimethoprim/sulfamethoxazole therapy, length of time of trimethoprim/sulfamethoxazole therapy, complete blood counts with differential, and incidence of PJP infection. Descriptive statistics compare rates of occurrence of PJP infection, length of therapy, rates of neutropenia

(defined as white blood cell [WBC] count < 4.0x109/L), and rates of trimethoprim/sulfamethoxazole discontinuation secondary to neutropenia.

Results: A total of 49 patients received heart transplants from 2008 to 2014. Of the 49 patients, 23 were male and the average age at transplantation was 6.44 years. Thirteen patients (sixteen patient encounters) received trimethoprim/sulfamethoxazole for PJP prophylaxis. No occurrences of PJP were reported. The average start date of prophylaxis was 18 days post-transplant. A variety of dosing regimens were observed in the study population; therefore, comparisons were made based upon frequency of dosing. Daily trimethoprim/sulfamethoxazole dosing was given in 3 patient encounters, three times weekly dosing was given in 1 patient encounter, and twice weekly dosing in 12 patient encounters. The average length of prophylaxis in each dosing group (i.e. daily, three times per week, two times per week) was 208 days, 168 days, and 333 days, respectively. One year of prophylaxis was completed in 33 percent, zero percent, and 66 percent, respectively. The average white blood cell count (x 109/L) on therapy was 8.9, 7.0, and 9.2, respectively. The percentage of patients experiencing neutropenia while on trimethoprim/sulfamethoxazole therapy was 66 percent, 100 percent, and 58 percent, respectively.

Conclusion: The patients receiving twice weekly prophylaxis completed a longer average duration of therapy, were more likely to complete one year of prophylaxis, and had a higher average WBC count while on therapy. The major limitations to this study were the small number of patients receiving trimethoprim/sulfamethoxazole prophylaxis and the variable dosing regimens. No cases of PJP infections were reported. From our limited data set, it may be beneficial to consider less frequent dosing of trimethoprim/sulfamethoxazole for PJP prophylaxis in a larger cohort of pediatric heart transplant patients.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 5b-058

Poster Title: Retrospective evaluation of peg-filgrastim utilization in the outpatient setting in a large community hospital

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Purpose: Granulocyte colony stimulating factors (GCSFs) are used for febrile neutropenia prophylaxis in cancer patients. Use is dependent upon chemotherapy regimen, risk factors, and clinical judgment. Evaluation of total spend on peg-filgrastim increased concern for utilization relying more on clinical judgment than guideline-directed recommendations, leading to potentially inappropriate prescribing and increased costs. The purpose of this study was to evaluate current peg-filgrastim prescribing habits in the outpatient setting compared to National Comprehensive Cancer Network (NCCN) and American Society of Clinical Oncology (ASCO) guidelines, with hopes to improve cost efficiency and documentation of guideline-directed indications prior to use.

Methods: This study was a retrospective chart review. All patients that received at least one dose of peg-filgrastim in the outpatient setting from January 1st to June 30th, 2016 were included in the study. Patients who underwent autologous stem cell transplant and patients at the St. Jude affiliate clinic in Huntsville, AL were excluded. Data collected on each patient included age, gender, diagnosis, chemotherapy regimen, intent of chemotherapy (curative versus palliative), chemotherapy cycle(s) that peg-filgrastim was administered, risk factors, and febrile neutropenia risk (less than 10 percent, 10-20 percent, greater than 20 percent). All patients will be categorized into a “high”, “intermediate” or “low” risk category based on chemotherapy regimen. Based on NCCN guidelines, the only absolute clinical indications consist of whether the patient is on a “high” febrile neutropenia risk regimen or if the patient develops febrile neutropenia on a lower risk regimen without peg-filgrastim for that cycle. “Intermediate” risk is determined based on chemotherapy regimen and patient risk factors

which include age greater than 65, previous chemotherapy or radiation, bone marrow involvement by the tumor, recent surgery or open wound, etc. “Low” risk is determined solely based on chemotherapy regimen.

Results: During the six month period, 85 patients were identified for receiving peg-filgrastim at least once in the outpatient setting. The average age was 58.9 years old and the range was 22-83 years old. The majority of patients were female (59/85, 69.4 percent). The three most common cancer diagnoses were ovarian cancer (21/85 patients, 24 percent), colon cancer (13/85 patients, 15 percent) and small cell lung cancer (12/85 patients, 14 percent). Of the 85 patients, 10 were “high” risk based on regimen (11 percent) and five patients (5 percent) had documented febrile neutropenia from a cycle without peg-filgrastim administration, making a total of 16 percent of patients have a true clinical indication of “high” febrile neutropenia risk. There were 38/85 patients with “intermediate” risk regimens; 30/38 (78.9 percent) had at least one risk factor, which according to guidelines allows for clinical consideration of peg-filgrastim. Among all patients, 61/85 (71.7 percent) had at least one risk factor. The cost of peg-filgrastim is approximately 4,000 dollars per injection. The average number of injections per patient was three, which equals approximately 12,000 dollars per patient.

Conclusion: Peg-filgrastim use is highly dependent on chemotherapy regimen and patient risk factors. It is vastly overused in the outpatient setting as witnessed by the low percent of absolute indication per guidelines. A more concise criteria of use using guideline recommendations could potentially decrease inappropriate use and cost to the patient. The improvement of utilization of peg-filgrastim will be recorded in a future prospective study using criteria development from this data.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 5b-059

Poster Title: Evaluation of efficacy and safety of thiopurine therapy in Crohn's Disease patients undergoing gastrointestinal surgery

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Purpose: Thiopurines, azathioprine and mercaptopurine, demonstrate benefit in induction of remission and preventing recurrence in post-operative CD patients and are often used as standard of therapy. However, when re-starting thiopurines post-operatively, patients are at higher risk of immunomodulary adverse effects, including myelosuppression and infections. Post-operative therapy is not thoroughly studied or well understood in this patient population. This study was designed to compare 30-day post-operative infection rate in patients who received post-operative thiopurines within 30 days to patients who did not receive thiopurines within 30 days.

Methods: The institutional review board approved this retrospective cohort study in adult CD patients (at least 18 years old) that have undergone gastrointestinal surgery during hospitalization at the University of Michigan Health System between January 2012 and December 2014. Patients were included if they were on pre-operative maintenance thiopurine regimens and received post-operative thiopurine therapy. Patients were excluded if they were treated with maintenance medications other than thiopurines or biologics, or if there were poor clinical records documenting the 30-day post-operative outcomes. Patients were divided into early treatment group (patients who received thiopurines within 30 days post-operatively) or delayed treatment group (patients who received thiopurines greater than 30 days post-operatively). Age, gender, race, comorbidities, type of surgical procedure, pre-operation infection, antibiotic use within 30 days, hospital length of stay, and gastrointestinal surgery history were collected and evaluated. The primary outcome was 30-day post-operative infection rate. Mean 30-day readmission rate was assessed as secondary outcome.

Results: Forty patients were included in the early treatment group and 8 patients were included in the delayed treatment group. Patient characteristics such as age, race, gender, comorbidities, type of gastrointestinal procedure, preoperative infection rate, and body mass index were similar between groups. Most patients received an elective gastrointestinal procedure (77 percent in the early treatment group versus 87 percent in the delayed treatment group). All patients received an immunomodulator agent pre-operatively followed by biologic therapy (66.7 percent versus 50 percent, respectively; p equals 0.65) and steroid therapy (26.3 percent versus 66.7 percent, respectively; p equals 0.07). There were no differences in 30-day post-operative infection rates (30 percent versus 25 percent, respectively; p equals 1) or 30-day readmission rates (20 percent versus 25 percent, respectively; p equals 0.67) between the early treatment group compared to delayed treatment group. There were no significant differences in mean post-operative length of stay (7.5 days versus 17 days, respectively; p equals 0.18) between the two groups.

Conclusion: Thiopurine exposure within 30 days of surgery compared to treatment greater than 30 days after surgery showed no difference in 30-day clinical outcomes. However, this study is small and larger, prospective studies are needed to determine the risk of post-operative complications in CD patients undergoing gastrointestinal surgery.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 5b-060

Poster Title: Comparison of diabetic numeracy skills in patients that regularly self-monitor blood glucose one or more times daily compared to a few times a week

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Purpose: Health literacy is the ability to find, understand, and use health related information, while health numeracy is the ability to understand and use numbers in everyday life. Numeracy plays a large role in diabetes management to adjust mediations and maintain a well balanced diet. The primary objective of the study is to establish if the diabetic numeracy test (DNT-5) scores are higher in patients that regularly self-monitor blood glucose (SMBG) one or more times a day compared to patients that test a few times throughout the week or not at all.

Methods: The institutional review board approved this voluntary survey for both men and women over the age of 18, with type-2 diabetes, who provided consent. The study was conducted at a primary care clinic. Eligible patients were identified through ICD codes or through prescribed diabetic medications. Patients were subsequently recruited by asking them to participate in the study and given a short survey to obtain consent and verification of eligibility. The survey included demographical questions, including the number of times of self-monitoring of blood glucose during the day. A second 5-item written survey was completed containing questions assessing the patient's diabetes numeracy skills using the DNT-5. A Pearson chi-squared test was used to analyze the data where a low DNT-5 score was defined as three or lower, and a high DNT-5 score was defined as a four or a five.

Results: Of the 74 surveys analyzed, 62 percent (n equals 46) SMBG one or more times per day; 28 patients had low DNT-5 scores while 18 patients had high DNT-5 scores. There was no significant difference (p equals 0.625) found between DNT-5 scores in patients that SMBG one or more times a day versus a few times a week or not at all. The average age of the patients was 68 years old with 41 percent (n equals 31) being female. More patients scoring higher on the DNT-5 had a higher level of education in comparison to those that scored lower.

Conclusion: Frequency of SMBG did not seem to impact health numeracy as determined by the DNT-5 survey, though further research is warranted to include a larger patient population to possibly show any statistical or clinical significance.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5b-061

Poster Title: Evaluation of Epstein-Barr virus after allogenic stem cell transplantation

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Purpose: Epstein-Barr virus (EBV) is a major cause of morbidity and mortality in patients who are status post allogenic bone marrow transplantation (BMT) due to immunosuppression. EBV can cause mononucleosis, lymphomas, and post-transplant lymphoproliferative disease (PTLD). PTLD is one of the deadliest outcomes of EBV therefore, it is vital that EBV risk factors are identified so that PTLD can be prevented. Additionally, B cell depleting agents have shown to be effective in both preventing and treating EBV. The objective of this study was to determine EBV risk factors and determine the effectiveness of rituximab in preventing and treating EBV.

Methods: This retrospective study was approved by The University of Michigan's institutional review board. All adult BMT patient (n equal to 416) data recorded in the institution's allogenic BMT database were included in this study as there were no exclusion criteria. Emerse was used to search the database for known risk factors for developing positive EBV titers such as acute graph versus host disease (AGVHD), cytomegalovirus (CMV) titers, the addition of T cell depleting agent thymoglobulin to BMT conditioning regimen, and BMT recipient CMV serostatus prior to transplantation. Additionally, Emerse was used to search for positive EBV titers (defined as greater than or equal to 2000 copies per mL) and rituximab doses and dates given for EBV positive titer treatment. The primary outcome was a positive EBV titer up to a year after BMT. The secondary outcome was a diagnosis of PTLD up to a year after the last positive EBV titer.

Results: Rituximab was added to conditioning regimens of 39 patients and of those 39 patients, only one developed a positive EBV titer (P less than 0.044, 97 percent EBV prevention). Additionally, when rituximab was given as treatment for EBV, the four dose regimen was 100 percent effective in preventing future positive EBV titers. Neither the addition of thymoglobulin

(P equal to 0.231) nor recipient positive CMV serostatus (P equal to 0.054) were found to be significant risk factors for developing a positive EBV titer. However, AGVHD was a significant risk factor for developing a positive EBV titer (P less than 0.0001).

Conclusion: Acute graph versus host disease was a significant risk factor for developing a positive EBV titer. Patients who received rituximab as an additional agent to their BMT conditioning regimen were significantly less likely to develop a positive EBV titer. Furthermore, these data suggest that regular EBV titer monitoring should be performed in patients who are at high risk for developing a positive EBV titer, such as those with AGVHD, so timely treatment can be given.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5b-062

Poster Title: Utilization of the T2 Candida Panel for rapid Candida species detection in a large community hospital

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Purpose: The T2 Candida Panel is a newly approved diagnostic test that allows for rapid (3-5 hours) species-specific detection of fungal pathogens from whole blood sample. This test detects five species of Candida (C. albicans, C. tropicalis, C. parapsilosis, C. krusei, and C. glabrata). This panel could enable clinicians to initiate anti-fungal treatment quicker, deescalate therapy faster, and possibly decrease mortality. It is projected that approximately 500 tests will be performed this year. The purpose of this study is to implement and evaluate the utilization of T2 Candida Panel in a large community hospital.

Methods: This retrospective, observational analysis consisted of 274 patients who met predefined criteria. The T2 Candida Panel was restricted to two specialty departments, Infectious Disease (ID) and Oncology. This list was further restricted to patients with febrile neutropenia without observed cause; patients in the ICU for at least 72 hours, with central venous line and unexplained fever, use of broad spectrum antibiotics, also in addition to one of the following: acute pancreatitis, recent major surgery, total parenteral nutrition, neutropenia, renal failure/hepatic failure, corticosteroids; patients with central venous line and unexplained fever, sepsis. Endpoints were defined as medication use, patient characteristics and risk factors, T2 Candida Panel results, corresponding blood cultures, time to de-escalation, and duration of therapy (DOT). Endpoint analysis will determine the feasibility of continuing the use of T2 testing and monitor clinical and economical outcomes.

Results: Of 345 T2 tests evaluated, 34 (9.0%) were positive. The resulting species were: 15 C. albicans/topicalis, 13 C. parapsilosis, and 4 C. krusei/glabrata. Three patients were positive for both C. albicans/tropicalis and C. parapsilosis and one patient had both C. parapsilosis and C. krusei/glabrata. Approximately 29% of the positive T2 patients had a corresponding positive blood culture. The average duration of therapy (DOT) of micafungin for patients with negative T2 results was 8.7 days. The average time to de-escalation of therapy for negative T2 patients was 45 hours. The average age of patients was 61 years old, of which 148 (54%) were male. Patients commonly had multiple comorbidities, most commonly HTN, HLD, T2DM, CKD, and/or COPD. Many patients had multiple risk factors, some of which overlapped, including: 64 patients (23%) malnourished or receiving a TPN,91 patients (33%) who had renal failure, 38 patients (12.8%) had intra-abdominal infection/surgery, and 96 patients (34.9%) were immunocompromised (cancer, chemotherapy, chronic steroid use, febrile neutropenia). Approximately 59.2 % of patients were in the ICU. The time to de-escalation/discontinuation of therapy was 40.8 hours.

Conclusion: The FDA approved T2's claim of 96.4% sensitivity in 2015 and granted a superiority claim over blood cultures. T2Candidemia Panel demonstrated greater sensitivity to Candida infection compared to blood cultures and produced results with a much faster result time leading to quicker therapy de-escalation. When the endpoints were reviewed, there was a difference among average DOT of micafungin, as well as, time to de-escalation of therapy, demonstrating inconsistent utilization of the test.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5b-063

Poster Title: Impact of ambulatory pharmacist driven anticoagulation patient education and monitoring

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Purpose: Anticoagulants offer life-extending benefits, but if taken incorrectly can pose significant risk of bleeding or thrombosis. Recognition of this potential for harm and introduction of the direct oral anticoagulants (DOACs) has provided the stimulus to improve patient care by changing current ambulatory pharmacy practice at the University of Virginia Health System. These ambulatory pharmacists are in a unique position to improve transitions of care by reinforcing safe and effective anticoagulant use. The purpose of this study was to assess outcomes of anticoagulation education alone or education with a monitoring call provided for patients newly prescribed an anticoagulant.

Methods: The University of Virginia Health System institutional review board approved this retrospective study that included patients 18 years or older who were dispensed a new anticoagulant prescription from the outpatient pharmacy between January 1st and June 30th 2016. First-fill education was attempted for all anticoagulant prescriptions and a monitoring call was made for prescriptions dispensed after April 1st, 2016. Pharmacists completed a standard anticoagulant education worksheet and monitoring questions for patients receiving a monitoring call to ensure all patients received consistent counseling. Data was collected through the EPIC electronic medical record system and from the standard anticoagulant education worksheets filled out by pharmacists at the time of medication dispensing. All patients identified were divided into two groups. Group A included patients dispensed a new anticoagulant prescription and group B included patients dispensed a new anticoagulant prescription who also received a monitoring call 23 to 30 days after the initial fill. The primary objective was the number of hospital admissions for any reason within 30 days, 31-60 days, and

the number of oral anticoagulant prescriptions written for a thirty-day supply or less with at least one refill that were not refilled or transferred within 60 days. Secondary objectives included hospital admission related to anticoagulant use within 30 days, within 31-60 days, and prescriptions never refilled and any admission or related admission within 31-60 days.

Results: There were 237 patients with a new anticoagulant prescription in group A and 269 patients in group B during the study period. The baseline characteristics of groups A and B were similar except for education delivery by phone (21.2 and 30.6 percent, respectively; P equals 0.017). The completion rate for initial education was 99.6 percent in group A and 98.5 percent in group B (P equals 0.378). Patients in both groups primarily received enoxaparin (41.8 vs. 39.8 percent), apixaban (40.1 vs. 40.9 percent), warfarin (9.3 vs. 12.6 percent), or rivaroxaban (7.1 vs. 5.2 percent). There was no significant difference between groups A and B for 30-day admission (13.1 vs. 16 percent; P equals 0.356), 31-60 day admission (9.3 vs. 8.6 percent; P equals 0.773), or number of prescriptions not refilled or transferred (40.7 vs. 41.3 percent; P equals 0.934). There was no significant difference between groups A and B for the number of related admissions within 30 days (29 vs. 14 percent; P equals 0.111), within 31-60 days (27.3 vs. 21.7 percent; P equals 0.666), or overall admissions or related admission within 31-60 days for prescriptions that were never refilled or transferred (P equals 0.165 and 1, respectively).

Conclusion: This study reinforces the role of ambulatory pharmacists associated with a health system in providing anticoagulation patient education to a large number of patients to ensure safe and effective use of these high-risk medications. While the introduction of a monitoring call to first-fill education was not associated with significant outcomes compared to first-fill education alone, ambulatory pharmacists were able to provide additional touch points in transitions of care. Further investigation of the impact of a monitoring call and ways to increase the usefulness of this intervention are required to continue to improve the health and safety of patients taking anticoagulants.

Submission Category: Infectious Diseases

Submission Type: Case Report

Session-Board Number: 5b-064

Poster Title: Late administration of botulism immune globulin in a 1 month-old infant.

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Purpose: This case illustrates the importance of considering botulism toxicity and administering botulism immune globulin late in an infantile patient that presents with neuromuscular paralysis and a history of honey ingestion. A previously healthy 1- month-old Asian female (4.1kg) presented to an outlying hospital in respiratory failure. Initially, the symptoms of infant botulism appeared 3 days prior to admission with slow and progressive development. Symptoms included less oral intake, numerous spitting after each feed, and decreased activity. Due to symptoms, the infant was taken to the pediatrician and diagnosed with a viral illness. On the day of admission, the infant started to have intermittent shortness of breath and gasping associated with perioral cyanosis, which prompted an Emergency room (ER), visit via EMS. The infant was intubated upon ER arrival and given a dose of IV vancomycin and ceftriaxone for suspected sepsis. After stabilization, the patient was transferred to the Pediatric Intensive Care Unit (PICU) for further management. Initial laboratory analysis, radiological exams, and cerebrospinal fluid showed no abnormalities. The meningitis and respiratory rapid multiplex PCR tests were negative for pathogens tested. Ceftriaxone and vancomycin (with therapeutic levels between 15-20 mcg/ml), were continued for suspected meningitis for a total duration of 7 days. Upon physical exam in the PICU, the infant had a weak cough, was unresponsive to painful stimuli with very limited movement after approximately 10 minutes of stimulation, had an overall floppy tone, and no gag reflex upon suctioning. The recognition of the extent of the abnormalities was delayed until day 8 of admission secondary to sedation for mechanical ventilation. Fatigability test was performed. Her pupils were initially constricted and responsive to light, but after ~30 seconds, both pupils were dilated and unresponsive to further light stimuli. The patient then developed significant constipation. Upon further questioning, her

mother stated the child was having a weak cry, poor sucking, decreased neck/head tone, decreasing swallowing, increased drooling, and slight downward gaze prior to admission. Eventually, it was discovered that, as a cultural tradition, her mother was using honey as a remedy to remove white patches from the patient's tongue for the past few weeks. Given the clinical scenario, a stool to test for Clostridium botulinum was sent to the Alabama Department of Public Health for confirmation of the diagnosis. Prior to confirmation of C. botulinum type A, Botulism Immune Globulin (BIG) was administered (Day 9 of admission) at a dose of 50 mg/kg (210mg/4.2ml) to our infant. After administration of immunoglobulin, the infant improved clinically over a period of two weeks and was able to be extubated. Improvements included eye tracking, responding to stimuli with much-improved muscle tone, and improved cough, gag, and respiratory effort. This case report suggests even with late administration of immunoglobulin along with the potential increase in lysis of Clostridium from broad-spectrum antimicrobials and increased toxin burden, immunoglobulin is still efficacious despite cost of approximately $45,000.

Methods:

Results:

Conclusion:

Submission Category: Pharmacy Law/ Regulatory/ Accreditation

Submission Type: Descriptive Report

Session-Board Number: 5b-065

Poster Title: Evaluation of State Compounding Regulations

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Purpose: Incidents such as the New England Compounding Center meningitis outbreak have lead to the development of federal compounding legislation. However, oversight of traditional compounding is still a responsibility of individual state boards of pharmacy. Historically, states have developed and enforced pharmacy-compounding regulations. The United States Pharmacopeia provides enforceable standards for compounding. Many boards of pharmacy have since adopted all or part of these standards but there remains inconsistency in the utilization of these standards. A systematic review of state regulations will benefit pharmacists as they provide input to their state boards of pharmacy regarding future revisions.

Methods: An extensive literature search was conducted to determine the need for a descriptive summary of state compounding regulations. A list of questions was developed to identify the extent to which USP standards are incorporated into state pharmacy laws and regulations, when the compounding regulations were last updated, and whether the regulations differentiated between sterile and non-sterile compounding. Each of the 50 state board regulation documents was accessed electronically and systematically reviewed to first determine if a separate compounding section was included. For those states with a separate section on compounding, the extent of USP standard inclusion was determined and categorized as complete adoption of USP compounding chapters, partial adoption of USP standards with individual state-developed guidelines, and absence of USP standards. The documents were also evaluated to determine when the compounding sections were last updated if that information was available. One additional criteria that was examined was whether states boards require

pharmacists to complete compounding-specific continuing education. All the information was compiled and the descriptive statistics were determined.

Results: There are 40 states that have a separate compounding section in the laws and regulations, which allows for efficient retrieval of information by pharmacists. For the remaining states, compounding regulations are addressed in a variety of sections. Since the New England Compounding Center incident in 2012, 10 states have not updated their compounding regulations. Out of the 50 states, nine reference only USP < 797> and two reference only USP < 795>. Of the remaining 39 states, 19 refer to both USP chapters and 20 states do not refer to either USP < 797> or < 795>. Eight states require adherence to all USP guidelines, not specifically those related to compounding. Massachusetts is the only state to require compounding specific CE hours for those pharmacists who engage in compounding practices.

Conclusion: Most states contain a separate compounding section within the pharmacy laws, regulations or practice standards. Individual state boards of pharmacy are responsible for developing practice standards and determining what is deemed appropriate. This review of state laws and regulations identified differences in compounding standards and organization of information. Not all states have adopted USP compounding standards. Pharmacists should understand respective practice standards when engaged in compounding. Consolidation of compounding standards into an easily retrievable document may be beneficial. Further revision of laws and regulations are needed to ensure quality compounding and safe medication delivery throughout all 50 states.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-066

Poster Title: Clinical Outcomes of Acetylcysteine in Non-Acetaminophen Induced Acute Liver Failure

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Purpose: There is no established standard of care for the treatment of non-acetaminophen induced acute liver failure (ALF). Recent evidence suggests the use of acetylcysteine in non-acetaminophen induced acute liver failure may have an impact on transplant-free survival. The purpose of this study is to assess the use of acetylcysteine for treatment of non-acetaminophen induced acute liver failure at an academic medical center.

Methods: This study was approved by the local Institutional Review Board. This is a retrospective chart review of patients receiving acetylcysteine for non-acetaminophen induced ALF from September 2015 through June 2016. Patients were excluded if they were under the age of 18 years or had liver failure that was due to acetaminophen toxicity. The variables of interest included baseline demographics, etiology of liver failure, clinical response, adverse effects, and survival measures. Clinical response was assessed with liver function tests (LFT) such as aspartate transaminase (AST) and alanine transaminase (ALT), International Normalized Ratio (INR), serum creatinine, and Model for End stage Liver Disease (MELD) scores. Clinical response was measured at 24, 48, and 72 hours and at the time of transplant-free discharge, death, or transplant. Survival measures included overall survival, transplant-free survival, and time to transplantation. Descriptive analysis was performed.

Results: Of the 50 patients included, 24 were male (48 percent) with an average age of 47 years. Twelve (24 percent) of the patients had grade I-II encephalopathy and 11 (22 percent) had grade III-IV encephalopathy. The most common etiology of ALF was ischemic 22 (44 percent). The median duration of acetylcysteine use was 21 hours (Interquartile Range (IQR) 17-

36). The median baseline ALT, AST, and MELD were 1604 (IQR 724-2060), 1598 (IQR 584- 5153), and 24 (IQR 16-34), respectively.
Thirty-three patients were discharged transplant-free, 16 patients died, and one patient received a liver transplant. The patient who received a liver transplant developed ALF due to acute hepatitis B infection with a MELD score of 40. Five out of the 12 patients with grade I-II encephalopathy and 5 out of the 11 with grade III-IV encephalopathy died. The median duration of use for acetylcysteine in grade I-II encephalopathy was 22 hours (IQR 21- 34) compared with 23 hours (IQR 21-53) in grade III-IV encephalopathy. Two patients experienced adverse events leading to early discontinuation of acetylcysteine therapy. One patient experienced abdominal pain and shortness of breath the other experienced oxygen desaturation.

Conclusion: Acetylcysteine was found to be safe in the study population with only two reported adverse events. There were a total of 16 deaths and one patient received a liver transplant. Eight patients experienced increase in liver enzymes despite initiation of acetylcysteine, however only 2 of these patients died. Further investigation in a large number of patients with a comparator group would be needed to determine the impact of acetylcysteine in non-acetaminophen induced acute liver failure.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5b-067

Poster Title: Monte Carlo Simulation (MCS) of colistin dosing in critically ill patients receiving Continuous Renal Replacement Therapy (CRRT)

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Purpose: Colistin is an antibiotic used to treat gram-negative bacterial infections primarily caused by Pseudomonas aeruginosa, Acinetobacter baumannii, and resistant Klebsiella species. Colistin is formulated as a prodrug, colistin methanesulfonate (CMS), which is converted into the active moiety, colistin. The original pharmacokinetic (PK) studies did not differentiate between CMS versus colistin. Furthermore, there is lack of guidelines for the dosing of CMS in patients undergoing Renal Replacement Therapy (RRT). The purpose of our study is to build a PK model of CMS and colistin during Continuous Renal Replacement Therapy (CRRT) using published PK data, and to determine its optimal dosage regimen.

Methods: A one-compartmental mathematical PK model for the colistin prodrug, CMS, was built based on the most relevant colistin PK studies found in the literature. Monte Carlo Simulation (MCS) techniques (Crystal Ball Classroom Edition, Oracle) were used to construct a 5000 virtual cohort, and individual colistin serum concentration profiles for each dosing regimen were generated. Simulated dosing regimens were chosen based on regimens previously utilized in the literature, as well as new regimens hypothesized to be effective. We selected the optimal colistin regimen as determined by pharmacodynamic target attainment of free area under the curve: minimum inhibitory concentration (fAUC/MIC) ratio of 10 in greater than or equal to 90 percent of virtual patients. Furthermore, we defined toxic trough levels as values above 0.4 ug/ml and 0.9 ug/ml, corresponding to free colistin trough levels of 10 percent and 80 percent respectively. The lowest possible dose that attained this target was chosen, in order to avoid toxic concentrations.

Results: The simulation results for 8-hour and 12-hour dosing regimens were not sufficient to maintain efficacy targets after 48-hours. Our chosen regimen for CMS was loading dose: 800 mg, maintenance dose: 300 mg every 24 hours, with an effluent flow rate (Quf) of 25 ml/kg/hour. This regimen maintained an average 120-hour fAUC/MIC ratio greater than 10 for 94 percent of the virtual subjects (MIC of 1 ug/ml), and the percentage of patients achieving toxic trough levels were lower than other regimens (80 and 10 percent for free colistin trough above 0.4 and 0.9 ug/ml, respectively). When comparing a stable dose regimen of loading dose: 800 mg, maintenance dose: 300 mg every 24 hours, with Quf of 25 ml/kg/hr versus Quf of 35 ml/kg/hr, we observed increased efficacy target attainment with Quf of 25ml/kg/hr. When an effluent rate of 35 ml/kg/hr was utilized, a higher maintenance dose was needed. According to our results, the regimen of choice for Quf of 35 ml/kg/hr is loading dose: 800 mg, maintenance dose: 450 mg CMS every 24 hours, which resulted in 91 percent target attainment at 120-hours, and 4 to73 percent toxic concentration targets for free colistin trough levels above 0.4 and 0.9 ug/ml respectively.

Conclusion: MCS analysis reveals that CRRT clears both CMS and colistin. The effluent rate and body weight has substantial influence on efficacy target attainment. Any CMS dosage regimen that achieves efficacy targets will also achieve toxicity targets. MCS suggests that for a Quf of 25 ml/kg/hr, a regimen of 800 mg loading dose, 300 mg maintenance dose every 24 hours, and for a Quf of 35 ml/kg/hr, 800 mg loading dose, 450 mg maintenance dose every 24 hours, will likely achieve efficacy targets with the lowest chance of achieving toxicity targets. These MCS projections need to be validated in clinical trials.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-068

Poster Title: Take my breath away: Evaluation of steroid prescribing in acute chronic obstructive pulmonary disease (COPD) exacerbations

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Purpose: Hospitalized chronic obstructive pulmonary disease (COPD) exacerbations are associated with a significant decline in lung function. Administration of corticosteroids during this acute state not only improves lung function but also decreases the length of hospital stay. The Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines recommend a regimen of prednisone 40 mg daily which corresponds to our institutional guideline which recommend prednisone 40mg orally daily. The purpose of this study is to assess the use of corticosteroids in COPD exacerbations on a general practice unit, as there is currently no internal data examining our compliance with institutional guidelines.

Methods: In this institutional review board approved internal review, our institution's prescribing practices for steroids in COPD exacerbation were assessed. Patients admitted to an internal medicine general practice unit with an ICD-10 documented diagnosis of COPD exacerbation from January 1, 2016 to June 30, 2016 were first evaluated for inclusion and exclusion criteria. To avoid any discrepancies, patients with a diagnosis of asthma or with maintenance chronic oral steroids were excluded from this study. The investigators reviewed each patient's prescribed steroid regimen throughout their hospital stay in a standardized method and then identified if it complied with the institutional guidelines. A compliant regimen was defined as one containing oral prednisone 40mg daily or an alternative oral steroid at equipotent dose. Patients that were included also had their glycemic control reviewed for a safety outcomes analysis. Retrieved data was then analyzed using descriptive statistics.

Results: 150 patients (49 percent male, 51 percent female) were included in this study. Mean age was 64 years. Median steroid dose in prednisone equivalents administered was 40 mg (IQR 40-50.5). Only 11.7 percent of steroid doses were administered intravenously. Among the 150 total steroid regimens, 92 (61.3 percent) were compliant with institutional guidelines. Hyperglycemic events occurred in 71 (47.3 percent) patients within this study. Among patients receiving less than or equal to 40mg of prednisone equivalents daily, 48.9 percent experienced hyperglycemic events. In patients receiving greater than 40mg of prednisone equivalents daily 44.8 percent experienced a hyperglycemic event.

Conclusion: The majority of patients receiving steroids for a COPD exacerbation were compliant with our institutional guidelines. Additionally rates of hyperglycemic events were similar between those receiving compliant steroid doses and those receiving higher than recommended steroid doses. While overall rates of compliance with institutional guidelines were good, there are still opportunities for optimization through prescriber education and potential pharmacy interventions.

Submission Category: Small and Rural Pharmacy Practice

Submission Type: Descriptive Report

Session-Board Number: 5b-069

Poster Title: Computerized approach for the appropriate selection of non-prescription therapy

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Purpose: Guidance and monitoring of non-prescription medications by pharmacists is an important aspect of self-care. The aim our project was to develop an innovative easy-to-use tool to assist patients and caregivers in the process of selecting non-prescription medications within the community pharmacy setting during instances where they have limited or no direct access to the pharmacist, and to help reduce the potential misuse of over-the counter (OTC) medications.

Methods: A 6-item questionnaire was administered to a convenience sample of 20 elderly patients. This survey allowed us to assess patient's knowledge about the proper selection, indications, interactions, and common side effects of OTC drugs. In addition, participants were asked to select which tool would they preferred to assist them in the selection of an OTC medication (i.e. app for mobile, web page, or a touch-screen at the pharmacy). We also interviewed five practicing pharmacists in order to determine which of the tools mentioned above would they support.

Results: According to our findings, the touch screen option was preferred by both patients and pharmacists. As such, our touch screen device was designed to assist and guide patients throughout OTC selection according their symptoms, and concomitant health issues. The prototype touch screen device is intended to be marketed to community pharmacies and professional organizations focused on retail pharmacies.

Conclusion: The implementation of this assistance tool is expected to help patients select and use OTC's appropriately. This may result in better utilization of these drugs, decrease potential drug interactions, and improve health related outcomes among patients who decide to use self-care approaches in addition to current therapies or as a resource to treat their ailments.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-070

Poster Title: Do people enrolled in Medicare Part D plans re-evaluate their plans yearly?

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Purpose: Medicare members are eligible to receive Medicare Part D benefits, which provide prescription drug coverage. Each year during open enrollment, those who have existing Medicare Part D plans may re-evaluate their plans and switch plans if deemed necessary. This study was designed to assess the participants' knowledge of how often they can switch Part D plans, with additional assessment for those who had previously switched plans.

Methods: The University of Mississippi Institutional Review Board approved this study to determine the participants' knowledge of Medicare Part D plan evaluation and reasoning for plan adjustment. A 14- question survey was created to assess these points. The inclusion criterion included people who were older than 18 years of age and currently enrolled in Medicare. Those who were enrolled in Medicare but did not have Medicare Part D were excluded. Eligible members of St. Luke's United Methodist Church in Jackson, MS and Main Street United Methodist Church in Hattiesburg, MS were provided with the informed consent form and the survey. The survey was administered between November 2015 and January 2016.

Results: A total of 47 surveys were distributed, but only 35 surveys were qualified for the study. The 12 completed surveys not included in the data analysis were due to lack of Medicare coverage (n=1) or lack of Medicare Part D coverage (n=11). Descriptive statistics were used to evaluate the responses for each survey questions. Of the 35 participants, 9.09 percent (n=3) were unaware of the ability to re-evaluate their Medicare Part D plans. All of those, who were aware they could switch Medicare Part D plans, knew it would be evaluated yearly. Participants were questioned on number of Medicare Part D plans since enrollment: 70 percent (n=21) had their original plan, 23.33 percent (n=7) have had two to three different plans, 6.67 percent (n=2) did not know. Of the 7 participants who have had multiple Medicare Part D: 42.86% (n=3) switched to a more affordable plan, 14.29% (n=1) changed as result of the plan no longer being

available in their area, 28.57 (n=2) were switched due to participation in the government's low-income subsidy program, and 14.29% did not provide clarification.

Conclusion: This study demonstrated the majority of people are aware of the option to evaluate their Medicare Part D plan yearly, but only a small portion of people take advantage of changing their plans. The main reason for switching to a different Medicare Part D plan was cost. Although this study shows people have knowledge of their Medicare Part D benefit options, a larger populated study would be needed for external validity.

Submission Category: Pain Management

Submission Type: Evaluative Study

Session-Board Number: 5b-071

Poster Title: Liposomal bupivacaine versus ropivacaine compounded solution for pain control after total hip arthroplasty: a retrospective cohort analysis

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Purpose: Liposomal bupivacaine, available as a brand name medication, is utilized for post-surgery pain control. At Jackson hospital of Montgomery, Alabama this medication was used for total hip arthroplasty procedures until it was recently removed from the formulary and replaced with a compounded ropivacaine solution, citing cost concerns. When performing hip arthroplasty, liposomal bupivacaine or ropivacaine is utilized as an anesthetic to relieve pain through the procedure and after. This study was conducted to determine if liposomal bupivacaine provided a significant advantage over the compounded ropivacaine.

Methods: The population for the study was gathered over a 3-month period and a retrospective study was performed. The population was approximately even between males and females with an average age of 65. During those 3 months, 67 patients had undergone a hip arthroplasty procedure performed by the same surgeon at Jackson hospital. A total of 29 patients who received liposomal bupivacaine and 38 who received the ropivacaine solution were included in the trial. Total morphine equivalent within 24 hours of surgery, greater than 24 hours after surgery and throughout stay was measured along with max pain score within 24hours of surgery and after 24 hours of surgery. The length of stay, and pain score on day of discharge were also measured. An unpaired t test was utilized to cross-examine the two different groups for these outcomes but a log-rank test was used for length of stay.

Results: In comparing the two groups, within 24 hours of surgery, patients who received liposomal bupivacaine reported an average max pain score 1.1 units higher than ropivacaine and 1.04 units higher on day of discharge. Both would prove to be statistically significant with P-vales of 0.0288 and 0.0255 respectively. The average pain score after 24 hours was nearly significant with a p-value of 0.0547. There was no statistical difference in the outcomes of total morphine equivalent within 24 hours of surgery, greater than 24 hours, and throughout their stay. The max pain score under 24 hours, and over 24 hours was not statistically significant along with length of stay. Liposomal bupivacaine patients however, on average received more total morphine within 24hrs of surgery and throughout their stay. Liposomal bupivacaine patients on average used 76.8mg of total morphine within 24 hours and 121.1mg throughout the stay compared to ropivacaine's 67.7mg and 117mg respectively. The liposomal bupivacaine group also reported higher pain scores during their stay at the hospital and on their day of discharge. Patients on ropivacaine also spent less time in the hospital.

Conclusion: Liposomal bupivacaine administration during hip arthroplasty does not appear to decrease the use of morphine throughout the patient's stay nor the length of their stay when compared to the institutional ropivacaine solution. Liposomal bupivacaine also yielded higher max pain score when compared to ropivacaine. This study did not show any justification for the increased expense of liposomal bupivacaine.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5b-072

Poster Title: Evaluation of Ertapenem Use at a Large Academic Teaching Hospital

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Purpose: Carbapenems are a protected class of antibiotics used in the treatment of certain drug-resistant organisms. Many institutions have specific criteria in place to guide and restrict use, however these are not always followed. At our site, ertapenem use is reserved for documented ESBL/AmpC organisms, community-onset polymicrobial infections, transition to once-daily outpatient therapy, or through Infectious Diseases approval. Exposure to these agents has been associated with the development of resistant organisms and adverse effects. The purpose of this study was to evaluate the appropriateness of ertapenem use, assess outcomes of use, and identify areas for antimicrobial stewardship intervention.

Methods: This investigation was a single-center, cross-sectional study of ertapenem use approved by the Investigation Review Board at Henry Ford Hospital in Detroit, Michigan. Patients older than 18 years who received ertapenem in June of 2016 were included. The first 50 patients were consecutively chosen from the earliest order date in June that met inclusion and exclusion criteria. Patients were excluded if they only received one dose of ertapenem before being discharged or one dose before an operative procedure. If patients had a repeat admission during the selected time period with another order of ertapenem, only their first admission was included in the study. Data collected included demographics, SIRS criteria, indication, dosage, duration, concomitant antibiotic use, microbiology results, adverse effects, and clinical response. The primary endpoint was appropriateness of ertapenem use defined as meeting at least one of the specific criteria set by Henry Ford's Antimicrobial Stewardship Program. Secondary endpoints included treatment pattern characteristics, adverse effects of ertapenem therapy, and clinical outcomes. Standard descriptive statistics were used to analyze

all study endpoints. Categorical data will be presented as number (percent) or median (interquartile range).

Results: 50 patients (52 percent male, 48 percent female) were included in the study. 74 percent of patients received 1 gram once daily, and 98 percent of patients were dosed correctly. Use of cefepime (48 percent) was most prevalent when looking at historical antimicrobial use, while the most common concomitant antibiotic was vancomycin (24 percent). Overall, 41 patients (82 percent) received ertapenem appropriately, while use in 9 patients (18 percent) did not meet any criteria. Criteria met included Infectious Diseases approval (58 percent), ESBL infection treatment (50 percent), transition to once-daily dosing for discharge (34 percent), and treatment of community-acquired polymicrobial infections (12 percent). Out of the 9 inappropriate cases, 2 received multiple doses for surgical prophylaxis, 2 for intra-abdominal infections, 3 for lower respiratory tract infections, and 2 for urinary tract infections. Six percent of patients experienced adverse effects based on progress note documentation. 36 percent of patients were discharged on ertapenem, 12 percent completed treatment before discharge, and 18 percent underwent escalation of therapy. 26 percent of patients developed a secondary bacterial infection within 30 days of ertapenem exposure. At the end of inpatient ertapenem therapy, 66 percent of patients showed improvement in response.

Conclusion: Through this retrospective study, we were able to assess appropriateness, safety, and outcomes of ertapenem use in reference of our institutions specified criteria. Overall, majority of ertapenem use was appropriate based on criteria. Ertapenem was generally well tolerated, and as expected efficacy was not in question. Opportunities for antimicrobial stewardship exist among patients who did not meet institutional criteria for use and those who received ertapenem for surgical prophylaxis.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 5b-073

Poster Title: Evaluation of tbo-filgrastim in adult oncology patients at a large community teaching hospital

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Purpose: Myelosuppresion is a dose-limiting toxicity of chemotherapy resulting in increased morbidity, mortality, and costs. Tbo-filgrastim is a granulocyte-colony stimulating factor (G-CSF) recommended for prevention and treatment of chemotherapy-induced neutropenia (CIN) in patients at high risk for infectious complications. In 2013, Inova Fairfax Medical Campus (IFMC) published an institution-specific guideline for appropriate use of tbo-filgrastim in adult oncology patients. This document was based on American Society of Clinical Oncology guidelines to promote cost-effective G-CSF use in hospitalized cancer patients. The purpose of this study was to assess the current use of tbo-filgrastim for CIN and evaluate adherence to institution-specific tbo-filgrastim guidelines.

Methods: This study was reviewed and approved by the Institutional Review Board. This was a retrospective analysis of adult cancer patients treated with tbo-filgrastim from January 1, 2015 to December 31, 2015. Patients who received tbo-filgrastim for stem cell mobilization or non-oncologic indications and patients with incomplete medical records were excluded from the analysis. Data collection included baseline demographics; type of malignancy; chemotherapy regimen; goal of treatment; tbo-filgrastim indication, dose, and duration; absolute neutrophil count (ANC); and patient-related factors that increase risk for neutropenic complications. Secondary endpoints included dose and duration of G-CSF therapy, time from completion of chemotherapy to initiation of G-CSF, ANC at initiation and discontinuation of G-CSF therapy, incidence of febrile neutropenia (FN), and severity and duration of neutropenia.

Results: 121 patients were screened and 100 patients were identified for inclusion in the study. Reasons for exclusions included: incomplete medical records (n equals 3), stem cell mobilization (n equals 3), and tbo-filgrastim for non-oncologic indications (n equals 15). The most common type of cancers were acute leukemias in 24 patients and non-Hodgkin's lymphoma in 17 patients. Approximately half the patients received G-CSF for prophylaxis. Of these, 22 percent, 17 percent, and 8 percent were classified into high, intermediate, and low FN risk categories, respectively. Tbo-filgrastim was administered in combination with antibiotics for FN treatment in 24 percent of patients. Additionally, 16 percent received tbo-filgrastim for afebrile neutropenia. Overall adherence to IFMC guideline recommendations was only observed in 59 percent of patients. Tbo-filgrastim was dosed and timed correctly in over 80 percent of the cases. The mean ANC at the time of initiation of G-CSF for treatment of FN was 301 cells/uL. The mean ANC at the time of discontinuation of G-CSF for prophylaxis, treatment, and afebrile neutropenia was 9808 cells/uL, 2413 cells/uL, and 4210 cells/uL, respectively. The mean duration of G-CSF therapy was 5 days. There were 13 episodes of FN in patients receiving G-CSF for primary or secondary prophylaxis.

Conclusion: This study highlights the significant usage of tbo-filgrastim outside published recommendations and the need to improve adherence to Inova Fairfax Medical Campus guidelines. Pharmacists can play an essential role in improving care and ensuring safe, cost-effective use of myeloid growth factors in oncology.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5b-074

Poster Title: Characterization of the use of fosfomycin in adult inpatients at Virginia Commonwealth University (VCU) Health

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Purpose: Fosfomycin is a unique antibiotic that inhibits bacterial wall synthesis with Federal Drug Administration (FDA) approval for the treatment of uncomplicated urinary tract infections (UTI). Since it has relatively broad aerobic gram negative and gram positive coverage, there has been interest in using it in complicated UTI. Fosfomycin is an attractive option for treatment due to its oral formulation and coverage that includes difficult to treat organisms, such as extended-spectrum beta-lactamase-producing (ESBL) Escherichia coli and vancomycin-resistant Enterococcus (VRE). Since increased use at VCU Health is suspected, this study aimed to characterize the utilization of fosfomycin in an inpatient setting.

Methods: A retrospective chart review was performed on 64 admissions to VCU Health during which at least one dose of fosfomycin was prescribed between January 1, 2015 – December 31, 2015. VCU Health is an academic medical center with approximately 800 beds, and this study was approved by the VCU Institutional Review Board (IRB). Patients were included if they were over the age of 18 and received at least one dose of fosfomycin during their inpatient stay. Demographics, allergies, and other relevant history were collected from the electronic medical record (EMR). Risk factors, including history of multi-drug resistant (MDR) organisms, catheter use, transplant history, and paraplegia, were also evaluated. The organisms grown, susceptibilities, and indication were recorded to allow for appropriateness of fosfomycin to be determined. The EMR was reviewed for up to 30 days after discharge. Documentation within 30 days of recurrent UTI, visit to the emergency department (ED), or readmission was assessed for treatment failure.

Results: A total of 74 bacteria were identified and treated with fosfomycin: Enterococcus faecalis (17.6 percent) with 2.7 percent VRE faecalis, Enterococcus faecium (17.6 percent) with 10.8 percent VRE faecium, Methicillin-resistant Staphylococcus aureus (MRSA) (2.7 percent), Staphylococcus lugdunensis (1.4 percent), beta-hemolytic Streptococcus (2.7 percent), Escherichia coli (28.4 percent) with 9.5 percent ESBL Escherichia coli, other Enterobacteriaceae species (16.2 percent), Morganella species (1.4 percent), and Pseudomonas species (12.2 percent). During eight admissions, no organisms were identified in patients receiving fosfomycin. Of the 74 bacteria identified, nine isolates were tested for fosfomycin susceptibility data. The total number of fosfomycin doses prescribed varied significantly: one dose (42.2 percent), two doses (7.8 percent), three doses (31.2 percent), four doses (9.4 percent), five doses (1.6 percent), eight doses (1.6 percent), 14-day supply (4.7 percent), and weekly prophylaxis in renal transplant patient with recurrent urinary tract infections (1.6 percent). Seven patients (10.9 percent) were readmitted within 30 days of discharge for UTI producing the same bacterial organism as the previous admission. Organisms included Enterococcus faecium, VRE faecium, Escherichia coli (n equals 2), ESBL Klebsiella species, Enterobacter cloacae, and Pseudomonas species.

Conclusion: As evident by local prescribing patterns, the use of fosfomycin at VCU Health is more often for complicated UTI than uncomplicated UTI as well as commonly being used in patients with MDR organisms. Further evaluation of the clinical outcomes with the use of fosfomycin would be useful to determine whether this is appropriate.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-075

Poster Title: Pharmacy and physician assistant student interprofessional experience – pharmacy student perspective

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Purpose: The new pharmacy education standards require interprofessional education (IPE). Real world IPE could help students improve skills to practice in the complex healthcare environment. The purpose of this project was to evaluate changes in Pharmacy (PharmD) student attitudes towards healthcare teams, team work, interprofessional education and IPE program satisfaction after a four day IPE experience with physician assistant (PA) students.

Methods: Twelve fourth-year PharmD and twelve second-year PA students were paired based on zip codes. Students and preceptors received IPE program orientation. Students then practiced together for 2 days in a community pharmacy and 2 days in a medical clinic or emergency room. Students self-evaluated their team performance daily. Students anonymously completed a validated Attitudes Toward Healthcare Team Survey (23 items) before and after the IPE program; and a post program survey (25 Likert, 6 yes/no, 3 demographic and 4 open-ended items) on Qualtrics. Data analyzed with descriptive and Mann Whitney U statistics (SPSS v22). P-value less than or equal to 0.05 was considered significant. Research received Institutional Review Board exemption.

Results: Ten PharmD students (4 women, 6 men) completed the IPE. Rotation contract issues prevented completion by two students. Since pre-program attitudes toward healthcare teams survey responses were mostly positive (ceiling effect), few significant changes occurred after IPE. The two attitudes that significantly became more positive were teams are more responsive to patient emotional and financial needs (p=0.048) and teamwork improves understanding of

other health professional roles (p=0.048). All PharmD students (100%) agreed that this IPE experience increased their ability to communicate with patients, understanding of patient clinical problems, and improved quality of care. They were also in agreement that working in a team reduces error (100%) and increases efficiency (90%). All students (100%) felt learning with other students would help them become a better team member and enhance their education. Students found the IPE experience worthwhile (90%) and that it should continue to be required (70%) as part of the PharmD curriculum. Forty percent of students did not feel more IPE days were needed. PA survey responses were similar (most not statistically different) to PharmD student responses.

Conclusion: This real-world IPE resulted in students learning about team functioning, team care, and discipline roles. Students felt IPE enhanced their clinical skills and education. Prior to the program, the pharmacy students' initial attitudes towards team healthcare were very positive. Therefore, the Attitudes Toward Healthcare Survey, although a validated tool, might not be an appropriate real world IPE assessment measure.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 5b-076

Poster Title: Impact of targeted pharmacotherapy on hospital readmissions in heart failure with diastolic dysfunction

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Purpose: The use of angiotensin converting enzyme inhibitors (ACE-I's), angiotensin receptor blockers (ARB's), beta-blockers, aldosterone antagonists, and isosorbide dinitrate/hydralazine have well documented morbidity and mortality benefits in heart failure with systolic dysfunction. However, the role of these agents in diastolic dysfunction is less clear. Currently, the 2013 ACCF/AHA Heart Failure Guidelines recommend these therapies for symptomatic relief or management of comorbid conditions rather than slowing disease progression or preventing hospital readmissions. The objective of this study is to determine the impact of targeted heart failure therapy on hospital readmission rates in patients with diastolic dysfunction.

Methods: The effect of heart failure targeted medication therapy on hospitalizations was evaluated in this retrospective, single-center, observational study of patients admitted for acute decompensated heart failure from January 2004 through December 2014. Patients were excluded if their ejection fraction was less than or equal to 40% without echocardiogram evidence of diastolic dysfunction or if they died during the index hospital admission. Descriptive statistics were used to evaluate baseline characteristics and rehospitalization rates based on medication use. Medications analyzed included diuretics, ACE-I's, ARB's, beta-blockers, aldosterone antagonists, isosorbide dinitrate/hydralazine, and digoxin. Subgroup analyses were performed to evaluate the impact of medications on patients with diastolic dysfunction only and those with combined systolic & diastolic dysfunction.

Results: An interim analysis of 100 patients was performed from December 2012 through December 2014 . Of those included, the average age was 57.2±14.9 years, 49% were female, and 72% were African American. The most common comorbid conditions included hypertension (81%), diabetes type II (50%), and hyperlipidemia (45%). Most patients were prescribed appropriate medication therapy at discharge including loop diuretics (82%), beta-blockers (81%), and ACE-I/ARB (68%). Ten and seven patients also received aldosterone antagonists and combination hydralazine and isosorbide dinitrate respectively. The average length of index hospital admission was 4.4 ±4.0 days with mean time to rehospitalization occurring at 284.2± 295.5 days. Of the 46 patients with diastolic dysfunction only, the average age was 60.8 ±12.6 years, 65.2% were female, and 69.6% were African American. Heart failure therapy at discharge included loop diuretics (80.4%), beta-blockers (80.4%), and ACE-I/ARB (56.5%). The average length of index hospital admission and mean time to rehospitalization was similar between patients with diastolic dysfunction alone and combined heart failure (3.7 ±2.9 days vs 4.9±4.7 days, p=0.147; 232.7± 257.9 days vs 329.6±322.0 days, p=0.193, respectively).

Conclusion: The interim analysis demonstrates that index hospitalizations and time to readmission appear to be similar in patients with diastolic dysfunction alone versus those with combined heart failure. The majority of patients in our cohort were prescribed appropriate targeted therapy.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 5b-077

Poster Title: Evaluating the use of an insulin administration protocol in patients receiving parenteral nutrition (PN)

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Purpose: Glucose variability (GV), hyperglycemia and hypoglycemia, affect outcomes in hospitalized patents especially infection rates. Hospitalized patients requiring parenteral nutrition (PN) are especially vulnerable to GV. Previous studies have shown that hyperglycemia during PN is an independent predictor of increased hospital and intensive care unit (ICU) length of stay (LOS), immunologic and cardiovascular complications, and mortality. Limited data exist on the use and success of insulin and PN protocols for medical and surgical patients receiving PN. This study's purpose was to evaluate the impact of a hospital PN and insulin protocol for blood GV and outcomes, including infection and hospital mortality.

Methods: An insulin and PN protocol was designed by a multidisciplinary committee. Dextrose amounts in PN and insulin to carbohydrate ratios were used to dose insulin and PN adjusted on average prior 24-hour blood glucose (BG). BG goal for all patients on PN was between 110mg/dL and 180mg/dL.
Data was collected from hospitalized adult (at least 18 years of age) patients who received PN for at least two consecutive days between 3/14/2016 and 7/1/2016. Patients admitted to the intensive care unit and patients who initially received cycled PN were excluded from the study. Baseline characteristics, glucose levels, insulin, dextrose doses and PN calorie, and clinical outcomes including infection rates and mortality were collected. GV was categorized as hypoglycemia tertiles (less than 70mg/dL and 40mg/dL) and hyperglycemia tertiles (greater than 150mg/dL, 250mg/dL and 400mg/dL).

Results: Sixty-six patients were analyzed. Mean age was 53 years, mean body mass index was 25 and 44 percent were male. Mean admission blood glucose was 132mg/dl and serum creatinine 0.93mg/dL. Thirty-five percent of patients had hypertension and 12 percent had known diabetes mellitus. Mean duration of PN was 13.5 days.
GV occurred in 54.5 percent of patients. Hyperglycemia was present in 54.5 percent of patients. 52 percent had a BG greater than 150mg/dL, 23 percent had BG greater than 250mg/dL, and 6 percent had BG greater than 400mg/dL. Hypoglycemia (BG less than 70) was experienced by 4 percent of patients, but none had severe hypoglycemia (BG less than 40mg/dL). Approximately 56 percent of patients had a documented infection during or after PN. There was no difference in infection rates between patients with and without glucose variability (p equal 0.93). Hospital mortality was 0 percent.

Conclusion: After implementation of a protocol for BG control during PN, 50 percent of BG were under 150 mg/dl without any episodes of severe hypoglycemia. GV occurred in 55 percent of patients, the majority attributed to hyperglycemia.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 5b-078

Poster Title: Impact of acid suppression therapy on iron supplementation in the pediatric intensive care unit

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Purpose: Patients admitted to the pediatric intensive care unit (PICU) routinely receive stress ulcer prophylaxis in addition to receiving oral iron supplementation to prevent iron deficient anemia (IDA) from frequent blood draws. Currently, it is believed that antacids may interfere with iron absorption because of the increase in gastric pH. We conducted a prospective, observational single blind trial to determine whether or not a patient's iron stores, hemoglobin (Hgb) and hematocrit (Hct) are maintained or altered while receiving either oral or IV ranitidine or esomeprazole and oral ferrous sulfate supplementation during their PICU stay.

Methods: This prospective, observational trial was IRB approved and occurred over 2 years in a 14-bed PICU within an academic pediatric institution. Included patients were less than18 years old, PICU admits, had blood draws once or more a day, and could receive oral iron supplementation, acid suppression therapy, and consented to participate. Exclusion criteria included patients previously diagnosed with chronic anemia, anemia of chronic disease, history of CKD, glucose-6-phosphate dehydrogenase deficiency, or hemochromatosis, NSAID use, 1 pint of cow's milk in 24 hours or more, Helicobacter pylori infection within 6 months, history of active short bowel syndrome, gastrointestinal bleed, ulceration requiring transfusion or causing hemodynamic instability, frank bleeding from nasogastric tube or rectum, or small bowel resection. Hemoglobin levels were the primary outcome of anemia and Hct was an additional indicator. Secondary outcomes were serum iron levels and gastric pH. Based on physician preference; patients received iron supplementation plus an H2 antagonist or a PPI. Hgb and Hct were monitored once a day or more, up to every 4 hours depending on the patient's needs.

CBC and iron panels were drawn at baseline with repeat levels for both 3 days after treatment was initiated. Baseline characteristics, serum iron, gastric pH, Hgb, and Hct were assessed by descriptive statistics. Serum iron, Hgb, and Hct were further analyzed using paired t-test. Statistical significance was P less than 0.05.

Results: Thirty-four patients met the inclusion and exclusion criteria, 44 percent males and 56 percent females. The majority were Caucasian, 53 percent, followed by African American, 38 percent. Weight of the 30 patients was 10.6 plus or minus 10.6 kg, and age was 24 plus or minus 42.5 months. The baseline means for iron were 43.2 plus or minus 34.9 mcg/dL, Hgb 8.9 plus or minus 1.13 g/dL, Hct 26.6 plus or minus 3.48 percent, and gastric pH 4.97 plus or minus 1.95. The iron levels increased to 50.9 plus or minus 24.6 mcg/dL by day 3. The mean difference of day 3 iron levels from baseline was 0.4061 mcg/dL (95 percent CI, 0.13-0.69, P equals 0.0056). Gastric pH decreased to 4.68 plus or minus 1.49 on day 5. The mean of Hgb and Hct increased on day 5 to 10 plus or minus 1.06 g/dL and 29.6 plus or minus 3.27 percent respectively. The mean difference of Hgb from baseline was 1.1800 g/dL (95 percent CI, 0.44-1.91, P equals 0.0030). The mean difference of Hct from baseline was 3.1259 percent (95 percent CI, 0.98-5.28, P equals 0.0061).

Conclusion: The use of either oral or IV ranitidine or esomeprazole along with oral ferrous sulfate supplementation did not affect the absorption of iron. Iron, Hgb, and Hct all showed statistically significant increases despite combined antacid and iron therapy. Thus despite use of antacids, combination use showed statistically significant increase in iron, Hgb and Hct. As this was a small trial, a larger, long-term study is needed to evaluate the clinical significance of this effect.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 5b-079

Poster Title: The effect of vitamin D deficiency treatment on glycemic control in patients with type 2 diabetes

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Purpose: More than 29 million people in the U.S. have diabetes, with type 2 diabetes mellitus (T2DM) accounting for 90-95 percent of all cases. Vitamin D deficiency may occur in 91 percent of patients with diabetes; recent studies have proposed that vitamin D plays a role in glycemic control through impact on β-cell activity and insulin sensitivity. Results of interventional studies have been conflicting, but data suggests potentially greater treatment effect in patients with higher baseline HbA1c. The purpose of this study was to determine whether treatment of vitamin D deficiency led to improved glucose control in patients with T2DM.

Methods: This retrospective chart review included 33 patients at an outpatient internal medicine clinic in Mobile, AL. Patients were included if they were age 19 and older and had a diagnosis of both type 2 diabetes and vitamin D deficiency based on ICD-10 coding using E11 and E 55 or 65 diagnostic codes. Vitamin D deficiency was defined by a serum 25-hydroxyvitamin D [25(OH)D] less than 30 ng/mL. There were no defined exclusion criteria. The primary outcomes measured were changes in vitamin D levels after treatment of deficiency and changes in HbA1c levels at 3, 6, 9 and 12 months following treatment of vitamin D deficiency. Secondary outcomes included changes in HbA1c lowering between patients with an HbA1c less than 8 percent vs. 8 percent or greater, changes in lipid profiles, blood pressure, and weight. Differences between groups were assessed using a two-sample t-test. Statistical significance was defined as p value less than or equal to 0.05.

Results: Deficient vitamin D levels significantly improved with treatment (16.5 ng/mL vs. 33.7 ng/mL; p less than 0.0001). Compiled data revealed no significant differences in HbA1c levels after treatment of vitamin D deficiency at 3, 6, 9 or 12 months (p equals 0.867, 0.19, 0.088, and 0.529, respectively). However, in patients with a baseline HbA1c of 8 percent or more (mean 10.5 percent), HbA1c levels improved at 3 months (8.8 percent; p equals 0.003), 6 months (8.4 percent; p equals 0.005), 9 months (8.1 percent; p equals 0.001), and 12 months (8.9 percent; p equals 0.03) after treatment. No significant differences in lipid levels, blood pressure, or weight were found.

Conclusion: Correction of vitamin D deficiency improved glucose control in diabetic patients with an HbA1c of 8 percent or higher but did not result in significant improvement in lipid profiles, blood pressure, or weight. These findings may suggest utility of vitamin D replacement in diabetic patients with poor glycemic control. Further studies should be conducted to strengthen the evidence of this correlation.

Submission Category: Pain Management

Submission Type: Evaluative Study

Session-Board Number: 5b-080

Poster Title: Defining phenotypic relationships between smoking and opioid using patients and assessing pain severity and function

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Purpose: More than 100 million Americans live with chronic daily pain and many use opioid analgesics to manage their pain symptoms. Patients also use tobacco simultaneously to cope with some of the pain symptoms they experience. The purpose of this study was to define the phenotypic relationship between smoking and opioids and to understand how comorbid tobacco use among opioid users is associated with patient's self-reported pain relief, functioning after taking opioids and confidence in ability to manage pain without opioids. By exploring this relationship, providers can design future interventions to aid opioid users and smokers in cessation.

Methods: The Institutional Review Board (IRB) approved this retrospective, cross-sectional, questionnaire-based study. Data were collected from new patients who presented at the Back and Pain Center at the University of Michigan in Ann Arbor between April 2015 and January 2016. Patients who completed the new patient questionnaire and provided information about their smoking habits and opioid medication use were included in the study. Patient's questionnaires were entered into the Assessment of Pain Outcome Longitudinal Electronic Data Capture (APOLO EDC) database. Patients were divided into four groups: 1) patients who did not smoke and did not use opioid medication, 2) patients who smoke but do not use opioid medication, 3) patients who do not smoke but use opioid medication, and 4) patients who both smoke and use opioid medication. Statistical analyses focused on questions about opioid medications use, smoking habits, pain severity, physical activity, and overall well-being of the patient. Patient's opioid medication regimen was converted to oral morphine equivalency (OME) in order to assess the differences between smokers and non-smokers in terms of daily

oral morphine equivalency. Further analysis was done to compare smokers and non-smokers in pain relief after opioid use, functionality after opioid use and confidence to stop opioid medication.

Results: Six hundred and thirty four new patient questionnaires were included in our study, 227 non-opioid non-smokers, 51 non-opioid using smokers, 268 opioid using non-smokers and 88 opioid using smokers. Patients who reported they were opioid using smokers had the worst overall score in pain, depression and anxiety. Non-opioid using smokers reported significantly better neuropathic pain scores (Pain Interference), and better functioning scores (Oswestry Disability Index; p=0.005 for both) when compared to opioid using smokers. Opioid using non-smokers along with non-opioid non-smokers had significantly less anxiety when compared to opioid using smokers (p=0.007 and p=0.002, respectively). Patients who identified as opioid using smokers used on average 10mg more oral morphine equivalents than the non-smoking opioid using group (p=0.009). Among all opioid users, there were no significant differences between smoking and non-smoking patients when asked about relief provided by opioids, function after taking opioids or confidence in ability to stop opioid medications (p=0.94, p=0.277 and p=0.101, respectively).

Conclusion: Opioids and cigarette smoking are both major public health problems. We found that patients who do not use opioids report better outcomes when compared to those using opioids, and patients who smoke used higher opioid doses. Similar contributory mechanisms between smoking and pain triggering could explain the correlation between these two. With the knowledge that relief provided by pain medications and the confidence to stop opioid medications are not different between smokers and non smokers who use opioids, providers can use this information to guide their practice, specifically suggesting other alternative remedies to help patients cope with pain.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-081

Poster Title: Longitudinal measurement of empathy in pharmacy students

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Purpose: Empathy has long been considered an important core element in healthcare provider-patient relationships. Thus, empathy and its development among providers (physicians, nurses, dentists and pharmacists) have been the focus of considerable research. Empathy of medical, dental and nursing students, as well as medical residents, has also been assessed longitudinally over the course of their training. However, little is known about empathy development among student pharmacists. Student pharmacists are taught about empathy and provided many opportunities to develop empathy skills throughout their four-year professional education. This study assessed empathy and how it changes in first-year (P1) student pharmacists.

Methods: Eighty-five P1 student pharmacists from the University of Michigan College of Pharmacy Class of 2019 participated in the study. Empathy was assessed using the Jefferson Scale of Empathy – Health Profession Student version (JSE-HPS), a validated instrument that provides a self-report of empathy (Thomas Jefferson University, Philadelphia, PA). The JSE-HPS was administered using an online survey at the beginning of the first professional year (week 8 of fall semester 2015); the online survey was administered a second time toward the end of the first professional year (week 14 of winter semester 2016). Students independently completed the survey during a Communications course in fall 2015 and a Self-Care Therapeutics course in winter 2016. Demographic information about the student (age, gender, work experience, previous patient interactions) was also collected. The JSE-HPS was scored using the prescribed algorithm. Data were analyzed using descriptive statistics, paired Student's t-tests, and analysis of variance. This study was granted exempt status by the Institutional Review Board of the University of Michigan (HUM# 00103485).

Results: Eighty-five students completed the JSE-HPS survey in the fall; 83 completed it in the winter. Three fall surveys and one winter survey were dropped as incomplete. Eighty-two paired surveys were analyzed. Mean empathy scores did not change between fall and winter semesters, 111.8 ± 10.6 vs. 109.61 ± 13.71, respectively (p=0.105). No effect of gender was observed in overall scores (males, 113.89 + 2.5 vs. females, 113.63 + 2.23; p=0.94); no changes were observed between fall and winter semesters. To evaluate the effect of age, students were classified into three categories: 19-21 years of age, 22-24 years of age, and 25 years of age or older. Empathy scores decreased significantly from fall to winter among students aged 22-24 years (112.08 + 11.05 vs. 108.12 + 14.5; p=0.0403); scores did not change significantly among other age groups. Fall empathy scores of students with prior pharmacy work experience were not significantly different from scores of students without prior work experience (p=0.099); no significant differences were observed between fall and winter scores. Overall empathy scores of students with previous patient interactions were similar to those of students without previous patient interactions (p=0.84); scores did not change significantly from fall to winter.

Conclusion: Overall, self-reported empathy of P1 student pharmacists did not change significantly over the first academic year. Gender, age, past work experience and experience interacting with patients did not have a significant effect on empathy scores. Continued longitudinal evaluation of empathy scores will be needed to understand how empathy development of student pharmacists progresses during their professional education.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 5b-082

Poster Title: Outlining the use of 4-Factor Prothrombin Complex Concentrate in patients not receiving vitamin K antagonist therapy

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Purpose: Literature provides limited information regarding the utilization of 4-Factor Prothrombin Complex Concentrate (4F-PCC) for indications other than vitamin k antagonist (VKA) reversal. This study characterized the use of 4F-PCC outside of its approved indication.

Methods: A retrospective chart review utilizing the electronic medical record was conducted on patients who received 4F-PCC from December 1, 2013 to August 31, 2016. Patients were included if they were 18 years or older and received 4F-PCC during the specified time frame. Patients were excluded if they used a VKA prior to 4F-PCC administration or were pregnant during the admission. The following data was collected: pertinent patient demographics, indication for 4F-PCC, INR trends 24 hours from administration of 4F-PCC, adverse events potentially related to 4F-PCC within 30 days of 4F-PCC administration, rate of initiation of procedures within 8 hours of 4F-PCC administration, and the use of adjunctive hemostatic therapies in combination with 4F-PCC. Descriptive statistics were used to characterize the data as appropriate.

Results: Twenty-three patients were included in the study. Patients were mostly Caucasian females with a baseline INR of 2.55 and serum creatinine of 1.45 mg/dL. The most common dose of 4F-PCC was 25 units/kg. Fifteen (65%) patients were given 4F-PCC for reversal of bleeding, 5 (21%) for an emergent procedure, 1 (4%) for reversal of elevated INR, 1 (4%) for apixaban reversal, and 1 (4%) for gift of life. Two (9%) patients had a Child-Pugh score of A, 7 (30%) with a score of B and 14 (61%) with a score of C. The median INR reduction from baseline

to immediately after 4F-PCC administrations was 0.65 (IQR 1.09), with the median time to first INR draw being 120 minutes (IQR 287.75). One (4%) patient with cirrhosis was diagnosed with portal vein thrombosis two days after 4F-PCC administration. Seven (33%) patients received cryoprecipitate, 17 (74%) received fresh frozen plasma (FFP), 4 (17%) received aminocaproic acid, 20 (87%) received either IV or oral vitamin K, 9 (39%) received platelets, 2 (9%) received desmopressin, and 1 (4%) did not receive any adjunctive therapies.

Conclusion: The most common off-label indications for 4F-PCC use in this evaluation was reversal of bleeding events, followed by need for emergent procedures. The median INR was decreased however, it is unknown if this was solely due to 4F-PCC administration as a majority of patients received adjunctive therapies. The significance of 4F-PCC use in situations other than VKA reversal must be determined in a larger, long-term clinical trial.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 5b-083

Poster Title: Evaluation of appropriate metabolic monitoring for patients prescribed atypical antipsychotics in a hospital based ambulatory care clinic

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Purpose: Atypical antipsychotics are associated with various metabolic side effects. In 2004, the American Diabetes Association (ADA), American Psychiatric Association (APA), American College of Endocrinology (ACE), and the North American Association for the Study of Obesity (NAASO) established consensus guidelines recommending scheduled monitoring of body mass index (BMI), waist circumference, hemoglobin A1c (HbA1c), fasting plasma glucose, fasting lipid panel, blood pressure, and personal/family history in these individuals. The purpose of this study was to determine if patients receiving care through our ambulatory care clinic and prescribed atypical antipsychotics are being appropriately monitored for metabolic effects based on the 2004 consensus guidelines.

Methods: This retrospective chart review was approved by the institutional review board. Patients receiving an atypical antipsychotic from August 1, 2011 – August 31, 2016 were identified. Patients were included if they received an atypical antipsychotic for at least 6 months and were seen by their primary care provider at least twice for a non-acute visit during the time of treatment. The following information was collected from the patient's electronic medical record: antipsychotic prescribed and indication; measures of BMI, weight, HbA1c, fasting plasma glucose, fasting lipid panels (total cholesterol, high-density lipoproteins, low-density lipoproteins, and triglycerides), and blood pressure; diagnosis of or worsening of any metabolic abnormalities during treatment. The primary objective was to determine the percentage of patients appropriately monitored for metabolic effects per 2004 consensus guidelines. The secondary objectives were to determine 1) the percentage of patients with a greater than 5 percent weight gain at any time during therapy and 2) the percentage of patients with a) evidence of an undiagnosed metabolic condition, b) a diagnosis of a metabolic condition made after antipsychotic initiation or c) worsening of and/or requiring adjustment in treatment

of a diagnosed metabolic condition after antipsychotic initiation. The results were analyzed using descriptive statistics.

Results: Eighty-one patients were included after reviewing 137 charts. Blood pressure and weight were obtained at each visit per standard triage procedures. Eleven patients had a preexisting diabetes diagnosis. Of the remaining 70 patients, a HbA1c was ordered or obtained in 3 percent (n equals 2) at the recommended time of 3 months after beginning therapy and in 20 percent (n equals 14) at any time during therapy. Ten percent (n equals 7) had a plasma glucose obtained 3 months after starting therapy. Forty patients had a preexisting hyperlipidemia diagnosis. Of the remaining 41 patients, a lipid panel was ordered or obtained in 7 percent (n equals 3) at the recommended time of 3 months after beginning therapy and in 59 percent (n equals 24) at any time during therapy. Forty-nine percent (n equals 40) had a weight gain of greater than 5 percent during therapy. Six percent (n equals 5) met diagnostic criteria for a metabolic condition (excluding obesity) but was not diagnosed, and 19 percent (n equals 15) were diagnosed with a metabolic condition after antipsychotic initiation. Of those with a preexisting metabolic condition, 38 percent (n equals 25) had worsening of and/or required therapy adjustments after antipsychotic initiation.

Conclusion: Based on data from this study, we conclude the need for education and implementation of more stringent monitoring of patients prescribed atypical antipsychotics in order to identify and manage metabolic conditions in this high-risk population.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-084

Poster Title: Relationship of lithium in drinking water to suicide and Alzheimer's mortality across fifteen Alabama counties

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Purpose: Lithium is currently used as a treatment for bipolar disorder and depression and has shown reduced suicide in those patients. Recent studies have supplied evidence that lithium may also be effective at reducing suicide at much lower doses, such as those found in drinking water. Additionally, some research has found stabilization of Alzheimer's at similar low levels. The purpose of this study is to compare suicide and Alzheimer's mortality rates to natural lithium levels in the drinking water of Alabama. Due to the modern increase in bottled water consumption, lithium levels in seventeen brands and one spring were also determined.

Methods: Water samples were collected from 15 Alabama counties: the 5 with the highest suicide rates, the 5 with the lowest suicide rates and the 5 counties with the highest population. These counties were chosen to provide as much variety in demographic characteristics as possible, while ensuring a broad range of rates. Five water samples from each county were collected using uniform containers from homes, restaurants and other public spaces. Lithium levels were measured using an inductively coupled plasma emission spectrophotometer. The average of the five measurements was used to represent the lithium level for each respective county. Suicide and Alzheimer's mortality rate data was collected from the Alabama Center for Health Statistics and the Centers for Disease Control and Prevention (CDC) for the years 1999-2013. The average rate for this 15 year range was then plotted against the mean lithium level for each county to determine the correlation coefficient (r). Significance was decided using Spearman's rank correlation test with an alpha value of 0.05. Several potential confounding variables were also compared to suicide rate including: age, sex, income, poverty and divorce. For the bottled and spring water one sample from each source was

collected and measured using inductively coupled plasma emission spectrophotometry. The lithium values were then compared to those found in the county samples.

Results: The plot of suicide rate versus lithium concentration showed an inverse linear relationship with a correlation coefficient of r equals -0.6286. Two counties were distinct major outliers; when removed the new r equals -0.8781. Spearman's rank correlation test gave a two-tailed p value of 0.0141 and without outliers p equals 0.0003. The correlation coefficient for suicide rate versus age-standardized Alzheimer's mortality rate was -0.2714 and p equals 0.3278. The male only suicide rate versus lithium concentration data remained significant, however, female only was significant only without the presence of outliers. Other confounders, with the exception of poverty, were not significant. Of the bottled waters sampled only 8 had a lithium concentration greater than 1 part per billion (ppb). The range of lithium concentrations for the counties was 0.4166 ppb to 32.88 ppb. The bottled water lithium concentrations ranged from 0 ppb to 12.5 ppb.

Conclusion: Lithium concentration in drinking water is inversely correlated with suicide rate but not with Alzheimer's mortality rate in 15 Alabama counties. The majority of sampled bottled water brands do not contain significant amounts of lithium. Further research into the nutritional essentiality of lithium is warranted.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5b-085

Poster Title: Evaluation of an interprofessional patient safety education program: Student pharmacists' perspectives

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Purpose: Annually, medical errors cost about $17 billion (Health Affairs 2011) and result in about 210,000 preventable deaths in a hospital (Journal Patient Safety 2013). All healthcare professionals need to help prevent these errors, thus students need patient safety training. Wayne State University developed an interprofessional student patient safety program to educate pharmacy and medical students together to prevent, analyze, and report medical and medication safety errors. The purpose of this research is to evaluate program effectiveness on teaching pharmacy students about patient safety, event analysis, reporting, and error prevention; and the impact of interprofessional learning.

Methods: Before the program, students completed the Healthcare Professionals Patient Safety Assessment Curriculum Survey (Nurse Education Today 2015) and an investigator-created survey assessing patient safety knowledge and opinions. The 5-hour session included brief didactic lectures, a Grey's Anatomy episode portraying a medical error, and interprofessional group work. Groups included 1-2 pharmacy and 7-8 medical third-year students. Group work focused on error statistics and analysis tools, just culture, human factors engineering, FDA Medwatch program, error reporting, and patient safety committees. After the program, students completed the original survey that included additional program learning and evaluation items. Students created a unique identifier resulting in de-identified databases. Project given IRB exemption. Only students completing both surveys were included. All Likert-like opinion-questions (4 point comfort, agreement, or familiar scales) were analyzed using Wilcoxon signed rank sums with descriptive statistics for demographics (SPSS version 22). Pre and post knowledge-questions scored as 0 (no or wrong answer), 1 (partial), and 2 (correct) by

2 investigators with differences adjudicated and then analyzed with Chi square. P value < 0.05 was considered significant. Open-ended learning-questions were analyzed qualitatively. Two investigators assigned 2-3 initial codes for each open-ended question response and developed simultaneously a codebook. Differences in initial codes were adjudicated by the research group. Initial codes were grouped into focus codes, which were followed by theme creation to generalize the findings.

Results: Seventy-six pharmacy students attended the program. Matched surveys existed for 67 students (88%). Prior to the program, almost all students knew errors with no harm need to be addressed (95%) and valued interprofessional patient safety teams (100%). Students became more comfortable reporting a patient safety error to preceptor (64% to 90%, p = 0.000) and being able to analyze an error for causes (51% to 91%, p = 0.000) after the program. Student agreement significantly increased for patient safety being included in schooling (46% to 68% strongly agree, total agreement 94% to 100%, p = 0.002); solutions to resolve errors should be evaluated by an interprofessional committee (42% to 64% strongly agree; total agreement 98% to 100%, p = 0.001), and non-healthcare professionals should be members on a patient safety committee (82% to 88% total agreement, p = 0.001). Assessment of knowledge demonstrated significantly more students (p=0.000) could define root cause analysis, just culture, and human factors engineering after the program. The most important themes learned about medication error and prevention were error analysis, patient safety improvements, and human accountability. Themes for interprofessional patient safety learning included enhanced learning, improved patient safety outcomes, and collaborative practice.

Conclusion: Case discussions, team work, and a television show facilitated interprofessional patient safety communication and application of knowledge. After the interprofessional patient safety education program, pharmacy students' knowledge about patient safety, error analysis, error prevention, patient safety committees, and interdisciplinary involvement improved. All students agreed interprofessional patient safety education is important didactic learning. The interprofessional patient safety education will be continued with exploration to add another Interprofessional education program day with additional patient safety topics and inclusion of additional healthcare professionals.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5b-086

Poster Title: Retrospective evaluation of directions for liquid medication dosage forms in pediatric patients at Concord Hospital Family Health Center

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Purpose: This study reviews prescribing practices for liquid medication dosage forms in pediatric patients at Concord Hospital Family Health Center (CHFHC). The purpose of this study is to assess a sample of liquid medications prescriptions for non-milliliter units such as teaspoon (tsp) versus millimeters (mL) versus the use of both. Also reviewed were types of units available on measuring devices at local pharmacies. This study and best practices will be used to develop a new computerized physician order entry system. Education will also be provided to healthcare providers about the results and best prescribing practices for liquid medication dosage forms.

Methods: A retrospective review of 42 pediatric prescriptions for liquid medications between 09/01/2015 to 09/01/2016 was conducted. The data was extracted from a report generated by the clinics IT department and included the patient's age, language, prescription directions, and medication. GraphPad software was utilized for statistical analysis. The second part of this study, reviewing measurement devices dispensed to patients, was conducted at eight local community pharmacies. All major chain pharmacies for this area were included as well as independent pharmacies. The analysis of the medication measurement devices included review of the types of measurements on the devices. Review of the best practices and the devices within the community was used to make recommendations for medication profile builds in the new computerized order entry database.

Results: The median age of patients was 7 years (range: less than 1 to 16 years old) and 10 patients (about 24%) were non-English speakers. Directions on all 46 prescriptions were written as tsp unit and only 11 prescriptions (23%) contained mL units within the directions as well. One prescription, of the 11 prescriptions, indicated cc referring to mLs. Acetaminophen and

antibiotics were the most prescribed liquid medication dosage forms. The data that was collected from pharmacies demonstrates different available liquid medication devices including syringe, spoon, cup, and dropper. Eight pharmacies provide syringes with liquid medications and five provide spoons. All devices were marked with mL and 42% were additionally marked in teaspoons.

Conclusion: Recommendations for prescribing practices for liquid medication dosage forms include writing orders in mL unit only and also the inclusion of the dose for example: 5 mg (10 mL) BID. The use of mL only for measurement is preferred to limit the confusion with other types of spoons within the patient's home. The need for this may be particularly important for those patients coming from a foreign country, 24% of our study population, where the avoirdupois system is not used. The availability of liquid medication devices that measure mL unit in the local pharmacies supports these recommendations.

Submission Category: Pharmacokinetics

Submission Type: Evaluative Study

Session-Board Number: 5b-087

Poster Title: Evaluation of the frequency of Cytochrome P450 2C19 variant alleles in a Mexican population compared to a Caucasian population

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Purpose: CYP2C19 is a cytochrome P450 enzyme involved in the metabolism of clopidogrel, carisoprodol, proton pump inhibitors, and certain antidepressants/antiepileptics. Genetic variations can lead to changes in drug metabolism, which can be associated with adverse events and/or therapeutic failure. Extensive pharmacogenetic studies have been completed in Caucasians, but less research has been performed in Mexican-Americans. Detection of genetic variations in drug metabolizing enzymes can help identify patients at risk for adverse drug reactions and/or therapeutic failure at standard dosages. This study compared the frequency of genetic variations in CYP2C19 in a Mexican population compared to a Caucasian population.

Methods: The Shenandoah University Institutional Review Board approved this cross-sectional study prior to its commencement. The DNA analyzed for this study utilized previously obtained samples with informed consent to allow for further studies relating to the pharmacogenetics of drug metabolism. All the subjects were greater than 18 years of age and self-identified as Mexican or Caucasian. A polymerase chain reaction (PCR) was then performed to test for the presence of CYP2C19*2 (rs4244285) and CYP2C19*17 (rs12248560) on a Applied Biosystems Quantstudio 6 Flex and a 7300 real-time PCR systems. The genotypes and allele frequencies were compared between groups using the Pearson X2 test and Fisher's exact test, when appropriate. A $p < 0.05$ was considered to be statistically significant.

Results: A total of 188 Mexican and 179 Caucasian samples were analyzed. The frequency of the CYP2C19*2 variant allele was 7.2% in the Mexican group compared to 16.0% in the Caucasian group ($p < 0.001$). The genotype frequencies were also significantly different

between the two groups (p=0.002). The frequency of the CYP2C19*17 variant allele was 6.0% in the Mexican group and 22.4% in the Caucasian group ($p < 0.001$). The genotype frequencies were also significantly different between the two groups ($p < 0.001$).

Conclusion: The CYP2C19 genotype and allele frequencies were significantly different between these Mexican and Caucasian populations. These results reveal that Mexicans are less likely to possess these two CYP2C19 genetic variations, which are most common in Caucasians. Further research needs to determine if other CYP2C19 variant alleles less common in Caucasians may occur at a higher frequency in the Mexican population.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-088

Poster Title: The Relationship Between Gender-Affirming Hormone Therapy and Depressive Symptoms in an Urban Transgender Population

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Purpose: Transgender/gender non-conforming individuals face higher risks of depression than the general public. Although true prevalence is unknown, estimates of depression range from five to ten times the national average, as high as 62%. Depression is often driven by discrimination and marginalization. Medically transitioning to one's authentic gender identity is one method of decreasing gender dysphoria and improving quality of life. However, further data is needed regarding the role of hormone therapy (HT) and other factors in lowering the risk for depression. This study evaluated the relationship between the presence of depressive symptoms and HT use in addition to other characteristics.

Methods: Using a community-participatory model, a transgender advocacy organization developed an on-line survey that gathered information about daily discrimination burden, coping skills and impact of discrimination among self-identified transgender/gender non-conforming adults at least 18 years old. Data were collected beginning June 2016 with University of Michigan researchers contracted for de-identified database analysis. IRB approval was obtained prior to analysis. Data pertaining to this study included responses about medical transitioning, hormone therapy, the Patient Health Questionnaire-2 item scale (PHQ-2), and the Generalized Anxiety Disorder 7-item Scale (GAD-7), common screening tools for depressive and anxiety symptoms respectively, and demographic and socioeconomic data. Responses to the PHQ-2 were categorized as indicating a risk of depressive symptoms if the PHQ-2 score was 2 or greater. GAD-7 responses were categorized as indicating generalized anxiety if the GAD-7 score was 10 or higher. GAD-7 scores of 15 or higher were categorized as indicating severe anxiety.

Using SPSS, data were analyzed using binomial logistic regression to calculate odds ratios (OR) for depressive symptoms. The primary outcome was the likelihood of depressive symptoms with concurrent HT use. Secondary outcomes included the odds of depressive symptoms based on education level, (high school or GED vs. minimum some college education), annual income (less than vs. greater than or equal to $25,000), age (less than or equal to vs. greater than 25 years), and comorbid severe anxiety.

Results: Sixty-one individuals were included in the database; 1 was deleted due to age less than 18 years. Of the 60 respondents analyzed, mean age was 28 (plus or minus 13) years. The majority was Caucasian (81.67%) and had a high-school diploma or a GED (73.33%). About one-half (51.8%) had an annual household income of at least $25,000. Forty-five respondents (75%) had a PHQ-2 score of 2 or higher, 31 (51.67%) had a GAD score of 10 or higher, and 22 (35%) had a GAD-7 score of 15 or higher.
Several factors lowered the risk of depressive symptoms. HT users had 76.6% lower risk (OR=0.23, p=0.06). Those who had some post-secondary education had a lower risk of 67.7% (OR=0.32, p=0.15). A significantly lower risk was found with an annual income of at least $25,000 (OR=0.30, p-value less than 0.05). Older age (greater than 25 years) was associated with a higher likelihood (OR=1.15, p=0.85).
When severe anxiety was added to the regression model, a significant higher risk for depressive symptoms was found (OR=17.38, p-value less than 0.01). Hormone therapy, education, and annual household income continued to show a lower, but statistically insignificant, risk. Older age remained a risk factor for depressive symptoms.

Conclusion: Depression and its associated relationship to suicide is a major concern in the care of transgender/gender non-conforming individuals. Slightly more than half of survey respondents were at risk of depression. Gender-affirming HT use was associated with lower likelihood of depressive symptoms. Education, annual income and younger age also appear to lower risk. Severe generalized anxiety significantly increased the risk of depressive symptoms. Our results emphasize the need to include depression screenings in the care of transgender/gender nonconforming patients and the importance of hormone therapy and anxiety treatment in the care of this population.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 5b-089

Poster Title: Prescribing habits of practitioners for upper respiratory tract infections: Are antibiotics being overprescribed in pediatric patients?

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Purpose: The Centers for Medicare and Medicaid Services are implementing PRQS (physician quality reporting system) measures to evaluate appropriate prescribing habits from physicians. These measures have been implemented as a cost-savings program to prevent unnecessary prescribing of medications to patients. The American Academy of Pediatrics has recently published guidance on the treatment of upper respiratory tract infections (URI). Most URI's are viral in nature, rendering an antibiotic useless, yet prescribers often prescribe antibiotics for a diagnosis of URI. This chart review is aimed at the PQRS measure evaluating a physician's prescribing habits when diagnosing a pediatric patient with a URI.

Methods: This retrospective chart review included patients from 3 months to 18 years of age who presented to the Baptist Hoover Clinic within the past year and received a diagnosis of URI. Data to be collected includes gender, age, diagnosis, and medication prescribed. Patients were identified by the ICD-9 code assigned for a URI.

Results: Thirteen patients were identified and included in the chart review who presented to clinic with cold or flu like symptoms and subsequently received a diagnosis of URI. Of the 13 patients diagnosed, 8 patients (62%) were prescribed antibiotics for their URI.

Conclusion: Primary care physicians who prescribe antibiotics for pediatric patients with URIs could be hindering their place of work from receiving a reimbursement due to the prescribing of antibiotics for unnecessary diagnoses. The overprescribing of antibiotics in pediatric patients with URIs could ultimately lead to antibiotic resistance. Diligent prescribing habits need to be reinforced in order to properly treat the patient, prevent unnecessary costs, and also generate revenue for the clinic.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 5b-090

Poster Title: Evaluation of bacteremia in pediatric patients in Mississippi's only children's hospital

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Purpose: Bloodstream infections are well defined in adult populations, with Staphylococcus aureus, Staphylococcus epidemidis, Enterococcus spp, and Streptococcus pneumoniae representing the most common causes. Staphylococcus aureus, generally considered the most pathogenic of those, results in a mortality rate of 20 to 40 percent. However, less is understood about the causes of bacteremia in pediatric patients, particularly those in a rural state. The purpose of this study was to establish the primary causative agents of bacteremia in pediatric patients admitted to Mississippi's only children's hospital to determine if these pathogens differ from the adult population.

Methods: This retrospective epidemiologic evaluation included pediatric patients 18 years or younger admitted to the University of Mississippi Medical Center between January 1, 2013 through December 31, 2015. Patients with a definitive positive blood culture identified by the TheraDoc surveillance system were reviewed. Patients admitted on several different occasions with different organisms were considered to be separate cases and were included, but relapsing episodes with the same initially identified pathogen were excluded. For those who had repeat cultures with the same pathogen, only the first positive culture was included. Positive blood cultures with organisms that are known contaminants (i.e. Bacteroides spp., diphtheroids) were excluded.

Results: 913 patient isolates had a positive blood culture, with 92 unique organisms identified. The most frequently identified organisms were Staphylococcus epidemidis (207/913, 22.67 percent), followed by Staphylococcus aureus (136/913, 14.90 percent). Methicillin-resistance

was observed in 60.30 percent of these strains. Other pathogens recorded included viridans group streptococci (49/913, 5.37 percent), Staphylococcus hominis (43/913, 4.71 percent), Enterococcus faecalis (37/913, 4.05 percent), and Escherichia coli (34/913, 3.72 percent). Organism frequencies varied yearly. Of the two most commonly identified pathogens, there were 64(23.02 percent) Staphylococcus epidemidis and 40 (14.38 percent) Staphylococcus aureus cultures in 2013. In 2014, there were 76(23.53 percent) Staphylococcus epidemidis and 45(13.93 percent) Staphylococcus aureus cultures, but 2015 identified 67(21.47 percent) Staphylococcus epidemidis and 51(16.35 percent) Staphylococcus aureus cultures. Variations in organism isolation were observed pending unit of the hospital. In the neonatal intensive care unit, 112 Staphylococcus epidermidis isolates were identified compared to 28 and 41 in the pediatric intensive care and emergency department. Staphylococcus aureus was most frequently identified in the emergency department with 58 positive cultures compared to 23 and 24 from the neonatal and pediatric intensive care units.

Conclusion: It was determined that the most common cause of pediatric bacteremia was Staphylococcus epidermidis followed by Staphylococcus aureus. Our results were found to be similar to the adult population. Upon further evaluation of the two most common pathogens cultured, our results revealed 2014 had the most positive cultures followed closely by 2015 then 2013. The emergency department resulted in the most cultures, including Staphylococcus aureus, with the neonatal intensive care unit, patients admitted to the floors, and pediatric intensive care unit following behind, respectively. Further analysis will be required to determine if the organisms cultured are pathogenic or contaminants.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 5b-091

Poster Title: The Effect of Trimethoprim-Sulfamethoxazole Dosing Regimen on the Incidence of Early Urinary Tract Infections in Pediatric Kidney Transplantation

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Purpose: Urinary tract infections (UTIs) and other infectious complications are common after renal transplantation, likely resulting from the high intensity of immunosuppression needed to prevent acute graft rejection. Trimethoprim-sulfamethoxazole (TMP-SMX) is frequently used both as prophylaxis against UTIs and Pneumocystis jiroveci (PCP) in the early post-transplant period, but the optimal duration of prophylaxis is unknown. The purpose of this study was to evaluate the association between duration of TMP-SMX prophylaxis and the incidence of UTIs during the first year post-transplant.

Methods: This was a retrospective cohort study of 121 pediatric renal transplant recipients transplanted between July 31, 2008 and December 31, 2014. Patients were divided into two groups based on duration of TMP-SMX prophylaxis, defined as subjects who received TMP-SMX prophylaxis for ≤ 3 months (Short) or those who received TMP-SMX between 3-12 months post-transplant (Long). The primary outcome was a culture-confirmed diagnosis of UTI during the first year post-transplant. Secondary outcomes include acute kidney injury, hospitalization for UTI, and TMP-SMX-resistant UTI. Due to the increased risk for UTIs, we examined congenital anomalies of the kidneys and urinary tract (CAKUT) as a secondary exposure, defined as CAKUT or non-CAKUT causes of end-stage renal disease (ESRD).

Results: TMP-SMX was used for PJP and/or UTI prophylaxis in 113 of the 121 patients (93%), with an alternative agent being used in the remainder of subjects. Of those receiving TMP-SMX, 96% received once daily dosing and 57% were in the Short prophylaxis group. CAKUT was the cause of ESRD in 43/121 (36%) of subjects. In the first year post-transplant, UTIs were diagnosed in 23/121 (19%) of subjects. Of those, 11/23 (48%) had a TMP-SMX-resistant UTI.

There was no difference in the incidence of UTI in the Short versus Long prophylaxis groups (15% versus 25%, P=0.15) or by cause of ESRD (26% CAKUT versus 15% Non-CAKUT, P=0.17). Acute kidney injury occurred in 9/23 (39%) of subjects with UTI, with no differences in the Short versus Long prophylaxis groups. Overall, 18/121 (15%) were hospitalized for management of UTI, with no differences by duration of TMP-SMX prophylaxis or cause of ESRD.

Conclusion: In this large retrospective cohort of pediatric kidney recipients, a longer duration of TMP-SMX prophylaxis did not reduce the incidence of UTI in the first post-transplant year. Only half of UTIs were resistant to TMP-SMX. Despite the perception that CAKUT increases the risk for post-transplant UTI in children, we found no difference in the incidence of UTIs in CAKUT versus non-CAKUT subjects. These data suggest that the desired length of PJP prophylaxis should drive the duration of TMP-SMX prophylaxis in the early post-transplant period, not the cause of ESRD or an effort to prevent early UTIs.

Submission Category: Small and Rural Pharmacy Practice

Submission Type: Evaluative Study

Session-Board Number: 5b-092

Poster Title: Analysis of the prevalence of screening mammographies in Mississippi Fee-for-Service and Managed Medicaid plans and identification of predictors of screening mammographies

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Purpose: The American Cancer Society estimates approximately 1 in 8 (~12%) of American women will develop an invasive type of breast cancer during their lifetime. When detected early, breast cancer is considered to be one of the most treatable cancers. The aim of this study was to evaluate sociodemographic and clinical characteristics that influence the likelihood of obtaining breast cancer screening mammographies in a Medicaid population.

Methods: A retrospective cohort study was used to determine the influence of geographic location, family history, and age on the prevalence of screening mammographies among women enrolled in Mississippi Medicaid. Prevalence of screening mammographies was compared between Mississippi Medicaid Fee-For-Service (FFS) and Managed Medicaid plans. Females aged 40 years and older, continuously enrolled for 3 years, and no long-term coverage were identified. Individuals with Medicare/Medicaid dual eligibility, previous breast cancer diagnosis, diagnostic mammography screening, and previous mastectomy were excluded. County codes from the data were used to classify the enrollee's residential location in a federally classified county of need or other Mississippi area. PROC GEOCODE in SAS 9.3 was used to calculate distance to the closest FDA certified screening mammography center. A logistic regression model was estimated to determine the influence of the aforementioned variables on the likelihood of receiving a screening mammography.

Results: After accounting for demographic and clinical variables in the logistic regression model, individuals with a family history of breast cancer were 6.1 times more likely to undergo mammography screenings. No statistically significant difference was found between the Mississippi Delta residents compared to other Mississippi county residents in obtaining a screening mammography (OR=0.9, 95% CI [0.8-1.0]). The likelihood to obtain a screening mammography (OR=1.2, 95% CI [1.2-1.3]) was higher among women of 55 to 64 years as compared to younger women. Caucasian women had lower odds of obtaining a screening mammography (OR=0.77, 95% CI [0.7-0.8]). Among women enrolled in FFS, obtaining a screening mammography (OR=0.3, 95% CI [0.30-0.38]) was lower than women enrolled in the Medicaid Managed Care plan. Overall, in Mississippi Managed Medicaid, the period prevalence of screening mammographies was 24.82% (3927 out of 15,823 individuals) compared to Mississippi Fee-for-Service Medicaid, where the period prevalence of screening mammographies was 10.37% (327 out of 3154 individuals).

Conclusion: Few studies have assessed access and risk factors associated with obtaining a screening mammography in a state Medicaid program. This study provides insight regarding influencing factors of obtaining screening mammographies in the Mississippi Medicaid population. Interventions and/or development of screening programs should be implemented to target women who were found to be less likely to obtain a screening mammography: 40-55 years, Caucasian race, lack of family history of breast cancer, and enrollment in a Fee-for-Service plan. Pharmacists can play an active role in encouraging women, especially those found to be less likely, to obtain a breast cancer screening mammography.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 5b-093

Poster Title: Evaluation of renal risk index and acute kidney injury in liver transplant patients

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Purpose: Acute kidney injury (AKI) is a common complication after liver transplantation (LT) that can lead to the development of end-stage renal disease (ESRD) and increase mortality. In order to improve outcomes, patients at high risk for AKI should be identified, and appropriate interventions should be implemented in a timely manner. Renal Risk Index (RRI) is a validated scoring tool that can predict post-LT ESRD and mortality. However, RRI has not been evaluated for predicting post-LT AKI. Therefore, this study sought to evaluate the prognostic ability of the RRI to predict post-LT AKI risk.

Methods: A retrospective chart review was conducted at the University of Michigan Health System (UMHS) for LT patients between January 1, 2010 and September 30, 2015. Patients were included if they were older than 18 years of age and underwent a first-time deceased-donor LT while receiving tacrolimus-based immunosuppressive regimen with or without basiliximab according to UMHS protocol. Patients were excluded if they had a history of ESRD prior to LT, defined as requiring renal replacement therapy (RRT) for at least three months, previous kidney transplant, simultaneous liver and kidney transplant, or other multi-organ transplant. RRI was calculated by an online calculator (https://rri.med.umich.edu) using 13 pre-transplant patient characteristics, and levels of AKI within 7 days post-LT were classified according to the Kidney Disease Improving Global Outcomes (KDIGO) criteria of no AKI (stage 0), stage 1, stage 2, and stage 3, based on serum creatinine (SCr) and urine output data. Kruskal-Wallis test was used to assess overall differences in RRI scores among the four AKI stages. Mann-Whitney test was used to determine specific differences between the AKI stages 0-2 and the AKI stage 3. Renal function at 1 year post-LT was assessed based on the KDIGO

chronic kidney disease (CKD) criteria. A predictive model of RRI for AKI stage 3 was examined using a receiver operating characteristic curve. A p-value less than 0.05 was considered statistically significant.

Results: Of 297 adult LT patients included in this study, 269 patients (90.6 percent) developed AKI stages 1-3 and 42 patients (14.1 percent) required RRT within 7 days post-LT. Baseline characteristics among the four AKI groups were similar in age, SCr, glomerular filtration rate (GFR), hepatocellular carcinoma, gender, and race, with a non-significantly higher proportion of men and African American patients presenting with stage 3 AKI. Mean RRI scores differed among the four AKI groups (p equals 0.005). The mean RRI score for the AKI stage 3 group was significantly higher than the AKI stages 0-2 group (3.30 plus or minus 4.14 vs. 1.78 plus or minus 1.63, p less than 0.0001). The majority of patients recovered from AKI. Although GFRs were not significantly different between the two groups (63.1 plus or minus 30.1 vs. 66.1 plus or minus 24.6 ml/min/1.73 m2, p equals 0.181), more patients in the AKI stage 3 group progressed to the stage 4 or higher CKD at 1 year post-LT (16.7 percent vs. 3.8 percent, p equals 0.001). The RRI score was modestly predictive for development of AKI stage 3 within 7 days post-LT (AUC 0.602, 95 percent confidence interval 0.534-0.670).

Conclusion: Early post-LT AKI was common and was associated with progression to severe CKD at 1 year post-LT. A higher RRI score at time of LT was associated with development of severe AKI in the early post-LT period. Predictive efficacy of RRI score for early post-LT AKI was only modest. Strategies for renal protection targeting high RRI patients should be tested to decrease the incidence of post-LT AKI and progression to CKD.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 5b-094

Poster Title: Guideline-directed antiplatelet therapy for patients with coronary artery disease (CAD): A chart review

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Purpose: Approximately 1 in 4 deaths in the United States is caused by heart disease. Performance measures ensure that patients with heart disease are being treated appropriately. This project is designed to analyze the percentage of patients with coronary artery disease (CAD) who were appropriately prescribed an antiplatelet medication at a large internal medicine clinic. This information will be used to help the physicians of this practice improve the quality of care that they are providing to their patients and to meet performance standards adopted by insurance providers.

Methods: Permission for this retrospective chart review was granted by both the president and administrator of Internal Medicine Associates of Opelika, Alabama as well as the institutional review board of Samford University. Patients with a diagnosis of coronary heart disease who had a recorded office visit between January 1 and December 31, 2015 and who were at least 18 years old were selected for inclusion. Coronary artery disease was defined as a diagnosis of a myocardial infarction, angina, atherosclerosis of a coronary artery, chronic total occlusion of a coronary artery, other chronic ischemic heart disease, or unspecified ischemic heart disease, according to International Classification of Diseases 9 or 10 codes. To be included, each patient must have had at least 2 face-to-face visits with the physician within the above time-frame. The primary endpoint is the percentage of patients with documented use of an antiplatelet agent at any time during 2015. Secondary endpoints include the percentage of patients who were prescribed aspirin and the percentage of patients who were prescribed clopidogrel.

Results: Initially 102 patients were located for possible inclusion in the study. Of these patients, sixteen had only one visit with a physician during 2015 and were therefore excluded. The remaining patients (n equals 86) were used for data analysis. The mean patient age was 75.5

years (plus or minus 10.8 years standard deviation), with a range of 54 to 98 years of age. Sixty patients were male (69.8 percent) and 26 were female (30.2 percent). When calculating the primary endpoint, it was found that 82.6 percent (n equals 71) patients had at least one antiplatelet medication listed in their medical record profile during 2015, while 17.4 percent (n equals 15) had no recorded antiplatelet use during that time. Of the antiplatelet agents, aspirin alone was the most common (n equals 43), followed by a combination of aspirin plus clopidogrel (n equals 12) and clopidogrel alone (n equals 11). Aspirin plus dipyridamole, ticagrelor, and cilostazol use were also rarely observed.

Conclusion: The heavy majority of patients diagnosed with coronary artery disease did have documented use of an antiplatelet agent, which is recommended by treatment guidelines. However, it is important to note that aspirin, the most commonly used agent, is typically purchased over the counter and most patients do not receive or fill a prescription for it. Even if aspirin use is documented within the patient chart, insurance providers may not have an accurate way of accessing this information and may mistakenly conclude that patients are lacking appropriate antiplatelet therapy.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 5b-095

Poster Title: Reduction in Readmission Rates by Inclusion of Clinical Pharmacist across Smartphone Application.

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Purpose: The economic burden of hospital readmissions has a tremendous impact on the healthcare system. In an effort to manage this burden, transitional care has emerged as a practical strategy to strive for improvements in patient outcomes while reducing healthcare costs. Findings from evidence-based literature suggests that pharmacists involved in transitional care have a positive impact through medication reconciliation, patient education, and post discharge follow-ups. The purpose of our project was to design an electronic tool to assist in the provision of transitional care services, which can be linked to the hospital's system allowing continuous interaction between pharmacists and discharged patients.

Methods: An evidence-based literature review was conducted among secondary databases to evaluate published literature about the pharmacist role in transitional care as well as the existence of electronic tools targeted to assist pharmacists in the provision of this service. Literature search was limited to articles published in English or Spanish between the years of 2010 to 2016. In addition, we conducted oral interviews to a group of five pharmacists and stakeholders in order to assess their perceived need for pharmacists who embrace the provision of transitional care services in Puerto Rico. Furthermore, we also screened their willingness and receptiveness to adopt innovative technology as part of the tools targeted to provide transitional care services by pharmacists and how they think this technology could impact the patient's health and the finances of the healthcare institution.

Results: Findings from our literature search and interviews performed to participants suggest a tremendous need for increasing the number of pharmacists involved in transitional care services. We also observed a lack of interactive technology tools available to assist pharmacists and other healthcare providers in the provision of transitional care activities, which opened an opportunity for us to present our innovative technology device as a tool to introduce and assist pharmacists who would like to become transitional care providers. According to participants, the role of the pharmacist in transitional care is very limited or almost non-existent, although highly needed. The group agreed that a technological device would be a great tool to facilitate the participation of pharmacists in transitional care services as well as to increase the access of patients to this healthcare professional. Participants recognized that direct pharmacist interaction with patients through medication reconciliation, discharge counseling, and post-discharge follow-up would decrease the number of adverse drug events, decrease readmission and plays an overall positive role in transitional care.

Conclusion: There is a need of pharmacists embracing transitional care in Puerto Rico, and also a need for technology tools available to ease the participation of these professionals in endeavor. Our pharmacists driven mobile application has been designed as a tool to assist pharmacists in providing innovative transitional care services to patients in a fashionable and easy to use application by making the pharmacist available to patients at all times. The implementation of this application is expected to contribute to decrease patient readmissions based on the accessibility and continuity of pharmaceutical care to discharged patients.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 5b-096

Poster Title: Self-monitored blood glucose patterns among patients with diabetes: are they doing it right?

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Purpose: There are over twenty-nine million Americans that are affected by diabetes mellitus, a complicated chronic disease that can be difficult to manage. However, self-monitored blood glucose results prove to be beneficial in helping both clinicians and patients control diabetes. Each year the American Diabetes Association publishes recommendations for self-monitored blood glucose to guide practitioners and patients in diabetes management. This study looked to characterize the general diabetic population's knowledge of self-monitored blood glucose and investigate current self-monitored blood glucose patterns.

Methods: Participants took a 15 question survey that was uploaded to Facebook on October 1, 2015 and remained open until January 1, 2016. Patients who were 18 years of age and older who had either type 1 or type 2 diabetes were included in the study. Demographic data was collected from patients in addition to information about the participants' self-monitored blood glucose knowledge and monitoring patterns among participants. This study used descriptive statistics to determine the amount of patients who were monitoring their blood glucose levels according to the American Diabetes Association Standards of Medical Care in Diabetes, 2015 Guidelines.

Results: There were a total of 56 responses to this survey. Two participants were excluded due to age, and 22 responders did not have diabetes and, therefore, were excluded. A total of 32 surveys were included in the final analysis. Twenty seven participants (84%) had type 2 diabetes and 53% were diagnosed greater than 5 years ago. Of the 32 participants included, 29 monitored their blood glucose levels daily at home, with most measuring levels one to two times a day (31% and 38%). 79% of individuals knew their preprandial blood glucose goal while only 69% knew their postprandial goal. The most commonly reported self-monitored blood glucose patterns among participants included: monitoring when waking up in the morning (76%), monitoring before going to bed (55%), monitoring before meals (45%), and monitoring

whenever the participant suspected hypoglycemia (45%). Commonly reported barriers to self-monitored blood glucose included: lack of time and/or business, forgetfulness, and cost of measuring at home.

Conclusion: Many patients with diabetes monitor their blood glucose levels at home on a daily basis. Additionally, some aspects of the sample population's self-monitored blood glucose patterns align with the American Diabetes Association guidelines. However, these results also indicate there is much room for improvement in self-monitored blood glucose patterns to help manage diabetes.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-097

Poster Title: Determinants of Success Associated with APPE Performance in a Pharmacy Program

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Purpose: The term success is vague and has multiple meanings. Yet pharmacy school admissions officers, curriculum committees and students often make difficult decisions based on the premise of predicting who will be successful. Studies have investigated success in pharmacy using grade point averages or standardized test scores. However, they may not be accurately measuring those skills that make students successful pharmacists. This study investigated both preadmission variables and pharmacy coursework grades against a chosen endpoint of success, fourth year direct-care Advanced Pharmacy Practice Experience (APPE) scores to determine which variables contributed the most to student performance in the APPE clinical setting.

Methods: This study was a retrospective cohort study conducted at the University of Michigan (UM) College of Pharmacy for the classes of 2014-2016. This study was considered exempt by the UM Institutional Review Board. Data were collected and de-identified for a total of 250 students, which included the pre-pharmacy variables (undergraduate grade point average [UGPA]), science-GPA, math-GPA, composite PCAT [Pharmacy College Admission Test] score, and PCAT chemistry sub-score). Pharmacy program variables included the average GPA of selected pharmacy school course sequences (therapeutics (5 courses), pharmaceutical sciences (4 courses), medicinal chemistry (3 courses) and a combination of direct care and disease management clinical skills courses (DC/DM). The outcome variable of average direct care APPE score was calculated by averaging the score/100 points assigned to all inpatient and ambulatory care APPE's. Statistical analyses were performed using IBM SPSS statistics suite 20.0. Characteristics were summarized by means and standard deviations for continuous variables. Pearson's r correlation was used to measure the strength of correlations between APPE

performance and both pre- and current pharmacy variables. Stepwise linear regression was performed to determine the significance of the variables. The priori of significance level was 0.5. A further analysis utilizing binary logistic regression was conducted. APPE scores were sorted into two categorical variables using the median APPE score of 82 to classify APPE performance as successful or non-successful.

Results: Of the 285 students, 283 were included in the final analysis. Select means and standard deviations include: PCAT composite 80.7 ± 14.1, undergraduate GPA 3.42 ± 0.30. Therapeutics course sequence 3.23± 0.26 and DC/DM course was 3.81 ± 0.22. The mean APPE score was 80.4 ± (6.68). Multivariate stepwise regression produced two significant models. DC/DM correlated significantly with APPE scores ($r=0.368$, $p < 0.001$). When both DC/DM and Therapeutics were combined, the correlation increased to $r=0.434$, $p < 0.001$. None of the pre-pharmacy variables or the medicinal chemistry or pharmaceutical sciences course series' were found to be significantly correlated with APPE scores in the multivariate stepwise regression. Using binary logistic regression, it was found that Therapeutics (OR=6.65, $p < 0.021$) and DM/DC (OR=14.36, $p < 0.001$) were predictive of success in APPE performance. Additionally, the inclusion of the two variables listed increased the predictive power from the 50% null model to approximately 70%. Comparing pre-pharmacy variables against the two predictive pharmacy variables, DC/DM and Therapeutics, via stepwise regression analysis, it was found that both UGPA ($r=0.364$, $p < 0.001$) and the combination of UGPA with PCAT composite score ($r=-0.410$, $p < 0.001$) were significantly correlated with therapeutics. Additionally UGPA ($r=0.244$, $p < 0.001$) and UPGA and PCAT composite ($r=0.283$,$p < 0.001$) were significantly correlated with DM/DC.

Conclusion: The results of our study show that pharmacy school variables were the most predictive of student success on direct-care APPEs. Once a student entered the pharmacy program, it was their performance and knowledge in pharmacy school that mattered as students began their advanced practice experience. Courses that focused on therapeutic knowledge and patient care skills were most highly associated with success in APPE's. This study may raise the awareness of the importance of incorporating more clinical courses and patient-related experiences within the pharmacy curriculum.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5b-098

Poster Title: Review of antibiotic use in patients with reported beta-lactam allergies at Johns Hopkins Bayview Medical Center

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Purpose: Reported beta-lactam allergies leads to deviations from the standard of care antibiotic therapies. The majority of self-reported beta-lactam allergies are found to be false positive. The deviations from standard of care antibiotic regimens due to beta-lactam allergy reporting have been associated with antimicrobial resistance and changes in the overall cost of treatment. The purpose of this study was to determine if the use of alternative antibiotics at Bayview Medical Center due to reported beta-lactam allergies are resulting in deviations from preferred antibiotic regimens and higher medication costs when compared to the recommended standard of care antibiotic regimens.

Methods: The institutional review board approved this retrospective study. Patients aged 18 years and older who were admitted to Johns Hopkins Bayview Medical Center between August 1, 2015 and August 31, 2015 and received antibiotics during their inpatient stay with a reported beta-lactam allergy including penicillins, cephalosporins, carbapenems, and monobactams were included in this study. Patients were identified using the electronic medical record system. The cost of the antibiotics used for each patient was calculated using average wholesale prices available through the facility's medication ordering database. In order to assess if there was any deviation from standard of care therapy, the 2016-2017 John Hopkins Medicine Antibiotic Guide was referenced. All antibiotic deviations were noted and the hypothetical costs of the preferred antibiotic regimens were calculated again referencing the facility's medication ordering database. The primary outcome was the number of patients who were treated with an alternative antibiotic due to a documented beta-lactam allergy. The secondary outcome was cost difference between the alternative antibiotic regimen that was used and the recommended first line antibiotic regimen. Data was collected into a spreadsheet and analyzed using the Mann-Whitney U. Statistical significance was defined as p value of less than 0.05.

Results: Out of the 128 patients who fit the inclusion criteria for this study, 74 deviations from standard of care antibiotics due to the reported beta-lactam allergies were revealed. These numbers indicate that in the population studied at John Hopkins Bayview Medical Center, 57.8 percent of patients with beta-lactam allergies received an antibiotic that strayed from first line standard of care therapy. The mean cost difference per course of therapy was found to be 23.34 dollars and the median cost difference per course of therapy 10.34 dollars. Through the use of Mann-Whitney U test, the cost difference between antibiotics used due to reported beta-lactam allergies and the hypothetical cost of standard of care was calculated to be statistically significant. (Mann-Whitney U equals 6877, n1 equals n2 equals 128, p less than 0.05, two-tailed). The Mann-Whitney U test was used because data was not normally distributed.

Conclusion: This study supports that patients with reported beta-lactam allergies at John Hopkins Bayview Medical Center are receiving antibiotics that diverge from recommended therapy. The cost difference between the antibiotics prescribed due to reported allergies and the standard of care regimen if no allergy existed was statistically significant. The clinical and economic significance of these antibiotic substitutions should be made in larger and more long-term studies. When the economic significance of using a non-preferred agent is being evaluated, the cost difference due to length of stay and antibiotic monitoring in addition to the cost of medication should be considered.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 5b-099

Poster Title: Comparison of warfarin dosing strategies after management of patients admitted with bleeds

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Purpose: The National Action Plan for Adverse Drug Reaction estimates that bleeding occurs in 15 to 20 percent of patients on warfarin and of that, 1 to 3 percent of those events are life-threatening or fatal. Practitioners are often faced with a dilemma when resuming warfarin therapy due to the risks of thrombosis if therapy is held or recurrence of bleed if anticoagulation is resumed. Because of these concerns, there are often two approaches that practitioners use when resuming warfarin therapy: resuming a patient's previous home dose or giving a bolus dose prior to resuming the home dose.

Methods: Adult patients who were on warfarin therapy prior to admission to the University of Michigan Health System (UMHS) and followed by the UMHS outpatient anticoagulation clinic admitted for either a major or minor bleed between January 2014 and December 2015 were included in this study. A major bleed was defined as a drop in hemoglobin greater than or equal to 2g/dL or 2 units packed red blood cells or bleeding at a critical site (intracranial, intraocular, intra spinal, intra articular, intramuscular, pericardial, or retroperitoneal) requiring medical or surgical intervention and a minor bleed was defined as any other bleed. A retrospective chart review of these patients was conducted using a computerized prescriber order entry database (CPOE) and data collected was analyzed between the two dosing approaches: resuming a patient's previous home dose (non-bolus group) or giving a bolus dose (bolus group). The first aim of this study was to compare the length of stay, time to therapeutic international normalized ratio (INR), readmission rate, and number of adverse events between the two approaches. The second aim was to establish guidelines that would provide practitioners recommendations on warfarin dosing when resuming therapy in patients admitted for bleed(s).

Results: A total of twenty-one patients were enrolled in the study and further divided into two groups based on dosing approach: eight patients in the bolus group and thirteen patients in the non-bolus group. The baseline characteristics of these two groups were similar. The average length of stay for the bolus group was 8.63 plus or minus 3.5 days compared to 7.46 plus or minus 4.5 days for the non-bolus group (p=0.5400). The time to reach therapeutic INR between the two groups was also not statistically significant (p= 0.2204) with the bolus group reaching therapeutic INR after an average of 5.13 plus or minus 4.29 days and the non-bolus group reaching therapeutic INR after an average of 14.0 plus or minus 19.33 days. Statistical analyses on thirty-day readmission rates and adverse event rates were unable to be conducted due to insufficient data. Lastly, dosing guidelines were unable to be established due to small sample size.

Conclusion: There does not appear to be any difference in effectiveness or safety of the outcomes studied in either dosing approach in our study. Further evaluation should be done to determine a benefit of either dosing strategy in order to develop guidelines for practitioners.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 5b-100

Poster Title: Management of hyperglycemia in patients with an acute exacerbation of chronic obstructive pulmonary disease

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Purpose: Acute exacerbations of chronic obstructive pulmonary disease are characterized by a worsening of symptoms leading to increased rescue inhaler use, and frequently, hospital admission. Acute exacerbations of chronic obstructive pulmonary disease are traditionally treated with high doses of systemic corticosteroids, despite consensus guidelines recommending low-dose corticosteroids. This can become a problem in patients with concomitant diabetes mellitus due to elevations in blood glucose associated with corticosteroid use. The purpose of this study was to evaluate the management of hyperglycemia in patients admitted to the hospital for an acute exacerbations of chronic obstructive pulmonary disease with concomitant diabetes mellitus.

Methods: This retrospective study included men and women of all ages who were admitted to Princeton Baptist Medical Center for an acute exacerbations of chronic obstructive pulmonary disease who also had concomitant diabetes mellitus. Demographic and clinical data was collected using electronic health records. Only unique patients were included and the most recent hospitalization was used for patients admitted with multiple exacerbations over the past 3 years. Patients admitted due to associated pneumonia were excluded. Data collected included the initial dose of intravenous corticosteroid, number of hospital days until taper to oral corticosteroid, and blood glucose control with basal insulin. Fasting blood glucose levels, most recent HbA1c, and other patient comorbidities were also collected. The primary outcome was the impact of uncontrolled fasting blood glucose (defined as a mean fasting blood glucose greater than or equal to 180 mg/dl) on the length of hospital stay. Secondary outcomes included the proportion of patients initiated on basal insulin who were not on insulin prior to

hospitalization, mean initial dose of corticosteroids, and mean time spent before dose reduction of corticosteroids occurred.

Results: There was a total of 100 patients evaluated for this study. The patient population had a mean HbA1c level of 7.4 plus or minus 1.7 and a mean body mass index of 32.2 plus or minus 9.3. Fifty-five (55 percent) patients were found to have an uncontrolled mean fasting blood glucose with a corresponding length of stay of 6.22 plus or minus 4.4 days, whereas 45 (45 percent) patients had a controlled mean fasting blood glucose with a length of stay of 5.69 plus or minus 4.8 days [95 percent CI, -1.3 percent to 2.4 percent, P value equals 0.57]. There were 71 patients that received basal insulin in the hospital and 21 (29.6 percent) of those were not on a basal insulin regimen prior to hospitalization. The majority of patients (93 percent) received initial intravenous corticosteroids, with 87 percent receiving methylprednisolone. The mean initial dose of methylprednisolone was 112 mg. Only 7 patients received initial oral corticosteroids with a mean dose of 38 mg. The mean time until corticosteroid taper was 4.6 plus or minus 3.6 days.

Conclusion: Patients with an uncontrolled fasting blood glucose had a slightly longer hospital length of stay compared to those with a controlled fasting blood glucose; however, this difference was not statistically significant. Initial corticosteroid doses are still mostly high-dose intravenous steroids, and this is continued beyond the emergency department. Increased education is still needed to reduce the routine use of high-dose corticosteroids.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 5b-101

Poster Title: Effectiveness of a multidisciplinary endocrine clinic for management of diabetes mellitus in adult kidney transplant patients

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Purpose: Kidney transplant patients may receive suboptimal management of chronic diseases following transplantation due to a gap in the transition of care to a primary care provider (PCP). On September 23, 2014, a multidisciplinary clinic, consisting of an endocrinologist, a clinical pharmacist, and a dietitian, was established within a University-affiliated transplant center to improve continuity of care for diabetes mellitus (DM). The purpose of this study was to assess the effectiveness of a collaborative endocrine clinic in improving management of DM for kidney transplant patients during the early post-transplant period.

Methods: This was an institutional review board approved, retrospective, single-center, cohort study of adult kidney transplant patients with Type 2 DM or post-transplant DM. The intervention group included patients who were referred to the transplant endocrine clinic within 180 days post-transplant and received DM care for at least 90 days between September 23, 2014 and December 31, 2015. Patients with Type 1 DM, multi-organ transplants, or missing HgbA1c were excluded. The control group included patients whose DM was managed through usual care by transplant nephrologists or PCP between January 1, 2014 to December 31, 2015. Each case was matched to a control for age and time from transplant. Changes in HgbA1c from the initial visit to the 3-month follow-up visit were compared between the intervention and control groups by a Student t-test. In the intervention group, the management of hypertension and hyperlipidemia and the assessment of microvascular complications were evaluated against recommendations by the American Diabetes Association (ADA) Standards of Medical Care in Diabetes 2015.

Results: Patients in the intervention and control groups (n equals 32 in each group) were well matched for baseline characteristics, including HgbA1c (7.0 plus or minus 1.25 percent versus 6.7 plus or minus 0.99 percent, respectively; p equals 0.254). The changes in HgbA1c over 3 months were not statistically different between the intervention and control groups (0.21 plus or minus 1.48 percent versus 0.68 plus or minus 1.20 percent, respectively; p equals 0.17). In a subset of patients with baseline HgbA1c greater than or equal to 7 percent, there was a decreasing trend in HgbA1c (minus 0.62 plus or minus 1.37 percent) in the intervention group; however, it did not reach a statistical significance compared to the control group (0.06 plus or minus 1.13 percent; p equals 0.19). At the 3 month follow-up visit, 80% percent of the intervention group patients with hypertension were started on an angiotensin-converting-enzyme inhibitor or angiotensin receptor blocker as clinically indicated, 78.1 percent were on appropriate statin therapy, and 78.1 percent and 87.5 percent were up to date on their eye and foot examinations, respectively.

Conclusion: The patients enrolled in the transplant endocrine clinic did not have statistically significant improvements in glycemic control compared to standard of care. However, this study was likely under powered with a short-term follow-up. The multidisciplinary clinic model demonstrated the potential for improved glycemic control for patients with uncontrolled DM and high adherence rates to the ADA recommendations in the management of comorbidities and complications. Additional larger, long-term studies may determine the true impact of the multidisciplinary endocrine clinic in management of DM for the kidney transplant patient population.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 5b-102

Poster Title: Frequency and management of secondary bacterial infection in pediatric patients with respiratory syncytial virus (RSV)

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Purpose: Respiratory syncytial virus (RSV) infection results in upper and lower respiratory tract illness in the pediatric population and is a common cause of hospitalization during the winter months. Studies suggest the increased intensity of symptoms seen in some children with RSV lung disease is caused by secondary bacterial infections as opposed to RSV alone. Understanding the relationship between co-infection with RSV and bacteria can help guide therapy decisions. The purpose of this study was to determine the incidence of secondary bacterial infections in patients with RSV as well as common pathogens and antibiotics use to treat the bacterial infection.

Methods: The institutional review board approved this retrospective chart review. All patients admitted to the Pediatric Intensive Care Unit (PICU) of Children's of Alabama with confirmed RSV infection from 2012-2016 were enrolled. Data collected included patient demographics such as age, gender, race, and weight. Patients' lengths of hospital stay and treatment measures (including type and duration of antibiotics, need for mechanical ventilation, length of supplemental oxygen support) were also collected. When applicable, additional patient culture data was gathered. Data collected was used to determine incidence of secondary bacterial infection in patients with RSV. Results were analyzed using descriptive statistics in order to determine incidence of bacterial co-infection, common antibiotics used, and durations of antibiotics.

Results: A total of 130 patients were included in the study. Sixty-two patients (47.7%) were found to have a secondary bacterial infection. The most common sites of infection were the lungs, urine, and blood representing 26.3%, 24.6%, and 19.3% of infections respectively. Haemophilus species (except H. flu) and MRSA infection occurred with the same frequency and represent the most common bacterial pathogens. The next most common pathogens were Pseudomonas aeruginosa and MSSA. Of the 107 patients who received antibiotics, the antibiotic regimen included vancomycin for 84 patients (78.5%), ceftriaxone for 48 patients (44.9%), and cefotaxime for 40 patients (37.4%). Cefepime, clindamycin, and ampicillin were each used in approximately 19% of patients. The average treatment duration for all antibiotics was 7.3 days. The longest treatment duration was 29 days (for a patient on vancomycin).

Conclusion: Pediatric patients with RSV infection who are admitted to the PICU are at increased risk for having a secondary bacterial infection. Further prospective studies are necessary to determine the true incidence and disease burden of bacterial co-infection in the setting of severe RSV infection.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Descriptive Report

Session-Board Number: 5b-103

Poster Title: Assessment of the Provision of Professional Liability Insurance for Students

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Purpose: Student pharmacists engage in patient care services through volunteerism, experiential education, and employment. All of these situations pose malpractice risk, and unlike any other health care professions, student pharmacists are licensed with state boards. Students may obtain professional liability insurance (PLI) in a variety of ways, individually or in conjunction with the school. This project was designed as a needs assessment to determine if there is a standard for pharmacy programs delivering education about PLI, requiring PLI, and/or providing PLI to student pharmacists.

Methods: This project is a needs assessment regarding the provision of PLI for students and consisted of an IRB-approved survey administered through Qualtrics online survey software. Participants identified were pharmacy programs' dean or administrator involved with student affairs. Participants were invited to take part in this study via email.
The email contained a hyperlink of the survey and an introduction to the study. Informed consent was obtained electronically on the first page of the survey by providing participants with an informational letter. The informational letter explained participation in the study, and that identifying information would not be collected. Participants took the survey requiring a maximum of 10-15 minutes giving information regarding their program's involvement with PLI for students. Survey questions included collecting basic demographics about the program, information regarding the schools policy on PLI, how students obtain PLI, what activities students participate in, and faculty/preceptor PLI status.
Data was collected over a three-week period through Qualtrics, and was accessible only through a secure user account available to the researchers. Data was analyzed using descriptive

statistics and Kruskal-Wallis ANOVA to examine variance within the independent ordinal data. No follow up was required for this study.

Results: Twenty-three percent of pharmacy programs completed the survey, with fairly even representation of public and private institutions. The majorities of programs were 2+4 programs (48.48%), offer dual degree programs (66.67%), and do not have satellite campuses (75.76%). The mode response for a program's average annual tuition was $30,001-$40,000 (36.67%), annual student fees (excluding book costs) being >$700 (33.33%), and an average number of 76-100 graduates per year (34.38%).
Fifty-six percent of pharmacy programs reported having a university level policy only. Programs primarily educate students about PLI by integrating into course content (43.48%) or encouraging it at an event (39.13%). A majority of programs require students to have PLI (56.52%) or encourage students to have PLI (30.43%). Students purchase PLI independently (43.48%), purchase PLI through a program-facilitated transaction (26.09%), or have PLI purchased for them by the program (30.43%). If the program provides PLI, majorities do not add additional costs to students (65.22%). A majority of programs do not require either their preceptors (54.55%) or full-faculty with active licenses (50%) to have PLI.

Conclusion: The results of this project indicate that student pharmacists may not have adequate liability coverage. The majority of the pharmacy schools who responded only maintain a policy for school related functions, and therefore students are unprotected during work and extracurricular volunteerism. This project has helped bring attention the potential risk to student pharmacists. Schools of pharmacy should reevaluate policies and procedures to ensure optimal coverage of malpractice insurance.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 5b-104

Poster Title: Use of a pharmacy patient medication assistance program in the prescribing of direct oral anticoagulants to improve transitions of care

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Purpose: Direct oral anticoagulants (DOACs) are high-risk medications that have the potential to cause serious adverse effects. These medications are costly; therefore, patients are frequently discharged with a free coupon card. However, this only provides a one-month supply of medication. The Pharmacy Patient Medication Assistance Program (PPMAP) assists patients who require medications but have inadequate financial resources. PPMAP is made possible through manufacturer assistance programs to provide free prescription drugs to qualifying individuals. The objective was to review prescriptions processed through PPMAP and the associated documentation in MedData to determine any lapse in therapy or delays in receiving these high-risk medications.

Methods: This was a retrospective descriptive study analyzing data from the outpatient pharmacy at the University of Virginia Health System (UVA) between January 1, 2016 and September 22, 2016. The data collected included the first-time fill of a DOAC that was billed through PPMAP. We looked at whether the prescription was written for a 30-day supply versus a 90-day supply, coupon usage prior to PPMAP, and the number of prescriptions previously billed through the patient's financial screening. Direct pharmacist involvement in patient-care was also noted. Pharmacist involvement consisted of counseling and communication with PPMAP. Furthermore, MedData, a prescription assistance software system utilized by UVA PPMAP was reviewed. Compliance with documentation by the PPMAP technician was assessed and included the date the application was created, date the patient returned financial screening forms, date the application was sent to the manufacturer, and date the medication was received.

Results: A total of 82 prescriptions for DOACs were billed through PPMAP in the study period with 40 of these being first-time fills. Of these, apixaban was prescribed most often (n=37, 92.5 percent) while edoxaban made up the remainder of DOACs prescribed (n=3, 7.5 percent). Prescriptions were written for a 30-day supply 25 (62.5 percent) times. Prior to billing through PPMAP, coupon cards and financial screening were utilized 18 (45 percent) and 10 (25 percent) instances, respectively. Pharmacists were directly involved in PPMAP application processing a total of 17 (42.5 percent) occurrences. In regards to MedData, complete documentation occurred 7 (17.5 percent) times. The date of application creation was documented a majority of the time (n=36, 90 percent), followed by the date the medication was received (n= 20, 50 percent), date the application was sent to the manufacturer (n=15, 37.5 percent) and finally the date the patient returned financial screening forms (n=8, 20 percent).

Conclusion: PPMAP at UVA provides medications to patients who are unable to afford them; however, there is a lapse in care as the enrollment process is complex and time-consuming. Patients are frequently discharged with a 30-day supply of the medication with aid from a one-time use coupon card and limited financial screening. In addition, there is a lack in utility of the MedData system as documentation is often incomplete and unreliable. As a result, it is difficult to determine the status of an application causing gaps in fills and non-compliance. This can ultimately lead to significant adverse effects and hospital readmissions.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5b-105

Poster Title: Assessment of Total Body Weight versus Adjusted Body Weight Dosing Of Daptomycin in the Obese Population

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Purpose: Research on weight based antibiotic dosing in obese patients is limited. Daptomycin is a potent weight-based antibiotic used for gram positive infections. Total body weight dosing (TBWd) of daptomycin in obese patients may be associated with high drug exposure when compared to lower adjusted body weight dosing (AdjBWd). The relationship between daptomycin dosing and drug related adverse effects are unknown in obese populations. Therefore, this study will explore the clinical efficacy and safety of daptomycin TBWd versus AdjBWd in obese subjects.

Methods: This is a retrospective cohort study at Beaumont Hospitals from 2012 – 2015. Participants with body mass index (BMI) ≥ 35 kg/mm2 and on daptomycin for a minimum of 72 hours were included. Participants were stratified into two groups: TBWd and AdjBWd for daptomycin. Baseline characteristics (i.e. weight, BMI), comorbidities, type of infection and pathogen, and daptomycin dosing regimen were reviewed. The primary endpoint is clinical efficacy and safety. The secondary endpoint assesses the length of stay (LOS), recurrent infections, readmission, and 30 day all-cause mortality. Statistical analyses of primary and secondary endpoints are performed using univariate analysis.

Results: Patients with BMI ≥ 35 kg/mm2 on daptomycin were screened (n = 230). After screening, 19 and 14 participants were included in TBWd and AdjBWd group, respectively. No differences were observed between TBWd and AdjBWd groups for weight (123±35 kg vs 135±29 kg), BMI (44±9 kg/m2 vs 47±7 kg/m2), comorbidities, daptomycin dose (689±249 mg vs 554±103 mg), and daptomycin duration (6.4±3.2 d vs 5.9±3.3 d). Infection types and organisms were diverse, with MRSA bacteremia being the most common in TBWd and demonstrating even

distribution in the AdjBWd group. There is no statistical difference between TBWd and AdjBWd in clinical success (50% vs 50%) and adverse effects, including CPK elevations (11% vs 7%). However, TBWd had statistically more clinical improvements and observed less clinical failures than the AdjBWd group. There is no statistical difference in LOS for TBWd and AdjBWd (14.7±10.6 d vs 12.8±18.9 d), recurrent infection, or all-cause mortality. However, there was a significant statistical difference in readmission rates (33% in TBWd vs 21% in AdjBWd).

Conclusion: Our preliminary data suggests there is no statistical difference in clinical success or adverse effect rates. TBWd showed more favorable clinical improvements with less clinical failures than the AdjBWd group. However, TBWd had significantly more readmission rates than AdjBWd. Therefore, further sampling is warranted to encompass greater power to detect differences between outcome and population variables between both groups.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 5b-106

Poster Title: Incidence and reasons for under-reporting of paclitaxel-induced neuropathy among women with breast cancer: a qualitative study

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Purpose: Although studies have documented discrepancies between the incidence of patient-reported and physician-recorded neuropathy during treatment with chemotherapy, reasons for under-reporting remain unclear. The purpose of this study was to identify whether breast cancer patients treated with paclitaxel purposefully under-reported neuropathy symptoms to their oncologist, and if so, what post-treatment beliefs influenced the decision to under-report. Specifically, beliefs explored pertained to how the patients' oncologist, cancer, and treatment may have contributed to the decision to under-report neuropathy. This decision is important for patient outcomes, as the occurrence of neuropathy may require treatment delay or discontinuation and symptoms can be life-long.

Methods: This was an exploratory qualitative study using semi-structured interviews. Subjects included 24 women with breast cancer who completed adjuvant/neoadjuvant treatment with paclitaxel recruited from the University of Michigan Comprehensive Cancer Center (UMCCC). The study was approved by the University of Michigan IRBMED. Participants were contacted about this study by the principal investigator of a larger study from which participants were recruited. Interviews were conducted in-person or over the telephone by four members of the research team using an interview guide. The interview guide was reviewed by UMCCC Breast Cancer Patient Advocates Advisory Committee and revised after the first two interviews. Information about six primary topics was obtained, including: relationship with the medical oncologist, interaction with other providers during appointments, perception of benefits and risks of paclitaxel therapy, side effects experienced during paclitaxel treatment, risks and benefits of continuing therapy after experiencing neuropathy, and neuropathy symptoms

during and after therapy. Interviews were recorded and transcribed verbatim, and the transcripts were analyzed by two members of the research team using NVivo software and an inductive approach.

Results: Of the 24 patients interviewed, 21 experienced peripheral neuropathy. Four major themes emerged including 1) patient description of neuropathy was multi-faceted, 2) physicians underestimate neuropathy experienced by patients, 3) patients acknowledge circumstances when they would consider under-reporting adverse effects, and 4) patients lack knowledge of the long-term consequences of neuropathy. Physicians tended to underestimate the occurrence of mild neuropathy, yet patients understood a "threshold", although not explicitly defined, at which the level of neuropathy could affect treatment decisions (delay or discontinuation). This perception of threshold may have affected the extent to which neuropathy was reported if patients did not view mild neuropathy as problematic enough. Three patients suggested instances in which they would consider under-reporting adverse effects. These patients were more likely to consider under-reporting when paclitaxel treatment was of high necessity yet they lacked knowledge of the long-term effects of neuropathy; alternatively, a high level of trust in the oncologist was a motivating factor for honest reporting. Finally, patients had an incomplete knowledge of the possible duration and severity of long-term neuropathy. Long duration of symptoms and a significant impact on functionality were critical for discontinuing treatment.

Conclusion: Two specific issues that may impact neuropathy reporting by these participants to their oncologists include the oncologists' "lower" assessment of patients' neuropathy severity and a lack of knowledge about the consequences of neuropathy, particularly with regards to the impact on patients' day-to-day life. A limited number of participants identified circumstances in which they would under-report their neuropathy. Future research should focus on enhancing methods of communication between physicians and patients in an effort to lessen this discrepancy, as well as assessing a more diverse patient population.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 5b-107

Poster Title: The impact of a pharmacist managed smoking cessation program within two university affiliated clinics

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Purpose: One out of every five adult deaths in the United States occurs due to cigarette smoking. According to the CDC, in 2014, nearly 40 million adults smoked cigarettes. Cigarette smoking is the leading cause for preventable disease and death which is why smoking cessation counseling is a key component to a patient's overall health. The purpose of this study is to evaluate the impact of pharmacist provided smoking cessation services in two university-affiliated outpatient clinics.

Methods: This institutional review board approved retrospective cohort study evaluated pharmacist and physician provided smoking cessation services in the University of Alabama Birmingham internal medicine and family medicine clinics. Patient-physician encounters in these clinics are typically 15 to 30 minutes in length, while patient-pharmacist encounters are scheduled in 30 to 60 minute appointments and include extensive behavioral counseling. Patients aged 21-80 years old who received smoking cessation counseling and therapy from pharmacists or physicians and had documentation of smoking status post-counseling documented in the electronic health record were included. Patients within the clinic were identified from the electronic health record based on documentation of prescriptions for smoking cessation therapy, including bupropion, varenicline, or nicotine replacement therapy. Patients were placed into a pharmacist or physician provided counseling group based on the provider who provided counseling at the time therapy was prescribed. The primary outcome measure was documented successful abstinence at a clinic visit after the patient's smoking

cessation counseling visit. Data collection occurred via the electronic health record and included: age, sex, race, success of quit attempt, and smoking cessation therapy prescribed.

Results: Thirty patients were included in the pharmacist group and 60 patients in the physician group for this analysis. The average age of the pharmacist group was 58 years old and 51 years old for the physician group. Therapy initiated between counseling groups followed a trend of more patients receiving nicotine replacement therapy for treatment with 46.7 percent in the pharmacist group and 56.6 percent in the physician group. Bupropion was initiated in 36.7 percent of patients in the pharmacist group and 28.3 percent in the physician group. Varenicline was initiated in 13.3 percent of patients in the pharmacist group and 10 percent in the physician group. Combination therapy was initiated in 3.3 percent of patients in the pharmacist group and 5 percent of patients in the physicians group. Abstinence rate was higher in the patients counseled by pharmacist (40 percent) versus physician's (10 percent). Regarding therapies in patients achieving abstinence, in the pharmacist group 50 percent achieved abstinence using bupropion and 41.3 percent using nicotine replacement therapy. In the physician group, 50 percent achieved abstinence using bupropion and 50 percent achieved using nicotine replacement therapy. No patients achieved abstinence on combination therapy in either group.

Conclusion: Patients receiving smoking cessation counseling from pharmacists resulted in greater rates of abstinence when compared with patients only counseled by physicians in the UAB Family medicine and internal medicine clinics. Limitations of this retrospective study include reliance on documentation by providers of smoking status post smoking cessation counseling in the electronic health record. Future studies are needed to further evaluate the clinical impact of pharmacist provided counseling and follow-up on smoking cessation.

Submission Category: Small and Rural Pharmacy Practice

Submission Type: Evaluative Study

Session-Board Number: 5b-108

Poster Title: Retrospective cohort analysis of electronic flag placement in pre-diabetic patients to increase early diabetes mellitus detection

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Purpose: American Diabetes Association (ADA) guidelines recommend screening patients who are at risk for developing type 2 diabetes every 3 years, but it has been found that rescreening rates are low in patients at high risk. In an Alabama rural family medicine clinic, electronic flags were placed onto patients' profiles who were considered high risk for developing diabetes, to re-signal rescreening at one year. The efficacy of these flags was evaluated as a tool to improve rescreening for early diagnosis of diabetes.

Methods: Retrospective cohort design was used to evaluate the effect of the intervention of flag placement on the rate of rescreening for diabetes one year later, versus a control group with no flag placed followed during the same time period. All patients were at least 45 years of age. Patients were included in the intervention group if the baseline A1c was 5.7-6.4% or 6.5-7%. Patients were excluded if they were on treatment for diabetes or were pregnant. Electronic medical records were assessed to collect patient information and data from baseline (from March 2013 to April 2014) and follow-up clinic visits after one year. Approval from the managing physician of the clinic, as well as from the Auburn University Institutional Review Board, was obtained. Subsequent A1c measurements and blood glucose measurements were collected from point-of-care or basic metabolic panels. Pertinent comorbidities were also recorded, such as hypertension and dyslipidemia. Chi-square test was used to compare A1c rescreening rate after one year between intervention and control groups. Multivariable logistic regression model was used to identify factors associated with rescreening after one year. In

addition, change in diabetic status at one year follow up from baseline diabetic status was also evaluated.

Results: Among patients in the intervention group (n=89), 74 patients were rescreened (83%); 32 of them by A1c (36.0%). Among patients in the control group (n=74), 63 patients were rescreened (85%); 16 of them by A1c (21.6%). Therefore, the intervention group had a higher rescreening rate by A1c than the control group (p=0.0453). Among patients in the intervention group, baseline BMI (p=0.012) and dyslipidemia (P=0.0027) were statistically significant factors associated with diabetic rescreening. Patients who were obese and had dyslipidemia were associated with higher likelihood of returning for rescreening. Additionally, patients in the intervention group had improved diabetic status compared to those in the control group. Specifically, more pre-diabetic patients at baseline were no longer pre-diabetic after one year in the intervention group compared to the control group (43.1% vs. 27.7%), and more diabetic patients at baseline became pre-diabetic or no longer diabetic after one year in the intervention group compared to the control group (88.9% vs. 50.0%).

Conclusion: The A1c rescreening rate was found to be statistically significant in favor for the intervention group, which suggests that electronic flag placement is a potential tool in prompting practitioner's stricter attention of obtaining subsequent A1c readings at follow-up clinic visits. Comorbidities such as dyslipidemia and obesity might help practitioners to identify patients for diabetic rescreening and further target those who might not come back for rescreening. The improved A1c rescreening for early diagnosis of diabetes might promote better control of patient's pre-diabetic and diabetic status and outcomes.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5b-109

Poster Title: Assessment of urinary tract infection treatment in the long-term care facility of a veteran's health system

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Purpose: Urinary Tract Infections (UTIs) are one of the most common reasons for antimicrobial use in long term care facilities (LTCFs). Overuse of antimicrobials can lead to increased antimicrobial resistance and the development of multidrug-resistant organisms. These resistant organisms can result in increased rates of recurrent infections, treatment failure, and overall morbidity. The purpose of this project was to determine the appropriateness of empiric treatment of UTIs in the LTCF of a veteran's health system.

Methods: This quality improvement project was approved by the institutional review board. A student pharmacist conducted a retrospective chart review for all patients residing in the LTCF and diagnosed with a UTI between June 1, 2015 and May 30, 2016. Data collected included the following: gender, ethnicity, age, height, weight, ideal body weight, serum creatinine, temperature, details of symptoms if present, results of urinalysis and urine culture, presence of a Foley or condom catheter, white blood cell count, antimicrobial regimen prescribed, and duration of therapy.

Results: Data was analyzed for a total of 135 individual patient encounters, representing 61 patients. Fifty-eight patients were male (95 percent) and 3 were female (5 percent), with 38 patients being African American (62 percent) and 22 (36 percent) being Caucasian. The mean age was 72.04 years. Thirty-seven patients (60.6 percent) had chronic urinary catheters in place, 30 being indwelling Foley catheters and 7 being condom catheters. Of the 135 individual encounters, urinalyses and urine cultures were performed in 112 (83 percent) and 109 (80.7 percent) encounters, respectively. In most cases, the reasons for obtaining the urinalyses and urine cultures were unclear as UTI signs and symptoms were reported in only 20 (14.8 percent) encounters. Fifty-two cultures grew greater than 100,000 colony forming units of one organism,

41 cultures were inconclusive (indicated as 3 or more bacterial organisms present), and 16 reported no growth. The antibiotics used for empiric treatment included: trimethoprim/sulfamethoxazole (39 encounters), ciprofloxacin (28 encounters), amoxicillin (19 encounters), levofloxacin (18 encounters), cephalexin (13 encounters), ertapenem (10 encounters), cefepime (3 encounters), cefdinir (2 encounters), cefuroxime (2 encounters), and nitrofurantoin (2 encounters). One patient received dual therapy with trimethoprim/sulfamethoxazole and ciprofloxacin. The duration of therapy ranged from 3 to 14 days.

Conclusion: Based on culture data, many patients may not have experienced true UTIs, making the use of antimicrobials questionable. More than half of the patients had chronic urinary catheters in place; the urinalyses of these patients are expected to be abnormal, but clinicians may have mistaken these abnormalities for true infections. A variety of antimicrobials were used for empiric treatment, with no apparent consistency for selecting an antimicrobial. Based on these results, efforts are currently underway to provide clinician education on the appropriate treatment of UTIs, and to develop a UTI treatment protocol to better aid with antimicrobial selection.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5b-110

Poster Title: Utilization of ertapenem in a large community hospital

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Purpose: Within our facility we have noticed an increase in ertapenem use in both the emergency department and hospital-wide. Ertapenem is a carbapenem antibiotic with broad spectrum activity, including activity against extended-spectrum B-lactamase (ESBL) producers, AmpC-producing Enterobacteriaceae and anaerobic bacteria. Ertapenem also has convenient once-daily dosing, thus making it a common empiric choice when an intra-abdominal infection is suspected. Currently, the long-term effects of ertapenem use on resistance patterns is not well understood; however, experts are concerned that overuse may accelerate carbapenem resistance. The objective of this study is to analyze appropriateness of ertapenem use hospital-wide using predetermined criteria.

Methods: A retrospective chart review was performed to analyze the use of ertapenem within our facility. Patients that received at least 1 dose of ertapenem between January 2016 and July 2016 was included in the study. Data collection included: patient demographics, microbiology results, antibiotics used, length of stay, cost of admission, and readmission rates. Appropriateness was assessed using pre-approved preliminary criteria for use for ertapenem. The criteria for use included (1) current non-pseudomonal ESBL infection or suspected recurrent ESBL infection, (2) colorectal surgery, (3) Intra-abdominal infection (IAI) with contraindications or resistance to cefazolin/ceftriaxone/cefepime + metronidazole, cefoxitin, piperacillin-tazobactam, or levofloxacin + metronidazole, and (4) one-time dose prior to discharge for home health purposes. Currently, an Infectious Disease consult is not required when prescribing ertapenem at our facility.

Results: 75 patient cases were reviewed. Overall ertapenem use was appropriate in 43 (57.33%) cases and inappropriately used in 32 (42.67%). Colorectal surgery accounted for 31 (41.33%) of all cases. Excluding colorectal surgery from the patient population, only 12 (27.27%) cases were appropriate and 32 (72.72%) inappropriate. 12 of the 32 (37.5%) inappropriate cases were due to abdominal pain or suspected intraabdominal infection. These cases could have narrowed antibiotic selection to cefazolin/ceftriaxone/cefepime + metronidazole, cefoxitin, piperacillin-tazobactam, or levofloxacin + metronidazole. Other conditions that had inappropriate use included empiric treatment for urinary tract infections, sepsis/bacteremia, pneumonia, and skin and skin structure infections.

Conclusion: Overall, ertapenem use was appropriate within our facility; however, there is a lot of room for improvement, especially when excluding colorectal surgery. Currently, little is known about the overuse of ertapenem on resistance patterns, but antimicrobial resistance continues to rise while antibiotic development is lagging. Experts are concerned that overuse of ertapenem might hasten carbapenem-resistant Enterobacteriaceae, Pseudomonas, and Acinetobacter species. This study suggests that our facility could benefit from restricting the use of ertapenem to an Infectious Disease consult and colorectal surgeries.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 5b-111

Poster Title: Evaluation of sildenafil treatment guidelines in neonates with pulmonary artery hypertension associated with bronchopulmonary dysplasia

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Purpose: Sildenafil is used for treatment of bronchopulmonary dysplasia associated pulmonary artery hypertension (PAH-BPD). In 2012, the FDA recommended against use of sildenafil in children with PAH due to reports of mortality at high doses. In 2014, the FDA clarified that cautious use is acceptable. The current recommended dose is 0.5-1mg/kg three to four times daily in children < 1 year. We developed guidelines at our institution for diagnosis and treatment of PAH-BPD using echocardiogram (ECHO) criteria and sildenafil doses consistent with current guidelines. Our purpose is to determine whether these guidelines are successful in the diagnosis and treatment of PAH-BPD.

Methods: We conducted a retrospective study at our institution which included pre-term infants diagnosed with PAH-BPD between January 2012 and June 2016. For infants with birth weight (BW) < 1500 grams, BPD was defined as oxygen (O2) requirement (after an O2 challenge test) at 36 weeks corrected gestational age. For infants with BW greater than or equal to 1500 grams, BPD was defined as O2 requirement on day of life 28. These babies were evaluated for PAH because they were >4 weeks old with an FiO2 >40% and positive pressure >4cm CPAP equivalent or had right ventricular pressures (RVP) >½ systemic pressures (SP). Weekly sildenafil dose, ECHO results and patient status were collected until sildenafil discontinuation or patient discharge.

Results: Nine patients qualified for inclusion in our study. All doses are reported as mean +/- standard deviation. Initial sildenafil treatment dose was 0.53 +/- 0.36 mg/kg/dose and total daily dose (TDD) was 1.59 +/- 1.07 mg/kg/day. Prior to sildenafil initiation, 7 patients had RVP >½ SP and 2 patients had RVP less than or equal to ½ SP as shown by ECHO. At the end of treatment, sildenafil dose was 1.30 +/- 0.64 mg/kg/dose and TDD was 3.91 +/- 1.93 mg/kg/day.

Six patients (67%) experienced reduction in RVP as shown by echocardiogram and 3 patients (33%) remained at baseline RVP. Three patients died during treatment and TDD was 4.17 +/- 2.39 mg/kg/day at the time of death. Of the remaining six patients discharged from the hospital, five patients were discharged on a TDD of 3.75 +/- 1.12 mg/kg/day.

Conclusion: These data suggest that PAH-BPD diagnosis and treatment occurred according to protocol in the majority of patients and there was wide variability in sildenafil TDD. The majority of patients experienced improvement in pulmonary artery hypertension as shown by reduction in RVP in echocardiogram. No patients showed worsening of pulmonary artery hypertension during sildenafil treatment.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-112

Poster Title: Evaluation of ambulatory zolpidem prescribing post-FDA alert at an academic medical center

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Purpose: In 2013, the Food and Drug Administration (FDA) issued a MedWatch alert for prescription brand name (Ambien, Ambien CR, Edluar, and Zolpimist) and generic drugs containing zolpidem. The alert highlighted that ingestion of higher doses may put patients, especially female patients, at risk for impaired morning activities due to lingering drug concentrations in the bloodstream. Following the alert, steps were taken to improve prescribing at VCU Health System (VCUHS) and an initial assessment was performed in November 2014 through January 2015. This analysis is a follow-up assessment of prescribing practices over one year later.

Methods: This quality improvement based, institutional review board approved, retrospective descriptive analysis was conducted using data from zolpidem prescriptions filled at VCUHS outpatient pharmacies from February 2016 through August 2016. Patients 18 years of age and older were included in the study. Patients prescribed zolpidem for a reason other than insomnia (e.g., participation in a sleep study) were excluded. Patients prescribed zolpidem by VCUHS providers who had prescriptions filled at other pharmacies were not included. Using Microsoft Excel, prescription dosing, frequency and duration of therapy were analyzed from both the prescription and patient perspectives. Dosing was characterized as optimal or suboptimal based on the FDA's recommendations for female patient, with immediate-release and extended-release doses greater than 6.25 mg being considered suboptimal. Dosing practices for female patients were compared between physicians and mid-level practitioners (nurse practitioners and physician assistants).

Results: A total of 729 zolpidem prescriptions were filled for 269 patients (n equals 537 [74 percent] for female patients). Most patients prescribed zolpidem were female (n equals 186 [69 percent]). Patients' ages were 25-83 years for females and 28-69 years for males, with 12 female patients and 2 male patients at 65 years of age or older. For the female patients, 269 prescriptions (50 percent) were prescribed at an optimal dose, representing 113 females (60 percent). For female patients, 57 percent of prescriptions (and 127 patients) were prescribed zolpidem pro re nata (PRN), while 43 percent of prescriptions (and 78 patients) were prescribed the drug with scheduled dosing. For the 12 geriatric female patients, 65 percent of the prescriptions were written PRN. For the male patients, 75 percent were prescribed doses at 10 mg or greater, and 58 percent of prescriptions (54 patients) were prescribed as PRN. Dose-range instructions (such as take 1-2 tablets) were provided in prescriptions for five female patients and four male patients. Fifty-five patients received multiple prescriptions to supply at least six months of treatment with zolpidem. Physicians' prescriptions were more often optimal (53 percent) compared to mid-level practitioners' prescriptions (39 percent).

Conclusion: This assessment demonstrates the continued opportunities to improve zolpidem prescribing, especially for female patients. Prescribing was improved relative to the prior assessment; however, half of the female patients received doses higher than the FDA's recommendations. Areas for improvement in prescribing include clarification of PRN and "dose-range" instructions. From the prescription and patient perspectives, physicians demonstrated more optimal dosing than mid-level providers. The assessment is scheduled for presentation to the Medication Safety Committee and Pharmacy and Therapeutics Committee, and the specific action plan will be guided by those discussions.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 5b-113

Poster Title: Efficacy of anti-hypertensives in metastatic renal cell carcinoma with vascular endothelial growth factor inhibitor-induced hypertension

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Purpose: Vascular endothelial growth factor (VEGF) inhibitors are the cornerstone of metastatic renal cell carcinoma (mRCC) therapy. However, a common side effect of VEGF inhibitors is hypertension. VEGF inhibitor-induced hypertension has been shown to potentiate morbidity and cardiovascular complications, such as coronary heart disease, stroke and heart failure. There are no clear guidelines on the management of mRCC patients with VEGF inhibitor-induced hypertension. The purpose of this study is to determine which class of anti-hypertensives, specifically angiotensin-converting enzyme (ACE) inhibitors/angiotensin II receptor blockers (ARBs) or calcium channel blockers (CCBs) is most effective in treating VEGF inhibitor-induced hypertension.

Methods: This is a retrospective, observational, paired longitudinal study. Subjects originally included 240 mRCC patients 18 years and older at the University of Michigan Health System (UMHS) Cancer Center who were/are concurrently on one or more of four VEGF inhibitor treatments (axitinib, pazopanib, sorafenib, or sunitinib) with ACE inhibitor(s)/ARB(s) and/or CCB(s). After stratification, 65 patients were included in the study. Patient data included systolic blood pressure (SBP), diastolic blood pressure (DBP), treatment start and end date, gender, age, date of diagnosis, and comorbidity, including chronic kidney disease (CKD) and diabetes. Additionally, the antihypertensive class(es) that each patient was/is taking was recorded. Lastly, the date of progression, date of last progression and date of death were collected to determine overall survival (OS) and progression-free survival (PFS) in these patients. The primary outcome was the efficacy of blood pressure treatments, determined by evaluating the changes in SBP and DBP over 7 months from the time of first VEGF treatment. This was done using mixed models and controlling for types of treatment. The secondary outcomes were OS and PFS, which were analyzed using Kaplan-Meier methods.

Results: Sunitinib was the most common first-line therapy (37 patients [57 percent]). Out of 65 patients, 24 patients (37 percent) were on one antihypertensive, eleven patients (17 percent) on two, 21 patients (32 percent) on three, and nine patients (14 percent) on four to six. ACE inhibitors/ARBs were used in 58 patients (89 percent), CCBs in 37 (57 percent), and combination of the two in 30 (46 percent). The primary choice for ACE inhibitor/ARB was lisinopril (40 patients [69 percent]) and CCB was amlodipine (34 patients [94 percent]). Changes in the first 7 months on first-line VEGF inhibitor showed that on average, patients treated with CCBs had an increase in SBP at a rate of 2.7 mmHg per month and DBP at 2.6 mmHg per month. In patients treated with ACE inhibitors/ARBs, SBP decreased by 0.2 mmHg per month and DBP by 0.1 mmHg per month. In patients treated with combination therapy, SBP decreased by 2.2 mmHg per month and DBP by 1.2 mmHg per month. The median overall survival was 58.2 months, and the median progression-free survival was 17.5 months.

Conclusion: VEGF inhibitors are the mainstay therapies for patients with mRCC. Hypertension is a common side effect of these medications, which usually warrants patients to be on additional ACE inhibitor/ARB and/or CCB therapy. For the primary aim, use of ACE inhibitor/ARB and CCB combination had the greatest effect on both SBP and DBP, followed by ACE inhibitor/ARB monotherapy. Since VEGF inhibitor-induced hypertension is a common complication for mRCC patients, either monotherapy with ACE inhibitor/ARB or combination therapy with ACE inhibitor/ARB with CCB rather than CCB alone should be considered for management of hypertension.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5b-114

Poster Title: Evaluation of vancomycin-associated nephrotoxicity incidence in Native American patients with and without concomitant piperacillin-tazobactam: a retrospective cohort study

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Purpose: Several recent reports have documented the association between nephrotoxicity and vancomycin with concomitant piperacillin-tazobactam therapy; however, the combination continues to be extensively used in hospitals as an empiric antibiotic regimen to provide sufficient coverage for drug-resistant microorganisms. In the setting of arid climates and scarce running water, however, severe dehydration and subsequent poor renal perfusion are long-standing risk factors predisposing individuals to a much greater likelihood of developing acute kidney injury (AKI). This study was designed to evaluate the incidence of AKI from intravenous vancomycin therapy with and without concomitant intravenous piperacillin-tazobactam therapy in Native Americans living in desert atmospheres.

Methods: This was a single-center, retrospective chart review screening 1389 patient visits from March 2015 through February 2016 that involved initiating intravenous vancomycin therapy with or without concomitant piperacillin-tazobactam. Study participants were included if they were aged 18 or older, initiated on intravenous vancomycin therapy for at least two consecutive days during which at least two serum creatinine values were obtained and documented in their paper charts, and had a baseline serum creatinine of 1.5 mg/dL or less prior to vancomycin therapy initiation. Patients were excluded if there was pertinent data missing from their paper charts, or their paper charts could not be obtained for review. Data collection involved patient age; gender; height; weight; vancomycin indication, duration, and dosage regimen; vancomycin trough goal range and actual trough levels; serum creatinine and blood urea nitrogen (BUN) levels; and concomitant piperacillin-tazobactam therapy. SPSS software was used to analyze the data.

Results: One-hundred ninety four patients were included in the study, of which 120 patients received monotherapy with intravenous vancomycin, and 74 patients received concomitant intravenous vancomycin and piperacillin-tazobactam therapy. AKI developed in 7 of 120 patients (5.8%) treated with intravenous vancomycin, compared to 18 of 74 patients (24.3%) in concomitant intravenous vancomycin and piperacillin-tazobactam-treated patients. Based on a sample size of 194 patients, there was no difference observed in the incidence of AKI in the Native American population as compared to the 5-35% range of published incidence of AKI development in patients treated with intravenous vancomycin. There was, however, a significantly greater incidence of AKI observed in patients receiving concomitant intravenous vancomycin and piperacillin-tazobactam therapy. Age (P = 0.433) and BMI (P = 0.220) were independent risk factors for AKI that were found to be non-statistically significant in the study population.

Conclusion: This retrospective cohort study found that Native Americans patients residing in desert climates receiving intravenous vancomycin therapy are on the lower end of the published ranges for developing AKI, while those receiving concurrent intravenous vancomycin and piperacillin-tazobactam have a four-fold higher likelihood of developing AKI. Larger prospective studies are needed to confirm that there is indeed no difference in the incidence of nephrotoxicity in Native Americans considering the prevailing dehydration observed in this population. These further studies may help provide guidance to clinicians as to more optimal empiric antibiotic therapy for similar patient populations.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 5b-115

Poster Title: Pharmacist contribution to the University of Michigan GRACE program

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Purpose: Escalating costs of healthcare in the United States are a burden for health systems, payers, and patients. At the University of Michigan, the Geriatric Resources for Assessment and Care of Elders (GRACE) Program, is an outpatient interdisciplinary team that works with complex older adults and their primary care providers to manage their health care with the goal of reducing utilization of acute care resources. The aim of this study is to describe and assess the pharmacist's role as part of this interdisciplinary team.

Methods: Patients enrolled in the GRACE program had a complete medication review (CMR) by a clinical pharmacist upon enrollment into the program and periodically thereafter. Recommendations were communicated to the GRACE team during weekly team meetings. A control group was identified using the same criteria as for patients enrolled in GRACE, but were assigned to primary care sites not yet working with the GRACE program. These patients also had a CMR by a clinical pharmacist, but drug therapy recommendations were not shared with the patients' prescribers. The primary objective was implementation rate of drug therapy recommendations between the two groups. For the secondary objectives, patients from the GRACE program had their medications compared against the CMS 2015 High Risk Medications list and Medication Appropriateness Index to assess the quality of the prescribing they received prior to admission into the GRACE program.

Results: A total of 198 patients were evaluated, with 96 being placed into the experimental group and 102 being placed into the control group. A total of 160 recommendations were made for patients in the experimental group and 215 were made for control group patients. Drug therapy recommendations were implemented more often for patients on the GRACE service compared to controls (55.6 percent vs 19.5 percent, p value less than .05). A total of 88 recommendations were implemented for GRACE patients with 54 (61 percent) of the

recommendations being related to discontinuation of medications. Assessment of quality of prescribing prior to GRACE enrollment revealed that 10 out of the 96 patients (10 percent) were admitted to the program while on at least 1 medication from the CMS High Risk Medications list. Using the Medication Appropriateness Index, the average score on admission to the program was 2.7.

Conclusion: This study demonstrates that involving a clinical pharmacist as part of the GRACE program interdisciplinary team results in more drug therapy changes. This could be attributable to the education and expertise that pharmacists possess in the realm of medication management, along with the trust that other health professions have in a pharmacist when they are making recommendations. When considering the initiation of any kind of outpatient program similar to the one described in this study, the contributions of a clinical pharmacist should not be overlooked in gauging possible strategies for improving patient health.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 5b-116

Poster Title: Impacts of Spirituality on Depression

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Purpose: To assess the impacts of spirituality in depressed patients and evaluate whether the degree of depressive symptoms has a correlation with the degree of spirituality

Methods: Our participants included 24 individuals who were admitted to Novant Health Prince William Medical Center's inpatient behavioral health unit for depression treatment and participants of an Islamic community center. Participants were interviewed briefly; individuals who were willing to participate in the study signed a consent form that was provided by the investigators. The participants then would complete two surveys. If the participants had trouble reading through the surveys, the interviewers would read the surveys for them.
The two surveys utilized were The Depression Inventory (BDI) and The Daily Spiritual Experience Scale (DSES). Rated on a 4- point scale, ranging from 0 to 3, BDI is a 21-item multiple- choice inventory. The minimum score can be as low as 0 while the maximum total score is 63. The breakdown of raw scores correlation to depression severity is listed below:
1-10-------- These ups and downs are considered normal
11-16------- Mild mood disturbance
17-20------- Borderline clinical depression
21-30------- Moderate depression
31-40------- Severe depression
Over 40----- Extreme depression
The DSES is a 16-item self-report survey that assesses ordinary experiences of connection with the transcendent in daily life. A greater spirituality refers to experiencing these measures (such as awe, gratitude, mercy, inspiration) many times a day or every day compare to lower spirituality where individuals reports experiencing these measures never or once in a while.

Results: Based on the results of DSES, patients reporting greater spirituality had lower measures of hopelessness, disappointment, and depressive symptoms. Those who believed in a higher power had a lower mean score than those who did not on the BDI. 18 out of 24 participants had an average score of 12, and the remaining 6 participants had an average score of 36 on the BDI.

Conclusion: The findings suggest that greater spirituality is associated with less severity of depressive symptoms, hopelessness, and disappointment; therefore, through our findings, we can conclude that the degree of depressive symptom severity, hopelessness, and disappointment were inversely correlated with one's level of spirituality.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Evaluative Study

Session-Board Number: 5b-117

Poster Title: Implementation of a revised pharmacy technician "core" training program

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Purpose: Effective training is critical to ensure pharmacy technicians are well-prepared to provide patient care, especially given increasing responsibilities, regulatory requirements (e.g., USP < 797>), and practice requirements (e.g., certification, licensure). Technician training was previously completed on-line in each work area. We implemented a core training program (off-line) prior to completing area-specific training (on-line) for inpatient pharmacy technicians utilizing a pharmacy space that was no longer used for patient care. This allowed individuals to train in a less-stressful environment away from patient care. The purpose was to improve pharmacy technician preparedness and satisfaction with training by establishing foundational knowledge and skills.

Methods: We informally surveyed several peer institutions about their approaches to pharmacy technician training. Using this information and our own processes, we developed a core training program (phone and computer system orientation, oral medications training, aseptic technique and sterile compounding, and automated dispensing cabinet processes). Core training requires approximately 1 week to complete, and technicians must complete an objective, standardized clinical examination (OSCE) for each station to pass and move on to area-specific training. A survey was developed to assess pharmacy technicians' perceptions of the training they received, how prepared they felt, and their satisfaction with training received. Each question was evaluated using a Likert scale (1 – 5, with 5 being best/very prepared/very satisfied). Prior to implementation of the core training (old training group), pharmacy technicians who had completed our current training process were asked to complete the survey, and were stratified into two groups – technicians who had worked at UMHS for more than six months, and technicians who worked at UMHS for less than six months. After implementation of the core training (new training group), the same survey was sent to new

employees at the completion of their full training (core training and area-specific training). Feedback was given and a consistent theme across all technicians was the inconsistency of training across all inpatient areas.

Results: The survey was completed by 24 pharmacy technicians: 12 technicians who underwent the old training program (prior to implementation of core training) and 12 technicians who completed the new training (after implementation of off-line core training). When asked how prepared they felt to perform their job after training, technicians who completed new training reported a mean score of 3.8 +/- 0.7 versus a mean of 3.4 +/- 1.1 among technicians who completed the old training (on a scale of 1 – 5, with 5 being very prepared) (p =0.3128). When asked how satisfied they were with the training received, technicians who completed the new training reported a mean score of 4.2 +/- 0.8 compared to a mean score of 3.2 +/- 1.0 amongst technicians who completed the old training (p =0.0129). With regards to overall satisfaction of the amount and usefulness of resources, the mean for technicians who completed the new training was 4.1 +/- 0.9 versus 2.8 +/- 1.1 for technicians who did not receive core training (p=0.0044). Overall themes from feedback about the old training included a lack of standard training and an undesirable “learn-on-the-go” approach. These themes were not noted after implementation of the new core training.

Conclusion: Implementation of a core pharmacy technician training using an off-line training center significantly improved the overall satisfaction of training received as well as the amount/usefulness of resources available. Feedback suggesting concerns about inconsistency in training and discomfort with training in the live environment was reduced. Implementation of a core training program outside of patient care may improve pharmacy technician training and reduce safety concerns with training in the patient care environment. Future improvements may include changes to improve preparedness, standardization among different areas, optimizing the duration of training, and assessment of outcomes.

Submission Category: Clinical Services Management

Submission Type: Descriptive Report

Session-Board Number: 5b-118

Poster Title: Implementation of a pharmacy-driven, COPD medication counseling service : A pilot study at a community hospital provided by clinical pharmacists and fourth year pharmacy students

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Purpose: The Centers for Medicare and Medicaid Services (CMS) now recognize COPD exacerbations as one of the most preventable reasons for hospital readmissions. This pilot was designed to help launch a pharmacy-driven COPD medication management and discharge counseling service as an addition to an established core measure (CM) care coordination hospital process. Goals of the study were to develop the counseling service, provide COPD medication counseling and describe its impact on readmissions. Patient data on clinical outcomes was collected for future analysis.

Methods: The pilot study took place from June 6th to September 22nd, 2016 at Inova Loudoun Hospital in Lansdowne, Virginia. The pharmacy team consisted of a clinical pharmacist, rotating fourth year pharmacy students, and a hospitalist. It was designed as a value added expansion to a core measure team consisting of case managers, nurses, and physicians. The CM team generated a daily report identifying COPD “index” (target) patients. These patients were placed in 3 categories: first admission with COPD as primary diagnosis, readmission unrelated to existing COPD diagnosis, and readmission due to COPD exacerbation. The proposed pharmacy-driven service provided medication and disease counseling to all hospital COPD target admissions. To launch the service, the pharmacy team was added to the target admission report. With the help of pharmacy students, the team developed a daily COPD monitoring sheet, a patient education handout and a visual aid of all available inhalers. Pharmacy students were primarily responsible for medication counseling of all target COPD patients. Students also assessed daily patients’ COPD medications, pertinent labs, and any ongoing antimicrobial therapy for appropriateness, efficacy, safety, and adherence. Recommendations to adjust

therapy were reviewed by a clinical pharmacist and approved by a hospitalist. An electronic intervention was documented in the EHR for each patient counseling. All COPD pilot patient data was de-identified and reviewed for any 30 day readmissions.

Results: To implement and provide the COPD counseling service, the pilot pharmacy team developed a patient monitoring sheet, a COPD education handout, a visual chart for all inhalers, and a COPD counseling electronic intervention. The clinical pharmacists were also added to the CM daily report of "index" (target) COPD admissions. A total of 67 target admissions took place during the pilot service period. The distribution of admissions into the 3 index groups were as follows: 43 (91.4%) admissions were categorized as first admission with COPD diagnosis, 14 (20.9%) admissions were categorized as readmissions with COPD exacerbation and 10 (14.9%) admissions were categorized as readmission unrelated to COPD diagnosis. Of the readmissions within 30 days, 9 (13.4%) were due to COPD exacerbations and 5 (7.4%) were admitted for causes unrelated to COPD. A total of 59 (88%) patients were counseled on their COPD medications and provided a handout with documented follow up electronic interventions. Patient monitoring sheets were collected for future analysis.

Conclusion: The national average for COPD readmissions within 30 days in 2015 was 20%. Recently, CMS reported ILH COPD readmission rate as "no different than the national rate." In contrast, our results show a 30 day readmission rate of 13.4%. These findings warrant further investigation. However, we speculate that pharmacy-driven medication counseling service was a valuable addition to the CM team. Plans for future development include the addition of a post discharge phone call and incorporating the service into the workflow with the continued help from pharmacy students. Formation of multidisciplinary CM rounding team will help to optimize clinical outcomes.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 5b-119

Poster Title: Implementation of a pharmacist-driven wellness clinic in Puerto Rico

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Purpose: A Wellness Clinic drives it services not only toward wellness, but also to disease prevention, health promotion, and health education. Currently, in Puerto Rico, the type of wellness clinic that we are addressing to is not available. Chronic conditions are the leading cause of morbidity, mortality, and disability in the United States, for which Puerto Rico is not an exception. Proper screening, prevention, treatment, and education can lead to a reduction in long-term health expenditures. Therefore, we see a need to help our community by offering a place in which they can receive all-in-one high quality health and wellness services.

Methods: To investigate about the impact of a wellness clinic, we conducted a dedicated search under the following databases: PubMed, International Pharmaceutical Abstracts, Medline, EBSCO, Academic search premier, Business source premier and EMBASE. To determine health related needs of our population, we conducted stakeholder interviews. The interview was performed to five (5) persons that represented the population we want to address the services to. Every stakeholder considered very convenient to have all-in-one resources to evaluate their health status since they haven't much time to spend going to different physicians in order to get preventive healthcare. They are willing to go once or twice a year to benefit from the prevention services. The services that some of the stakeholders are expecting from a Wellness Clinic are: pharmacist services including counseling on smoking cessation, medication therapy management, management of chronic conditions like diabetes, hypertension, and dyslipidemia, nutrition services provided by a nutritionist, dental services, fitness, physician consults, and a laboratory to obtain their results in one place. The willingness

to pay varies throughout the stakeholders since it is correlated with the services provided with a range of $100 to $500.

Results: The variety of services that we decided to provide at the clinic comprise the following: blood pressure monitoring, total lipid panel monitoring, fasting glucose checkup, administration of adult immunizations, smoking cessation strategies, HIV testing, stress management, rapid hemoglobin test, and nutritional counseling. The expected revenue on year one was $311,917.06 and the expected revenue on subsequent years was $344, 804.00. Revenue per Patient was shown as the estimated revenue per patient including the smoking cessation service ($112.80) and without the smoking cessation service ($92.80). To obtain the expected annual profit, 20 patients would have to visit the wellness clinic per day. Defining potential markets as a group of individuals, firms, and organizations in a particular market who have some level of interest in a particular product or service, private community pharmacies, universities, hospitals, and private companies could be potential markets interested in our wellness clinic. Marketing strategies would have to be developed in order to promote our services in a way that satisfies the potential investors.

Conclusion: Through our extensive research we have determined that with adequate design, a pharmacist driven wellness clinic is a suitable option for a community. We will provide healthcare access to improve and maintain wellness and health in the working class of Puerto Rico. With the services offered in our wellness clinic, we will promote the expansion of the pharmacist role in the overall community, increase prevention and health education, build trust relationships with our patients, provide the opportunity of experiential education for our pharmacy volunteers and students, and help decrease healthcare-related expenditures for individuals and government.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Descriptive Report

Session-Board Number: 5b-120

Poster Title: Appropriate use of vitamin K in patients on warfarin with supratherapeutic international normalized ratio: Evaluation of practice in a medical facility

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Purpose: CHEST guidelines recommend no administration of vitamin K for patients with an international normalized ratio (INR) less than 10. For patients with an INR greater than 10 without significant bleeding, vitamin K 2.5-5 mg orally is recommended. For patients with major bleeding, vitamin K 5-10 mg intravenously is recommended. This study aims to evaluate the appropriate use of vitamin K in patients on warfarin with supratherapeutic INR, patients scheduled for surgery, and bleeding patients, in comparison with the current CHEST guidelines.

Methods: This cross-sectional descriptive study was conducted at a small community hospital in Virginia. Patient medical records were screened from May 2015 to April 2016. Study population included patients (N=43) who were admitted on warfarin. International normalized ratio values prior to administration of vitamin K were recorded and divided into three categories - less than 4.5, 4.5-10, and greater than 10. Administered dose and route of vitamin K were also recorded. The study sample was divided into 3 groups based on indication for vitamin K use - patients scheduled for surgery, patients who were bleeding and patients with supratherapeutic INR from warfarin therapy.

Results: Twenty patients (46.5%) were scheduled for surgery, 9 (20.9%) had bleeding events and 14 (32.6%) had supratherapeutic INR. Of the 14 patients with supratherapeutic INR, 8 had INR 4.5-10 and were administered 2.5mg (4 patients) and 5mg (4 patients) oral vitamin-k. Of the remaining 6 patients, 5 patients with INR 4.5-10 were administered intravenous vitamin-k (1 patient, 2mg; 3 patients, 5mg; and 1 patient, 10mg) and the remaining patient with INR greater than 10, was administered intravenous vitamin k 5mg. Among the 9 patients with bleeding events, 3 had INR less than 4.5 and were administered 2mg (1 patient) and 10mg (2 patients) intravenous vitamin-k. The fourth patient with INR 4.5-10 received 5mg intravenous

vitamin-k. Of the remaining 5 patients, 4 patients with INR 4.5-10 were administered oral vitamin-k (3 patients, 2.5mg and 1 patient, 10mg) and the remaining patient who had INR less than 4.5, received oral vitamin-k 5mg. Twenty patients had surgical procedures of whom 12 received oral therapy [(11 with INR less than 4.5 received 2.5mg (6 patients), 5mg (4 patients) and 10mg (1 patient)] and 8 received intravenous therapy [7 with INR less than 4.5 received 2.5mg (1 patient), 5mg (3 patients), and 10mg (3 patients)].

Conclusion: This study shows that vitamin K use in this facility was not consistent with the current CHEST guidelines. Judicious use of vitamin k will help improve patient outcome, as well as reduce health-associated costs.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-121

Poster Title: The Effectiveness of Online Learning Modules on Student Performance and Knowledge Retention

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Purpose: To assess students knowledge in the areas of physiology and statistics along with evaluating the effectiveness of web-based statistical learning modules in remediation of knowledge deficiencies uncovered by the baseline assessment.

Methods: Students were required to complete a baseline assessment test in both physiology and statistics. First year pharmacy (P1) students were designated to take the physiology assessment and second year pharmacy (P2) students were required to take a baseline statistics assessment as part of their courses. P2 students will then be required to take a post-module statistics assessment after the administration of online learning modules. P2 students' scores on the baseline assessments and post-module scores were be compared to assess short-term retention. The study also looked at the effectiveness of these modules on struggling students versus the general student population by examining scores of the students scoring in the lower quartile and those scoring below the average. Lastly, third year pharmacy (P3) students were administered the baseline statistics assessment a year after using the learning modules to evaluate long-term retention of statistical information.

Results: The average score on the physiology assessment taken by first-year pharmacy students was 50.5%. All the topics covered in the assessment were low, with the biggest deficit in the renal system (33%). There was a statistically significant difference between the assessment scores based on the institution in which the physiology course was taken (U of M vs. other institution; 59.% vs 45.2%). There also was a statistically significant difference in the assessment scores based on the year the course was taken (2015 vs prior to 2015; 62.1% vs 47.3%). In regards to the statistics assessment, there was a statistically significant improvement in post-

module scores for all six modules administered ($p < 0.001$) based on the past 5 years of data collected. The same trend was seen for the class of 2017. The "at risk" group, those that scored below the average on the baseline statistics assessment, showed significant improvement in all six modules based on their post-assessment score($p < 0.001$). In regards to retention of information post-module use, we found that there was a statistically significant improvement in reassessment scores during students P3 year of pharmacy school in the majority of the modules when compared to their baseline assessment scores.

Conclusion: The use of assessments to uncover students baseline knowledge and deficits is important for an educational institution to know in order to adjust their curriculum appropriately. The use of web-based modules is an appropriate method in remediating some of the knowledge on both a short-term and long-term basis.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5b-122

Poster Title: Inpatient criteria for Hemin in acute intermittent porphyria (AIP); the development of a protocol

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Purpose: Acute intermittent porphyria (AIP), a rare heme disorder caused by low levels of porphobilinogen deaminase. Often times, patients may be latent in which they have no symptoms; however, they may have an acute attack leading to hospitalization due to abdominal pain, hyponatremia or neurological symptoms. Due to the rarity of this disease, many institutions, including Inova Loudoun, do not have a protocol to treat these patients. Institutions initially give Hemin, which costs $8,000 per dose which not all patients require. Implementing a protocol will prevent the overuse of Hemin, which is beneficial to both the patient and the hospital.

Methods: Being that there is no protocol at Inova Loudoun on how to treat AIP patients, research was performed to determine what testing would need to be completed in patients having an acute attack prior to the administration of Hemin. Appropriate testing according to protocol was to determine patient porphobilinogen (PBG) levels. Once the protocol was determined, the Chief Medical Officer of the hospital evaluated and approved the protocol for implementation. Hospital records were then reviewed for patients with AIP who had been admitted and treated with Hemin over the past 18 months. Two patients had been treated at the hospital during this time period. The patients' records were then evaluated to determine if proper testing had been completed before the administration of Hemin.

Results: It was determined that each patient had not been properly tested prior to the administration of Hemin. PBG testing should be completed at admission of every AIP patient. The most recent testing for this patient was done one year prior to this admission. The second patient had testing completed, but it was not until after the first dose of the medication was given. Had the hospital had a protocol in place prior to the admission of the patients and the

administration of Hemin, they could have potentially saved $40,000 due to the number of doses that were potentially not needed.

Conclusion: Although AIP is a rare disease, with the increasing number of patients that Inova Loudoun has experienced with the disorder and the cost of each dose to treat the patients, the implementation of a protocol will help prevent overspending and overuse of the medication.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-123

Poster Title: Comparison of two methods of urine mRNA quantification for Hypoxia Inducible Factor 1 as a biomarker of hypoxic kidney disease.

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Purpose: Use of urine as a non invasive diagnostic tool for kidney pathologies and therapeutics has been extensively studied. We have previously shown that HIF-1 urinary mRNA could serve as a potential biomarker of hypoxic kidney diseases. Timely processing of urine specimens can impact downstream mRNA quantification yield. The Zymo Urine RNA Isolation Kit allows for immediate processing with minimal supplies which could potentially improve the yield of mRNA compared to traditional methods. In our study, we sought to compare the yield and quality of urinary HIF-1 mRNA processed with the Zymo Urine RNA Isolation Kit to the existing protocol.

Methods: Healthy donors were recruited in accordance with Shenandoah University IRB guidelines after obtaining informed consent. After collecting the urine samples, the samples were divided into two groups to be analyzed in parallel using two different approaches for the initial RNA isolation. Urine samples were collected and 50 mL was immediately stored at -80° C per our current method and the other 50 mL was immediately processed using the Zymo Urine RNA Isolation kit. These urine samples were put through an initial lysis step after which the lysate was stored at -80° C for a later RNA isolation. RNA isolation was completed for each sample in parallel using the Qiagen RNeasy Plus Mini Kit and the Zymo Urine RNA isolation kit. cDNA was then synthesized from both the RNA isolates of the parallel methods and then ACTB and HIF-1a expression levels were assayed by RT PCR. The resulting expression levels were compared between the RNA isolated from the two methods to assess if there was a difference in yield by the level of expression.

Results: The resulting CT values for ACTB and HIF-1a in our initial sample group of 8 donors showed similar levels of amplification in specimens processed using the Zymo Urine RNA Isolation Kit compared to our current established method. Additional urine specimens are being screened to confirm these preliminary results.

Conclusion: The Zymo Urine RNA Isolation Kit has shown comparable urinary HIF-1 mRNA yield compared to our current methods. Additionally, the protocol is more convenient and less labor intensive than our current method and can serve as a viable alternative for urine specimen processing for downstream molecular based experiments.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 5b-124

Poster Title: Incidence of bronchopulmonary dysplasia following caffeine prophylaxis in extremely premature neonates

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Purpose: This study was conducted to determine the incidence of bronchopulmonary dysplasia (BPD) in extremely premature neonates, 28 weeks gestational age (GA), who received caffeine for prevention of BPD according to the University of Michigan Brandon Neonatal Intensive Care Unit's respiratory distress syndrome (RDS) protocol. The RDS protocol adopted caffeine prophylaxis based on the results of a study by Schmidt B. et al. 2006. This study, which was designed to examine the use of caffeine for the treatment of apnea of prematurity, showed a beneficial effect of caffeine on the prevention of BPD in a secondary data analysis.

Methods: The institutional review board approved this open-label, retrospective cohort study. All inborn neonates between March 1st, 2010 and June 30th, 2015 at the University of Michigan who were 28 weeks GA with adequate caffeine and supplemental oxygen data at 36 weeks corrected GA (definition of BPD) were included in the study. Outborn neonates and neonates missing caffeine or oxygen data were excluded from the study. The Vermont Oxford Network database was used to identify eligible patients. Caffeine dosing data were derived from electronic medication administration records. The primary outcome of interest was the incidence of BPD among neonates receiving caffeine for BPD prophylaxis. Data analyses also included comparisons between BPD and Non-BPD neonates for demographics such as GA, birthweight, and sex as well as caffeine data such as average weekly maintenance doses and total caffeine exposure at 36 weeks corrected GA.

Results: The incidence of BPD among the 75 included neonates receiving caffeine for BPD prophylaxis identified in this study was 64% (48/75). Demographic comparisons between groups with 95% confidence intervals showed a mean GA of 25.9 0.37 weeks in BPD neonates compared to 26.9 0.36 weeks in Non-BPD neonates, a mean birthweight of 839 58 grams in BPD

neonates compared to 954 77 grams in Non-BPD neonates, and of the 48 neonates with BPD, 47.9% were male and 52.1% female. The total caffeine exposure at 36 weeks corrected GA was 506 44 mg/kg for neonates with BPD and 476 66 mg/kg for neonates without BPD.

Conclusion: The use of caffeine for BPD prophylaxis resulted in a 64% incidence of BPD among extremely premature neonates. Although limited by a small sample size, the reported incidence rate greatly surpasses the 36.3% incidence of BPD in caffeine treated neonates seen by Schmidt B. et al. 2006. The increased incidence seen in this study may suggest that, when limited to neonates that are extremely premature (28 weeks GA), caffeine may not provide a benefit in the prevention of bronchopulmonary dysplasia.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-125

Poster Title: Phytochemical composition of the root bark during growth of the antimalarial plant Artemisia annua (Sweet Annie): screening for possible antimicrobial activity

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Purpose: To determine the phytochemical constituents in the outer root bark of Artemisia annua at various stages of growth, and between different parts of the root including the taproot, lateral root, and root hairs. To develop optimal solvent extraction and high performance liquid chromatography (HPLC) methods to quantify and eventually identify and purify selected root constituents. The extracted root bark phytochemical constituents will then be screened for possible antibacterial and antifungal activities.

Methods: Root samples of Artemisia annua were collected from the Shenandoah River Cool Spring campus near Berryville, Virginia and outside the Health Professionals Building in Winchester, Virginia in late spring and summer. For the developmental study, the dried outermost bark from the taproot at various stages of plant growth (12-100 inches in height) were scrapped, finely chopped, sieved (less than 0.5mm) and extracted in 30 vols (w/v) of 70 percent methanol at 70 degrees C for 20 min following homogenization via ultrasonication. Following centrifugation a 20ul sample was analyzed by HPLC (Shimadzu 20AD with a UV-vis photodiode array detector utilizing a C18 analytical column). Sample of root bark were also extracted with ethlyl acetate and ethanol as described above and air-dried (warm hair dryer) and reconstituted with either ethanol or DMSO. The extracted samples were tested for antimicrobial activity using the disk diffusion antibiotic sensitivity method (Kirby-Bauer antibiotic testing). Yeast (BY4741) and E.coli (HB101 K-12) were the yeast and bacteria utilized for testing. Known antibacterial and antifungal agents, Ampicillin (Sigma) and Fluconazole (Sigma) respectively were used as controls.

Results: The level of major phenolic phytochemical constituents (hydroxycinnamate derivatives (HC), p52-61 cluster, and p70) present in the taproot outer bark increased as the plant grew: 12, 18, 36, 54, 72, and 100 inches. The level of p70 was 0.1, 5-7, and 27 units/mg at 12-18, 36-54, and 72 inches respectively. The lateral roots at 36-100 inches generally contained higher levels of phytochemicals compared to the taproot and significantly lower in the root hairs. Ethyl acetate (EA) extracted a total of 1.2, 3.4, and 22.6 percent of total outer lateral root bark content of HC, p52-61 cluster, and p70 respectively. EA extracted 81.5 percent of the total extractable (22.6 percent) constituents during the first extraction followed by 17.6 percent after the 2nd and 0.9% after the 3rd extraction. This relative extraction selectivity excludes most water-soluble constituents to allow for a more concentrated and lipophilic p70 to be used for further purification and to screen for possible pharmacological activity.
EA, ethanol, and 70 percent methanol extracted, DMSO and ethanol reconstituted lateral root bark preparations were screened for antimicrobial activity using a disk diffusion method. Slight E. coli growth inhibition was noted in EA extracted and DMSO reconstituted root bark extracts.

Conclusion: Root bark constituents appear in root bark as early as 14 days after seed germination and reach maximal mature levels at 6 feet in height. Thus, to maximize root bark constituents, harvesting should be done when the plant is 6 feet tall and before the plant flowers. Most of the root-bark phytochemicals are water-soluble and poorly extracted, therefore two EA extractions is necessary to get 99 percent of the extractable p70.
Higher concentrations of extracts and more purified p70 preparations should be tested with a variety of gram-positive and gram-negative bacteria and fungi to better assess root bark antimicrobial activity.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-126

Poster Title: Phytochemical analysis of several popular green leafy vegetables: Comparison of organic, non-organic, and dietary supplement formulations of curly leaf kale

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Purpose: There is a pre-conceived notion that organic vegetables are believed to be superior than non-organic vegetables. To explore this notion, this study was designed to develop a solvent extraction and high-performance liquid chromatography (HPLC) methodology to separate, identify, and quantify phenolic phytochemical constituents in several popular green leafy vegetables. Using this “fingerprint analysis” method, we identified plant specific phytochemical markers for accurate analysis of plant greens or dietary supplement formulations. Additionally, we determined if organic curly leaf kale has a different phytochemical composition compared to non-organic kale, as well as an available organic dried kale dietary supplement.

Methods: Vegetable greens for this study was obtained from local supermarkets and were all grown in California. Fresh leaf samples were cut into thin slices and air dried in a chemical fume hood overnight. Portions of the air dried samples were further dried in a 58 degrees Celsius oven for two days to obtain leaf dry weights. A sample of chopped and sieved (less than 0.5mm) dried leaf was extracted in 30 volumes (weight/volume) of 70 percent methanol for 20 minutes at 70 degrees Celsius following homogenization via ultrasonication. After centrifugation, 20 microliters of the supernatant was analyzed via HPLC (Shimadzu 20AD with a UV-vis photodiode array detector utilizing a C18 analytical column). Organic kale dietary supplement capsules were obtained from Solaray Inc, Park City, Utah.

Results: HPLC chromatograms of methanolic extracts of dried leaves of curly leaf kale (Brassica oleracea), spinach (Spinacia oleacea), Swiss chard (Beta vulgaris), and watercress (Nasturtium officinalis) showed distinctive species specific compounds allowing each to be identified in a mixture of all four plants. Furthermore, leaves of five different species of Brassica (i.e. kale, collard and turnip greens, bok choy, and mustard greens) showed distinctive identifiable HPLC profiles. Statistically significant differences were found between organic and non-organic curly leaf kale. Most notable was a 50 percent higher level (N equals 4; P less than 0.01) of 12 specific glucosinolates in organic kale. Two additional phenolic compounds showed a 86 percent (N equals 4; P equals 0.01) and 245 percent increase (N equals 4; P less than 0.01). HPLC profiling revealed that the dried organic kale leaf dietary supplement made by Solaray matched the typical fingerprint of kale with no evidence of any adulterations. Using characteristic glucosinolates derivatives as markers, the air dried kale contained 7.8 fold higher difference of glucosinolate derivatives than the dietary supplement. Based on this measurement, one capsule daily dose of 440 mg would give only 0.4 percent of the kale phytochemicals found in 100 gram serving of kale.

Conclusion: Green leafy vegetables even within the same species of the Brassica genus have distinctive phytochemical constituents making possible accurate analyses of the nutrient composition and possible adulteration in dietary supplements and food products. Organic kale may have a higher nutritional value as well as being pesticide and herbicide free based on our HPLC analysis. Compared to taking a dried leaf dietary supplement, eating a 100 gram serving of fresh or steamed kale is far better than taking a dietary supplement, in addition to being much less expensive.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-127

Poster Title: A comparison of two different intervention documentation methods for assessing the impact of an early pharmacy practice experience program

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Purpose: The doctor of pharmacy curriculum at Auburn University Harrison School of Pharmacy includes a required longitudinal early Pharmacy Practice Experiential (PPE) education course. First through third year student pharmacists visit patients in the community and document their visits in "progress notes" within an electronic health record and third year students document interventions in an online intervention system. The study objective is to compare the number and types of interventions identified through a retrospective analysis of progress notes versus those entered into the online intervention system in order to gauge the full impact of the Early Pharmacy Practice Experiential (PPE) program.

Methods: This retrospective study was submitted to the Institutional Review Board for approval. The course director randomly selected all progress notes for 20% of the student teams to roughly represent 20% of the enrolled patients in the program from August to December 2014. Investigators initially reviewed notes for three patients together in order to develop a consensus and improve inter-rater reliability. Reviewers used an Excel spreadsheet to categorize interventions documented by student pharmacists in their required progress notes. Two investigators reviewed each progress note and tracked interventions documented within them using a data collection form. In case of a disagreement, a third investigator reviewed the note and resolved the discrepancy. Patients were excluded if major discrepancies existed between progress notes over time and the sequence of events in the patient history could not be easily determined. An existing report was utilized and downloaded from the online data system (Quantifi, Pharmacy One Source 2016). Data were summarized according to the type of intervention as well as the outcome (accepted, declined, or unknown) of the intervention. Descriptive statistics were utilized to describe frequency data.

Results: Notes and interventions from six teams were analyzed. The teams included 96 students (15-18 students per team and 2-4 faculty members) supervised by 15 faculty members. Together these teams completed 265 visits for 57 patients. Overall, 64 (1.1 interventions per patient) interventions were identified from Quantifi versus 327 (5.7 interventions per patient) through progress note review. The most common interventions documented within progress notes were disease state counseling (n=50), labs assessed (n=41), patient counseling other (n=35), drug counseling (n=32), and patient referral (n=28). The most common interventions by Quantifi were vaccine recommended (n=20), patient counseling (n=13), and OTC recommendation (n=6). Two teams accounted for the majority (46.9%) of the Quantifi interventions. The other teams ranged from a low of 38 interventions to a high of 79 interventions.

Conclusion: In conclusion, more interventions were identified through progress note review than were documented on the online intervention system. Progress note review revealed greater impact than what was suggested through the online intervention system. These results suggest the need within the program for universal documentation instruction which warrants further investigation. Overall, the review does suggest that the program is substantially impacting the community through education and medication recommendations.

Submission Category: I.V. Therapy/ Infusion Devices/ Home Care

Submission Type: Descriptive Report

Session-Board Number: 5b-128

Poster Title: Evaluating the labeled and off-label indications of hospital-administered intravenous immunoglobulin therapy

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Purpose: Intravenous immunoglobulin therapy provides passive immunity for primary and secondary immunodeficiencies by increasing the antibody titer and antigen-antibody reaction potential. It is currently approved for several indications including: primary humoral immunodeficiency, chronic immune thrombocytopenic purpura, chronic inflammatory demyelinating polyneuropathy, multifocal motor neuropathy, chronic lymphocytic leukemia, and Kawasaki syndrome. However oftentimes, if clinicians perceive a patient benefit, intravenous immunoglobulin is utilized for off-label indications. The primary objective of this study was to evaluate and report findings for approved indications as well as non-approved indications for intravenous immunoglobulin therapy at Johns Hopkins Bayview Medical Center.

Methods: This was a single-center, retrospective chart review approved by the institutional review board at the Johns Hopkins Bayview Medical Center. The hospital is a tertiary care center primarily for adult patients. All patients who received intravenous immunoglobulin therapy from September 1, 2011 to September 1, 2016 were included. Data extraction software was used to obtain the records of patients who received inpatient administration. Patients who did not receive immunoglobulin therapy were not included. Age, gender, weight, name of intravenous immunoglobulin product, indication for use, and dose administered were collected from each record. The manufacturer labels for each intravenous immunoglobulin product were used to confirm approved indications.

Results: Health records were reviewed from 137 patients, all of whom received hospital-administered intravenous immunoglobulin. Ages ranged from newborn infants to 94 years with an average of 48 years. Privigen, the most frequently used intravenous immunoglobulin agent, was administered to 128 patients. Gamunex was administered to 9 patients. Intravenous immunoglobulin therapy was used for 35 different indications. Out of 137 patients, 47 patients received treatment for labeled indications: 34 percent of patients received intravenous immunoglobulin for idiopathic thrombocytopenic purpura, 21 percent for chronic inflammatory demyelinating polyneuropathy, and 10.6 percent for Kawasaki syndrome. 90 patients were treated for off-label indications: 16 percent for Guillain-Barre Syndrome, 8.7 percent for dermatomyositis, 8 percent for paraneoplastic syndrome, 5.1 percent for myasthenia gravis, 5.1 percent for necrotizing myositis, 5.1 percent for hyperbilirubinemia, 2.9 percent for scleroderma, 2.9 percent for pyoderma gangrenosum, and 2.1 percent for systemic lupus erythematosus.

Conclusion: This preliminary study identified potential off-label indications for the use of intravenous immunoglobulin therapy. Expanding the search of immunoglobulin therapy use to other hospitals, and collecting detailed information on the response to therapy and dosage used, can provide valuable information as to how immunoglobulin therapy is being used, and which conditions respond to immunoglobulin therapy. Ultimately, this data may lead to designing future placebo-controlled randomized trials that would evaluate the effectiveness of intravenous immunoglobulin therapy and subcutaneous immunoglobulin therapy for conditions that do not have current guidelines, consensus, or FDA indications.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 5b-129

Poster Title: Grants record of clinical faculty in the department of pharmacy practice

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Purpose: Scholarship and research are generally expected for clinical faculty in the department of pharmacy practice as part of their responsibilities, however a general lack of comfort in the ability to design and conduct research was reported, which is consistent with the decline in the average scholarly productivity. Besides publishing manuscripts, grant application is also a major component of scholarly activities, which has not been reported before. Our study checked the numbers and types of grant received by clinical faculty in an effort to better understand the current status of scholarly productivity in clinical faculty in the department of pharmacy practice.

Methods: A quantitative observational study was conducted to determine the number and types of grants received by clinical faculty in the department of pharmacy practice of pharmacy schools in the past 2.5 years in the US. The American Association of Colleges of Pharmacy (AACP) online news, "Faculty News" from January 2014 to June 2016 was utilized as the source to obtain grant data. The eligibility criteria for including data were as follows: 1) the recipient of grant must be a clinical faculty with active pharmacist licensure, 2) the recipient of grant must belong to the department of pharmacy practice, and 3) the research topic for the grant must be practice-based or academic-based. Grants in pharmacy administration and biomedicine, as well as Institutional awards, were excluded. In addition to the primary focus of the study, information such as recipient university, funding institute, grant type, and award amount were collected to analyze secondary endpoints. The data was analyzed using Microsoft Excel 2016.

Results: As of July 2016, there are 136 pharmacy schools in the US. On the contrary, only a total of 141 grants were awarded to the clinical faculty in the department of pharmacy practice in the past 2.5 years. The state or federal departments awarded 28 percent of the grants, while non-federal institutions awarded the rest 71.8 percent. Of the non-federal grants, 30.3 percent

were received from a variety of foundations, 21.1 percent from pharmacy and pharmaceutical companies, 10.6 percent form universities, and 9.9 percent from various organizations. The mean and median of the amount received from the state and federal departments were $429,159 (mean (SD) =600,681) and $148,331, whereas from non-federal sectors they were $122,172 (mean (SD)= 328,759) and $36,203, respectively. Even though state and federal funding agencies provided the least percentage of grants, they provided with the most amount. In addition, 70 percent of the pharmacy schools that received grants belonged to public universities, whereas only 30 percent belonged to private universities. Finally, Purdue University, a public university, received the most number of grants, namely 30 grants.

Conclusion: The study provided the statistics of grants received by the pharmacy practice faculty in the US from January 2014 to June 2016. The results demonstrated that the percentage of grant received by pharmacy practice faculty from federal funding agencies was much less in comparison to non-federal funding agencies. Moreover, the results depicted that out of all the non-federal funding institutes, various foundations awarded the maximum number of grants, followed by pharmacy and pharmaceutical companies. Unfortunately, “Faculty News” is generated from self-report of each pharmacy school, therefore our results may be limited by self-report bias and inaccuracy of the source data.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 5b-130

Poster Title: Implementation of an antimicrobial stewardship program on a medical unit at a community hospital compliant with 2017 Joint Commission standards: a 30-day pilot study

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Purpose: The Department of Health and Human Services, Centers for Medicare and Medicaid Services and Joint Commission proposed new rules in June 2016 requiring antimicrobial stewardship programs in all hospitals as conditions of participation in Medicare and Medicaid. In compliance with latest accreditation standards, Inova Loudoun Hospital expanded their antimicrobial stewardship from daily monitoring of all target broad-spectrum antimicrobials to include daily antimicrobial monitoring service on a medicine unit. This study was a 30-day pilot to the proposed antimicrobial expansion. The purpose of the pilot was to optimize clinical outcomes, and describe the type, frequency, and acceptance rate of antimicrobial recommendations.

Methods: Inova Loudoun Hospital, a 183-bed community hospital in Lansdowne, Virginia, conducted a 30-day pilot study, which included daily antimicrobial monitoring service of all patients on a 39-bed medicine unit. This initiative was added to an existing antimicrobial stewardship program, which monitors daily the use of the following target broad-spectrum antimicrobial agents- piperacillin/tazobactam, meropenem, ertapenem, linezolid, daptomycin, and aztreonam. The pilot study team included an attending infectious disease physician, two clinical pharmacy specialists and a fourth year pharmacy student. The pharmacy student rounded daily on all medicine unit patients receiving antimicrobials to evaluate their use for appropriate indication, selection, spectrum of activity, duration of therapy as well as appropriate use of broad specrum antibiotics, and therapy for longer than seven days. The use of a probiotic for primary prevention of Clostridium difficile-associated diarrhea was monitored in compliance with Inova Loudoun Hospital's policy for Clostridium prophylaxis. Objective parameters were collected from each patient including basic demographic information,

underlying diseases and infections, pertinent laboratory data including culture and susceptibility, and radiographic data. The student's antimicrobial stewardship recommendations were reviewed and approved by the clinical pharmacists and the infectious diseases physician. The number of accepted antimicrobial stewardship interventions was documented including the type of intervention, prescribing physician, and whether intervention was accepted or rejected.

Results: A total of 254 unique patients were screened during the pilot study from August 16th to September 20th, 2016. The average monitoring duration was 2.47 days, with a range of 1 to 14 days. A total of 104 unique antimicrobial interventions were suggested to Inova Loudoun Hospital physicians. The interventions made are as follows: 74 probiotic interventions for Clostridium difficile prophylaxis, 21 therapy de-escalations, 5 dose adjustments, 2 indication changes, 2 for duration of therapy change, none for selection. A total of 64 patients (29.5 percent) had an ID consult. Piperacillin/tazobactam was used most frequently used in 57 patients, followed by meropenem 20, ertapenem 6, linezolid 1, daptomycin 1, and aztreonam 1. Pharmacy documented two accepted interventions with regards to de-escalation of piperacillin/tazobactam therapy. The infectious diseases physician was consulted on at least 50 percent or higher of all the target antibiotics cases. No cases of target antimicrobial therapy longer than 7 days were documented. Non-target antimicrobials were varied and encompassing. Ceftriaxone (28 percent) was most frequently used in this category, followed by vancomycin (16 percent) and levofloxacin (12 percent). Vancomycin had the most interventions (8) with 2 (50 percent) accepted.

Conclusion: This pilot study was utilized to describe antimicrobial use for all patients on a medicine unit. Most frequently used antibiotics included piperacillin/tazobactam, carbapenem, ceftriaxone, vancomycin, and levofloxacin. This study was the pilot step in expanding Inova Loudoun Hospital's antimicrobial stewardship program according to new Joint Commission requirements. It helped identify areas of improvements where antimicrobial education should be provided to hospital prescribers and pharmacy staff. The study was also a valuable indicator for challenges and time commitment if implemented into the pharmacy workflow. Ultimately, multidisciplinary antimicrobial rounds on each hospital unit will be most beneficial to optimize clinical outcomes.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-131

Poster Title: Phytochemical analysis of stems, leaves, rhizome and roots of the medicinal plant Fallopia japonica (Japanese Knotweed)

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Purpose: Develop a solvent extraction and high performance liquid chromatography (HPLC) methodology to separate, identify, and quantify phenolic phytochemical constituents in different parts of the plant Fallopia japonica. Using this methodology we will: 1. Compare the levels of resveratrol, the resveratrol glucoside piceid and the anthraquinone emodin in stems, leaves, leaf petioles, and rhizomes of the plant. 2. Determine if the geographical location of the plant affects its phytochemistry.

Methods: Samples of Japanese Knotweed was harvested in August 2015 from several locations in the states of Vermont, New York, and Pennsylvania. Plant material was dried in a chemical fume chopped, sieved (< 0.5mm) and extracted in 30 volumes (w/v) of 70% methanol for 20 min at 70°C following homogenization utilizing a ultrasonication probe (Fisher Scientific). After centrifugation 20 µl of the supernatant was analyzed via HPLC (Shimadzu 20AD with a UV-vis photodiode array detector utilizing a C18 analytical column) utilizing a 3-100% acetonitrile gradient.

Results: HPLC fingerprinting chromatograms of methanolic extracts of various parts of the plant revealed a distinct pattern of phenolic compounds. Marked differences were also seen in the various layers of the rhizome bark with the most prominent compounds found in the middle yellow portion of the rhizome and root bark. The highest levels of resveratrol were found in the orange and yellow regions of the rhizome bark
Plants from various locations along the US east coast showed minor differences but most prominent phytochemicals were very similar in all rhizome samples.

Conclusion: The middle orange/yellow layer of the outside bark from plant rhizomes contains the highest levels of most of the phytochemicals especially reseveratrol found in Fallopia japonica. Some differences were noted in rhizome samples from different growth locations from Vermont to Pennsylvania perhaps due to known hybridization between plants between Fallopia japonica and Fallopia sachalinensis (Giant Knotweed). The rhizomes of this abundant often invasive plant provides a plentiful renewable resource for the important antioxidant dietary supplement resveratrol.

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Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-132

Poster Title: Assessment of common health conditions self-treated by Hampton University's pharmacy community

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Purpose: Over-the-counter (OTC) products are the products that can be purchased without a prescription and can be used for self-treatment of many health conditions. Self-treatment using OTC products is commonly observed amongst healthcare professionals. The purpose of this study was to assess the most common health condition being self-treated by student pharmacists and pharmacists at Hampton University, Hampton, VA using the OTC products, and to identify the most important factor affecting the decision of student pharmacists to self-treat with OTC products.

Methods: This institutional review board approved questionnaire-based cross-sectional study with sample size of 158 for student pharmacists and seven for pharmacists was conducted during the spring semester of 2016 to assess the use of OTC products for self-treatment of health conditions such as allergies, cold/flu, sleep deprivation, pain and for first-aid care. Student pharmacists from the four professional school years and pharmacists from the department of pharmaceutical sciences were included in the study. The study participants were read an oral consent that described the study and they provided consent by turning in the questionnaire. The participants that denied participation were excluded from the study. A five-point Likert scale was utilized to assess participants' attitude towards taking OTC products for the above-mentioned conditions. The participants were also asked to rank their preference to self-treat each of the conditions as well as to determine the most important factor affecting their decision to self-treat with OTC products. The primary objective of the study was to determine the most common condition being self-treated by student pharmacists using the

OTC products and the secondary objective was to determine the most important factor affecting the decision of student pharmacists' to self-treat with OTC products. The results obtained from analyzing the questionnaires of student pharmacists were then compared to that of the pharmacists to identify the trend between the two sample groups.

Results: Self-treatment preference questionnaires of 158 student pharmacists and seven pharmacists were analyzed using five-point Likert scale.The data demonstrated that 84.2 percent of the 158 students either agreed or strongly agreed to self-treat for pain, while only 9.5 percent either disagreed or strongly disagreed to self-treat. Whereas 64.6 percent of the student pharmacists either disagreed or strongly disagreed to self-treat for sleep deprivation, only 20.9 percent agreed. Based on the top two ranking preference choices, 58.78 percent of the student pharmacists preferred pain to be self-treated with OTC products, followed by allergies (51.4 percent), cold/flu (43.6 percent), first-aid care (34.0 percent), and lastly, sleep-aid (14.09 percent). Amongst pharmacists, 71.43 percent preferred allergies to be self-treated the most, while sleep deprivation to be self-treated the least (14.29 percent) with OTC products. 37 percent of the student pharmacists chose "easy access" as the most important factor affecting their decision to self-treat with OTC products. This was followed by minor illness (28 percent), sufficient pharmacological knowledge (21 percent), more cost effective (eight percent), and finally, other (six percent of the seven pharmacists, easy access, minor illness, and sufficient pharmacological knowledge were equally the most important factors affecting their decision to self-treat with OTC products.

Conclusion: Based on the results obtained from the analysis of the self-treatment preference questionnaires, it is concluded that pain is the most common condition to be self-treated using OTC products by student pharmacists, and easy access to OTC products is the most common factor affecting student pharmacists' decision to self-treat with OTC products at Hampton University. Amongst the pharmacists at Hampton University, allergies is the most common condition to be self-treated using OTC products, and minor illness, easy access, and sufficient pharmacological knowledge are all equally preferred most common factors affecting their decision to self-treat with OTC products.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 5b-133

Poster Title: Effectiveness of topical extemporaneously compounded formulation of timolol 0.5% gel in patients with infantile hemangioma.

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Purpose: Infantile hemangioma (IH) is the most common vascular tumor in childhood, with prevalence in the first year of age of 10%. Propranolol is currently an effective treatment option; and because of his systemic effect, but only is indicated in patients older than 6 months of age. Timolol a beta blocker used in eye glaucoma also has shown effectiveness as topical formulation in neonates and pediatric patients with IH in European populations.
The porpouse is to Evaluate the therapeutic effectiveness of topical extemporaneously compounded formulation of timolol 0.5% gel in a group of patients with diagnosis of superficial infantile hemangioma.

Methods: An open prospective observational study at the Children's Hospital of the California´s in Mexico was performed in childrens diagnosed with infantile hemangioma, between the ages of 1 to 8 months. Patients were treated with extemporaneously compounded formulation of timolol 0.5% gel prepared by the pharmacist, administered topically every 12 hours. The treatment efficacy was assessed using a visual scale clinical improvement by the dermatologist, and safety of timolol was determined based on the adverse effects reported.

Results: 51 patients were treated in the period of May 2015 to 2016, 47% female and 53% male. The IH location was mainly in head and neck (59%). The effectiveness was presented in 88% of the patients with a rating of excellent and good treatment, reflected in the decrease in size and coloration of the hemangioma. Treatment had an average duration of 5.0 ± 2.2

months. Side effects were presented in 8% of the patients. Along the study 375 extemporaneously compounded formulations of timolol were elaborated by the pharmacist.

Conclusion: Topical timolol 0.5% gel proved to be an effective and safety option to reduce the size and coloration of infantile hemangioma in neonate and pediatric patients. In addition to being an important alternative to considered when systemic treatment is contraindicated.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 5b-134

Poster Title: Review of urinary tract infection management for patients admitted to the emergency department: assessment of adherence to guidelines and identification of hospitalization criteria

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Purpose: Community-acquired urinary tract infection (UTI) is one of the most common indications for antibiotic prescription. Previous studies on the adherence to guidelines on antibiotic use reported a prevalence of inappropriate prescriptions varying from 20 to 50%, both in the community and hospital settings. The misuse of antibiotics not only have an important economic impact but can also lead to therapeutic impasses.
This study aimed at establishing the current management of UTIs for patients admitted to the emergency department (ED) of our hospital.

Methods: In this retrospective observational study conducted between January 2015 and May 2016, consecutive patients admitted to the ED for a suspected UTI were included, including patients hospitalized (n=50) or discharged (n=50) after their ED admission. Assessment of adherence to guidelines for antibiotic prescription was conducted using the guidelines of the French-speaking society of infectious disease (SPILF).

Results: In the hospitalized group, 22 (44%) antibiotic prescriptions initiated at the ED did not comply with national guidelines. The two main causes for inappropriate prescriptions were the use of two antibiotics in patients with no severity criteria (15, 68%) and/or the use of a non-recommended drug (6, 27%). In this group, 17 (35%) antibiotic prescriptions ordered by the urologist on patients' discharge did not comply with national guidelines. The two main causes

of inappropriate prescriptions were the use of a non-recommended drug (9, 53%) and an inadequate duration of treatment (9, 53%).
In the discharged group, 29 (60%) of the antibiotic prescriptions ordered at the ED did not comply with national guidelines. The two main causes of inappropriate prescriptions were an inadequate duration of treatment (23, 79%) and the use of a non-recommended drug (19, 66%).
We could also identify discrepancies between reasons for hospitalization in our cohort compared to the criteria for hospitalization mentioned in the national guidelines.

Conclusion: This study has identified areas of improvement for the management of UTIs in our hospital. Our suggestions for optimisation include educational materials and a decision tree displayed at the ED, and specific therapeutic protocols in our computerized prescription system.

Submission Category: Critical Care

Submission Type: Descriptive Report

Session-Board Number: 5b-135

Poster Title: Evaluation of a Digestive tract Selective Decontamination protocol in an critical care unit

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Purpose: To evaluate the adequacy of Digestive tract Selective Decontamination (DSD) protocol and the impact on the incidence of nosocomial infections (NIs) and multi-drug resistant bacteria (MRB) among patients hospitalized in an critical care unit (CCU).

Methods: Retrospective, descriptive study of patients included in the protocol for 6 months (from 02/01/2015 to 08/31/2015). The protocol consists of the following administration: 1. Broad-spectrum antibiotic during first 4 days; 2. Topical non-absorbable antimicrobials for the oropharynx (cream) and digestive tract (oral suspension (OS)) as compounding containing colistine, tobramycin, nystatin +/- vancomcyn; 3. Hand hygiene and sanitation; 4. Cultures at hospitalization and then weekly to control efficacy and resistance. Compounding, prepared by the Pharmacy Department, were dispensed in unit doses, reducing the risk of contamination. The MIXED DSD protocol included: cream, mupirocin cream (nasal route) and OS; STANDARD DSD protocol: cream and OS. Demographics data, average length of stay in CCU, symptoms and reason of prescription were gathered through electronic health record. These last two data were compared with the ones specified in the protocol. Symptoms: a) Orotracheal intubation >72 hours (OTI); b) Decreased level of consciousness (GCS≤11); c) Necrohemorrhagic pancreatitis; d) Radical esophagogastrectomy; e) Neutropenia. Prescription options: 1. MIXED a) Patients from other hospital (EXTERNAL) and patients admitted in our hospital for more than 72 hours (INTERNAL) and MRSA negative samples; b) Carriers of MRSA before and during hospitalization) 2. STANDARD (remaining patients). Data collected from the Spanish National

Study of Nosocomial Infection Control were utilized to measure the frequency of infection, comparing this period with the one without DSD (from 02/01/2014 to 08/31/2014).

Results: In this protocol were included 96 patients with a mean age of about 59 years and an average length of stay in CCU of 16 days. The distribution of symptoms was as follows: 75% OTI, 21% GCS≤11 and 4% neutropenia. Of the 96 patients, 47% started the MIXED treatment (67% INTERNAL, 23% EXTERNAL and 10% carriers of MRSA); 23% changed the treatment to a STANDARD one after MRSA negative samples. The remaining 53% started a STANDARD treatment. When evaluating the adequacy to the protocol, 91% of prescriptions fulfill the criteria for use, being the main cause of failure the wrong way of prescription.
The number related to incidence of NIs decreased from 19.14 to 7.14 for each 100 patients (reduction of 62.69%); ventilator-associated pneumonias (VAPs) from 2.4 to 1.74 per 1000 days of mechanical ventilation (MV) (reduction of 27.5%); central venous cateter-associated bloodstream infections (CVC-BSIs) from 8.66 to 4.8 episodes per 1000 days of CVC (reduction of 44.57%). There wasn´t any MRB to antimicrobials associated with DSD.

Conclusion: There was a high protocol compliance.
We reached the expected reduction related to incidences of NIs and CRBSIs according to published bibliographic data, being VAP susceptible to be reduced.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-136

Poster Title: Efficacy and Safety of Tigecycline for patients with Multidrug-Resistant Acinetobacter baumannii Infection

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Purpose: Acinetobacter baumannii(A. baumannii) is one of the major cause of nosocomial infections and sepsis in severe ill patients. Carbapenem antibiotics are used for serious A. baumannii infection, however, carbapenem-resistant A. baumannii is increasing worldwide. In recent years, multidrug-resistant A. baumannii (MDRAB) has been an emerging problem and the treatment of it's infection is difficult. Because treatment options are limited for MDRAB infection, tigecycline is considered to be the drug of choice for MDRAB infection. In this study, we aimed to evaluate the efficacy and safety of tigecycline for patients with MDRAB infection.

Methods: We retrospectively analyzed medical records of patients who received tigecycline for longer than 4 continuous days intravenously for MDRAB infection from January 2010 to December 2015. We reviewed WBC, hs-CRP, procalcitonin (PCT) and negative conversion of cultures in order to determine the clinical effect.

Results: Among 61 patients who received tigecycline treatment for MDRAB in this period, 43 patients were included in this study. The 27 (62.7%) patients were male, and mean age of patients was 62.9 ± 15.2 years. The average treatment duration of the tigecycline was 15.9 ± 10.5 days and median length of the stay in hospital was 68.8 ± 43.6 days. There were no significant differences in WBC before and after tigecycline treatment (p=0.538) but hs-CRP, PCT was significantly reduced (p 〈0.05). Twenty-two patients (51.2%) received tigecycline monotherapy and 21 patients in combination with other antibiotics. There were no significant differences in clinical efficacy between the two groups (p=0.907). In outcomes measure, the total therapeutic response rate showed 62.8%. Twelve patients was shown to increase hepatic

enzymes or bilirubin. And three patients were experienced GI problems including nausea, vomiting and hiccup. But serious adverse event was not observed.

Conclusion: Our findings suggest that tigecycline may be safe and effective option for seriously ill patients with renal failure in the treatment of MDRAB infections. However, more prospective, controlled trials are required to objectively evaluate the efficacy and safety of tigecycline in MDRAB infection.

Submission Category: Geriatrics

Submission Type: Evaluative Study

Session-Board Number: 5b-137

Poster Title: Salivary biomarkers in Alzheimer's disease

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Purpose: Currently, there are several studies for the early diagnosis of AD through saliva. It seeks to identify the presence of substances such as Aß peptide and p-tau, as biomarkers. These tests are non-invasive and subsequent analysis is performed by the ELISA method, which is highly sensitive. Salivary levels of Ab42 can be seen as a potential marker of AD, cooperating to the exclusion of other types of degenerative disorders. Ab42 levels differ in control subjects without mild dementia, and risk markers for the development of AD patients.

Methods: This is a case-control study in patients with probable diagnosis and cognitively healthy patients without AD, which had as research centers the cities of São Paulo and Cuiaba, respectively the capitals of the states of São Paulo and Mato Grosso , in Brazil.Were invited to participate in this experiment, 120 elderly, arranged:
without AD Group: 60 cognitively healthy individuals without diagnosis of AD, aged over 60 years old, coming from the Laboratory of Vestibular Rehabilitation Master's Program in Vestibular Rehabilitation and Social Anhanguera University Inclusion in São Paulo - SP.
Group DA: 60 patients with probable diagnosis of AD, coming from the Geriatric Center in Cuiabá - Mato Grosso.Saliva was collected using vials Salivette® type, which consist of plastics tubing containing a cotton roll and a plastic filter. Immediately after the collection, the saliva were stored in refrigerator under the temperature of - 20 ° C, and kept stored up to p time they were processed to read the results.
After being removed from the freezing temperature, the saliva were subjected to centrifugation for five minutes at 3000 revolutions per minute (rpm).
At this point, call processing of samples, cotton Salivette® was discarded, and the separated saliva aliquots of 200 uL type in Eppendorf tubes for quantitation of the Aß-peptide and tau protein by ELISA.

Results: In the graph showing the concentrations of T-tau expressed in the saliva of healthy patients and patients with AD, we found that the T-Tau expression in patients (86.7 ng / ml) is significantly higher compared to patients without oF (134.4 ng / ml), confirming the hypothesis that t-tau can be used as biomarker for AD. In the graph that shows the concentration of Ab42 in the saliva of patients without AD and DA, it was observed that the variation, although small, points to higher concentrations of Ab42 in AD patients (11.47 pg / ml).

Conclusion: The experimental results and their respective validation by the literature search allowed to take as a possible outcome the following points. • The reduction in T-Tau expression and increased tau-p salivary occurred in the same group of patients with probable AD, there demonstrating viability for the use of these substances as biomarcadores.Novos are needed, involving the assessment of salivary expression substances such as beta amyloid peptide and tau protein to demonstrate the involvement of these components in patients with AD.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 5b-138

Poster Title: Evaluation of chemotherapy-related medication errors intervened

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Purpose: Chemotherapy is for treating cancer with anti-cancer agents. Chemotherapy may differ in dose or administration schedule based on the body surface area (BSA) and laboratory results of the individual patient, and the regimen is complicated by the variety of drug kinds, dosages and usages. In addition, the therapeutic index is narrow. So, if a medication error has occurred, it could have a serious effect on the patient, including death. The purpose of this study is to analyze the type and incidence of chemotherapy-related medication errors (ME), and to find very frequent or critical errors to prevent their potential occurrence.

Methods: Medication errors can occur at any time of the prescribing stage, the dispensing stage, and the administering stage respectively. Among them, we conducted the study with only ME found before preparation, in other words at the prescribing stage. We screened 11,244 chemotherapy-related prescriptions for outpatients and inpatients at Daegu catholic university medical center (DCUMC) from 1 October 2014 to 31 October 2015. Of these prescriptions, we reviewed the cases that had potential to harm patients and violate the process to decrease efficiency at the preparing stage. For this period, 437 ME cases occurred, resulting in interventions by pharmacists during their daily routine practice in the chemotherapy preparation room, they were submitted in error reports in the Electronic medical record (EMR). These interventions were based on patients data available on the EMR and drug-specific information, and investigated by two research pharmacists retrospectively. The analysis was classified by 9 categories: (the diluent, the dose, the administration schedule, the drug code of DCUMC, the omission of medication order to be scheduled, the prescription route, the mix group, the economics of anti-cancer agents, and others), and their type and frequency were analyzed. In general, the diluent category covered the drug adequacy, concentration, stability,

and the volume of diluents. This study was performed by detecting the prescriptions actually modified, excluding those modified by the needs of physicians.

Results: During the study period, the total number of ME was 437. Prescription route errors were the most common at 123 cases (28.1%). These involved cases in that general drugs were prescribed to the chemotherapy preparation room or anti-cancer agents that are required to be mixed were prescribed to the inpatient pharmacy. The following 110 cases (25.2%) consisted of an incorrect diluent including serious mistakes confusing dextrose in water with normal saline. Next, incorrect dosage of drug category (52 cases, 11.9%) contained cases prescribed with doses calculated by the individual BSA of the wrong patient, doses beyond the safety range of the drug, doses written in grams instead of milligrams, and doses reduced incorrectly. And a mix group designated incorrectly (61 cases, 14.0%) were next, as well as many administration schedule errors contrary to regimens reflecting the type of tumor (15 cases, 3.4%) and uneconomic drug prescriptions (14 cases, 3.2%). Other than that, there were drug code errors (6 cases, 1.3%), medication order omissions (5 cases, 1.1%), and other errors (51 cases). Some of the other errors included fatal administration route errors such as a change from intrathecal injection to intravenous injection or from intravenous injection to subcutaneous injection.

Conclusion: Pharmacy interventions among the staff could reduce the number of ME before the dispensing stage and the administering stage. In order to reduce ME, both pharmacists and other staff need to be encouraged to report ME. Besides, It is necessary to develop a chemotherapy assistant program to find and prevent the incorrect route or the incorrect diluent errors that occur frequently, instructing pharmacists to know before preparation. And appropriate education training for prescribers as well as pharmacists should be delivered.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 5b-140

Poster Title: Efficacy of fish oil-based versus soybean oil-based fat emulsion in the occurrence of parenteral nutrition-associated liver disease in premature infants

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Purpose: Administration of parenteral nutrition (PN) is critical for growth and effect of therapy in premature infants. However, in many of these infants, long term PN is associated with development of PN associated liver disease (PNALD). Recent reports show that omega-6 fatty acid in the soybean oil fat emulsion may be responsible for promoting PNALD. Fiish oil fat emulsion have been used in preterm infants for their reduction effect of PNALD. The aim of this study was to evaluate the effect of fish oil fat emulsion and soybean oil fat emulsion on the occurrence of PNALD in PN dependent preterm infants.

Methods: This study was designed for the premature infants who administered PN with lipid emulsion for at least 4 weeks at Seoul St. Mary's hospital's neonatal intensive care unit. Between September 2013 and February 2014, preterm infants who received PN with soybean oil fat emulsion were classified as SO group. And between September 2014 and August 2015, preterm infants who received PN with fish oil fat emulsion were classified as FO group. To evaluate the liver toxicity, we investigated the change of aspartate transaminase (AST), alanine transaminase (ALT) and direct bilirubin (DB) on the first day and the final day of PN. Also, to evaluate the nutritional status, we investigated the change of weight, total protein, albumin and triglyceride (TG) on the first day and the final day of PN.

Results: 74 patients were included in the study. 32 premature infants were included FO group. And 42 premature were included SO group. The change of AST was decreased 0.5 IU/L in FO group. But the change of AST was increased 8.5 IU/L in SO group. This result showed statistically

significant difference (P=0.02). The change of ALT and DB were increased 13 IU/L, 0.18 mg/dL in FO group and 27.5 IU/L, 0.53 mg/dL in SO group. These results showed no statistically significant difference. The change of weight, total protein were no significant difference. But the change of albumin level in FO group was significant greater than in SO group (0.74 mg/dL versus 0.46 mg/dL, P=0.01). Also, the change of TG level was decreased 90 mg/dL in FO group and increased 4.5 mg/dL in SO group (P=0.03).

Conclusion: Compared with the two groups, there was a significant decrease in AST of FO group. And the increase of albumin, TG level in FO group were significantly greater than SO group. In conclusion, this study suggests that fish oil fat emulsion may give the result for the effective decrease of the risk of PNALD. Also, fish oil fat emulsion was effective in the improvement of nutritional status in preterm infants.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-141

Poster Title: Efficacy and safety evaluation of pegfilgrastim in patients with non-Hodgkin's lymphoma

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Purpose: Myelosuppressive chemotherapy-induced neutropenia must be considered as an extremely serious condition, because it makes the body vulnerable to bacterial and fungal infection and can lead to life-threatening complications including sepsis.
Pegfilgrastim(Neulasta®) is a PEGylated form of the recombinant human granulocyte colony-stimulating factor (G-CSF) analog filgrastim. Compared to other G-CSFs, pegfilgrastim is approved for prophylactic use in patients with nonmyeloid malignancies receiving myelosuppressive anti-cancer drugs associated with a clinically significant incidence of febrile neutropenia.
In this study, we aimed to assess the efficacy and safety evaluation of pegfilgrastim in 'real world' patients receiving chemotherapy regimens associated with a high neutropenia risk.

Methods: This retrospective study utilized data from patients who received first cycle of CHOP(cyclophosphamide, doxorubicin, vincristine, prednisolone or dexamethasone), R-CHOP(rituximab-CHOP), ICE(ifosfamide, carboplatin, etoposide), DHAP(cisplatin, cytarabine, dexamethasone), ESHAP(etoposide, methylprednisolone, cisplatin, cytarabine) chemotherapy for Non-Hodgkin's lymphoma(NHL) at Seoul St. Mary's hospital from March 2014 to August 2014. Subjects using pegfilgrastim(Pegfilgrastim group) were compared with those not using pegfilgrastim(Control group).

Results: A total of 56 patients, 29 patients were pegfilgrastim group and 27 patients were control group. The incidence of chemotherapy-induced neutropenia was significantly lower in the pegfilgrastim group than in the control group(37.93% vs. 81.48%, p=0.0009). Even though

the incidence of chemotherapy-induced febrile neutropenia was lower in pegfilgrastim group than in the control group(10.34% vs. 25.93%, p=0.171), there was no statistically significant difference between two groups. Adverse event occurred in only 1 patient in the pegfilgrastim group.

Conclusion: In NHL patients receiving myelosuppressive chemotherapy regimens associated with a high neutropenia risk, pegfilgrastim prophylaxis significantly reduced the incidence of chemotherapy-induced neutropenia. Therefore, prophylactic use of pegfilgrastim is considered as a suitable treatment for these patients. Further investigation is needed to evaluate the safety and cost-effectiveness of pegfilgrastim in NHL patients with febrile neutropenia.

Submission Category: Pain Management

Submission Type: Evaluative Study

Session-Board Number: 5b-142

Poster Title: Under optimized multimodal analgesia after major joint replacement surgeries in Korean national sample: focusing on the utilization of acetaminophen

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Purpose: Best available evidence on perioperative pain management recommends the use of multimodal analgesic therapy for all postsurgical cases. Component therapies of multimodal analgesia remain widely variable, however, the use of acetaminophen in postsurgical patients is consistently recommended by practice guidelines. The main goal of this study was to assess the use of postsurgical acetaminophen to predict national-level utilization of multimodal analgesia after major joint surgeries in Korea.

Methods: Using the Health Insurance Review & Assessment Service-National Patient Sample (HIRA-NPS) extracted from the entire population of the Korean National Health Security System (2014) applying a stratified randomized sampling method. Subjects were those who underwent knee replacement or total hip replacement surgeries. All available dosage forms of acetaminophen in Korea, such as extended-release tablet, syrup, or sterile injection solution of propacetamol were considered. Patients were regarded to have acetaminophen for their acute postoperative pain if they received acetaminophen dose more than 3,000 mg per day over two consecutive days.

Results: Among 10,771 patients of total knee and hip replacement surgeries in 2014, the average total caring periods related to the surgeries including discharge medications in 1,450 acetaminophen users were 41.8 days (minimum 0 day, maximum 161 days). For 9,321 patients who were not received acetaminophen, the average total caring periods were 35.9 days (minimum 0 day, maximum 208 days). The use of acetaminophen for acute postsurgical pain management was 13.5% (N= 1,450), which was fairly conservative compared to that of in the United States. The mean usage period of acetaminophen was 11.3 days (minimum 2 days, maximum 91 days), and the mean dose of acetaminophen per person per day was 1,942.4 mg (minimum 640 mg/d. maximum 8,000 mg/d).

Conclusion: According to the results of the analysis, the use of acetaminophen for postsurgical pain management is under optimized in major joint replacement surgeries in South Korea. It indicates limited utilization of multimodal analgesia for postsurgical patients in South Korea.

Submission Category: Pediatrics

Submission Type: Descriptive Report

Session-Board Number: 5b-143

Poster Title: Management of surgical pain with dexketoprofen on pediatric patients of a Mexican Hospital

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Purpose: Dexketoprofen is the dextro-rotatory enantiomer of ketoprofen, an NSAID derived from the propionic acid. Is documented its efficacy in the management of postsurgical pain in patients after 12 years with usual doses of 50 mg every 8 or 12 hours, and maximum of 150 mg per day. At the Hospital Infantil de las Californias (HIC), dexketoprofen is used since the year 2008, usually in combination with other analgesics. Through the review of files, we show the prevalence and management of this drug in patients treated in the Ambulatory Surgery Center (CCA) of this hospital and the utility in pediatrics patients.

Methods: A retrospective study was conducted with the information contained in the files of the patients who had a surgical procedure during the year 2015, selecting a random sample of 300 files of a total of 859 corresponding to that period. A format was developed to collect the necessary information about the patients and the procedures performed. The documented variables were -file number, age, weight, sex, surgery(s) practiced(s), date, implementation and results of the scale for the measurement of pain (VAS and/or BPS), concomitant drugs (differentiating narcotics of other analgesics and drugs for other purposes), dose, route of administration, dosing interval, moment(s) of administration (pre-surgical, trans-surgical and post-surgical) and number of doses. The analysis of the information was carried out using the statistical program Statistical Package for Social Sciences® (SPSS®) version 21.0, for Windows.

Results: 300 files of patients that had some surgical procedure were reviewed: 185 men (62%) and 115 women (38%). Their ages were between 20 days and 18 years. The medical specialties in which surgical procedures were undertaken were -pediatric surgery (40%), orthopedics (18%), Ophthalmology (17%), Pneumology (8%), lip and palate (6.3%), otorhinolaryngology (5%), gastroenterology (3.7%), plastic surgery (1%), and 1 per cent other surgeries. In 118 patients (39%) dexketoprofen was administered; doses handled were 0.13-1.79 mg/Kg, with an average±SD 0.89±0.23 mg/kg intravenously. The concomitant analgesics were metamizole, fentanyl, nalbuphine and morphine and in only 16 patients the treatment of the pain was just with dexketoprofen. In 84% of the patients was applied the scale of Visual Analog Scale for assessment of pain.

Conclusion: Besides the fact that there is currently controversy about the use of dexketoprofen in individuals under the age of 12 and that in Mexico is not recognized its use in Pediatrics, the Hospital Infantil de las Californias has used this analgesic without showing adverse reactions. The analysis of 300 files of patients with some surgical procedure in the ASC of HIC showed that 39 per cent of them were administered this analgesic with an average effective dose of 0.89 mg/kg intravenously. These results help us to create a protocol for further efficacy and safety analyses.

Submission Category: Clinical Services Management

Submission Type: Evaluative Study

Session-Board Number: 5b-144

Poster Title: Incorporation of pharmacy services at an advanced plastic surgery center in Tijuana, Mexico.

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Purpose: The hospital TjPlast is an institution that specializes in procedures of plastic, aesthetic and reconstructive surgery performed in a professional manner and with high technology, which is why it took the initiative to incorporate a pharmacy specialist to the group of quality professionals that are already working in the institution beginning with activities focused on optimizing the distribution and dispensing of medicines and health products.
Assess the impact of the incorporation of the pharmacist in the area of plastic surgery in activities related to management medication use.

Methods: An space was settle for the pharmacy and we modified manuals and formats of distribution activities and dispensing medicines and medical supplies was organized.
The impact assessment was carried out by statistics that illustrate the type of procedures performed, the amount of dispensed medicines and the therapeutic group that they belong to, efficient use of drugs as well as internal reports of perceived improvements after incorporation of the pharmacist.

Results: During the period May 2016 to July 2016, we managed to implement a hospital pharmacy in TjPlast, which meets the requirements set by current regulations. Medication use was assessed and process improvements medication stages were performed. Health personnel reported that delays or cancellations of surgeries due to lack of drugs decreased by 80%. Pharmaceutical care in 116 patients was achieved. The main therapeutic groups dispensed were: Antibiotics (32%), anti-inflammatories (26%), anesthetics (19%).

Significantly, most plastic surgery clinics in Mexico do not have pharmacists for the proper use of medication. For this reason we consider important the inclusion of the pharmacist in this type of service.

Conclusion: The incorporation of the pharmacist had a positive impact as it provides knowledge towards continuous improvement for the safety of patients, but there are even more activities that can be develop to promote the correct use of medication, which is to implement later.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 5b-145

Poster Title: Design and Development of a Modular Compounding Starter-Kit

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Purpose: Pharmacists are authorized by law to perform compounding through a validated prescription or order issued by a licensed prescriber. The practice of compounding consists on the mixing, combination, and alteration of drug ingredients, which enables the pharmacist to provide medications and novel dosage forms tailored to meet individual patient's needs. Nowadays, compounding is re-emerging as a pharmacy specialty with a tremendous potential for professional development and financial opportunities for retail pharmacists. The aim of our proposal was to design an innovative modular compounding starter-kit for non-sterile compounding in community pharmacies in Puerto Rico, and encourage pharmacists to venture into compounding.

Methods: A comprehensive literature review was conducted to scope the need and market opportunities for pharmaceutical compounding globally, and to assess the existence of a modular compounding kit similar to our proposed unit. In addition, a group of ten independent community pharmacy owners were interviewed to inquire about their willingness to incorporate compounding services in their pharmacies using our proposed modular unit. Selected pharmacies were identified from strategic locations in Puerto Rico with representation from all cardinal points of the island. Investigators contacted pharmacy owners via phone or personal visit and requested their consent to give a brief orientation about the product. After the orientation, the pharmacy owner was given a brochure describing our proposed modular compounding starter-kit, and was also requested to complete an 8-item questionnaire in order to assess their receptiveness to our novel unit.

Results: Findings from our literature review revealed a trend of stable growth of the pharmaceutical compounding market globally due to rising demand for personalized medicines to meet individual patient needs. However, no modular compounding units intended for use in community pharmacies were identified from our search. Among surveyed pharmacy owners, only 70% were engaged in compounding activities and reported an average of 16 compounding prescriptions per month. Eighty-percent of participants agreed that the compounding market in Puerto Rico has a potential for growth, and 50% were willing to invest in compounding. Regarding the pharmacy owner's receptiveness to the modular compounding starting kit, 90% agreed it is an innovative and interesting concept, and 80% reported their willingness to acquire the unit if available in the market.

Conclusion: Based on the feedback received from interviewees, a prototype of the compounding starter kit was built following the minimum legal requirements for non-sterile compounding stated by the Pharmacy Law of Puerto Rico and Regulation 156. Our novel Starter-Kit was designed to meet the required standards to help pharmacies engage in compounding in a fashionable, simple, professional, and affordable way. If performed professionally and following the highest standards, pharmaceutical compounding throughout a portable modular unit offers the the independent community pharmacists an opportunity to increase its profits, but most important, it will increase pharmacist's and patient's satisfaction with individualized therapeutic care.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 5b-146

Poster Title: Antibiotic dispensing patterns in community pharmacies in Minia, Egypt : a simulated patient study

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Purpose: Although antibiotics saved countless number of lives since their discovery, recent reports have confirmed that we are rapidly approaching a time when minor curable infections will become deadly. Being the first point of contact with patients, community pharmacies play a crucial role in the regulation of antibiotics self-medication in developing countries. This is evident in Egypt, where lack of antibiotic dispensing regulations made rational use of antibiotics totally dependent on the attitude and knowledge of pharmacy staff. Thus, the aim of our study is to evaluate the quality of community pharmacies' practices toward self-medication with antibiotics in Minia governorate, Egypt.

Methods: Patient simulation methodology was employed as a tool for evaluation. Four trained undergraduate pharmacy students acted as simulated clients who visited randomly selected community pharmacies in Minia Governorate, Egypt (n=100) asking for amoxicillin. The simulated patent was a 40 year-old male with low grade fever and productive cough with purulent green sputum and malaise that was persistent for 3 days. The diagnosis should be made as a case of acute bronchitis. The SP is allergic to penicillin. SP has no prescription and has not been diagnosed by a GP. No information was provided to the pharmacy staff until being requested. The visits were recorded and filled in a standard data collection form by the SP, after completion of each visit immediately with the aid of a co-observer in order to minimize recall bias. The measured variables were: pharmacy demographics, service provider, asking about patient characteristics and dispensing patterns. The visits were done in different times to assure variability. The service provider profession (either being a pharmacist or not) was estimated by

one SP and confirmed with a second visit from another simulated patient in which the SP asked for the pharmacist directly.

Results: In 100 community pharmacies, 52.63% of service providers were pharmacists, 18.95% were pharmacy assistants, 3.16% were pharmacy assistants who referred the case to a pharmacist, 17.89% were sellers and 1.05% were pharmacy students. Generally, 95.7% dispensed amoxicillin (AMX) for the SP. Sixty nine percent of community pharmacies dispensed AMX to the SP without even knowing the reason of the request or checking symptoms. AMX was dispensed in 28.57 % of pharmacies after asking about symptoms. Only one percent abstained from dispensing AMX after knowing the symptoms and 1.09% did not ask about symptoms and did not dispense AMX. 95.6% of community pharmacies dispensed AMX without asking to see a prescription and 94.5% dispensed AMX without asking about previous diagnosis with bacterial infection. 5.61 % of pharmacies asked about previous diagnosis or a prescription before dispensing. 80% of pharmacies dispensed AMX after knowing that the SP has neither a prescription nor a previous diagnosis with bacterial infection. Surprisingly, 96.7% of pharmacies did not ask about penicillin allergy. Only 1.09% asked about allergy and dispensed cefadroxil as alternative while 1.09% abstained from dispensing AMX after asking about drug allergy. 100% of community pharmacies provided no counselling about the adverse reactions of AMX.

Conclusion: Although the majority of service providers were pharmacists, patient simulation shows a dangerously low level of community pharmacies' practices toward dispensing antibiotics. The current attitude and knowledge of pharmacy staff in Minia, Egypt toward dealing with acute bronchitis infections or dispensing antibiotics particularly are highly incompetent in facing the phenomenon of self-medication with antibiotics.

Submission Category: Small and Rural Pharmacy Practice

Submission Type: Evaluative Study

Session-Board Number: 5b-147

Poster Title: Evaluating the potential overuse of short acting inhalers in patients with chronic obstructive pulmonary disease (COPD) in a community pharmacy

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Purpose: The purpose of this study is to assess the potential overuse of short acting inhalers in patients with chronic obstructive pulmonary disease (COPD) in a community pharmacy setting and make necessary interventions if needed. People with COPD are often using their short acting inhaler multiple times per day, indicating they are currently uncontrolled. These people may need additional therapy or counseling on proper inhaler technique. It is at this point pharmacists can provide the necessary intervention by recommending additional treatment to a physician, counseling on proper inhaler technique and use, or counseling on smoking cessation.

Methods: Subjects were recruited from a community pharmacy's prescription records and were included using predetermined criteria. Fill history data was collected on all prescriptions of albuterol HFA inhalers: ProAir©, ProAir Respiclick©, Ventolin©, and Proventil© filled from 01/01/2016 to 08/15/2016. Daily reviews of all short acting inhaler prescriptions were conducted. Subjects who could be contacted in person were asked if they would consent to complete a standardized, validated questionnaire to determine their COPD Assessment Test (CAT) and Modified Medical Research Council (mMRC) dyspnea scale scores. An alert note was placed with the inhaler for any subjects refilling a prescription. If the subject could not be contacted in person, a phone call was made and the same procedure was performed telephonically. Based on their scores, subjects were categorized according to the Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines and their current medications were assessed. If it was determined that the subject was uncontrolled, a recommendation along with its evidence was sent to their physician. Subjects were asked how they were using their inhalers and counseled on technique if necessary. If the subjects admitted to smoking they

were counseled on smoking cessation. If patients could not be contacted while in the store or telephonically, a second phone call was attempted. Subjects were excluded if no contact was made on the second attempt.

Results: Qualified interventions included counseling on smoking cessation, counseling on proper inhaler technique, counseling on proper inhaler utilization, and contacting the provider with a recommendation if the subject was not on the appropriate therapy based on the GOLD guidelines. A total of 118 subjects were identified based upon the inclusion criteria. A total of 41 subjects were excluded based upon the exclusion criteria. A total of 38 subjects were unable to be contacted on a second attempt, leaving a total of 39 subjects that gave consent and completed the questionnaire. A total of 10 of the 39 (25.6%) did not require any interventions, 15 of the 39 (38.46%) required counseling on proper inhaler technique, and 11 of the 39 (28.21%) required counseling on proper use of their inhaler. A total of 12 of the 39 (28.21%) subjects admitted to continued cigarette use and were counseled on smoking cessation. Of the 39 subjects, 8 (15.38%) were identified as needing a change in therapy and a recommendation was faxed to the subject's prescriber. Out of the 8 recommendations made, the provider accepted 6. A total of 50 interventions were made during the study period.

Conclusion: As indicated by these results, there is great opportunity for pharmacists to make interventions on behalf of COPD patients. Since pharmacists are easily accessible to these patients, they have the ability to assist patients in receiving optimal benefit from their medications. This data indicates that many patients are experiencing unnecessary symptoms, most of which could be avoided with additional counseling. By providing these interventions to patients, we are able to demonstrate the vital role that we play in patient care.

Submission Category: Oncology

Submission Type: Case Report

Session-Board Number: 5b-148

Poster Title: Trimethoprim/sulfamethoxazole induced liver injury in the treatment of pneumocystis jiroveci pneumonia in an oncology patient

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Purpose: Hepatic injuries caused by trimethoprim/sulfamethoxazole are considered to be very rare and unpredictable however of all the antibiotics that has been studied to cause drug induced liver injury it is the fourth most common to do so. There is limited evidence that exist on the risk factors of drug induced liver injury however it has been shown that drugs given in higher doses of 50 mg daily are more likely to lead to drug induced liver injury than lower doses. In this case trimethoprim/sulfamethoxazole was used in the treatment of pneumocystis jiroveci pneumonia. PCP can be a life threatening acute lung disease in a patient who is severely immunocompromised and is treated with a dose of 15 to 20 mg of trimethoprim/kg/day divided every 6 or 8 hours per manufacture labeling. A 55 year old woman receiving chemotherapy for primary CNS lymphoma with a regimen of day one Rituximab 500 mg/m2, day two Vincristine 1.4 mg/m2 and Methotrexate 3.5 mg/m2 then on odd cycles Procarbazine 100 mg/m2 (days 1-8). The patient received cycle four 10 days prior to presenting to the emergency room with profound shortness of breath and fever. The CT chest scan showed small pleural effusion/multifocal consolidations confirming pneumonia. After several days of not improving on broad spectrum antibiotics it was suspected that the patient may have PCP so trimethoprim/sulfamethoxazole was started at 2 tablets every 8 hours for 21 days (12.3 mg/kg/day of trimethoprim) . The patient improved rapidly and was discharged days later to a nursing home facility close to home. After a total of five days of being on the antibiotic the patient was readmitted to the hospital with elevated liver enzymes. The nursing facility had stopped the trimethoprim/sulfamethoxazole two nights prior to being admitted to the hospital. The patient presented with jaundice eyes and itching all over along with a rash that had improved since trimethoprim/sulfamethoxazole had been discontinued. The liver enzymes upon arrival were as follows, ALK 1156, AST 258, and ALT 496. On day two of the admission the liver enzymes continued to be elevated at ALK 1176, AST 174, and ALT 394. At this point it had

been 23 days since her last administration of chemotherapy concluding that the chemo was not the causative agent. Extensive research was then performed on all medications that had been administered in the past few weeks and other than the trimethoprim/sulfamethoxazole no identifiable causative agents were discovered. Trimethoprim/sulfamethoxazole induced liver injury is classified as either unpredictable or idiosyncratic type of reaction with the most common pattern of injury (60 percent) being cholestasis. The onset of cholestasis typically occurs within 7 days after the initial administration of trimethoprim/sulfamethoxazole which fits the time frame in which this patient's liver injury occurred. Given the relationship between the trimethoprim/sulfamethoxazole and the time of onset along with an increased risk of drug induced liver injury due to the high dose used, it is apparent that trimethoprim/sulfamethoxazole is the mostly likely cause of this patient's liver injury.

Methods:

Results:

Conclusion:

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-149

Poster Title: Evaluation of outcomes pre and post implementation of a standardized pathway in pediatric posterior spinal fusion patients

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Purpose: Prior to 2011, the care of the post-operative posterior spinal fusion (PSF) patient was based on individual physician preference. A comprehensive review of the literature determined the importance of standardization of post-operative care. The purpose of this study was to evaluate patient outcomes pre and post implementation of a standardized pathway in PSF patients. Outcomes analyzed include length of stay, pain control, narcotic usage, time to ambulation, and time to regular diet.

Methods: Institutional Review Board approval was obtained to conduct a retrospective review of 64 patients with adolescent idiopathic scoliosis (AIS) treated with a PSF. All patients between 10-21 years of age with a diagnosis code of AIS and a procedure code for PSF admitted to the hospital from April 1, 2010-March 30, 2011 (n equals 27) were included in the pre-standardization group and those admitted April 1, 2014-March 30, 2015 (n equals 37) were included in the post-standardization group. Patients were excluded if they had a chronic condition including renal disease/dysfunction, seizures, and/or neurologic disorders.

Results: Data were analyzed using generalized estimating equations and the Wilcoxon Signed Rank test. With matched analyses comparing patient and clinical characteristics based on sex, race, age, and BMI, n equals 25 in both the pre and post standardization groups. The alpha equals 0.001. Although not statistically significant (p equals 0.0166), the median length of stay was 5.3 days [Interquartile Range (IQR) 5.2-5.4] and 4.4 days [IQR 4.3-4.6] in the pre and post standardization groups, respectively. Time to ambulation in the hall was significantly different

between the groups with the pre-standardization group ambulating on median post-operative day (POD) 3 [IQR 3.0-3.0] and the post-standardization group ambulating on median POD 2 [IQR 2.0-2.0] (p less than 0.0001). There was less usage of the patient controlled analgesia (PCA) with a median of 2.3 mg/kg [IQR 1.2-2.7] and 1.1 mg/kg [0.9-1.6] in the pre and post standardization groups, respectively (p less than 0.0001). The median morphine equivalent usage was 13 [IQR 0.0-160.5] and 3 [IQR 0.0-16.0] in the pre and post standardization groups, respectively. Also statistically significant, a regular diet was resumed on POD 4 [IQR 3.0-4.0] in the pre-standardization group and POD 2 [IQR 2.0-2.0] in the post-standardization group (p less than 0.0001).

Conclusion: Standardization of care for pediatric patients undergoing a PSF showed improved outcomes in our patient population. This was associated with less overall patient controlled analgesia and morphine equivalent usage along with decreased time to regular diet and mobilization in the hall, resulting in a shorter length of stay.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 5b-150

Poster Title: In his corner: the ongoing impact of patient-centered care on a high-utilizing patient with complicated chronic illness

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Purpose: Healthcare Hotspotting is defined as applying resources to target patients, dubbed "super-utilizers", who are using a high percentage of healthcare resources and incurring excessive costs. As part of a minigrant project through the Camden Coalition of Healthcare Providers, Primary Care Progress, and the Association of American Medical Colleges; an interprofessional team of students sought to address issues surrounding a super-utilizing patient with sickle cell disease.

Methods: Primary outcomes for this project were frequency of emergency department (ED) visits and incurred costs over a 30-day period. A secondary outcome was hydroxyurea adherence as measured by mean corpuscular volume (MCV), which is known to increase during hydroxyurea therapy. The team was comprised of pharmacy, medical, nursing, and social work students. Some patient-specific strategies to improve outcomes included: family involvement, persistent support of medication adherence and education, advocacy, care coordination, connection to the sickle cell community, and restoring attention to patient-identified goals.

Results: A downward trend was observed in both measures of utilization that were employed. Average ED visits decreased from 3.35 to 2.16 in a 30-day period. Average costs incurred per a 30-day period also decreased from $65,700 to $35,600. MCV values increased from an average of 87 fL to 92 fL demonstrating improved hydroxyurea adherence.

Conclusion: Super-utilizing patients account for a large majority of healthcare dollars spent and resources used. By targeting super-utilizing patient through interprofessional team based

medical and social interventions, healthcare utilization and costs can be decreased and quality of life improved.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 5b-151

Poster Title: Gnaphalin has preferential cytotoxic effects towards breast cancer MCF-7 and prostate androgen-dependent LnCaP cancer cell lines

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Purpose: Gnaphalin is a flavonoid extracted from a bioactive fraction of Gnaphalium gracile, a species that belongs to the family Asteraceae. Many species of the Gnaphalium genus are commonly used in the treatment of several different diseases, such as, skin infections, bronchial disorders, and cancer. These healing properties may be attributed to flavonoids, secondary metabolites in plants, with various bioactive properties including antioxidant, anti-inflammatory, antiviral, antimicrobial, and antineoplastic effects. Gnaphalin, was tested for antineoplastic activity on breast cancer cell lines MCF7, MDA-MB-231, and prostate cancer androgen-dependent LnCaP, and androgen-independent PC3 cell lines.

Methods: Cells were seeded on a 48 well plate with the appropriate media and were allowed to reach approximately 70 percent confluency, followed by treatment of Gnaphalin in concentrations of 5, 10, 20, 40, and 80 micromolar, or DMSO (dimethyl sulfoxide), the vehicle of dissolution at a final maximum concentration of 0.3 percent. Cells treated with DMSO were used as a control. After treatment, the cells were incubated for 24 hours and MTT (3-(4, 5-methyl-thiazol-2-yl)-2, 5-diphenyl-tetrazolium bromide) was used to determine cellular viability by adding it at a concentration of 100 microgram per well followed by incubation for 3 hours at 37 degrees Celcius. Purple crystal formation indicated cell survival. Formazan crystals were dissolved with acidulated isopropanol and a measurement of optical density was obtained by spectrophotometry at a wavelength of 590 nanometers.

Results: When determining potential anti-neoplastic agents, it is preferred to achieve desired effects at concentrations of less than 100 micromolar. Gnaphalin was tested on MDA-MB231 breast cancer cells and showed an IC-50 of greater than 80 micromolar. Gnaphalin lacked efficacy in the estrogen-independent MDA-MB231 cancer cell line. Gnaphalin was also tested on MCF 7 breast cancer cells and showed an estimated IC-50 of 40 micromolar. These results suggest an increased efficacy by Gnapahlin in the estrogen dependent MCF 7 cancer cell line. Testing of Gnaphalin on PC3 prostate cancer cells, never truly reached an IC-50 within the parameters studied. Thus, it demonstrated lack of efficacy in the androgen-independent PC3 cancer cell line. Gnaphalin was tested on LnCaP prostate cancer cells, with an estimated IC-50 of 60 micromolar. Gnaphalin showed a cytotoxic effect on androgen-dependent LnCaP cancer cell line.

Conclusion: Analysis of the data reveals a cytotoxic effect of Gnaphalin on cell lines MCF-7 (breast) and LnCaP (prostate). Both cell lines had acceptable IC-50s. MDA-MB-231 (breast) and PC3 (prostate) did not exhibit cytotoxic effects due to high IC-50 levels among the drug concentrations utilized. MDA-MB-231 is more tumorigenic and less differentiated than MCF7. MCF7 preferentially forms tumors in the presence of oestrogen. LnCaP is androgen dependent for cell growth and proliferation. Both MDA-MB-231 and PC3 exhibit a lack of hormonal dependency. These results may indicate that Gnaphalin has structural/functional characteristics that are detrimental to cancer cells with hormone dependency.

Submission Category: Pharmacokinetics

Submission Type: Evaluative Study

Session-Board Number: 5b-152

Poster Title: Intralipid sequestration of lipophilic compounds

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Purpose: Research in animal models and human case studies has shown the effectiveness of Intralipid Emulsion (ILE) in reducing toxic levels of lipophilic drug that are encountered in overdose situations. This study looks at the ability of ILE to sequester amitriptyline and verapamil along with their active metabolites to facilitate their elimination from the body. The goal was to develop and validate an in vitro assay that would accurately quantify concentrations of drug to confirm ILE sequestration in serum. This study will prove useful in estimating drug concentration levels in a patient presenting with overdose symptoms after receiving ILE treatment.

Methods: An assay was developed and standards were prepared to cover a range from therapeutic to toxic drug concentrations. The method was validated by preparing quality controls that were compared to known drug concentrations and then quantitated using LC/MS/MS analysis. These controls were then used throughout the study to ensure precision and accuracy. An in vitro model was developed using Rapid Equilibrium Dialysis (RED) devices which allow free drug to dialyze across a semipermeable membrane and equilibrate similarly to free drug in human serum across tissue compartments. Total and free drug serum concentrations were determined in the absence and presence of ILE at equilibrium and quantified using high performance liquid chromatography coupled with tandem mass spectrometry (LC/MS/MS).

Results: Equilibrium dialysis experiments showed there was an overall reduction in free drug concentrations with the addition of ILE for both amitriptyline and verapamil as well as their metabolites. Data showed that as serum drug and metabolite concentrations increased, the

percent reduction in free drug serum concentrations by ILE also increased. In both cases, free drug concentrations were reduced by ILE to a greater extent for the parent drug than its associated metabolite. The reduction in free drug concentrations by ILE were greater for amitriptyline than verapamil. Physiochemical factors that affected ILE sequestration include: Log P, Log D, protein binding, and percent drug ionized in serum.

Conclusion: Overall, these in vitro studies support the hypothesis that the administration of ILE enhances drug sequestration in the serum compartment and reduces free drug concentrations available for diffusion into peripheral compartments for both drugs and their metabolites. Characterizing the degree of intralipid drug sequestration based on the physiochemical properties of various compounds will aid in estimating the reduction in free drug concentrations encountered in an overdose patient after receiving intravenous ILE treatment.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 5b-153

Poster Title: Beta blocker use in hospitalized heart failure patients: Does target dose equal target heart rate control?

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Purpose: Beta blockers are recommended in heart failure with reduced ejection fraction (HFrEF) patients to reduce mortality and mortality, with a goal to titrate to a maximum dose. However, it can be problematic to attain these high doses in clinical practice secondary to the adverse event occurrence. Newer evidence has indicated that heart rate reduction, rather than beta blocker dose achieved, may be a better predictor of prognosis given the negative cardiovascular consequences of longstanding elevated heart rate. The purpose of this study was to describe discharge heart rate as a function of beta blocker dose in hospitalized HFrEF patients.

Methods: HFrEF patients admitted between September 2013 and September 2015 were reviewed. Inclusion criteria: at least 18 years of age, ejection fraction less than 40 percent, use of a HFrEF guideline recommended beta blocker for at least 48 hours' duration and appropriate concomitant standard heart failure regimen at discharge, which consisted of an angiotensin-converting enzyme inhibitor or angiotensin receptor blocker, a HFrEF guideline recommended beta blocker, and a diuretic. Exclusion criteria: ICU admission, dobutamine administration, administration of additional rate controlling agents, atrial fibrillation history, implantable pacemaker and documented noncompliance. Target beta blocker doses were defined as: bisoprolol 10 mg daily, carvedilol 25 mg twice daily, and metoprolol succinate 200 mg once daily. Optimal heart rate control was defined as a heart rate less than 70 beats per minute (bpm) and determined based upon the last heart rate captured in the medical record prior to discharge. Patients were divided into groups based upon the percentage of target beta blocker

dose achieved. The primary subgroup analysis was the achievement of optimal heart rate control in patients receiving less than 50 percent target beta blocker dose compared to ≥ 50 percent target beta blocker dose. Secondary analysis included describing the hemodynamic adverse effects experienced during index hospitalization secondary to beta blockade.

Results: Of the 3378 patients screened, 225 met inclusion criteria with 88 patients receiving less than 25 percent target dose, 58 receiving 25-49 percent target dose, 40 receiving 50-99 percent target dose, and 39 receiving 100 percent target dose. Mean discharge heart rate was 84 ±17 bpm for patients on less than 25 percent target dose, 84 ±13 bpm on 25-49 percent target dose, 80 ±13 bpm on 50-99 percent target dose, and 76 ±12 bpm on 100 percent target dose. Overall 20 percent of the total population achieved optimal heart rate control prior to discharge (n=46 heart rate less than 70bpm; n=179 heart rate greater than or equal to 70bpm). Similar rates of achievement were observed regardless of target beta blocker dose achieved (25 percent in the ≥50 percent target dose group vs. 18 percent in the less than 50 percent target dose group;p=0.23). Rates of bradycardia (28 percent in the ≥ 50 percent target dose group vs. 19 percent in the less than 50 percent target dose group;p=0.18) and hypotension (52 percent in the ≥ 50 percent target dose group vs. 50 percent in the less than 50 percent target dose group;p=0.89) were similar between groups.

Conclusion: Optimal heart rate control achievement was similar whether hospitalized HFrEF patients were receiving at least 50 percent target beta blocker dose or less. Despite lower average heart rates observed on 100 percent target dose, a low portion of the overall population achieved optimal heart rate control secondary to beta blockade. Inpatient beta blockade remains suboptimal compared to guideline recommended target doses despite no significant differences in adverse effects with higher beta blocker doses. Opportunities exist for inpatient beta blocker optimization prior to discharge to improve both suboptimal heart rate control and suboptimal beta blocker dosing relative to guideline recommendations.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 5b-154

Poster Title: Antiproliferative and chemosensitizing effects of metformin in neuroblastoma cell lines

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Cassaundra Boils
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Purpose: Metformin is a medication commonly used as first-line treatment in type II diabetes mellitus. Established studies have demonstrated potential use of metformin in decreasing proliferation in various solid tumor cancer cell lines, including, but not limited to, breast, prostate, and lung. Neuroblastoma is known to be an extreme challenge for therapeutic intervention, and increasingly higher doses of chemotherapy are required due to resistance in many patients. Subsequently, this causes increasing toxicities. Validating metformin's effect on cell proliferation and chemosensitivity would add to existing data regarding its potential use in the prevention and treatment of neuroblastoma.

Methods: Human neuroblastoma cell lines SK-N-SH and SK-N-MC were maintained in Minimum Essential Media at 37 degrees Celsius in 5 percent carbon dioxide. To optimize experimentation cell density, a concentration range of cells were plated (SK-N-SH 2 x 103 to 7 x 103); (SK-N-MC 2 x 104 to 1 x 105)) in a 96-well plate. Following a 24-hour incubation, cells were treated with 5mg/mL MTT solution and incubated an additional 2 hours at 37 degrees Celsius. MTT solution was then removed, and cells were treated with DMSO. Absorbance was measured at 570 nanometers to determine proliferation of cells.
Optimal cell concentrations were selected and plated. Following an additional 24-hour incubation, three plates of each cell line were treated with increasing metformin concentrations (0-10 millimolar) in isolated rows. Proliferation of cells was determined following treatment for 24, 48, and 72 hours. A fourth plate of SK-N-SH cells was treated with metformin (5 and 7.5 millimolar) and cisplatin (2.5 micromolar) both individually and in combination. Absorbance was measured by aforementioned process to determine cisplatin toxicity in combination with metformin compared to control.

Results: Data was collected and graphed. Regarding SK-N-SH cell line, proliferation of samples exposed to metformin succeeding 24-hour incubation was slightly greater than control. SK-N-SH samples exposed to metformin for 48 and 72-hour time intervals showed both a time-dependent and concentration-dependent decrease in proliferation compared to control (p less than 0.05). Treatment with 1.25 and 2.5 millimolar metformin concentrations resulted in similar proliferation in regards to control, while 5, 7.5, and 10 millimolar metformin concentrations resulted in a significant decrease in SK-N-SH proliferation compared to control (p less than 0.05).
Similarly, SK-N-MC cell line samples exhibited both a time-dependent and concentration-dependent decrease in proliferation compared to control (p less than 0.05).
Cisplatin 2.5 micromolar alone decreased the cellular concentration following exposure to SK-N-SH cell samples for 24 hours. However, compared to treatment with cisplatin alone, SK-N-SH cells treated with a combination of cisplatin and metformin had much lower cellular proliferation (p less than 0.05).

Conclusion: Demand for an alternative therapeutic intervention when treating neuroblastoma is vital to improve prognosis for such patients. Metformin's exceptional therapeutic index and mild side effect profile allows it to be a favorable agent for potential use in neuroblastoma. This study identifies both a time-dependent and concentration-dependent decrease in proliferation of SK-N-SH and SK-N-MC cell lines following treatment with metformin, and establishes metformin's ability to increase sensitivity of cells to cisplatin chemotherapy in SK-N-SH cells. Further studies should focus efforts on determining the mechanism of metformin's effects in SK-N-SH and SK-N-MC cell lines.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Descriptive Report

Session-Board Number: 5b-155

Poster Title: Employment of a Cost Savings Calculator to Enhance Physician Acceptance of an Initiative to Encourage the Cost-conscious use of Glycoprotein IIb/IIIa Inhibitors

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Purpose: High-bolus dose tirofiban and double-bolus eptifibatide have equal recommendation in current practice guidelines for non-ST segment elevation acute coronary syndrome. However, some physicians prefer eptifibatide for this indication due to previous study with tirofiban at an inferior dose and consider it to be a more cost effective agent. This assertion is particularly challenging due to the multiple presentations of the two medications and the lack of equivalence in terms of infusion times. We aim to create a calculator capable of generating a cost of therapy estimate which will assist in encouraging physician acceptance of the most cost effective agent.

Methods: A cost calculator was devised for tirofiban and eptifibatide to illustrate anticipated drug costs associated with a calculated dose for a given patient weight. For each drug, the dose administered was defined based on recommendations found in current literature for percutaneous coronary intervention (PCI). Both drugs require weight-based dosing administered by infusion with at least one bolus dose. Set variables included recommended dose, available drug presentations, and the various drug presentation costs. A range of formulas were built into Excel which defined the amount of drug a given patient is expected to receive at a given point during infusion. Some patients, depending upon their weight and infusion time, required more than one package to satisfy the full dose required; in these instances, a combination of package sizes was used. Our calculator utilized a function in Excel Visual Basic capable of populating the best combination of available package sizes to achieve the lowest total cost for a defined infusion. Of note, after the infusion is stopped, remaining drug is wasted. Combination selection is relatively independent from the amount of drug needed as the smallest amount of necessary waste does not always correlate with the most

cost effective option. Three patient weight models (70kg, 100kg, 120kg) were run to compare the cost savings benefit defined by each group.

Results: For each drug, the most favorable package combination was chosen based on lowest total cost as determined by programmed excel functions, rather than estimated drug waste. The minimum infusion time of eptifibatide is 12 hours following two bolus doses. Tirofiban infusion may run for up to 18 hours following a single high dose bolus, however, an infusion time of 12 hours is commonly employed. For three patient weight models (70kg, 100kg, and 120kg) evaluated at a 12 hour infusion time, total costs were $944, $944, and $1,236 for eptifibatide versus $350, $525, and $541 for tirofiban, respectively. These data demonstrate cost-savings associated with tirofiban administration, specifically: $594 in the 70kg patient, $419 in the 100 kg patient, and $695 in the 120kg patient. Further illustration of this benefit is seen when eptifibatide at its minimum infusion time is compared to tirofiban at its maximum suggested infusion time. For the 70kg, 100kg and 120kg patients, the respective costs were $525, $700, and $716 for tirofiban at 18 hours versus $944, $944, and $1,236 for eptifibatide at 12 hours. The associated cost savings per patient are $419 for the 70kg patient, $244 for the 100kg patient and $520 for the 120kg patient.

Conclusion: The results of this model demonstrate a cost savings benefit associated with the use of tirofiban over eptifibatide. The employment of a cost savings calculator may help visualize anticipated savings and enhance physician acceptance of tirofiban over eptifibatide. Future implications of this tool include adjustment to evaluate other therapeutic alternatives and expanded utilization to other stakeholders as well as potential evaluation to determine efficacy in demonstrating cost-effectiveness of given therapies.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5b-156

Poster Title: Analysis of Prescription Drug Labeling Changes from January 2014 to January 2016

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Purpose: This analysis was conducted to evaluate labeling changes communicated by the FDA in 2014 and 2015.

Methods: Data were initially collected from the FDA MedWatch safety archives. The labeling changes were categorized, tabulated in a database, and cross-referenced with Multum Medisource Lexicon's drug tables and Meyler's Side Effects of Drugs. Analysis of drugs recently approved and parameters related to labeling changes was completed.

Results: The FDA issued a total of 1089 press releases with multiple labeling changes in the past 2 years. These included black box warnings (59, 5.4%), contraindications (100, 9.2%), warnings (747, 61.3%), precautions (747, 68.6%), adverse reactions (446, 41.0%), and package inserts/medication guides notes (456, 41.9%). Most common black box warnings were drug abuse (20.3%), cardiovascular (13.6%), tumor (8.5%), and CNS events (3.4%). Most common adverse reactions addressed the skin (20.2%), sensory (12.8%), cardiovascular (12.1%), musculoskeletal (10.8%), central nervous (9.2%), endocrine (9.2%), and hematologic systems (7.2%). Of the 420 drugs approved from 2000 to 2015, labeling changes impacted 24.4%. A total of 11 drugs (26%) of the 42 drugs that were approved in 2014 received labeling changes. Drug classes with most labeling changes were CNS/Psychiatric agents (20.8.5%), anti-infective agents (13.5%), antineoplastic agents (12.6%), and cardiovascular agents (12.3%).

Conclusion: A significant number of communications with drug labeling changes have been analyzed with up to 17 labeling changes per drug. Education to health care providers is essential to improve reporting of adverse drug events for optimal assessment and analysis.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-157

Poster Title: Evaluation of Hypoglycemia Protocol at a Tertiary Teaching Hospital

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Purpose: Hypoglycemia can occur due to multiple etiologies including medications, liver failure, and secondary to critical illness. Due to the increased mortality risk associated with hypoglycemia, appropriate treatment of hypoglycemic episodes is crucial. Literature is available describing protocol implementation for prevention of hypoglycemia, however there is a paucity of data regarding treatment and management of hypoglycemia in the inpatient setting. At our institution, the hypoglycemia protocol is automatically ordered when insulin is prescribed. For other etiologies of hypoglycemia the nurse is required to contact the provider. The purpose of this study was to review hypoglycemia treatment at our institution.

Methods: Hypoglycemic episodes at a 650-bed academic medical center were retrospectively reviewed for events occurring during two weeks in August 2015. The methodology was approved by the University of Tennessee institutional review board. Adult patients were included for analysis if they had a blood glucose (BG) value of less than 60mg/dL on chemistry labs or point of care testing. Patients undergoing cardiopulmonary resuscitation or on an insulin infusion were excluded from this review. Secondary episodes of hypoglycemia within a single admission were also excluded. The primary outcome was percentage of times hypoglycemic episodes were treated. Secondary outcomes measured were time to treatment of hypoglycemia, time after treatment to repeat blood glucose reading, if hypoglycemia reoccurred within a 24-hour period, and etiology of hypoglycemia

Results: One-hundred and four episodes of hypoglycemia were included. Most episodes occurred in the general ward (n equals 58), followed by 24 episodes in the intensive care unit (ICU), four in a stepdown unit and 15 in the emergency department (ED). Medications were found to contribute to 45 (43 percent) hypoglycemic episodes, while liver disease accounted for

6 (6 percent), and 53 (51 percent) were due to other or unknown causes. Initial BG was a median of 52 mg/dL (IQR 42-57). For the primary outcome, only 50 (48 percent) of these hypoglycemic episodes were treated with oral or intravenous glucose. When divided by hospital unit, ICU patients had the highest treatment rate (86.6 percent), compared to the ED (53.3 percent), general wards (43 percent), and stepdown (25 percent). There was no difference in treatment rates if the protocol was previously ordered (n equals 63) compared to patients without the protocol (n equals 41), 52.3 percent versus 34.1 percent, p equals 0.32. Of the 50 episodes treated, the median time to initial treatment was 27 minutes (IQR 5-143). Time to treatment was greater than one hour in 20 episodes. The time to repeat BG was a median of 37 minutes (IQR 11-78).

Conclusion: In this retrospective analysis, the hypoglycemia protocol in this tertiary teaching hospital is underutilized. Of the episodes that were treated, the time to treat hypoglycemia was prolonged and greatly varied, as was the time to repeat BG after treatment. Based on these results of this study, we plan to design an electronic form to provide proper documentation of nursing actions taken when a hypoglycemic event occurs in addition to structured nursing education.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-158

Poster Title: Efficacy of intravenous acetaminophen in post bariatric surgical patients

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Purpose: Intravenous (IV) acetaminophen (APAP) has historically been used for pain management in bariatric surgery. The rationale is that this regimen would provide scheduled analgesia, and may eliminate the need for post-surgical pain management with opioids. Recent studies into the efficacy of this approach have yielded conflicting results. These incongruous results, along with a price increase in IV APAP, have placed extra emphasis on appropriate use of this medication. The purpose of this study was to determine the optimal duration and frequency of IV APAP needed to decrease the use of opioids for pain control after bariatric surgery.

Methods: Prior to beginning data collection, exempt status was approved by the institutional review board. Patients included in the study were at least eighteen years of age, received bariatric surgery, and had at least one order for IV APAP. Taking into account the dependent variable we used a significance level of 5 percent and 85 percent power, and determined that 102 patients would need to be included. As there were two regression lines to be fit, that number was doubled to 204. The final number of patients included was 220. Data collection points included total IV morphine equivalents (mg), total doses of IV APAP, body mass index (BMI), type of surgery, secondary perioperative procedures, and laparoscopic or open surgery. Data was collected for the determined timeframe of 7/1/12 through 7/1/15 using the electronic medical record. The collected data was then evaluated to determine the point at which an increase in IV APAP does not decrease the use of morphine.

Results: The dependent variable was the total IV morphine equivalents (mg) per patient. The independent variables included total doses of IV APAP per patient, BMI, sleeve surgery (77.27 percent), lysis of adhesion (1.36 percent), hernia repair (4.55 percent), and laparoscopic procedure (98.18 percent). Linear regression lines of the dependent variable and independent variables were overlapped analyzing for a decrease in morphine equivalents. The Davies' test was used to detect a change in the slope which determined how many doses of IV APAP were used before there was a change in morphine equivalents. There was a significant change in the trend of morphine equivalents before and after three doses of IV APAP ($p=0.029$) with a stronger negative trend before three doses.

Conclusion: The results of this evaluation help to identify opportunities for improvement of TriStar Centennial's utilization of IV APAP. The formulary for IV APAP limits dosing to 1,000 mg IV dosed every 8 hours and this data would suggest that 3 doses of IV APAP is sufficient for decreasing the use of opioids after bariatric surgery. Intravenous acetaminophen is a high-cost medication that is frequently used at TriStar Centennial Medical Center, particularly in bariatric surgery patients. Pharmacists have the opportunity, through increased monitoring and diligence, to reduce the use of IV APAP without compromising patient safety and care.

Submission Category: Clinical Services Management

Submission Type: Descriptive Report

Session-Board Number: 5b-159

Poster Title: Implementation of acute care pharmacist coverage on weekends in a non-teaching community hospital

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Purpose: Numerous studies in the past few years have proven the benefit of clinical pharmacy services in acute care settings, including intensive care units (ICU) and emergency departments (ED). While many hospitals have added at least partial coverage during the week, the percentage of hospitals offering weekend acute coverage by residency-trained clinical pharmacists remains low, especially in non-academic, community hospitals. The purpose of this study is to show the impact of providing weekend acute care coverage with a novel hybrid position in a community hospital.

Methods: Beginning January 2, 2016, a rotation of 4 clinical pharmacists was initiated during the weekend to provide "acute care" coverage to the emergency department and intensive care units. Prior to initiation of this program, pharmacists provided ED coverage on weekends and critical care patients were assessed only if they were on a consultation medication (i.e. Coumadin, vancomycin, etc). This hybrid shift allowed for 2 hours of designated time in the morning to round with the ICU team and evaluate each patient. Retrospective observational analysis was completed on all pharmacist-documented medication interventions during the weekends from January 2 to August 28, 2016. Intervention reports were run for each weekend and sorted by both type of intervention and identification of the acute care pharmacist on duty. Further sorting was done to manually separate interventions made for patients in the ICU from patients in the ED. The following data was compared between the ICU and ED during the hybrid weekend shift: intervention type (based on hospital-specific intervention codes), response to intervention (patient assessed, recommendation followed, and recommendation not followed), and financial implication/cost avoidance of intervention determined by Truven Analytics software.

Results: During the study period from January 2-August 28, 2016, 318 interventions were recorded by the four pharmacists rotating through the hybrid acute care weekend shift. Of the total number of interventions in both the ED and ICU, 66.5% of interventions were marked as recommendation followed, 31.7% of interventions were patient assessment only, and 6% of interventions were recommendation not followed. Interventions related to patient care in the ICU comprised 178 of the total 318 (~56%), while the ED interventions were 140 (~44%). The financial implication of these interventions for the ED and ICU was $119,992.00 and $126,434.00, respectively. This implies a savings of $3,444.58 on average for each shift worked during the study time period. New therapy recommendations, antibiotic and culture recommendations, ICU monitoring, and adverse event prevention comprised 73% of the total interventions in the ICU. In the ED, antibiotic and culture recommendations, questionable dose, medication history, and new therapy recommendations comprised 58.5% of the total interventions.

Conclusion: By designating 2 hours out of an established 10 hour weekend ED shift to ICU coverage, 178 interventions were recorded that otherwise would not have been completed. Addition of ICU coverage to the ED weekend shift prevents a 48 hour delay in appropriate treatment and avoidance of adverse events that are both clinically and financially significant.

Student Poster Abstracts

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Evaluative Study

Session-Board Number: 5b-160

Poster Title: Evaluation of the sepsis protocol in the emergency department.

Primary Author: Kristina York, University of Tennessee College of Pharmacy, Tennessee; **Email:** kyorkyor@uthsc.edu

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Purpose: The Center for Medicare and Medicaid Services released a quality measure in 2015 to improve outcomes in septic patients. In February 2016, our institution instituted a sepsis protocol and order set in the emergency department based on this quality measure. This protocol has led to a doubling of the use of broad spectrum antibiotics vancomycin and/or piperacillin/tazobactam in the emergency department. The purpose of this study is to follow the hospital course of patients who were initially selected for treatment with the sepsis protocol in the emergency department to determine if the use of early broad spectrum antibiotics was necessary.

Methods: The study was retrospective and has been submitted to the Institutional Review Board for exemption from final review. One aspect of the quality measure requires patients with a suspected source of infection who also met two or more criteria for Systemic Inflammatory Response Syndrome (SIRS) to be treated with broad spectrum antibiotics within three hours of presentation. Patients were included if they presented to the emergency department from February 2016 to July 2016 and received piperacillin/tazobactam and/or vancomycin as part of the emergency department sepsis order set. Patients who left against medical advice or who were transferred to or from an outside medical facility were excluded. Baseline demographics, SIRS criteria, admission diagnosis, continued antibiotics, blood cultures and discharge diagnosis were collected from institutional electronic medical records. The primary outcome was to determine how many patients initially treated with broad spectrum antibiotics for sepsis were ultimately diagnosed with sepsis.

Results: 184 patients were included in this study (n=184). Of patients meeting the sepsis criteria who were initially treated in the emergency department with empiric antibiotics, only 71% (131/184) were admitted to the hospital. The remaining 29% (53/184) were discharged from the emergency department. Of the patients admitted, 44% (57/131) had an admission diagnosis of sepsis, and 48% (62/131) had a discharge diagnosis of sepsis. Positive blood cultures returned on 13% (17/131) of patients who were admitted. At discharge, 66% (121/184) of patients who initially met sepsis criteria in the emergency department were not diagnosed with sepsis at any point during their hospital course.

Conclusion: Almost two-thirds of patients who met sepsis criteria and were empirically treated with protocol vancomycin and/or piperacillin/tazobactam upon presentation at our institution did not have a diagnosis of sepsis at any time during their hospital course. This protocol appropriately treats septic patients. However, many patients without sepsis received antibiotics unnecessarily due to the lack of specificity in identifying septic patients. This led to a sharp increase in the unnecessary use of broad-spectrum antibiotics in patients without sepsis. This increased use of unnecessary antibiotics complicates antibiotic stewardship efforts and could potentially lead to more drug-resistant strains of bacteria.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-161

Poster Title: Cost-effectiveness of extended-release levodopa-carbidopa versus controlled-release levodopa-carbidopa in patients with advanced Parkinson's disease

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Purpose: Parkinson's disease is a progressive, neurodegenerative disease affecting dopamine levels in the mesencephalon. Parkinson's disease therapy centers on levodopa-carbidopa for symptom alleviation; however, prolonged use of levodopa-carbidopa is associated with a diminishing effect over time, requiring higher doses and, consequentially, higher risks of adverse events. Newer formulations of levodopa-carbidopa have focused on increasing the dosing interval to increase effectiveness and decrease adverse events. We sought to determine the relative cost-effectiveness of Rytary, an extended-release formulation of levodopa-carbidopa, in comparison to Sinemet CR, a controlled-release formulation of levodopa-carbidopa, and the generic equivalent of Sinemet CR in patients with advanced Parkinson's disease.

Methods: From the perspective of a U.S. health payer, we evaluated advanced Parkinson's disease patients. We developed a decision model to simulate the direct costs and outcomes associated with each levodopa-carbidopa formulation. Outcomes associated with each treatment alternative were comprised of therapy non-responders, therapy responders with no adverse events, and therapy responders with adverse events. Adverse events were characterized by type and were related to healthcare resource utilization. All clinical effectiveness data, including probability of therapeutic response and adverse event prevalence, were based on clinical trial data. We assumed no difference in clinical effectiveness between Sinemet CR and its generic equivalent. Medication costs were determined using RED BOOK. All other cost data were derived from previously published literature. We evaluated costs over a one-year time horizon and all costs were standardized to March 2016 dollars using the medical component of the Consumer Price Index (CPI). The model calculated the incremental cost-effectiveness ratio (ICER) in dollars per amount of "off" time reduced in hours for our base case

scenario. Univariate sensitivity analyses were conducted to assess the effects of input variability on the base case result. In addition, probabilistic sensitivity analysis (PSA) was conducted to assess the robustness of our base case analysis. As this was a modeling study based solely on published literature, the analysis was exempt from Institutional Review Board review.

Results: Base case analyses suggest that Rytary dominates brand name Sinemet CR. In comparison to generic CR formulations, Rytary was expected to have an ICER of $3808.40 per additional hour of "off" time reduced. PSA showed large variability in the model. Sinemet CR was dominated by both Rytary and generic controlled-release levodopa-carbidopa. The cost-effectiveness acceptability curve suggests that at a willingness to pay threshold of greater than $3800 per additional "off" hour reduced, Rytary would have a greater probability of cost-effectiveness than generic controlled-release levodopa-carbidopa. One-way sensitivity analyses suggest that our base case result was especially sensitive to changes in the efficacy of Rytary.

Conclusion: Our study determined that Rytary would be considered cost-effective if the willingness to pay threshold was greater than $3800 per additional "off" hours reduced. Standard U.S. cost-effectiveness thresholds are not helpful in evaluating the results of this model, since outcomes are not reported as quality-adjusted life years (QALY). The lack of a standard threshold to evaluate non-QALY analyses complicates the interpretation of this analysis. Future economic models of Parkinson's disease would benefit from the development of a clinically-relevant threshold for reduction in "off" hours.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5b-162

Poster Title: Evaluation of Dosing Alert Parameter Customization in a Pediatric Hospital

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Purpose: An interdisciplinary team of physicians, pharmacists, and IT staff was created to review and adjust medication error alerts. A biweekly report covering the top 10 alerts over a selected time period, typically 1-2 weeks, was composed and presented to the committee. Medications were selected for review by the committee and modifications to alert parameters were adjusted if deemed necessary. This content was reviewed and modified based on primary and tertiary resources and standard practice of care was taken into consideration. The primary focus of this committee was to decrease the number of alerts without negatively impacting patient safety.

Methods: For this evaluation, the top 10 medications that triggered the greatest number of alerts were selected. These medications included ondansetron, dexamethasone, polyethylene glycol, diphenhydramine, fentanyl, diazepam, cefazolin, levetirecetam, furosemide, and ketorolac. The total number of alerts triggered by our computer system was evaluated before and after alert customization using the Students t-test. Additionally, errors reported in the Safeguard error reporting system and were compared before and after alert modifications occurred.

Results: In the group of medications evaluated, total alerts were lowered from an average of 2.37 percent in the period prior to the change to 0.78 percent in the period after the change (mean 1.58 percent, 95 percent CI 0.6801-2.4939, p value equals 0.0017). During the time periods studied there were 20 medication errors reported. Comparative safety evaluation is ongoing.

Conclusion: Careful and judicious adjustment to dosing alert parameters resulted in fewer overall alerts and decreased errors in the group of medications that were evaluated. A limitation of this evaluation is that error data was obtained from a voluntary reporting system and may not accurately reflect the actual number of events. Ongoing comparative safety data will continue to validate our findings.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-163

Poster Title: Metformin ameliorates myofibroblast differentiation in idiopathic pulmonary fibrosis

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Purpose: Idiopathic pulmonary fibrosis (IPF) is a chronic, progressive lung disease with poor prognosis. Management options are limited to two approved pharmacological agents. A hallmark of IPF pathogenesis is myofibroblast differentiation, characterized by de novo alpha smooth muscle actin (αSMA) stress fibers assembly. Transforming growth factor beta (TGFβ) is an established trigger of cell differentiation and matrix assembly in fibrosis. Interestingly, metformin has been shown to modulate TGFβ signaling and reduce fibrosis in preclinical diabetes models. However, its therapeutic benefits in IPF remain unclear. Thus, we investigate the efficacy of metformin as an option in the treatment of IPF.

Methods: Normal and fibrotic Human lung fibroblasts (NHLF and FHLF, respectively; FHLFs isolated from an IPF patient), and human epithelial cells were used in vitro. Western analysis: After reaching 70% confluence, cells were serum starved and subjected to TGFβ1 for 48 h and concomitant metformin for 24 h (total 72 h). Relative expression of αSMA and GAPDH were assessed using ImageJ software. Immunofluorescence: Cells were plated on a four well chamber, in the absence or presence of TGFβ1 for 48 h and concomitant metformin for 24 h (total 72 h). The fixed cells were incubated with primary anti-αSMA (Sigma-Aldrich). The immuno-fluorescence staining images were obtained using Zeiss fluorescent microscope and analysis conducted using ImageJ software.

Results: We first determined optimal TGFβ1-induced MF differentiation to occur at 72 h as evident by marked increase in αSMA. Interestingly, the stimulatory effects of TGFβ1 were decreased with metformin as evident by decreased αSMA expression and assembly in all three cell-lines. Additionally, the anti-fibrotic effect of metformin is dose dependent as evident by decreased αSMA assembly at metformin 5 mM and 10 mM.

Conclusion: Our results demonstrate that metformin has beneficial anti-fibrotic effects as it ameliorates myofibroblast differentiation. Metformin could potentially be a pharmacologic option in IPF management.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 5b-164

Poster Title: Incidence of hypotension in atrial fibrillation patients treated with intravenous amiodarone versus intravenous metoprolol versus intravenous diltiazem

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Purpose: Current intravenous (IV) therapies used to treat atrial fibrillation include amiodarone, metoprolol, and diltiazem. Since these agents can reduce blood pressure, hypotension is of concern. Previous studies conducted to determine rate-lowering effects of medications in the treatment of atrial fibrillation have observed a higher incidence in hypotension in patients receiving diltiazem compared to amiodarone. The purpose of this study was to evaluate the incidence of hypotension in hospitalized patients with atrial fibrillation receiving IV amiodarone, metoprolol, or diltiazem.

Methods: This retrospective chart review was exempt from approval by the institutional review board. Adult patients (greater than 18 years of age) with at least one order for IV amiodarone, metoprolol, or diltiazem during the timeframe of April 1, 2016 to July 1, 2016 were identified using the electronic medical record at Centennial Medical Center. Patients were not eligible if they received medications from each group (IV amiodarone, metoprolol, and diltiazem) simultaneously. For each group, fifteen patients meeting the above criteria were randomly selected and evaluated. Data points included hypotension, defined as systolic blood pressure less than 90 mmHg, time of hypotension in relation to infusion, and recorded blood pressure if hypotension occurred. Additional data points included heart rate, the time to hear rate less than 120 beats per minute in relation to infusion, and the duration of heart rate less than 120 beats per minute. Comorbidities such as heart failure, diabetes, chronic obstructive pulmonary disease, and hypertension were also evaluated.

Results: Of the three groups evaluated, IV amiodarone had the lowest incidence of hypotension with 13.3 percent of patients experiencing hypotension after administration. IV metoprolol caused hypotension in 20 percent of patients. Furthermore, IV diltiazem had the highest incidence of hypotension with 33.3 percent of patients experiencing hypotension with an average time to hypotension was 211 minutes after administration. The average time to hypotension was 158.5 minutes and 41.3 minutes for amiodarone and metoprolol, respectively. Additionally, IV diltiazem had less heart rate control between the three groups with 33.3 percent of patients experiencing a heart rate greater than 120 beats per minute after being controlled with a heart rate less than 120 beats per minute. Conversely, 6.67 percent of patients in the amiodarone group and 13.3 percent of patients in the metoprolol group did not maintain heart rate control after IV administration.

Conclusion: In this retrospective study of hospitalized patients with atrial fibrillation, IV diltiazem resulted in more frequent hypotension and had less control of heart rate compared to IV amiodarone and IV metoprolol. Amiodarone caused the least amount of hypotension. These results support the findings of previous studies when looking at rates of hypotension in the treatment of atrial fibrillation. Pharmacists have a critical role in identifying patients at higher risk for hypotension and suggesting another therapy, if necessary. Future studies are needed to investigate a pharmacist-led intervention to determine the appropriate intravenous agent to control atrial fibrillation and avoid hypotension.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 5b-165

Poster Title: Implementation of a continuous glucose monitor system in a diabetes education program

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Purpose: Continuous glucose monitor systems (CGMS) provide real time readings that can be used by clinicians to determine a blood glucose pattern to enhance therapy for diabetic patients. Many patients can benefit from CGMS including uncontrolled type 1 and type 2 diabetics, patients that don't show symptoms of hypoglycemia, or are not at an optimal hemoglobin A1c goal, children with type 1 diabetes. The utilization of CGMS as a diabetes educational tool is limited and could enhance concepts of how dietary intake impacts blood glucose.

Methods: Patients were referred to the pharmacist for diabetes education in a primary practice clinic. Each patient was given appropriate counseling on diet, activity, and goals of therapy based on American Diabetes Association practice guidelines. The length of the visit was standardized to one hour. Upon consent, patients were fitted with a continuous glucose monitor (CGM) to wear for 7 days. Patients were given a food log and instructed to record all dietary intake including liquids. The patients were asked to check blood glucose a minimum of twice daily. Patients returned to the the clinic after 7 days in order for the CGM data to be downloaded. A laptop with the CGM data was shown to each patient to discuss data and compare fluctuations in blood glucose to the food log. Based on the data, patients were given additional meal planning instructions. Patients were surveyed regarding the information provided and the impact that added data had on their understanding of diabetes. Patients were monitored with follow-up in clinic three months after baseline visit for compliance with medications and improvement in A1c from baseline. Data was also presented to the primary care physician for future follow-up with patient.

Results: Currently ten patients have consented into the study. Eight patients had Type 2 Diabetes Mellitus (DM) and 2 patients had Type 1 DM. The average baseline A1c for the study group was 9.4%. The average A1c after 3 months was 7.4%. Patients in follow-up sessions demonstrated a better understanding of their disease including the impact of diet on blood glucose readings and the importance of adhering to the meal plan. Disease improvement appeared to improve patient's quality of life. In the Type 1 diabetic patients, CGM technology also allowed improved insulin utilization and both patients reported less hypoglycemia.

Conclusion: Although only a small sample, the impact of CGM technology along with standardized diabetes education provided significant reductions in A1c, improved patient satisfaction, and better understanding of the disease. Continuation of the study in order to increase the sample size may provide additional insight on how beneficial CGM may be in a diabetes education program.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5b-166

Poster Title: Impact of polymerase chain reaction (PCR) blood culture identification technology on antimicrobial stewardship

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Purpose: Polymerase chain reaction (PCR) technology can be used for rapid identification of microorganisms and detect if certain resistant genes are present following a positive blood culture. PCR technology can decrease the time to organism identification which aids in more timely adjustment to appropriate antimicrobial therapy (escalation or de-escalation) or reinforces treatment decisions when treating a patient empirically. The laboratory at this community hospital utilizes a PCR blood culture identification panel for all positive blood cultures. The purpose of this study is to determine the impact of this PCR technology on antimicrobial therapy.

Methods: Existing pharmacists' documentation and patient chart information were reviewed retrospectively for the period of January 1 – April 30, 2016. Antimicrobial therapy was evaluated for 115 patients who had a positive blood culture and PCR organism-identification performed. Evaluation of the impact of organism identification via PCR was completed through patient chart review, pharmacists' documentation, and date/time of antibiotic administration. The impact of the PCR test was determined by the effect on antimicrobial therapy and classified in one of 8 categories including narrowed therapy, no change in therapy, infectious disease (ID) consult, addition of antibiotic, antibiotic discontinued, confirmed therapy, patient expired/transferred, and prevented antibiotic. Secondary analysis included the microorganisms identified by the PCR.

Results: During the four month evaluation period, 122 interventions were identified for 115 positive blood culture results. The most common interventions were narrowing therapy (20.5 percent), consulting Infectious Disease (17.2 percent), and adding (12.3 percent) or

discontinuing (11.5 percent) antimicrobials. PCR results that resulted in “no change in therapy” were primarily due to contamination (86.9 percent); however, the PCR result confirmed appropriate current antimicrobial therapy for the remainder of the results that were classified in this category. Of the 115 positive blood cultures, gram positive bacteria made up the majority at 66.1 percent (n equals 76) verses gram negative at 30.4 percent (n equals 35). Additionally, 2 samples were recorded as “none detected” (as the PCR test did not have the organism on the identification panel), and 2 samples were positive for Candida glabrata.

Conclusion: PCR rapid organism identification lead to an intervention (or multiple interventions) in 63.1percent of the cases reviewed over the four month evaluation period. As PCR results are available more rapidly than traditional blood cultures, interventions made based on these results likely improved time to appropriate antimicrobial therapy. Obtaining further data, with a more standardized documentation process (including exact time to appropriate therapy) would contribute to a better in-depth understanding of laboratory-based PCR technology significance in this hospital setting.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 5b-167

Poster Title: Medication utilization in a non-profit pharmacy distribution network

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Purpose: According to the Centers for Medicare and Medicaid Services, medication non-adherence can negatively impact patient outcomes and increase overall healthcare costs. The Dispensary of Hope addresses this issue by procuring surplus medications via donations that otherwise would have been destroyed and make them accessible to charitable pharmacies and clinics. With these medications, underserved patients who are low income and uninsured are able to continue their prescribed medication therapy. In detailing how the Dispensary of Hope manages the movement of medications, we aim to identify efficiencies in the organization's processes and how the addition of pharmacists can further enhance current operations.

Methods: Medication movement at the Dispensary of Hope begins at the point of medication donation and ends at medication delivery to charitable pharmacies and clinics. Within this framework, the Dispensary of Hope utilizes a medication list called the Target List which specify medications the organization aims to keep from medications that have been donated by manufacturers or physician practices. The Target List is updated quarterly and each update takes into consideration the addition or removal of medications based on data supporting its demand and clinical utility. Placing pharmacists in charge of updating the Target List provides benefit to the organization due to the pharmacist's extensive medication knowledge. Donations that arrive at the Dispensary of Hope and match medications designated by the Target List, are received and then entered into the organization's inventory system. Inventory updates, provided in real time, can be viewed by charitable pharmacies and clinics who are then able to order, receive, and dispense the medications to underserved patient populations across the United States. To ensure that the organization's current processes align with its operational goals, the Dispensary of Hope utilizes an independent third party to collect and analyze drug

utilization information and site satisfaction surveys. In doing so, the Dispensary of Hope aims to improve upon itself to better reflect the needs of the communities it serves.

Results: The Dispensary of Hope is operationally designed for ease of intake and distribution of donated medications to access sites, thereby increasing its charitable power to the community. In the 2015 fiscal year, the Dispensary of Hope dispensed quantities of medication equal to 359,878 thirty-day fill prescriptions. Per fiscal quarter, this translated to an average of 89,970 thirty-day fills. In the first fiscal quarter of 2016, the Dispensary of Hope dispensed a total of 124,071 thirty-day fills.

Conclusion: There has been great success with the inclusion of pharmacists at the Dispensary of Hope in helping drive formulary and medication procurement decisions. The organization still possesses a supply limitation that must be overcome in order to achieve its goal of providing medication access to the underserved population. The organization provides 225 of its 405 target list medications in consistent supply and aims to expand consistency. To do so, the organization requires increased partnership with medication donors to provide larger volumes to support demand and ensure supply stability. This step will allow for a greater impact on health improvement outcomes.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Evaluative Study

Session-Board Number: 5b-168

Poster Title: Impact of knowledge and job values on the career interests of student pharmacists

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Purpose: The profession of pharmacy is experiencing a trend of employment saturation in many avenues of the job market. This calls for further analysis of the factors affecting the perspective of student pharmacists' interest in different areas of pharmacy. The purpose of this study was to investigate the extent to which knowledge of a career path and the importance of job values impact career interests among first and second year student pharmacists.

Methods: All first and second year student pharmacists of the University of Tennessee College of Pharmacy were surveyed to evaluate their current career plans. The instrument included both established and study-derived items and focused on self-assessed knowledge of pharmacy career paths, job-related values, interest in industry-specific jobs, and basic demographics. Correlation analysis was conducted using SPSS (version 22) to determine if a relationship existed between career interest and knowledge as well as between career interest and job values. Additionally, a multinomial logistic regression was conducted using STATA (version 14) to evaluate the likelihood of choosing a specific pharmacy career path (community, hospital, non-traditional, ambulatory care, or academia) based on the relative importance of students' job values while controlling for select demographics.

Results: Three hundred and thirty-one student pharmacists were surveyed, and a positive correlation was observed between a higher interest in chain pharmacy and the importance of salary, benefits, and knowledge of chain pharmacy as a profession (p less than 0.05). Also, a positive correlation was observed between a higher interest in hospital pharmacy and the importance of advancement opportunities, work environment, and knowledge of specialist, generalist, and ambulatory career fields (p less than 0.05). A positive correlation was observed between interest in academia and the importance of advancement opportunities and

knowledge of all facets of pharmacy, except managed care and community (p less than 0.05). Controlling for gender, grade point average, and relationship status, relative risk ratios of 2.02 and 0.44 (both p less than 0.05) were observed for advancement opportunities and the importance of salary for hospital pharmacy when adjusted for the job values assessed. In addition, adjusted relative risk ratios of 0.17 and 9.5 (both p less than 0.05) were observed for the importance of salary and advancement opportunities for an academic position. In addition, adjusted relative risk ratios of 4.6 and 0.56 for advancement opportunities and salary (both p less than 0.05), were observed for non-traditional pharmacy.

Conclusion: First and second year student pharmacists who value salary and benefits are more likely to seek employment in community pharmacy practice. However, students who value advancement opportunities are more likely to seek employment opportunities within hospital, academia, and non-traditional areas of pharmacy practice.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5b-169

Poster Title: Assessing the frequency of electrocardiogram (ECG) monitoring and evaluating contributing factors on the incidence of QTc-prolongation in pediatric hematology-oncology patients receiving methadone

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Purpose: Methadone has a boxed warning for QTc prolongation and serious arrhythmias, such as torsades de pointes. The package insert advises that patients receive baseline and follow up ECGs when initiating and increasing methadone dosing. No studies have assessed QTc prolongation risk in pediatric patients receiving methadone. As part of a quality improvement (QI) effort, this retrospective chart review was designed to evaluate the frequency of electrocardiogram monitoring and collect data on potential risk factors for QTc prolongation in pediatric hematology/oncology patients receiving methadone therapy.

Methods: A retrospective chart review of patients who were prescribed methadone at St. Jude Children's Research Hospital between January 2014 and June 2016 was performed. The following patient data were collected from the electronic health record for each course of therapy: patient demographics, initial methadone dose, methadone titration doses, related comorbidities, relevant cardiac history, and prior history of anthracycline use. Serum concentrations for potassium, magnesium, calcium, and creatinine on the day the ECG was performed were recorded. Baseline and follow-up QTc intervals was recorded. QTc prolongation was defined as a QTc interval greater than 460 milliseconds (msec) for patients ages 0-15 years, greater than 450 msec for males greater than 15 years, and greater than 470 msec for females greater than 15 years old. Borderline QTc prolongation was defined as a QTc interval of 440-460 msec for patients ages 0-15 years, 430-450 msec for males greater than 15 years and 450-470 msec for females greater than 15 years old. Medications administered

during the week prior to ECG monitoring that could affect electrolytes (angiotensin converting enzyme inhibitors, angiotensin receptor blockers, beta blockers, and loop diuretics) or prolong the QTc interval (amitriptyline, arsenic trioxide, azithromycin, ciprofloxacin, citalopram, crizotinib, escitalopram, fluoxetine, granisetron, haloperidol, methadone, mirtazapine, olanzapine, ondansetron, pentamidine, promethazine, risperidone, sertraline, sorafenib, and trazodone) were recorded.

Results: Seventy-five methadone initiations in 52 patients were evaluated. Baseline ECGs were obtained at initiation for 57.3 percent (43/75) of methadone therapies. Normal baseline QTc interval was reported in all but one patient. This patient had a prolonged baseline QTc interval while receiving three concurrent QTc prolonging medications prior to methadone initiation. ECG monitoring after therapy initiation was performed in 70 percent (30/43) of the cases where a baseline ECG was obtained. During follow-up monitoring, borderline QTc prolongation was observed in four patients, and prolonged QTc interval was observed in one patient. Follow-up ECGs after methadone dose increases were performed in 59 percent (10/17) of patients. In patients monitored after a dose increase, one patient developed a borderline QTc prolongation, and two developed a prolonged QTc interval. Doses were decreased in all patients with a prolonged QTc interval, and QTc intervals returned to normal for two of three patients. All patients with abnormal QTc intervals during methadone therapy were receiving at least two other QTc prolonging medications. Serum electrolytes were normal in all patients at the time of the abnormal QTc intervals except for one patient with hypokalemia and hypomagnesaemia at follow-up and one patient with hypocalcemia after a dose increase.

Conclusion: In approximately half of methadone therapy initiations analyzed, a baseline ECG was obtained prior to initiation. Follow-up ECGs were obtained after therapy initiation for 70 percent of patients who had received baseline ECGs. Abnormal QTc intervals were observed during ECG follow-up monitoring after both methadone therapy initiation and dose increases. All patients with abnormal QTc intervals were also receiving at least two medications with a QTc prolongation risk. Based on the results of this project, process improvement efforts to increase QTc monitoring in patients receiving methadone will be implemented.

Submission Category: Pediatrics

Submission Type: Case Report

Session-Board Number: 5b-170

Poster Title: Steven-Johnson syndrome associated with the use of lisdexamfetamine in a pediatric patient

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Purpose: This case report is a retrospective case study examining a drug-induced adverse event in a pediatric patient after taking lisdexamfetamine. The 15-year old male presented from an outside hospital with a five-day history of fever and mucosal changes. After one day of fever, the patient was self-treated with one dose of ibuprofen and acetaminophen. He continued to spike fevers over the next few days, and his guardian began to notice cracking of his oral mucosa. The cracking and erythema continued to worsen, so his guardian brought him to an outside institution. Cultures were obtained, and prophylactic antibiotics and antivirals were started for suspected Stevens-Johnson syndrome (SJS). His facial swelling worsened and progressed to severe stomatitis, prompting subsequent transfer to Le Bonheur Children's Hospital. The patient had been on lisdexamfetamine 30 mg once daily for attention deficit hyperactivity disorder for an unknown amount of time, but it was noted that his last dose was one week prior to symptom onset. His oral exam revealed full-thickness desquamation and exudates on both his upper and lower lips, along with the buccal mucosa, tongue, and hard palate. The glans penis showed multiple small, full-thickness vesicles. His skin was positive for Nikolsky sign. A skin biopsy sample was taken from three separate blisters. Ophthalmic examination showed bilateral conjunctival erythema with yellow exudates. Numerous 3 to 5 millimeter vesicles were noted bilaterally on the dorsal hands and wrists. Bilateral palms and the left plantar foot contained intact bullae. Lab studies were significant for alkaline phosphatase 448 IU/L, aspartate aminotransferase 331 IU/L, and total bilirubin 5.7 mg/dL. All other labs were within normal limits. Prophylactic antibiotics and antivirals were discontinued due to the fact that they are not routinely recommended in the treatment of SJS. He was treated with lacri-lube and prednisone ophthalmic and mupirocin for his penile lesions. The patient was kept in the critical care unit as his skin condition continued to worsen developing into whitish and erythematous ulcers in the oral area, glans of penis, and throughout his

extremities. A peripherally inserted central catheter was placed in order to start total parenteral nutrition. Intravenous immunoglobulin was given for three days. He developed pancytopenia and continued to have rising liver function tests and hyperbilirubinemia. He remained febrile for seven days after admission, but all blood cultures remained negative, including cultures for herpes simplex, Epstein-Barr, coxsackie, and parvo B19. His lips became bloody and raw, and it led to them adhering together. The bullae on his hands became exposed, which required more extensive wound care. Twelve days after admission, dermatology was able to confirm the biopsy as being SJS. He continued to have persistent labial edema, and he developed a new yellow, mucopurulent drainage from his mouth. He complained of increasing pain to his tongue and lips and was only able to respond by shaking his head. Around day 16 of admission, he began to show improvement in his labial and buccal appearance and started feeling well enough for ambulation. Twenty-one days after admission, he was improved enough to be discharged and instructed to follow up with dermatology in a week. Based on the Naranjo algorithm score of 4, the probability of this being an adverse drug reaction caused by lisdexamfetamine is possible; however, there are a few case reports of amphetamines causing SJS, so the possibility should be included as part of the differential and may warrant the inclusion of monitoring for this adverse reaction as a part of routine counseling.

Methods:

Results:

Conclusion:

Submission Category: General Clinical Practice

Submission Type: Case Report

Session-Board Number: 5b-171

Poster Title: Resolution of macrocytosis with the addition of folic acid despite normal laboratory markers

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Purpose: Anemia is commonly differentiated as microcytic or macrocytic based on the mean corpuscular volume (MCV). When MCV is elevated in the presence of concurrent low hemoglobin, macrocytic anemia is diagnosed. This is commonly associated with etiologies such as alcoholism, liver disease, or malnutrition and commonly manifests with deficiencies in cobalamin (B12) or folic acid (B9). To test for these deficiencies, laboratory values for serum methylmalonic acid (MMA) and serum homocysteine are often obtained. An increased result of either or both would indicate a nutritional deficiency. This case report suggests nutritional deficiencies to be present despite normal laboratory markers. A 37 year-old male (58.6 kg, 91 percent ideal body weight) was admitted to Regional One Health status post motor vehicle accident. He had extensive full body injuries, including a subarachnoid hemorrhage and extensive facial, rib, and extremity fractures. His social history was positive for alcohol and tobacco use. The patient was admitted to the trauma intensive care unit (TICU) and, due to his alcohol history, empirically started on folic acid 1 mg daily, thiamine 100 mg daily, and multivitamins. On hospital day 3 (HD3), the Nutrition Support Service (NSS) was consulted to provide enteral nutrition for the patient. At this time, he had a hemoglobin of 8.5 g/dL with a slightly elevated MCV of 100.7 fL indicative of a macrocytic anemia. It was noted that his MCV was elevated during prior hospital days, ranging from 99.9 to 106. Impact Peptide 1.5 with supplementary glutamine and protein was initiated and serum homocysteine and MMA levels were ordered to determine the origin of the macrocytosis. NSS continued folic acid 1 mg daily, as this deficiency is common in patients with an alcohol history. The MCV on HD4 to HD6 remained elevated between 101.9 and 102.4. On HD5, the laboratory reported values for homocysteine and MMA of less than 3 mcmol/L and 214 nmol/L, respectively. The decision was made to continue folic acid due to the patient's clinical picture and the benign nature of the

supplement. The patient also had a mandible fixation on HD5. Pyridoxine 25 mg daily was initiated on HD7 in case the patient had an underlying B6 deficiency. On HD8, the MCV peaked at 105.2 fL with a concomitant hemoglobin of 7.9 g/dL. During subsequent days, the MCV and hemoglobin continued to decline. By HD14 the macrocytosis had resolved and the MCV remained normal throughout the remainder of the hospital stay. Due to a declining hemoglobin (6.5 g/dL) and hematocrit (20.4 percent), on HD17 the patient required a transfusion of 700 mL of packed red blood cells. This raised the hemoglobin to 9.6 g/dL and this value was maintained throughout the hospital stay. On HD18, the patient was switched to Replete with Fiber and NSS signed-off allowing the medical nutrition team to take over the patient's nutrition. A follow-up homocysteine and MMA were ordered, which resulted with normal values for both homocysteine (7.1 mcmol/L) and MMA (343 nmol/L). The remaining course was largely unremarkable with the patient being transitioned to a liquid pureed diet with supplementary Boost Plus on HD31. It is notable that the patient received folic acid until discharge. He was discharged on HD35 with hemoglobin of 9.7 g/dL and MCV of 89.4 fL. It is important to take multiple factors into account when making decisions on therapy, including past histories, laboratory values, disease state knowledge, and the general clinical appearance of the patient.

Methods:

Results:

Conclusion:

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5b-172

Poster Title: Initiation of a pharmacy-assisted discharge counseling program in a pediatric hospital

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Purpose: Discharge is a critical juncture in a patient's medication therapy and, by extension, the transition of care process as a whole. Far too often, mistakes are incurred and opportunities to optimize therapy are missed. Pharmacy involvement in discharge education and evaluation has the potential to improve outcomes and patient satisfaction while optimizing nursing staff time. This study assessed interventions resulting from a pharmacist-assisted discharge counseling program in a pediatric hospital.

Methods: A non-randomized, single-center cohort study was conducted December 13, 2015 to May 18, 2016 in a Medical Surgical Nursing Unit of a tertiary care, 255-bed pediatric hospital. Patients targeted for counseling were those discharged with home medications or new prescriptions during pharmacy discharge service hours (weekdays; 0800-1630). The clinical pharmacist was contacted by the nursing unit when discharge orders were entered in the chart. On qualifying patients, pharmacists conducted chart reviews to evaluate clinical appropriateness, potential for insurance problems, provided patient education on all medications, and notified the medical team with recommendations when appropriate. Study data were collected via weekly computerized reports that detailed information on date and time patient discharge orders were entered into the electronic medical record, actual time of discharge, and the length of time between the order and actual discharge. Data collection sheets were provided to clinical pharmacists on which to document all patients on whom they counseled. The pharmacist would record date and time, patient identifiers, medications, and total time spent on the session. Documented interventions were recorded and categorized, as well as any reason that counseling did not occur. Additional study information, including

demographics and 30-day readmission, were also recorded. Pharmacist interventions were the primary outcome evaluated, while secondary outcomes examined time requirements, reasons for missed counseling opportunities, 30-day readmission, and predicted hospital savings resulting from the program.

Results: A total of 998 patients were discharged from the nursing unit during the study period. Of the 566 patients that met inclusion criteria, 195 (34% of opportunities) were counseled. 30 interventions were made (one for every 6.5 counseling sessions or 15%) with the most common interventions being Clarification of Orders and Dosing Changes. 30-day readmission was 15% for counseled patients and 17% for documented, uncounseled, qualifying patients. A total of 3,440 minutes (57.3 hours) were spent; minimum, maximum, and average time spent was 5, 120, and 18 minutes respectively. On average, one intervention was made for every 115 minutes of pharmacist time invested. Approximate pharmacist labor cost was $3,039, while projected savings from the counseling program were $22,815; a net saving of $19,776. Reasons for not counseling the remaining 371 qualifying patients included Not Available/No Time (18%), Pharmacist Not Paged (48%), Patient Already Discharged (6%), Other (8%), and Missed Opportunity (22%).

Conclusion: A pharmacist-assisted discharge counseling program showed potential in aiding the transition of care in a pediatric hospital through interventions in both clinical and practical aspects of planned outpatient therapy. Optimization of treatment, selection of medications covered by the patient's insurance, and prevention of avertible prescription errors helped reduce discontinuity of care and showed a slight improvement in 30-day readmission. Logistical data on time and staffing requirements demonstrated a disproportionate ratio of current pharmacist availability to need. This reflects the limited resources available prior to expansion, but anticipated hospital savings are expected to aid the fiscal viability of the program.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 5b-173

Poster Title: Frequency, severity, and medication utilization of brown recluse envenomation in pediatric outpatients

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Purpose: Brown recluse spiders (Loxosceles reclusa) are venomous spiders endemic to certain areas of the United States. Loxosceles envenomation is associated with a wide range of clinical symptoms. A previous comprehensive analysis performed at this hospital evaluated the incidence, clinical presentation, complications, therapies, and patient outcomes in children admitted with suspected brown recluse envenomation. Our objective was to describe the incidence, presentation, antibiotic therapy, and pain management in children presenting to the emergency department (ED) with suspected brown recluse envenomation that did not require hospital admission, with future plans to compare our findings with those patients admitted to the hospital.

Methods: The institutional review board approved the retrospective review of the medical records of patients less than or equal to 18 years of age who presented to a Southeastern regional freestanding pediatric hospital ED who had suspected brown recluse spider bite between January 1, 2008 and December 31, 2013. Patients were excluded if they were admitted to the hospital and if the probability of a brown recluse spider bite was unlikely based upon review of the electronic medical record, including ED, admission and/or discharge progress notes. Patient demographics, chief complaint, associated clinical symptoms, vital signs, lesion description, pertinent laboratory values, complications, and treatment modalities were recorded. Cases were categorized as proven, probable or possible brown recluse envenomation based on published suggested reporting standards for loxoscelism. Standard statistical tools were used for data analysis.

Results: Preliminary analyses of 594 patient charts revealed 50 patients (8 percent) classified as possible brown recluse envenomation. Out of these 50 patients, 30 (60 percent) presented with a chief complaint of spider bite and 16 (32 percent) with an abscess or lesion. Cultures were obtained on 10 patients, with 50 percent resulting positive; four patients tested positive for methicillin-resistant Staphylococcus aureus (MRSA), and 1 patient tested positive for methicillin-susceptible Staphylococcus aureus (MSSA). However, 31 patients (62 percent) were given at least one antibiotic at discharge. The antibiotics that were most often prescribed were clindamycin (74 percent) and sulfamethoxazole/trimethoprim (13 percent). Interestingly, the patient with a positive wound culture for MSSA was not prescribed an antibiotic; all 4 patients with MRSA received antibiotic therapy. For pain management, 7 patients (14 percent) were given a non-steroidal anti-inflammatory drug (NSAID), 13 (26 percent) were given an opioid, 8 (16 percent) received lidocaine, and 1 patient (2 percent) was given acetaminophen. Further symptom management included 6 patients (12 percent) receiving an antihistamine, 2 patients (4 percent) receiving steroids, and 3 patients (6 percent) receiving epinephrine. Comparison to previous admission data is ongoing.

Conclusion: While the overall incidence of possible brown recluse envenomation in patients presenting to the ED was small, the majority presented with spider bite as the chief complaint. Nonetheless, 62 percent of these patients were discharged with antibiotics, even though only 5 patients had a documented, concomitant bacterial infection. A variety of pain medications were also commonly administered for symptomatic management. These patients experienced minimal systemic effects at the time of ED presentation and did not require hospital admission for treatment. Further analysis is needed to compare inpatient and outpatient treatment of brown recluse envenomation.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Evaluative Study

Session-Board Number: 5b-174

Poster Title: Characteristic Traits in Pharmacy Residents: Residency Program Directors' Perceptions of Residents Who Scrambled Compared to Residents Who Matched to a Post-Graduate Year One Program

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Purpose: Research suggests that pharmacy residency programs find certain characteristic traits desirable in candidates competing for a post-graduate year one (PGY1) residency position. However, no study has compared these individual characteristic traits in pharmacy residents to determine if differences exist between those candidates that have matched and those who were left to vie for remaining openings during the post-match scramble. Select traits may be advantageous to a candidate and preferred by a program, which may strategically impact the search process. We aimed to address this comparison by evaluating perceptions of PGY1 residency program directors (RPDs).

Methods: This study was approved by the East Tennessee State University Institutional Review Board. A quantitative web-based survey using Dillman's Tailored Design Method was distributed via email to RPDs within the US on four separate occasions between January and March of 2016, Program directors were identified using the American Society of Health-System Pharmacists (ASHP) public online residency directory. RPDs that participated in the 5-minute survey answered basic demographic information and questions involving characteristics of previous residents who scrambled and matched. Informed consent was obtained by all survey participants. The 13 individual characteristic traits assessed were based on previous studies identifying desirable pharmacy resident traits by residency programs. Only responses pertaining to PGY1 residents were included in this study. Resident characteristics were evaluated using a 5-point Likert scale, from strongly agree to strongly disagree. The primary outcome was the

difference between residents that scrambled versus residents that matched to a PGY1 program and their associated personality traits. Differences in mean scores between residents who scrambled and residents who matched were compared using the Student's t-test and categorical variables were compared using the Chi-square test Values of p less than 0.05 were considered statistically significant.

Results: A total of 232 PGY1 RPDs completed the survey. Several RPDs completed matched and scrambled survey sections, resulting in a total 315 data sets. Although responses came mainly from RPDs in a Pharmacotherapy program (N = 203), there was no relationship found between type of PGY1 program and RPDs that have matched versus scrambled residents (P equals 0.97). In addition, there was no relationship found between number of residents per program and RPDs that have matched versus scrambled residents (P equals 0.71). Cronbach's alpha was calculated at 0.949, showing consistency and reliability between personality traits and allowing for a combined mean score. Overall, there was no difference in the primary outcome of combined 13 personality trait mean scores between residents who matched (mean equals 4.32, SD equals 0.48) and residents who scrambled (mean equals 4.36, SD equals 0.62) (P equals 0.54).

Conclusion: Mixed opinions and perceptions of the scramble process and scrambled resident exist. Based on the results of this research, there is no difference in perceptions between pharmacy residents that scramble and those who match to a PGY1 program from RPDs. Both groups are believed to possess the traits that are found to be desirable in pharmacy residents.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-175

Poster Title: Cholesterol medications and breast cancer: Unraveling the potential value of statins in breast cancer treatment

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Purpose: Breast cancer is the most common female invasive cancer. Women with hormone receptor-negative breast cancer generally have a poorer prognosis as it is more aggressive and difficult to treat with current treatment. Recent evidence suggests that 3-hydroxy-3-methyglutaryl-coenzyme A (HMG-CoA) reductase inhibitors, or "statins", may play a role in cancer prevention. The purpose of this study is to test if statins decrease cell proliferation and determine their effect on anti-proliferative and pro-apoptotic signaling pathways. Furthermore, this study investigates whether these effects are dependent on estrogen receptor status.

Methods: Two breast cell lines (MDA-MB-231 and MCF-7) were used in this study. Cytotoxicity assays were performed to assess cell proliferation after 24 and 48-hour treatment using the WST-1 reagent. Cell lines were also treated for 24 hours at subconfluency with the following agents: DMSO (dimethyl sulfoxide) as a control, 20 M lovastatin, 20 M simvastatin, 10 mM metformin, 5mM aspirin, 20 M lovastatin + 10 mM metformin, 20 M simvastatin + 10 mM metformin, 20 M lovastatin + 5mM aspirin, and 20 M simvastatin + 5 mM aspirin. Following treatment, cells were lysed and protein content quantified. Changes in protein expression were analyzed using Western Blotting for a variety of pro-apoptotic, pro-survival, cell cycle regulation, and cell growth markers. Cytotoxicity assays were also performed to assess cell viability after a 24-hour treatment using the WST-1 reagent.

Results: Our results showed morphological changes and visible signs of cellular stress in cells treated for 48 hours with statins. The more evident morphological changes were observed with statins in combination with metformin or aspirin. While these changes were observed with statin treatment alone, lovastatin and simvastatin treatment resulted in a decrease in cell proliferation in MDA-MB-231 cells after 24-and48-hour treatment but not in MCF-7 cells. On

the other hand, treatment with metformin, aspirin, and the combination of a statin with metformin or aspirin resulted in cell toxicity after 48-hours in both cell lines. In an effort to study the pathways involved in these changes in cell proliferation, cells were treated for 24 hours with the different agents and protein lysates collected. Western blot analysis of MDA-MB-231 cells treated with statin drugs resulted in decreased expression of proliferative proteins (p-Akt, p-mTOR, G□L, and AMPK□), and increased expression of the pro-apoptotic proteins (p21, p27, and cleaved-PARP). MCF-7 cells treatment with statin drugs resulted in decreased expression of proliferative proteins (p-Akt, p-mTOR, G□L, and c-Raf), and increased expression of the tumor suppressor p27. Furthermore, MCF-7 cells treated with metformin and aspirin showed decreased levels of pMEK1/2 and Rictor protein expression.

Conclusion: Our results support further investigation of statins as potential agents for use in breast cancer. Morphological changes in statin-treated MDA-MB-231 and MCF-7 cells were evident, suggesting that cells were undergoing stress. Protein analysis results yielded promising data in regards to anti-proliferation and apoptosis. Preliminary data suggests that both apoptosis and impaired cell survival may contribute to statin's effects on tumor growth. Our results direct our attention to the mTOR/Akt signaling pathway as a possible mechanism of action. Additional research is underway to better develop an understanding of the effectiveness of statins and if combination treatment may yield improved results.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-176

Poster Title: Evaluation of epidural corticosteroid use and associated adverse effects

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Purpose: Neck and low back pain are commonly treated with epidural corticosteroid injections (ESI). Serious adverse events such as paraplegia, stroke, spinal cord injury, blindness, and even death have been associated with the administration of steroids into the epidural space. In April 2014, the United States Food and Drug Administration issued a Safety Announcement requiring the labeling of injectable corticosteroids to include a warning describing these risks. The purpose of this study aims to characterize the use of epidural corticosteroid injections, describe the patients who received epidural corticosteroid injections, and attempt to identify adverse drug events associated with their use.

Methods: For this medication-use evaluation, Institutional review board approval and a waiver were obtained form Union University and West Tennessee Healthcare, respectively. Eligible subjects included any adult patient who received an epidural steroid injection starting January 1, 2012 to May 31, 2016. Informed consent was waived; only preexisting data were abstracted from the medical record. No patients who received an epidural steroid injection were excluded. Subjects were identified utilizing a search for medication orders, charges, procedure codes, ICD-9CM codes, and ICD-10 codes in West Tennessee Healthcare databases. Information Systems and Pharmacy Department employees of Jackson-Madison County General Hospital completed the search. A review of the medical record was completed to identify patient, procedural, and medication characteristics. Adverse events were identified by reviewing records from future encounters that occurred within 30 days of an epidural steroid injection. Cardiovascular and neurologic adverse events such as paraplegia, stroke, spinal cord injury, blindness, hyperglycemia, and hypertension were recorded. Basic descriptive statistics were used to describe medication utilization and safety outcomes.

Results: Between January 1, 2012 to May 31, 2016, 1,823 orders for an ESI were identified. A convenience sample of 70 patients was reviewed to establish use characteristics associated with their most recent ESI. Eighteen (26%) patients had a previous ESI. Thirty-seven (52.8%) patients were female, and 61 (87.1%) were Caucasian. The most common single indications for ESI included low back pain (41.4%), lumbosacral radiculopathy (15.7%), and spinal stenosis (14.3%). Five of six cervical ESIs were administered above the recommended C7 to T1 location (one at C5-6, four at C6-7), and 21 (30%) injection approaches were described as intralaminar. No transforaminal injections were identified. Betamethasone was the most commonly administered steroid (88.6%); no orders for dexamethasone were identified. All ESIs were administered with a local anesthetic, and 68 procedures were performed with radiologic contrast medium and fluoroscopy. Comorbidities that were present at the time of ESI and related to potential adverse events included hypertension (58.6%), diabetes (77.1%), stroke (2.9%), and seizure (4.3%). One patient was diagnosed with transient ischemic attack in the emergency department 12 days after betamethasone ESI at L4 using fluoroscopy. This adverse event was possibly related to the ESI based on a Naranjo Scale of two.

Conclusion: From this initial assessment of ESIs, providers seem to be following the recommendations of the FDA Safe Use Initiative Working Group in respect to real-time fluoroscopy and limited use of sedation but are administering particulate steroids over dexamethasone. This study was limited by the accuracy and completeness of clinical documentation and selection bias. In addition, an outpatient provider not part of West Tennessee Healthcare may have treated ESI-related adverse events. Medical records of many more patients will need to be evaluated to better characterize utilization and understand adverse events occurring in this patient population due to the low frequency.

Submission Category: Pediatrics

Submission Type: Case Report

Session-Board Number: 5b-177

Poster Title: Sulfamethoxazole-trimethoprim induced drug reaction with eosinophilia and systemic symptoms (DRESS) syndrome: A case report

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Purpose: This case report illustrates the potential risk of drug reaction with eosinophilia and systemic symptoms (DRESS) syndrome associated with sulfamethoxazole-trimethoprim (SMX/TMP). The patient is a 16-year-old Caucasian female who presented to the emergency department (ED) with a chief complaint of a left lower leg lesion. She had visited Puerto Rico 6 weeks prior, during which time she obtained a mosquito bite. The bite progressed to an abscess, which was initially treated with oral SMX-TMP. After 6 days of treatment, oral ciprofloxacin was added to her antibiotic regimen due to the lack of improvement. Despite dual antibiotic therapy, the patient's clinical condition worsened. Upon presentation to the ED, the patient complained of general malaise, decreased appetite, fever, and had developed an erythematous maculopapular rash covering a large percentage of her back, chest, and upper trunk. Erythema of the face and bilateral conjunctivae were also noted. The patient was hypotensive with a blood pressure of 89/62 mmHg and tachycardic with a heart rate of 118 beats per minute. Laboratory work performed in the ED was significant for white blood cell count (WBC) 1,000/mcL, hemoglobin 12.4 g/dL, hematocrit 37 percent, and platelet count 74,000/mcL. Aspartate aminotransferase (AST) and alanine aminotransferase (ALT) were also mildly elevated at 77 IU/L and 48 IU/L, respectively. Due to concerns for sepsis, the patient was admitted to the pediatric intensive care unit (PICU) for further evaluation and management. The infectious diseases, dermatology, and hematology services were consulted. Ciprofloxacin and SMX/TMP were discontinued, and vancomycin, ceftriaxone, and doxycycline were initiated to cover for potential sources of infection. Daily complete metabolic panels (CMP), complete blood counts (CBC), and liver function tests (LFT) were ordered in addition to blood cultures. Based upon the patient's history and presenting symptoms, tick borne illness, toxic shock syndrome, and DRESS syndrome were all high on the differential diagnosis. By day 2 of hospitalization, the patient's hemodynamics stabilized, appetite improved, and the rash had

significantly faded; however, her LFTs continued to rise. The patient's WBC count and platelets trended up towards normal limits and she continued to clinically improve throughout the remainder of her hospital stay despite steadily increasing LFTs. Broad spectrum coverage with vancomycin and ceftriaxone was discontinued after 48 hours due to negative blood cultures, doxycycline was continued due to the inability to rule out a potential tick borne illness, and treatment with prednisone was initiated to prevent rebound of DRESS syndrome. The patient was discharged 3 days after admission with instructions to follow up outpatient with the dermatology clinic for monitoring of all pertinent labs including LFTs, cell counts, and thyroid function, and to adjust the steroid taper. She was seen 3 times in clinic after discharge. Her cell counts and thyroid function tests were within normal limits and her LFTs returned to baseline approximately one month following hospitalization. The patient's physical exam, history, and lab findings all supported a diagnosis of DRESS syndrome, including more specifically, fever, rash, facial erythema, elevated LFTs, elevated eosinophils, atypical lymphocytes, leukopenia, and thrombocytopenia. In addition, the timing between the initiation of SMX/TMP and the development of symptoms was also consistent with the presentation of DRESS syndrome. Based on the Naranjo score of 4, the probability of this being an adverse drug reaction caused by SMX/TMP is possible. In summary, while the probability of developing DRESS syndrome from SMX/TMP is low, it is not unheard of. This case report illustrates the importance of recognizing the signs and symptoms of DRESS syndrome, promptly identifying and discontinuing the offending agent, and knowing how to properly monitor and manage the sequelae that commonly occur with this syndrome.

Methods:

Results:

Conclusion:

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 5b-178

Poster Title: Evaluation of potential barriers to use of sacubitril-valsartan in patients with heart failure

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Purpose: Sacubitril-valsartan decreased mortality in patients with heart failure (HF) with reduced ejection fraction (EF) compared to enalapril in the PARADIGM-HF trial. The American Heart Association and American College of Cardiology (AHA/ACC) Guideline for the Management of HF recommends replacement of an angiotensin-converting-enzyme inhibitor (ACEI) or angiotensin II receptor blocker (ARB) with sacubitril-valsartan (Class I) in persistently symptomatic HF patients. Measuring the potential population that could benefit from sacubitril-valsartan is the first step to optimizing guideline compliance. The purpose of this study was to identify and quantify potential barriers to sacubitril-valsartan use at outpatient appointments in patients with recent HF hospitalizations.

Methods: The institutional review board approved this retrospective electronic chart review of all decompensated HF admissions to Vanderbilt University Medical Center (VUMC) from 09/01/2015 to 06/15/2016. HF admissions were identified using an automatic algorithm within the electronic medical record. Inclusion required meeting 3 of the following algorithm criteria: International Classification of Disease 9 or 10 code history of HF at admission, inpatient order for an intravenous loop diuretic, HF admitting diagnosis, or specific B-type natriuretic peptide (BNP) level based on body-mass index (BMI); BNP greater than 400 pg/mL if BMI less than 26; BNP greater than 100 pg/mL if BMI 26 to 35; BNP greater than 50 pg/mL if BMI greater than 35. Patients meeting any of the following criteria were excluded: EF greater than 40 percent, lack of chronic cardiology or primary care outpatient appointments at VUMC, or classification of New York Heart Association Class I HF at time of follow up. The primary objective was to categorize and quantify the barriers to sacubitril-valsartan therapy at the time of post-discharge follow up. Potential barriers to therapy, defined according to the package insert and PARADIGM-HF

criteria, included hyperkalemia (potassium greater than 5.2 mEq/L), renal dysfunction based on estimated glomerular filtration rate (eGFR), hepatic dysfunction (Child-Pugh class C), hypotension (systolic blood pressure less than 95 mmHg), pregnancy, lack of insurance, and documented ACEI-induced cough or angioedema.

Results: Of the 389 admissions identified, a total of 124 patients met study criteria (mean age 64 years, 58 percent male, median EF 25 percent). Only 9 patients (7 percent) received sacubitril-valsartan therapy. Of those not receiving sacubitril-valsartan, 49 patients (40 percent) were identified as having at least one potential barrier to the use of sacubitril-valsartan, and 66 patients (53 percent) lacked identifiable barriers. Patients without barriers had a higher systolic blood pressure (mean 121 vs 106 mmHg, P less than 0.001), lower serum creatinine (mean 1.3 vs 2.0 mg/dL, P less than 0.001), and increased use of ACEI or ARB therapy (67 vs 38 percent, P equals 0.003) but did not differ in age (P equals 0.5). Identified absolute barriers included hypotension (n=21, 43 percent), hyperkalemia (n=5, 10 percent), and eGFR less than 15 mL/min/1.73 square meters (n=4, 8 percent). Relative barriers included cough (n=8, 16 percent), eGFR 15 to 29 mL/min/1.73 square meters (n=16, 33 percent), and no insurance (n=3, 6 percent). Angioedema, hepatic dysfunction, and pregnancy were not observed. Of the 5 patients with hyperkalemia, 2 were receiving potassium supplementation or an ARB, and 9 of the patients with hypotension were tolerating ACEI, ARB, or hydralazine therapy.

Conclusion: In this retrospective study of patients meeting guideline criteria for sacubitril-valsartan therapy, only 7 percent of patients were prescribed sacubitril-valsartan. However, 53 percent of the total patient population lacked an identifiable barrier to use of sacubitril-valsartan. Common barriers to sacubitril-valsartan therapy included hypotension, hyperkalemia, and renal dysfunction. Pharmacists have the opportunity to play a key role in identifying patients that could benefit from sacubitril-valsartan therapy in accordance with the AHA/ACC guidelines. Future studies are needed to measure the impact a pharmacist-led sacubitril-valsartan optimization intervention could have on heart failure outcomes.

Submission Category: Automation/ Informatics

Submission Type: Descriptive Report

Session-Board Number: 5b-179

Poster Title: Development of a pneumonia severity index (PSI) calculator through a third year pharmacy student informatics internship in an academic medical center

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Purpose: Physicians at Vanderbilt University Medical Center (VUMC) requested development of a clinical decision support (CDS) tool for the computerized physician order entry (CPOE) system that would calculate a Pneumonia Severity Index (PSI) score upon patient presentation to the emergency department (ED), with the primary diagnosis of community acquired pneumonia (CAP). The PSI score was developed by the Pneumonia Patient Outcomes Research Team (PORT) project to create a tool for assessing short-term mortality rate in CAP patients and for guiding physician triage of patients to either inpatient or outpatient treatment.

Methods: Flowcharts were constructed which detailed the current CPOE workflow for CAP patients, the desired CPOE workflow, and the proposed PSI calculator. Communication occurred between the informatics pharmacists and providers in order to obtain feedback from the providers for specific functionality desired in the calculator. The pharmacy interns created the dynamic PSI calculator using hypertext markup language (HTML), JavaScript, cascading style sheet (CSS), and CDS rule logic coding language that updates the PSI Score, risk class, and treatment recommendation upon demand. A CDS logic file was constructed in order to implement the HTML file for the PSI calculator into the computerized ordering system. Continuous quality assurance and testing was also performed to ensure that the calculator computed values correctly and functioned as intended.

Results: The calculator computes the PSI Score and risk class based on the patient's age, gender, nursing home status, coexisting illnesses, physical findings, and lab and radiographic findings. Various point values are attributed to these options selected by the user while interacting with the tool. Alerts display if a user does not input required fields, and attributes such as age and gender prepopulate on the page through integration with the patient's record. Recent lab values such as blood urea nitrogen (BUN), sodium, and glucose also display on the calculator to aide the user in completion of the form.

Conclusion: The robustness of the PSI calculator will be validated by vigorous back-end testing before implementation into the CPOE. Back-end testing will ensure the overall quality of the webpage and help mitigate the risk of end-user error. A dynamic PSI calculator, such as this tool, aims to assist providers in determining appropriate treatment for CAP patients while improving efficiency in calculating PSI scores. In the future, data extracted from the calculator could aid in research pertaining to CAP patients. Designing and constructing a PSI calculator gave pharmacy interns experience writing code with HTML, JavaScript, and CSS.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5b-180

Poster Title: Findings and implementation of the multiplex polymerase chain reaction meningitis/encephalitis panel in a community hospital.

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Purpose: Meningitis and encephalitis can lead to serious complications such as mental disabilities, sensory loss, or death if not treated swiftly and appropriately. Unfortunately, diagnosis through conventional approaches can take several days to identify the pathogen and optimize therapy. The meningitis/encephalitis (ME) multiplex polymerase chain reaction (PCR) panel identifies the most common microorganisms involved in infections of the central nervous system in roughly one hour. The purpose of this study was to to examine the implementation parameters of this novel panel at a community hospital and determine if early recognition of specific pathogens altered prescribers' antimicrobial choices to affect patient outcomes.

Methods: This retrospective analysis was conducted in a single community hospital in which 29 ME PCR panels were performed. Twenty-seven eligible participants aged 1 day to 74 years old were identified. Participants were included if the ME PCR panel was performed during their hospitalization between May 1-September 12, 2016. Testing was performed automatically on cerebrospinal fluid (CSF) with greater than 5 cells/microliter white blood cells (WBC) or at the request of the physician. There were no exclusion criteria due to the nature of the study. A manual, retrospective review of the panel findings, patient chart information, and clinical decisions of the prescribers was conducted. CSF WBC counts were recorded to aid in testing parameter decisions. Outcomes including test accuracy, antibiotic choice and duration, and length of stay were analyzed.

Results: WBC counts of positive tests ranged from 16 to 3326 cells/microliter. The ME PCR panel identified 12 positive and 17 negative results. Positive identifications included 7 enterovirus, 3 herpes simplex virus-2 (HSV2), 1 varicella zoster virus (VZV), and 1 S. agalactiae. The test was 100 percent accurate when compared to final CSF culture results. Of the enterovirus identifications, 28.6 percent of patients did not receive antimicrobials due to ME PCR panel results while 42.8 percent received one empiric dose before results were available. Acyclovir was appropriately started in 50 percent of the cases it was indicated for. The antibiotic spectrum was narrowed after the panel confirming S. agalactiae returned. Of the 17 cases negative for CNS infection, 57 percent of patients that were prescribed antimicrobials received less than or equal to 48 hours of empiric therapy. Inappropriate therapy was avoided in 20.7 percent of patients. The total average length of stay of all patients was 106.6 hours (71.8 hours for positive tests vs. 139.6 hours for negative tests). The average length of stay when antimicrobials were altered due to the ME PCR results was 88.6 hours.

Conclusion: Implementing the ME PCR panel in a community hospital allowed prescribers to deescalate antimicrobial therapy and begin acyclovir for HSV2 and VZV etiologies. This positively affects patient outcomes by reducing the risk of complications and antibiotic resistance from unnecessary antibiotic exposure. Based on the lowest CSF WBC count of this evaluation, increasing the WBC count to automatically test from 5 to 10 cells/microliter may be considered, however further study will be needed to conclude this decision.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5b-181

Poster Title: Data mining in the electronic medical record to reduce alert fatigue

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Purpose: Alert fatigue is a well-documented phenomenon whereby clinicians become desensitized to safety alerts, especially alerts within the electronic medical record. Dose range alerts are of particular importance to pharmacists as they have the potential to avert medication errors. In a single year at Methodist LeBonheur Healthcare there were 174,944 dose range alerts, 80 percent of which were overridden further highlighting the scope of the alert fatigue problem. This research seeks to predict which dose range alerts would be successful in an attempt to ameliorate alert fatigue and make dose range alerts more meaningful.

Methods: A dose range checker report was used to collect the dose range checking alerts within the Methodist LeBonhuer Healthcare System from August 1, 2015 to July 31, 2016. Patient identifiers were removed from the dataset, and eleven features were selected during preprocessing which included the drug, dose, dosage form, patient age, and others. Due to an imbalance in the number of successful and overridden alerts, the dataset was randomly reduced to 20,000 entries with an equal distribution of successes and overrides. The dataset was then used to create a decision tree within the Waikato Environment for Knowledge Analysis (WEKA) Explorer version 3.8.0. A decision tree is a predictive tool commonly used in data science and was used to build a model with our dataset which predicts whether a dosage alert will be successful or overridden. 10-fold cross validation, a robust method to estimate a predictive model's true error rate, was used to validate the decision tree. 10-fold cross validation partitions the data into ten equal subsets and uses those partitions for training and testing. For ten iterations, nine partitions are used to build a decision tree, and the subset held out at each experiment is used for testing.

Results: For the purposes of this analysis, successes were considered a positive result while overrides were considered a negative result. 17,841 alerts (89 percent) were correctly classified and 2,159 alerts (11 percent) were misclassified. 8,883 entries were labeled as a success and would have resulted in an alert being presented to the prescriber. 94 percent (8,362) of alerts labelled success were true positives, while only 6 percent (512) of alerts labelled success were false positives. 11,117 entries were labeled as an override; 85 percent (9,470) of alerts labelled override were true negatives, while 15 percent (1,638) of alerts labelled override were false negatives. The sensitivity and specificity were 84 percent and 95 percent respectively.

Conclusion: Based on the results of the 10-fold cross validation, 94 percent of alerts presented to the prescriber were successful. Thus, if this decision tree was implemented within an electronic medical record, it could greatly reduce the number of overridden alerts. This would help to reduce alert fatigue which can be detrimental to providing patient care. This analysis has confirmed the plausibility of using decision trees to reduce overridden alerts thereby making dose range alerts more meaningful. Future work will involve continuing to improve the sensitivity of the model.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5b-182

Poster Title: Interdisciplinary anesthesia tray revision project: Reducing the opportunity for human error

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Purpose: Contrary to medication errors in other areas, anesthesia errors are poorly defined and are only recently being recognized. The administration of these medications lacks safety checks used in many areas, such as barcoding and scanning and double checks by pharmacists. There is a shortage of documentation and extensive research needed to identify and resolve problems in this unique environment. The most common anesthesia errors include mistakes in drug dose and drug substitution: both caused by human error. The purpose of this project was to implement anesthesia tray improvements to decrease the opportunity for human error.

Methods: An interdisciplinary initiative with anesthesia and pharmacy lead by the chief of anesthesia was launched to reexamine trays used in four different operating rooms. The contents were evaluated by frequency of use, par levels, location of look-alike/sound-alike medications, potential for stocking premixing, and presence of unnecessary high alert drugs. The interdisciplinary team removed medications and reconfigured trays to enhance safety.

Results: Medications that were stocked in trays but rarely used and those available in automated medication dispensing cabinets were removed, averaging ten unique medication removals per tray. Medications that previously had to be mixed and drawn up during a procedure were replaced with admixtures, averaging four unique medication replacements per tray. Also, an average of two medications were replaced per tray to allow for safer unit of use products. An average of three medications per tray were added that were previously needed, but not available. The greatest amount of changes was seen in the trauma tray with a total of

twenty-seven removals, replacements, and additions. The least amount of changes was slightly less at a total of seventeen. If look-alike/sound-alike medications could not be removed, they were strategically placed in opposite sides of the tray. By decreasing the amount of medications in each tray, previously cluttered trays became more organized. With less medications to choose from, there were less opportunities to choose the wrong drug. With pre filled syringes replacing ready mix ampules and vials, there were less opportunities to draw up the wrong dose or inadvertently administer undiluted medications.

Conclusion: Multiple opportunities were identified to enhance anesthesia medication safety in the operating room. The only costs associated with this initiative were labor. Reorganizing anesthesia medication trays was effective in decreasing the opportunity for human error and may be a simple way to lower the amount of administration errors in the operating room.

Submission Category: Oncology

Submission Type: Case Report

Session-Board Number: 5b-183

Poster Title: Pembrolizumab-induced myasthenia gravis: A fatal case report

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Purpose: Pembrolizumab is a novel monoclonal antibody that enhances anti-tumor responses by inhibiting the programmed cell-death 1 receptor. While efficacious in different metastatic cancers, pembrolizumab has also been associated with numerous life-threatening immune related adverse events. Myasthenia gravis, a neuromuscular autoimmune disorder characterized by muscle weakness secondary to antibodies targeting the acetylcholine receptor, is one such immune related adverse event that has been associated with pembrolizumab use. Although rare, it has mainly been associated with the development of exacerbations in patients with pre-existing myasthenia gravis. We present a fatal case of myasthenia gravis following an infusion of pembrolizumab in a patient with no prior myasthenia gravis history. A 63-year-old Caucasian male weighing 135 kilograms presented to the emergency department following right eyelid drooping, puffiness, blurred vision, and shortness of breath upon ambulation for two days. Past medical history was significant for hypertension, osteoarthritis, benign prostatic hypertrophy, nephrolithiasis, and stage IV malignant melanoma of the right scalp with metastases to the liver and brain. Home medications included losartan 100 mg, meloxicam 15 mg, and tamsulosin 0.4 mg all taken once daily. Per patient interview, he also underwent radiation therapy six weeks prior to admission and received the first infusion of pembrolizumab two weeks prior to his symptom onset. Physical exam was significant for mild right ptosis secondary to periorbital edema and mild erythema. A magnetic resonance angiography of the head and neck and a magnetic resonance image of the brain and brainstem were unremarkable for new findings. Abnormal admission lab results included creatinine phosphokinase 10,386 units/L, aspartate aminotransferase 409 unit/L, alanine aminotransferase 179 unit/L, troponin 1.280 ng/mL, and white blood cell count 18.5 thou/mcl.

The patient was started on pyridostigmine 120 mg orally every six hours and prednisone 60 mg orally daily for myositis, and ceftriaxone 1 gram every 24 hours for presumed infection. The patient developed facial muscle weakness, bilateral ptosis, and worsening respiratory failure on day two of hospitalization and was transferred to the intensive care unit where noninvasive positive-pressure ventilation was initiated. Intravenous immunoglobulin 40 grams daily was started on day two and continued until day six for five total doses. On day six of hospitalization the steroid regimen was changed to methylprednisolone 1 gram IV daily for seven total doses. After approximately one week of hospitalization, serologic testing results returned positive for acetylcholine receptor modulator antibody at 61 percent and negative for anti-muscarinic antibodies. These laboratory findings, coupled with the recent initiation of pembrolizumab led the medical team to diagnose the patient with PD-1 induced autoimmune myasthenia gravis with myositis. Subsequently, daily plasmapheresis was initiated days seven through nine of hospitalization and on day 11. On day nine the patient developed hypercapnic respiratory distress and became increasingly drowsy requiring mechanical ventilation. Despite aggressive medical treatment, the patient showed no signs of improvement. Per the wishes of the patient and his family, aggressive care was withdrawn and comfort measures pursued on day 12 with expiration shortly thereafter. While this immune related adverse event is rare, one previous report of new onset myasthenia gravis has been identified, though the patient was seronegative. Compared with patients experiencing a myasthenia gravis exacerbation secondary to pembrolizumab, new onset myasthenia gravis appears to be more resistant to myasthenia gravis treatment regimens. Clinicians should be aware of this rare potential adverse event and remain aggressive in treatment strategies. As our case highlights, obtaining an accurate and thorough medication history is vitally important to help differentiate a drug-induced cause and aide in determining the best treatment strategy. Rapid recognition and discontinuation of pembrolizumab therapy is imperative to prevent further worsening symptoms and improve prognosis.

Methods:

Results:

Conclusion:

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Case Report

Session-Board Number: 5b-184

Poster Title: Metronidazole-induced cerebellar toxicity following prolonged course of therapy

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Purpose: Purpose: To report a case of metronidazole-induced cerebellar toxicity noted on a magnetic resonance imaging (MRI) scan following a prolonged course of therapy. Summary: A 53-year old female, with a past medical history of Hepatitis C cirrhosis and Type 2 Diabetes Mellitus, presented to the emergency department with worsening altered mental status, dysarthria, and possible urinary tract infection (UTI). Following a thorough history and physical, it was noted that the patient had been on triple antibiotic therapy with vancomycin, ceftriaxone, and metronidazole 500mg three times daily for 6 weeks for bilateral submandibular abscesses. After ruling out a UTI, an MRI scan was completed and was notable for T2 hyperintense signal within the splenium with no definite abnormal T2 signal within the internal capsules, and symmetric abnormal T2 hyperintense signal within the cerebellum dentate nuclei, without restricted diffusion, mass effect, volume loss, or abnormal enhancement. This change is a classic sign for metronidazole toxicity, and although the MRI findings were consistent with possible metronidazole toxicity, the patient's lactulose was up-titrated to rule out hepatic encephalopathy. Conclusion: Review of the literature reveals inconsistencies regarding risk factors (i.e. dose, duration of therapy, and susceptible patient characteristics) for development of metronidazole-induced cerebellar toxicity; however MRI findings of abnormal signal intensity, involving the dentate nuclei of the cerebellum bilaterally and symmetrically, are consistent among all published case reports. Therefore, despite unknown etiology, it is likely that this patient represents a case of cerebellar toxicity due to metronidazole administration.

Methods:

Results:

Conclusion:

Submission Category: Pediatrics

Submission Type: Case Report

Session-Board Number: 5b-185

Poster Title: Prolongation of wound healing secondary to dexmethylphenidate: case report

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Purpose: Introduction: In many disease states, such as diabetes mellitus, peripheral vasculopathies have been associated with prolonged healing times of superficial injuries and infections. Centrally-acting, psychostimulant medications are associated with peripheral vasculopathies such as Raynaud's Phenomenon. In the pediatric population, psychostimulant medications such as methylphenidate, dexmethylphenidate, dextroamphetamine, and lisdexamfetamine are commonly prescribed for treatment of Attention Deficit/Hyperactivity Disorder (ADHD). According to the Centers for Disease Control and Prevention, there are over 6 million children and adolescents in the United States diagnosed with ADHD. The aim of this report is to characterize the association of dexmethylphenidate with prolonged wound healing secondary to peripheral vasculopathy.
Case Presentation: A 14-year-old, Caucasian male presented to pediatric emergency department with bilateral lower extremity pain with accompanying inflammation. Upon x-ray, patient was found to have early exostoses involving the left first distal phalangeal tuft with mild soft tissue swelling around the nail bed. The patient had been suffering with the pain for 10 months, consulted with a podiatrist, completed two rounds of antibiotic therapy with clindamycin, and had both toenails removed. Throughout the symptomatic period, the patient had been adherent to dexmethylphenidate previously prescribed for ADHD. The patient was discharged on a twenty-eight-day course of oral clindamycin and recommendations to temporarily discontinue dexmethylphenidate.
Discussion: Given the abnormal persistence of the patient's wound, the absence of comorbid conditions, and the absence of concomitant medications, dexmethylphenidate was identified as the likely etiology of prolonged wound healing by the medical team. Evaluation with the Naranjo algorithm indicated a "possible" adverse drug reaction. One previous study, Yu et al, 2010, reported the development of peripheral vasculopathy upon initiation of methylphenidate

and dexmethylphenidate therapy in four pediatric patients. The authors demonstrated concern for adverse effects in the peripheral vascular system of children and adolescents associated with psychostimulant treatment. Upon conducting a literature search, an absence of published cases demonstrating prolonged wound healing were found.
Conclusion: Psychostimulant-induced peripheral vasculopathy can have significant impacts on wound/infection healing in pediatric patients. Given the prevalence of ADHD and psychostimulant use, current lack of case report publication indicates that adverse drug reactions, such as presented here, are often overlooked. Therefore, patients receiving centrally-acting psychostimulant medications with persistent wounds/infections should be evaluated for the presence of psychostimulant-induced peripheral vasculopathy.

Methods:

Results:

Conclusion:

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-186

Poster Title: Comparing methods of measuring adherence to glaucoma medication: self-report versus electronic monitoring

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Purpose: Poor adherence remains problematic for many glaucoma patients. This is concerning as damage may be ongoing even though symptoms may not worsen immediately without therapy. Medication adherence is quantified through self-report, physician report, pharmacy records, and electronic monitors; however, patients and physicians often poorly estimate adherence, and pharmacy records lack verification of proper technique. Electronic monitoring could potentially become the gold standard to measure adherence as it records the exact time and number of drops instilled. This pilot study assessed and compared patient adherence and self-efficacy using adherence tools and a new electronic monitoring device, Kali Drop.

Methods: The University of Tennessee Health Science Center Institutional Review Board approved this pilot study. Patients were recruited from a group ophthalmology practice in Memphis, TN. Patients receiving treatment indicated for glaucoma were asked to participate by completing a survey at baseline and at follow-up at 60 days. Patients were further required to use Kali Drop, a new 3G wireless medication monitor, to administer all eye drops during the 60-day period. Kali Drop records and wirelessly transmits topical medication use in real-time; the resulting data can then be viewed by patients, providers, and other caretakers. The baseline survey focused on patient demographics, mobile phone usage, medication adherence, and glaucoma-related self-efficacy. Self-reported adherence was assessed using the Morisky Medication Adherence Scale and Medication Adherence Reasons Scale (MAR-Scale). Adherence was tracked using the Kali Drop web-based interface over two, 30-day intervals and across the entire study period.

Results: A total of 30 patients were recruited with complete data available for 27 at completion of the study. The majority of patients were white (70.4 percent), female (70.1 percent), and over age 65 (55.6 percent). At baseline, self-reported adherence was high according to both the Morisky Scale (high adherence equals 0; 63 percent) and MAR-Scale (7 out of 7 days; 89 percent). Adherence, according to the Morisky Scale, declined over the course of 60 days (p equals 0.01) with 56 percent remaining highly adherent. Kali Drop recorded decreasing rates of adherence from the first month (63 percent) to the second month (48 percent; p equals 0.018). No change in adherence was observed according to MAR-Scale. Many patients reported high self-efficacy at baseline (53 percent), but results showed a decline in patient's self-efficacy across the study (48 percent; p equals 0.037). Furthermore, those reporting high self-efficacy decreased in adherence according to Kali Drop (p equals 0.049). There was not a decrease in self-efficacy observed by Morisky Scale or MAR-Scale. Kali Drop observed high adherence in patients who were highly adherent according to MAR-Scale (56.5 percent; p equals 0.602) and highly adherent according to Morisky Scale (56.5 percent; p equals 0.593).

Conclusion: Self-reported adherence to glaucoma medication is typically poorly estimated and different adherence tools may show different levels of adherence. Kali Drop is an effective tool to accurately measure adherence and may be more effective at relating patient self-efficacy to adherence. Further trials are needed to assess the utility of Kali Drop at providing interventions in this population where adherence to medication is of utmost importance.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-187

Poster Title: Evaluation of aminoglycoside dosing protocol for adults in a community hospital

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Purpose: Aminoglycosides are an important therapy in the treatment of life-threatening gram-negative infections. They also act synergistically with beta lactams to treat gram-positive pathogens. Aminoglycosides have limited tissue distribution, are renally eliminated, and have a narrow therapeutic index. Therefore, dosing of these antibiotics is tailored to patient's indication, weight, age, and renal function. Meritus Medical Center has a protocol to guide pharmacists in selecting treatment dose and frequency. The purpose of this study is to assess adherence of pharmacists to the current protocol, frequency of extended and traditional dosing schedule, and the incidence of drug-induced nephrotoxicity.

Methods: A retrospective chart review of adults (18 years and above) who received at least one dose of gentamicin or tobramycin, spanning August 01, 2015 to July 31, 2016, were performed. Patients were excluded if they received pre or post-operative prophylaxis, were treated with a topical aminoglycoside, and or used aminoglycoside for less than 48 hours. Patients who received amikacin were excluded from this study due to lack of in-hospital monitoring and low use of medication. Eight hundred and forty patients were identified and were sieved to 109. Extended dosing was defined by 5-7 mg/kg of gentamicin or tobramycin. Traditional dosing was 1-3 mg/kg of gentamicin or tobramycin. Drug induced nephrotoxicity was identified using Acute Kidney Injury Network criteria: increase in serum creatinine more than or equal to 0.3 mg/dL or a 50% increase in SCr within 48 hours.

Results: Ninety-two orders (84.4%) were adherent to the protocol for both dose and frequency. Deviations from the protocol (5.5%) occurred when the physician did not consult the pharmacist and patients were treated in an outpatient setting. Pharmacists increased or decreased initial dose or frequency (10.1%) in response to patients' age, creatine clearance, and

disease state. Deviations occurred in the treatment of community acquired pneumonia, urinary tract infection, pelvic inflammatory disease, and endocarditis. There were two cases of inappropriate use of the extended interval regimen. Patients were on synergistic regimens, which warranted use of traditional dosing. Most patients (63.3%) were on an extended interval dosing frequency of every 24-hours. The average 6-hour serum levels were within 24-hour range on the Hartford nomogram. There was one case of extended interval of every 72 hours. The patient's supratherapeutic trough necessitated an extension of the interval. Traditional dosing occurred in 19.2% of the orders. Drug-induced nephrotoxicity occurred in 2.8% of the patients. Two of the three cases of nephrotoxicity resulted from use of tobramycin. One patient receiving gentamicin, with a serum creatinine of 1 mg/dL, experienced acute kidney injury at an initial dose and frequency of 5 mg/kg every 48 hours.

Conclusion: The application of the protocol in the majority of orders resulted in therapeutic trough levels for both drugs. Since most patients were placed in extended interval dosing, they received high peak concentrations and experienced low rates of nephrotoxicity. The incidence of drug-induced nephrotoxicity observed is less than the reported incidences of 6% in extended dosing and 15.4% in traditional dosing. Additionally, patients on extended interval dosing had a lesser need for therapeutic drug monitoring and frequent dose adjustments.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 5b-188

Poster Title: Observational survey-based study of healthcare access following the Maryland Health Progress Act of 2013 in homeless women of My Sister's Place

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Purpose: To evaluate access to healthcare following former Mayor Martin O'Malley's implementation of the Maryland Health Progress Act in 2013 which included an expansion of Medicaid to include a wider age range and an increase of the income cap. Currently, it is unknown how many Baltimore City residents are aware of this expansion and their possible eligibility for Medicaid coverage. The ultimate goal of this study is to determine if the Maryland Health Progress Act has made a positive impact on healthcare coverage.

Methods: My Sister's Place is a day shelter located in Baltimore, Maryland that provides resources and support to homeless women in the area. The majority of these women rely heavily on government funded healthcare programs for their health insurance. The women are given an abridged version of the Consumer Assessment of Healthcare Providers and Systems (CAHPS) survey. This survey obtains data regarding the women's access to healthcare, health insurance, fiscal status, and basic demographic information which will help categorize the population of interest. Descriptive statistics will be used to describe the My Sister's Place population's healthcare. Chi-squared analysis will be used to describe the demographic data. Inferential statistics will be used to make the comparison between healthcare access from the study population to national data.

Results: The current investigation includes data that may not represent the entire study population based on the current status of data collection. The population consists of African American females which are predominantly over the age of 35. All of the women in the study fall well below the poverty line all making a self-reported annual income of less than $10,000.

Everyone surveyed had some form of insurance which varied and all the women reported having access to a primary care provider which they have visited within the past 12 months. The average length of time between appointment scheduling and the actual visit were split among the groups. Half of the women reported making a visit within one day and the other half reported waiting from at least two weeks to two months to see their primary care provider. In addition, the majority of the women reported making at least 3 emergency room visits in the past 12 months which was not correlated to the lack of a primary care provider but seemed to trend with the travel distance from each of the women's providers. Most of the participants reported no difficulty traveling to their providers with the exception of one participant.

Conclusion: Despite the resources and assistance programs available, our team realized that a very large proportion of the participants still use the emergency department for care more than once in the past 12 months. This may be attributed to the circumstances that existed upon presentation of the illness, however it is an interesting speculation which may require further observation. The following results pose a question to the investigating team about whether or not the care and access our population of women can be compared to the average American and whether this expansion made a tangible difference in these women's lives.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 5b-189

Poster Title: Service description and descriptive analysis for an interprofessional discharge clinic (IDC) within a primary care practice

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Purpose: Transitions of care (TOC) is a focus of interest from patients, providers, and policymakers. For two years, the University of Maryland Department of Family and Community Medicine (DCFM) piloted two practice-wide initiatives to improve TOC. The first initiative consisted of 2-4 days post-discharge telephone calls according to Medicare Transitional Care Management Services. The second was an interprofessional discharge clinic (IDC) staffed by a clinical pharmacist, social worker, care management nurse and attending physician.
The purpose of this study is to describe the services and the impact on patient care, including the 30 day readmission rate, medication errors, and interventions documented.

Methods: A daily list of patients admitted to any hospital in the region was received by DCFM through a regional health information exchange. The first initiative, post-discharge telephone calls from a social worker, offered patients an appointment with a practice physician. Patients were also asked about issues regarding self-care, ability to attend appointments (e.g. transportation), and changes in medication during these phone calls. The second initiative, an interdisciplinary clinic, was held for a half-day per week. During these visits each health care professional would conduct rounds to meet with the patient individually and document their interaction in the electronic medical record (EMR).
A retrospective chart review was performed for each patient identified. Data collected included: patient age, gender, race, comorbidities, cause of index admission, readmission within 30 days and 1 year, and documented medication errors and interventions at first visit. The primary outcome was 30 day readmission. Secondary outcomes included documented medication errors and interventions at first follow-up. Data were collected retrospectively using an electronic medical record and analyzed using SAS data system.

Results: Among 167 patients, 154 patients were seen by a physician only (PO), and 13 patients were seen in the IDC. Readmission within 30 days of discharge occurred for 41 patients (26.6%) seen for follow-up by a PO and one patient (7.7%) in the IDC group (p = 0.19). Seventy patients (45.5%) in the PO group and 11 patients (84.6%) in the IDC group (p = 0.0082) were found to have at least one medication error at the first follow-up visit. All patients seen at the IDC had an intervention made at first follow-up, while 68 (44.2%) seen by a PO received no intervention (p = 0.0009).

Conclusion: Sample size was a major limitation in comparing the two groups. A statistically significant increase in medication error and intervention documentation was found in the IDC group. It is critical that health care systems continue to develop new strategies such as IDCs to reduce unnecessary hospital readmissions.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 5b-190

Poster Title: Applying the Theory of Planned Behavior to Inhaler Use for Patients with Chronic Obstructive Pulmonary Disease

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Purpose: Studies investigating behavioral influences on inhaler use in patients with Chronic Obstructive Pulmonary Disease (COPD) are limited. These beliefs may lead to noncompliance and non-adherence, which has the potential to increase the risk of adverse outcomes including exacerbations, worsening breathing symptoms, and possibly death. The Theory of Planned Behavior is a theoretical framework that has been used to investigate the motivations behind a variety of health behaviors. This study evaluates how patients' attitudes and beliefs toward COPD management influence their behaviors and decisions to use or not to use their inhalers as prescribed.

Methods: Patients with outpatient visits for COPD at a single primary care center over a 12-month time period were identified based on ICD-9 codes. A survey instrument characterizing patient's motivations, behavioral influences, and perceived ability relating to the use of controller inhalers had previously been developed and used for a study of patients with persistent asthma. The survey was refined to address domains for the management of COPD using a check-list and 5-point Likert-type scale questions. This was administered as a voluntary telephone survey to identified patients. For those who did not answer the initial call, a voicemail was left that included a call-back number. Three attempts were made if the participant did not answer during the first or second call. De-identified survey responses were recorded and analyzed using descriptive statistics. Chi-squared and Fisher's Exact Tests were used for subgroup analyses.

Results: Of 107 patients identified, 25 completed the survey (23% response rate). All 25 participants reported picking up a prescribed inhaler within the past year. 72% (n=18) of participants reported using their inhaler daily, or 30 out of the last 30 days, while 28% (n=7) of participants reported using their inhalers on 15-25 of 30 days. Barriers to daily use reported by patients included cost (n=8, 32%) and transportation to the pharmacy (n=9, 36%). Perception of disease severity and benefit from inhaler were also identified as potential behavior determinants with 16% (n=4) reporting other illnesses more important than COPD, feeling fine without using an inhaler, or not believing COPD diagnosis. Of those participants who rated 5/5 in importance of inhaler use, 4 were inconsistently using their inhaler within the last 30 days. These participants could not afford their prescriptions, did not believe to have COPD, and did not know how to use their inhaler. The participants who rated less than 5 on the importance of inhaler use reported feeling fine without using their inhaler or believed to have other important illnesses than COPD.

Conclusion: While most patients in this study reported purchasing inhaler medications in the last year, not all reported consistent use. Perceptions related to symptom improvement and importance of COPD identified as potential motivators for non-adherence. Cost and access to pharmacies were also identified as physical barriers to optimal medication use. These results indicate that a combination of psychosocial and external factors influence patients' decisions to use or not to use an inhaler for COPD management. Future research on perceived risk and physical barriers of medication non-adherence among patients with COPD may help clinicians better target medication education and adherence interventions.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-191

Poster Title: Quality analysis of high-dose versus low-dose parenteral thiamine use in hospitalized patients

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Purpose: Chronic alcohol use can lead to thiamine deficiency with severe deficiency resulting in Wernicke's encephalopathy (WE). The Royal College of Physicians guidelines for managing WE recommends IV thiamine 500 milligrams every eight hours for three days. For WE prophylaxis, 100 milligrams daily has been widely used. The objective of this medication use evaluation was to evaluate the appropriate utilization of high-dose (greater than 100 milligrams daily) vs low-dose thiamine in patients in order to assess the need for implementation of a standardized protocol to ensure appropriate use of thiamine and for cost savings.

Methods: This retrospective study was completed at a 527-bed academic teaching hospital located in Baltimore, Maryland. The study cohort received IV thiamine between March 30, 2016 to April 30, 2016 and were analyzed for: age, sex, weight, chief complaint, initial neurologic symptoms (confusion, ataxia, delirium tremens, hallucinations, ocular symptoms, language problems, seizures), primary diagnosis, diagnosis of Wernicke's encephalopathy, current alcohol use, active withdrawal and/or history of withdrawal, pancreatitis and/or history of pancreatitis, initial parenteral thiamine regimen, number of doses of thiamine administered, length of stay, and inpatient mortality. All symptoms and history were obtained from physicians' notes through each patient's electronic medical record. Medication costs were also evaluated in our study. All of the data was analyzed using the Fisher's exact test.

Results: A total of 73 patients were included in this evaluation with 41 patients receiving high-dose thiamine (greater than 100 milligrams daily) and 32 patients receiving low-dose thiamine. Of all the patients, two had a confirmed diagnosis of Wernicke's encephalopathy and one patient with a "possible" Wernicke's encephalopathy diagnosis. The remaining 38 patients who received high-dose thiamine did not have documented WE. These patients did, however, have a greater severity of symptoms upon admission with: 15 patients who presented with confusion, 5 with delusions or hallucinations, 18 with altered mental status, and 4 with ataxia versus 0, 1, 1, and 3 patients who received low-dose thiamine, respectively. Additionally, patients with high-dose thiamine had a longer length of stay of seven days versus three days in patients that received low-dose thiamine. The total cost for the first three days of therapy for all patients was $8,523.33. If all patients without suspected or documented WE had received low-dose therapy, the cost for first three days of therapy for all patients would have been $871.50. Throughout the analysis, it was also evident that many other regimens were prescribed such as thiamine 500 milligrams daily and 100 milligrams every 8 hours.

Conclusion: Overall, high-dose thiamine regimens were used in patients presenting with a higher severity of alcohol withdrawal. Current evidence suggests that low-dose thiamine is sufficient for patients without clinical suspicion or documented WE. A standardized order panel could be implemented to give only two options for parenteral thiamine that includes 100 milligrams daily or 500 milligrams every 8 hours that automatically discontinues after nine doses. Implementation of this order panel would allow for more accurate dosing of thiamine and allow for more cost savings. Limitations of this study include its retrospective nature, sample size, and short time frame of study.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 5b-192

Poster Title: Investigation of pharmacologic and non-pharmacologic treatment of youth with developmental and coexisting mental health disorders classified by school grade level status

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Purpose: The aim of this study was to investigate pharmacologic and non-pharmacologic treatment of youth with developmental and coexisting mental health disorders and to identify patterns in psychiatric diagnoses and mental health treatments to ultimately describe pediatric clinical profiles and care needs.

Methods: Demographic and clinical care information was self-reported by caregivers of youth with chronic mental health conditions via an online survey that was approved by the institutional review board. Primary caregivers of children and young adults with a developmental delay and a mental health condition were recruited online from parent advocacy groups in the United States to complete the online questionnaire. Caregivers were eligible to participate in the survey if (1) their child was 21 years old or younger; (2) a doctor had ever told them that their child has a delay in development such as: behavioral, communication, social or emotional; (3) one of the following was true: the child has been diagnosed with autism spectrum disorder, the child has been diagnosed with a learning disability, the child has problems with social skills, or it is difficult for the child to have a conversation when talking with people; and (4) a doctor had ever told them that their child has Attention Deficit Hyperactivity Disorder (ADHD) or Attention Deficit Disorder (ADD), anxiety, a mood disorder, or depression. A total of 237 participants completed the questionnaire. Information on current grade and age at the time of the survey was used to determine grade status, which assessed whether youth were at or below grade level. Use of pharmacologic and non-pharmacologic treatments was investigated based on this grade status classification.

Results: 69 (29.1 percent) of the 237 participants were determined to be at grade level for age and 168 (70.9 percent) were not at grade level for age. Youth who were at grade level were significantly more likely to have caregiver-reported ADHD (P equals 0.0026) or a caregiver-reported anxiety disorder (P equals 0.0034) and were less likely to have aggression (P equals 0.0002). Youth who were not at grade level were significantly more likely to have caregiver-reported depression (P equals 0.0053) and aggression toward others (P equals 0.0018). A higher proportion of youth at grade level had caregiver-reported communication disorders (P equals 0.0803) and a higher proportion of youth not at grade level had caregiver-reported intellectual disabilities (P equals 0.1609), but these differences were not statistically significant. Youth at grade level were more likely to use benzodiazepines (P equals 0.0468) and engage in speech therapy (P equals 0.0321). Youth who were not at grade level were more likely to engage in individual psychotherapy (P equals 0.0004) and family therapy (P less than 0.0001). A higher proportion of youth at grade level used any ADHD medication (any stimulant, clonidine, or atomoxetine; P equals 0.0628), but this difference was not statistically significant.

Conclusion: Differences in developmental and mental health disorder diagnoses as well as pharmacologic and non-pharmacologic treatments were found based on grade status classification. This suggests a role for grade status in the identification of youth with certain care needs to direct interventions and provide optimal care. Youth who are at grade level may have different clinical concerns, such as ensuring progression in school by targeting anxiety, ADHD, and communication issues using evidence-based treatment. Based on this analysis, youth who are not at grade level may have conditions requiring intensive treatment such as aggression, depression, and intellectual disabilities.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-193

Poster Title: The effect of clevidipine vs. nicardipine on blood pressure lability in acute intracranial hemorrhage

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Purpose: Clevidipine is a novel ultrashort-acting dihydropyridine calcium channel blocker that is FDA-approved for rapid reduction of blood pressure when oral therapy is neither feasible nor desirable. It has been studied in the setting of subarachnoid hemorrhage, intracranial hemorrhage, perioperative hypertension, and hypertensive crises. It is administered intravenously, like nicardipine, but it has a faster onset of action and shorter duration of effect. The aim of this study is to compare the effect of clevidipine or nicardipine on blood pressure lability in patients requiring emergent blood pressure control in the Neurocritical Care Unit (NCCU) at a large academic medical center.

Methods: A retrospective case-control study was performed via chart review on all patients with hemorrhagic stroke admitted to the NCCU requiring blood pressure management with either continuous or intermittent infusions or injections of clevidipine and/or nicardipine. Patients older than 18 years of age diagnosed with hemorrhagic stroke between December 2012 to September 2016 were eligible for inclusion. Baseline characteristics such as age, gender, past medical history, initial Glasgow Coma Score, and hemorrhagic stroke severity were collected from the electronic medical record. Patients receiving clevidipine (intervention group) were matched with patients receiving only nicardipine (control group) based on diagnosis and baseline characteristics. Continuous vital signs data were collected via BedMaster (Excel Medical Electronics, Jupiter, FL), which allows for recording of all core physiological data at 240Hz for waveforms and 0.5Hz for trend data. This program allowed us to review continuous blood pressure readings, as opposed to electronically charted vital signs, which are dependent on nurse documentation. The time to reach a goal blood pressure of 160mmHg after the first exposure to the antihypertensive drug and the number of times and duration of blood pressure

deviations above 160mmHg and below 110mmHg were evaluated. Statistical tests were two-tailed, and a p value of less than 0.05 was considered to be statistically significant.

Results: A total of 20 patients were included in the intervention group. They were matched with 40 patients in the control group. The mean blood pressure prior to initiation of clevidipine in the intervention group and nicardipine in the control group did not differ. The blood pressure lability throughout the duration of the antihypertensive drug infusions also did not differ between the two groups. A statistically significant difference was found in the mean time to reach goal blood pressure (19.1 minutes vs. 48.5 minutes, p equals 0.0495).

Conclusion: This retrospective case-control study demonstrated that compared with nicardipine, clevidipine did not impact blood pressure lability. However, use of clevidipine was associated with a significantly shorter time to goal blood pressure, which may be clinically meaningful. Larger prospective studies are needed to confirm our findings, as this study had many limitations. We overcame the issue of charting inaccuracy by using a comprehensive system for data collection, which was a common limitation in previous studies. This study provided useful insight to the institution, and may encourage continued use of clevidipine in the NCCU.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5b-194

Poster Title: Evaluating the impact of an oral chemotherapy standardized process improvement tool on patient-perceived ability to adhere to oral chemotherapy treatment plans

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Purpose: Recent progress in the treatment of cancer has seen an increasing number of patients receiving oral chemotherapy, as well as the accelerated development of new oral antineoplastic agents. Oral chemotherapy offers certain benefits to patients including ease of administration and autonomy over treatment. However, the lack of practice-level systems to ensure the safe management of oral chemotherapy poses a challenge to patients and practitioners. The purpose of this study is to describe the effect of a standardized education process on patient-perceived ability to adhere to oral chemotherapy treatment plans and handle medication safely, and to identify patient-reported barriers to adherence.

Methods: The current study is a prospective, single center, patient survey-based study conducted at The University of Maryland Greenebaum Comprehensive Cancer Center (UMGCCC) including all oncology patients 18 years and older who were newly started on an oral chemotherapy agent from November 1st, 2015-November 1st 2016. The institutional review board approved this study. Subjects who met inclusion criteria and provided informed consent were asked to complete two versions of the same survey, once before administration of an Oral Chemotherapy Standardized Process Education Improvement Tool, and once after. The survey was devised to assess patient-perceived understanding of a myriad of factors related to oral chemotherapy treatment plans and to identify patient-perceived barriers to adherence. The Oral Chemotherapy Standardized Process Improvement Tool was administered by a study investigator and consisted of components related to drug procurement and patient education, including medication administration, food/drug interactions, side effects, storage and handling. Subjects completed the Post-Survey by telephone within 2 weeks after discharge. The primary outcome was the mean composite value of patient-perceived understanding before and after

administration of the standardized process tool, based on a scale of 1-5 (1 indicating “Not confident at all,” 5 indicating “Very confident”). Secondary outcomes included: the change in frequency of identification of barriers to adherence, and the mode level of adherence determined by the Morisky Medication Adherence Scale-8 (low, medium, or high) after discharge.

Results: Ten patients were enrolled over the course of 15 weeks. Eight out of 10 patients completed the study, while 2 were unable to be reached within the designated follow-up period. At enrollment, only 8 out of 10 patients reported receiving some baseline medication education upon initiation of a new oral chemotherapy agent. The mean composite value of patient-reported understanding at baseline was 4.03 out of 5.0, with individual means ranging from 1.06 to 5.0. The mean composite value of patient-reported understanding collected in the Post-Survey period was 4.71 out of 5.0, with individual means ranging from 4.17 to 5.0. Utilization of a standardized education process demonstrated a 16.8% mean overall increase in patient-perceived ability to adhere to oral chemotherapy treatment plans and handle medication safely. Patients were 54.5% less likely to identify barriers to adherence after administration of the standardized education process tool than they were at baseline (n=5 vs. n=11) . Six out of 8 patients (75%) completing the study demonstrated high adherence within the follow-up period, while 2 out of 8 patients (25%) demonstrated moderate adherence.

Conclusion: This study has shown that implementation of a standardized education process can demonstrate a meaningful improvement in patient-perceived ability to adhere to oral chemotherapy treatment plans and handle medication safely, reduce patient-perceived barriers to adherence, and serve as a model for the development of more effective procedures at oral chemotherapy transitions of care.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-195

Poster Title: Daptomycin utilization in a community hospital setting

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Purpose: Daptomycin (Cubicin), a broad spectrum cyclic lipopeptide antibiotic, binds to the bacterial membrane causing a depolarization of membrane potential leading to bacterial death. Daptomycin's spectrum of coverage includes gram positive bacteria commonly found in infections such as bacteremia, complicated skin and soft tissue infections (SSTI), bone/joint infections, and urinary tract infections. At this community hospital, prescribing of daptomycin is restricted to infectious disease specialists due to its broad spectrum of activity and high cost. The purpose of this study was to assess the appropriateness of daptomycin usage, perform a cost-analysis, and assess monitoring for adverse effects.

Methods: A retrospective descriptive chart review was performed. The inclusion criteria were patients who received daptomycin in the inpatient setting from January to June of 2016. Exclusion criteria were patients receiving daptomycin in the outpatient setting and those who received one time doses of daptomycin. Variables assessed included infectious disease consult in place, allergies, weight, renal function, dosing, indication, cultures and sensitivities, use of SSRIs, previous antibiotic therapies, and adverse effect monitoring (creatinine kinase (CK) levels). This drug use evaluation (DUE) is IRB approved.

Results: Daptomycin was prescribed for 39 different cases during the study period. Of the 39 cases, a total of 172 doses (230 vials) of daptomycin were administered costing a total of about $115,000. Overall, 12 cases (31%) were treated for SSTI, 12 cases (31%) for bone/joint infections, 10 cases (25%) for sepsis/bacteremia, 5 cases (13%) for urinary tract infections. Common reasons for the use of daptomycin included coverage for vancomycin resistant enterococci (VRE) until sensitivities were finalized, allergies to vancomycin, failure of vancomycin therapy, and impaired renal function. Overall, 81% of the doses of daptomycin were administered appropriately. Inappropriate usage was due to high doses, low doses, and

renally unadjusted doses. In addition, doses were assessed to determine if an alternative antibiotic could have been used first line such as vancomycin or linezolid. There were 80 vials ($40,000) of daptomycin that could have been substituted for another antibiotic based on final culture sensitivities and the patient's profile. With regards to adverse event monitoring, 18 patients (46%) had CK levels to monitor for rhabdomyolysis.

Conclusion: Retrospective analysis of appropriate daptomycin use at this community hospital revealed the need for further interventions in the usage of daptomycin from a cost and proper usage perspective. Based on the results of this analysis, a recommendation is to develop a medication usage guidelines to facilitate appropriate daptomycin prescribing and assess the need for other antibiotic usage. In addition, the guidelines should include details on monitoring for daptomycin.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 5b-196

Poster Title: Evaluation of the appropriateness of initial antibiotic therapy in sepsis

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Purpose: Appropriate initial antibiotic therapy in sepsis has been shown to significantly reduce mortality. Although diagnostic testing for pathogens has improved dramatically, small community hospitals may not have access to these tools. Periodic re-evaluation of the epidemiology of sepsis and the susceptibilities of pathogens is necessary to provide appropriate initial therapy. The objective of the study was to evaluate the local incidence of pathogens in sepsis and compare the selection of initial antibiotic therapy for sepsis with the recovered pathogen sensitivities.

Methods: All clinical research represented in the abstract was approved by the appropriate ethics committee or institutional review board. A computer-generated list of all patients from a small community hospital with a discharge diagnosis of sepsis between March and August 2016 was completed. The source of sepsis was identified from the electronic medical record. Initial antibiotic therapy was compared to local recommendations as well as the susceptibilities of recovered pathogens. Appropriateness was determined for local recommendations and for pathogen sensitivities. Appropriate therapy for local recommendations was defined as administered therapy consistent with therapy based on local recommendations. Inappropriate therapy for local recommendations was defined as therapy anything other than the local recommendations. Appropriate therapy for pathogen sensitivities was defined as administered therapy sensitive for pathogens identified. Inappropriate therapy for pathogen sensitivities was defined as administered therapy intermediately sensitive or resistant for the pathogens identified. The percentage of appropriate therapy was calculated for the entire time period as well as for each month for local recommendations and for pathogen sensitivities.

Results: The computer system identified 245 patients with sepsis. Of those 245, only 28 (11%) patients met the Surviving Sepsis definition of sepsis and had cultures with organisms identified and sensitivities performed. Of the 28 patients, the types of infections were 13 (46%) skin and soft tissue infections, 7 (25%) urinary tract infections, 5 (18%) bacteremia, 1 (4%) intraabdominal, and 1 (4%) pneumonia. Overall the organisms recovered included 7 (25%) Escherichia coli, 6 (21%) streptococci, 6 (21%) methicillin resistant Staphylococcus aureus, 3 (11%) Pseudomonas aeruginosa, 2 (7%) Enterococcus faecalis, 2 (7%) methicillin susceptible Staphylococcus aureus, 2 (7%) Proteus mirabilis, 1 (4%) Actinetobacter baumannii, 1 (4%) coagulase-negative staphylococci, 1 (4%) Klebsiella pneumoniae, 1 (4%) Serratia marcescens, 1 (4%) Streptococcus parasanguinis and 1 (4%) viridans group streptococci. Twenty-seven (96%) patients received appropriate initial antibiotics. Vancomycin (n=20) was most frequently used, followed by piperacillin/tazobactam (n=8), cefepime (n=5), ceftriaxone (n=4), levofloxacin (n=4), clindamycin (n=2), ertapenem (n=2), linezolid (n=1), metronidazole (n=1), cefazolin (n=1), and aztreonam (n=1). Single antibiotic therapy was frequently used (n=20), then dual therapy (n=10), triple therapy (n=4), and quadruple therapy (n=1).

Conclusion: Appropriate antimicrobial therapy was successfully achieved for patients diagnosed with sepsis most of the time, which should have a positive impact on mortality and morbidity. Single antibiotic therapy was most frequently used although broad spectrum therapy was most frequently prescribed. Continued surveillance of appropriateness of therapy will allow for changes to be made to empiric therapy if necessary.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-197

Poster Title: Effect of implementation of a residency preparation course on residency match rates at large pharmacy school

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Purpose: To compare ASHP residency match rates at the University of Maryland School of Pharmacy (UMSOP) prior to and after implementation of a Residency Preparation Elective Course (RPEC), amongst students who completed the RPEC versus those who did not, amongst students who were a part of a major student organization or not, and also to identify the perceived value of RPEC by students who completed the course.

Methods: This project was approved by the University of Maryland IRB. Match rates amongst the graduating classes from 2013 to 2016 were obtained via review of university graduate and class records. RPEC was first offered to third-year pharmacy students (P-III) during the Fall semester of 2013. The pre-implementation group consists of the graduating classes of 2013 and 2014. The post-implementation group consists of the graduating classes of 2015 and 2016, for whom would have taken the course during the Fall semesters of 2013 and 2014.
Match rates amongst students in the post-implementation group who completed RPEC versus those who did not were then compared. Match rates between students who had Rho Chi (RX) and/or Phi Lambda Sigma (PLS) appointments, and who completed the residency preparation course, were compared to those who did not. Enrollment into a fellowship position is considered matched in this study. Statistical analysis for all comparisons was performed using a two-tailed fisher exact test. A P value of 0.05 was set a prior.
A survey was emailed to all previous students who pursued a residency after graduation, in order to obtain insight on how well prepared students felt they were prior to applying for residency. The results from those who completed RPEC were then compared to those who did not.

Results: The post-implementation group had a significant higher match rate compared to the pre-implementation group (75.9 percent versus 62.7 percent; P 0.031). Match rates amongst students who took RPEC were not statistically different compared to those who did not (78.4 percent versus 74.7 percent; P 0.82). Of students who completed RPEC, those who were part of a major student organization had significantly higher match rates compared to those who were not (90.3 percent versus 69.8 percent; P 0.046). Match rates comparing all students who were part of a major student organization regardless of completion of RPEC were significantly higher than those who were not (88.1 percent versus 68.9 percent; P 0.0013).
Three hundred and twenty students were provided with the survey. Twenty-eight students responded, six (21.4 percent) whom completed RPEC. All 6 students reported that they felt significantly better prepared for the application process because of this elective. Many students who did not take the elective indicated that had the class been offered at a time that better fit into their schedule they would have taken the course despite his or her confidence.

Conclusion: ASHP match rates were significantly higher amongst the graduating classes for which RPEC was offered. Match rates amongst students who completed RPEC versus those who did not were not statistically significant. Students who were part of a major student organization had significantly higher match rates compared to those who were not, irrespective of completion of RPEC. Further investigation with a larger group, accounting for additional variables that may contribute to obtaining a residency is warranted.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-198

Poster Title: Evaluation of levalbuterol utilization at a community hospital

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Purpose: There has been a long debate on whether levalbuterol provides any therapeutic advantage over albuterol in the treatment of obstructive airway diseases as acquisition costs for levalbuterol are notably higher than those of albuterol. Concerns of the deleterious effects of albuterol led to the discovery and marketing of levalbuterol although clinical literature has failed to show these adverse effects to be clinically significant. The objective of this medication use evaluation is to assess compliance to the Frederick Memorial Hospital levalbuterol use criteria.

Methods: Patients were retrospectively identified by searching the pharmacy records for levalbuterol orders between January 2016 and June 2016. The following information was collected: patient account number, age, cardiac past medical history, hospital floor where admitted, dose conversion of levalbuterol to albuterol, heart rate, home medication list, number of levalbuterol and albuterol administrations, prescribing doctor, number of days on albuterol before the switch to levalbuterol. Measures of central tendency were used for analysis. Levalbuterol criteria for use (must meet at least one): patients who report tachycardia (20 beats per minute over baseline) following administration of albuterol, pediatrics or adults who are currently on levalbuterol treatment as an outpatient, patients with cardiac diseases that could potentially worsen with tachycardia (poorly controlled arrhythmias, decompensated heart failure, and valvular disease).

Results: Two-hundred and twenty five patients with levalbuterol orders were exported from the electronic medical record between January 2016 and June 2016. Sixty randomly identified patients were included in the analysis. Of those patients 56.67% met the criteria for levalbuterol use and 43.33% did not meet criteria. The majority of patients that met use criteria did so due to the presence of preexisting cardiac disease that could potentially worsen with

tachycardia. Only one patient had documented tachycardia post albuterol administration. There were a high number of patients that did not meet criteria for levalbuterol. This resulted in two hundred and seventy three inappropriate administrations of levalbuterol which translated into $567.84 in excess cost.

Conclusion: There is currently poor compliance to the use criteria for levalbuterol at Frederick Memorial Hospital. The majority of appropriate use was due to patient's pre-existing cardiac disease. Current clinical data suggests that levalbuterol offers no clinical advantage compared to albuterol from a cardiac standpoint. Based these data and the significant cost difference between the two agents; it is recommended that the use criteria be altered to reflect current clinical evidence. Further additional efforts should be made to ensure proper utilization of restriction criteria within the hospital.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5b-199

Poster Title: Appropriateness of initial antibiotic therapy for urinary tract infection (UTI) in a small community hospital

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Purpose: Urinary tract infections (UTI) are among the most common bacterial infections acquired in the hospital and community. Annual total cost of UTI in 2010 was estimated to be equivalent to $2.3 billion. Delayed antibiotic therapy may lead to progression of infection and complications such as recurrent infections, kidney damage, and sepsis. Appropriate initial therapy is important to combat progression of infection. The purpose of this study is to evaluate the appropriateness of initial antibiotic therapy for UTI in a small, community hospital.

Methods: This evaluation was approved by the appropriate ethics committee or institutional review board. Patients who were diagnosed with a UTI during March-August 2016 who had a positive urine culture were identified. Susceptibilities for the organism identified as the etiology of the UTI were examined and compared with the antibiotics the patient received. Appropriate initial therapy was defined as the initial antibiotic was susceptible for the organism identified. Inappropriate initial therapy included any instance where the organism was intermediately susceptible or resistant to the initial antibiotic therapy administered. The percentage of each pathogen was calculated. The percentage of appropriate and inappropriate therapy were calculated.

Results: Of 312 pts, 30 pts (10 percent) were randomly selected. Overall, the most prevalent organism isolated was E. coli (33 percent) followed by Klebsiella pneumoniae (13 percent). In March, P. aeruginosa (50%) incidence was equal to E. coli . In June, Klebsiella pneumoniae and E. coli made up more than half of the organisms isolated (57 percent). Twenty-two pts (73 percent) were appropriately treated with antibiotics. March had a 100 percent appropriate treatment rate. Treatment was appropriate in April through August for 83, 67, 71, 50 and 75 percent of pts respectively. The empiric antibiotic therapy used varied. Ceftriaxone was the

most frequently used antibiotic (42 percent) overall, and the most frequent monotherapy (60 percent). Ceftriaxone monotherapy was mostly appropriate (83 percent). Vancomycin (13 percent) and piperacillin/tazobactam (13 percent) were the next most frequently used antibiotics. Piperacillin/tazobactam was used appropriately every time (100 percent), while vancomycin was mostly used appropriately (80 percent).

Conclusion: Empiric antibiotics used during the treatment of UTI was appropriate for 73 percent of the patients in this study. Since the goal is to have appropriate treatment for 90 percent of patients, revision of empiric antimicrobial therapy for UTI may be necessary. Review of additional patients with a larger sample size may reveal patterns of inappropriate therapy to be addressed.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Descriptive Report

Session-Board Number: 5b-200

Poster Title: Relative value unit development for the evaluation of pharmacist interventions in Sentri7

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Purpose: To develop a Relative Value Unit (RVU) for each intervention performed by a pharmacist at Meritus Medical Center(MMC).
Interventions that pharmacists make in the hospital vary greatly in patient benefit, complexity and cost. To maximize a pharmacist's time, it is essential to focus on interventions that bring clinical benefit to both the patient and highest cost savings. Evaluation of pharmacists solely on the number of interventions performed is therefore ineffective.
Understanding the gravity of each intervention a pharmacist accomplishes would become more apparent if each intervention had a relative value that correlated to its complexity, cost and patient benefit.

Methods: Sentri7 is software used by MMC to track interventions by pharmacists. Information on time taken to complete for each intervention is tracked by Sentri7. Hard cost savings were previously determine based on drug product costs and average lengths of therapy while soft cost savings were determined by literature review. Hard and soft costs were determined prior to the start of the project.
The following algorithm was developed to assign an RVU to each intervention.
Log_10⁡〖(0.25(hr))×(0.25(cost))×Patient Benefit〗)
In this equation time taken represents the complexity of the intervention the pharmacist is completing. Cost represents what dollar amount the pharmacist is saving the institution. Patient Benefit was given the most weight in the equation so that other factors do not overshadow the well-being of the patient. The Patient Benefit Rating (1-5) was assigned to each intervention by two experienced pharmacists.

Results: An RVU of 1-5 was assigned to each primary intervention listed in Sentri7, using the algorithm in the previous section. The development of the RVU is not to compare one pharmacist to another, but rather to maximize the overall effort of the pharmacist in areas that are of most benefit to the patient. This can be done with the average RVU per intervention. The larger the resulting number is, the more value each intervention has for the patient and the hospital.

7 pharmacists were evaluated based on the total RVUs associated with the interventions they had completed in the month of July. Three pharmacists evaluated had a similar number of interventions completed which were 116, 112, and 115. While the pharmacists had a similar number of interventions, their average RVUs for the month were 2.6, 2.3 and 2.5 respectively. Two other pharmacists completed 20 and 29 interventions. The corresponding RVUs were 78 and 58 respectively. While, the latter pharmacist had 29 interventions, the pharmacist with 20 intervention offered more value to the patients and hospital.

Conclusion: The development of the RVU was successful in adding value to the interventions of pharmacists at MMC. This will lead to a better understanding of interventions performed by pharmacists.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 5b-201

Poster Title: Incidence and trends in anticoagulants used in a small community hospital

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Purpose: Novel oral anticoagulants (NOACs) were approved in 2010 and were the first additions to oral anticoagulation since the approval of warfarin. NOACs may provide a more predictable level of anticoagulation for patients at risk of embolism, removing the necessity of monitoring. In theory, this class of medications should provide a more favorable treatment compared with warfarin, however, differences in cost of medication may make utilization difficult. The purpose of this study is to determine the incidence of use of anticoagulants in a small community hospital and identify any trends over time.

Methods: All clinical research represented in the abstract was approved by the appropriate ethics committee or institutional review board. A retrospective review of patients receiving anticoagulation in a small community hospital was completed. All patients who received warfarin, heparin, enoxaparin, fondaparinux, apixaban, rivaroxaban, or dabigatran during January 2010-August 2016 were identified from a computer-generated list. Any dose of anticoagulant administered was counted as an episode. Only one episode per anticoagulant per admission was recorded, allowing for recording of episodes of different anticoagulants per admission. The number of episodes of each anticoagulant used was determined by month. Trends in use were identified.

Results: Fondaparinux and warfarin were the most frequently used anticoagulants in 2010-2016. The overall use of fondaparinux trended down over the 6 years. Similarly, the use of warfarin also trended down over the time span. In March 2011, dabigatran use started and the overall use increased through 2016. In March 2012, rivaroxaban use started, peaked in June 2014 and then gradually decreased. Apixaban use started in August 2014, peaked in June 2015, and gradually decreased thereafter. With the addition of more oral anticoagulants the use of

warfarin dropped significantly by as much as 50 percent. Overall, the use of heparin continuous infusion was fairly consistent during 2010-2016 and was unaffected by other agents.

Conclusion: In conclusion, the use of injectable anticoagulation agents (except heparin) and warfarin has been affected by the approval of the NOACs. Not only did the use of warfarin decrease, but the use of each NOAC rose very quickly after drug approval, only to the decrease slightly and level off after each subsequent NOAC was approved. The use of continuous infusion heparin seemed to be independent and did not appear to be affected by any other anticoagulant.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 5b-202

Poster Title: Adherence to guidelines for transitioning patients between anticoagulants in a small community hospital setting

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Purpose: Anticoagulants are used to prevent the formation/extension of blood clots related to atrial fibrillation, venous thromboembolisms (VTE) and other causes. When transitioning between anticoagulants, appropriate timing of administration is essential to prevent increased risks of bleeding from excessive anticoagulation and increased the risk of thrombosis from inadequate anticoagulation. Pharmacokinetic (PK) properties of each agent indicate the estimated onset and duration of action giving practitioners a guide for the timing of administration when transitioning between agents. The purpose of this study is to determine if the transition time between anticoagulants was appropriate.

Methods: All clinical research represented in the abstract was approved by the appropriate ethics committee or institutional review board. A retrospective review of patients receiving anticoagulation in a small community hospital was completed. All patients who received heparin, enoxaparin, fondaparinux, apixaban, rivaroxaban, or dabigatran during January 2010-August 2016 were identified from a computer-generated list. Patients were excluded if there was no start and stop date available, or there was only one agent used. The time between agents was calculated and compared to established transition times. The average transition time for each pair of anticoagulants was calculated. Transition time was acceptable if it was within 1 hour before to 1 hour after the accepted transition time to allow for the variance in nursing administration. The percentage acceptable transition time was calculated overall and for each transition pair.

Results: Overall transition-time was 66.3 percent unacceptable between anticoagulants based on guidelines. Transition-time from enoxaparin to dabigatran, enoxaparin, apixaban, heparin, or fondaparinux were 100 percent unacceptable, with average times of 7.88, 0.58, 4.83, 1.06, 9.15 hours. Transition-time from apixaban to enoxaparin, dabigatran, or heparin were 100 percent unacceptable, with average times of 16.85, 4.70, 1.53, 1.06 hours. Transition-time from dabigatran to apixaban or dabigatran were 100 percent unacceptable, heparin with a 66.7 percent unacceptable transition time, and fondaparinux with a 66.7 percent unacceptable transition time. Average times were 9.43, 10.07, 32.03, 10.25 hours. Transition-time from heparin to rivaroxaban was 75 percent unacceptable, enoxaparin was 55.6 percent unacceptable, heparin and dabigatran were 66.7 percent acceptable, apixaban was 58.8 percent unacceptable, and fondaparinux was 60.5 percent acceptable. Average times were 25.01, 15.97, 3.50, 6.81, 7.50, 5.25 hours. Transition-time from rivaroxaban to heparin or dabigatran were 100 percent unacceptable, and fondaparinux was 50 percent acceptable, with average times of 17.5, 0.30, and 11.62 respectively. Transition-time from fondaparinux to apixaban or rivaroxaban were 100 percent unacceptable, to enoxaparin or dabigatran were 75 percent unacceptable, and to heparin was 76.3 percent unacceptable. Average times were 26.95, 20.86, 21.46, 9.16, 14.38 hours.

Conclusion: There is a consistently high percentage of episodes of transitioning between anticoagulants where there isn't adequate transition time from one anticoagulant to another. The clinical significance of these occasions remains unknown, however, education of prescribers and pharmacists may increase the consistency of adherence to recommended transition times.

Submission Category: Leadership

Submission Type: Evaluative Study

Session-Board Number: 5b-203

Poster Title: Evaluation of tutees' self-perception of the value and satisfaction of peer tutoring

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Purpose: Peer-tutoring programs in pharmacy schools have become more prevalent in the United States and could benefit both the peer-tutor and tutee. The peer-tutoring program at the University of Maryland School of Pharmacy was designed to assist the learning of PharmD students who may have some difficulty in a course. The purpose of this research study was to investigate the impact of peer-tutoring on tutees' self-perception of the value and their satisfaction of peer tutoring. The results from this study will be used to further enhance the peer-tutoring program at the University of Maryland School of Pharmacy.

Methods: A satisfaction survey consisting of 14 questions was distributed to 117 pharmacy students at the University of Maryland School of Pharmacy. The survey was sent by the Office of Student Affairs to tutees who received tutoring services during the 2014-2015 and 2015-2016 academic years. This voluntary survey was distributed and administered electronically through SurveyMonkey and participants were allotted 14 days to complete the survey during a single sitting with 3 reminder emails. 13 closed-ended questions evaluating tutees' self-perceptions were based on a Likert Scale of 1 to 5. An open-ended question allowed participants to elaborate on their perceptions of improvements that could be made to the peer-tutoring program, which created further insight into their satisfaction levels about the program.

Results: A total of 20 students completed the survey out of 117 enrolled (17 percent). 70 percent of students were peer-tutored 1-5 times over the course of one academic semester. Students generally agreed that peer-tutoring increased their confidence going into the exam (mean value equals 3.9) and felt that it improved their performance on the exam (mean value equals 3.7). Out of the students who reviewed materials before receiving peer-tutoring in the

specified course (n equals 17), a slight majority felt that peer-tutoring enabled them to learn and apply new study strategies (mean value equals 3.35), as well as felt that peer-tutoring reinforced their understanding of challenging concepts and materials from the course (mean value equals 3.41). In contrast, the students who did not review materials before receiving peer-tutoring in the course (n equals 3) found that peer-tutoring enabled them to learn and apply new strategies (mean value equals 4.33), as well as reinforced their understanding of challenging concepts and materials from the course (mean value equals 4.67).

Conclusion: Students generally benefited from the peer-tutoring program provided by the University of Maryland School of Pharmacy in that it helped them to ask questions they would have been reluctant to ask a professor, reinforced their understanding of challenging concepts and materials from the course, and increased their confidence going into the exam. From student comments, the program could be improved by mandating that peer-tutors and students meet at least once in person and that peer-tutors should take more initiative in understanding the tutees' learning needs.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Descriptive Report

Session-Board Number: 5b-204

Poster Title: Incidence and reasons for readmission within 30 days for patients with chronic obstructive pulmonary disease (COPD) and COPD related illness

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Purpose: With the advent of the Affordable Care Act, the Centers for Medicare and Medicaid Services (CMS) are required to reduce payments to inpatient prospective payment system (IPPS) hospitals for excess readmissions, defined as any readmission within 30 days regardless of reason. Chronic Obstructive Pulmonary Disease (COPD) is identified by CMS as associated with a high risk for readmission, resulting in potential penalties to IPPS hospitals. The overall purpose of this study is to identify risk factors for COPD readmissions which may identify areas for healthcare provider intervention, thereby reducing the number of COPD readmissions and preventing loss of funds.

Methods: All clinical research represented in the abstract was approved by the appropriate ethics committee or institutional review board. At a small community hospital, the number of patients admitted between February and July 2016 with a primary discharge diagnosis of COPD was identified as a baseline potential number of 30-day-readmissions. Of these, patients who were readmitted within 30 days between March and August 2016 with a primary diagnosis of COPD were identified. Risk factors for COPD 30-day-readmission were identified. The incidence of literature-identified risk factors (including tobacco use, exposure to passive tobacco use, environmental pollution presence, weather changes, three or more emergency visits/readmissions within previous year, no immunization for influenza/pneumococcus, medication nonadherence, low physical activity, acute respiratory illness, and no pulmonologist management) was determined. Thirty-day readmission rate was determined by month and the presence of risk factors was determined for each month.

Results: There were 633 admissions with COPD diagnosis. Of these, 13 (2%) led to 1 or more readmissions within 30 days. 2 (0.3%) led to 2 readmissions within 30 days. The most prevalent risk factor for readmission was environmental pollution, with all patients (100% of readmissions) claiming exposure to pollution. Other risk factors present included tobacco use, non-adherence to yearly influenza vaccine, and acute respiratory illness. Each of these risk factors were claimed by 10 patients (66.7% of readmissions). There were 8 (53.3%) incidences without the pneumococcal vaccine. Four (26.7%) were non-adherent or did not understand proper medication technique. Two (13.3%) did not have access to a pulmonologist, and there were 0 (0%) risk factors for patients who could not afford their medications or readmissions related to weather change.
Of the 2 patients that had 3 COPD-related admissions within 30 days, each had a similar risk factor profile of environmental pollution, tobacco use, non-adherent to influenza or pneumococcal vaccine, and they were the only patients listed without access to a pulmonologist.

Conclusion: Five of ten risk factors identified were modifiable. Order of prevalence of modifiable risk factors: tobacco use, non-adherence to the influenza or pneumococcal vaccines, medication non-adherence, and lack of pulmonologist intervention. This data identifies areas of improving COPD-related readmission, which is a patient and hospital concern. Educational programs for non-adherence issues are easily implemented. Smoking cessation has a lesser success rate according to the Centers for Disease Control. Outpatient pulmonologist access can be arranged before discharge. According to the Global Initiative for Chronic Obstructive Lung Disease guidelines, these programs could reduce future readmissions.

Submission Category: Preceptor Skills

Submission Type: Descriptive Report

Session-Board Number: 5b-205

Poster Title: Implementation of a simulated hospital medication reconciliation policy to teach medication reconciliation upon admission in a pharmacist care laboratory

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Purpose: Pharmacists play an important role in medication reconciliation to reduce the risk of medication errors. However, few studies describe strategies for the education of the process or measure the effectiveness of the education in the pharmacy curriculum. The purpose of this study is to describe a systematic method and process of teaching medication reconciliation upon admission in the hospital setting based on a simulated medication reconciliation policy and patient case in the Pharmacist Care Laboratory to second year pharmacy students.

Methods: This is a retrospective study describing the instructional method for teaching a systematic medication reconciliation process to second year pharmacy students in the Pharmacist Care Laboratory course from January 2016 to May 2016. Students are educated on a six step medication reconciliation process; in which the objectives of the lab experience is for students to be able to effectively reconcile patient's medications, identify medication reconciliation discrepancies, and document appropriate recommendations based on the simulated medication reconciliation policy and patient case. Second year pharmacy student's response on pre and post medication reconciliation assessment questions and confidence levels were collected along with student's performance on medication reconciliation on the final examination. Turning Point technologies, Exam Soft, and submission of student's medication reconciliation documentation in Joule were queried from the Pharmacist Care Laboratory course from January 2016 to May 2016 specific to medication reconciliation

Results: Fifty-six second year pharmacy students completed the Pharmacist Care Laboratory medication reconciliation course. Based on student performance, there was an increase from pre to post assessment scores, indicating student understanding of how to perform a medication reconciliation. (Pre-assessment median score 67% (IQR 76-83%) and Post-assessment median score 83% (67-100%). 82% of students reported feeling either extremely confident, very confident, or moderately confident in conducting medication reconciliation by the end of lab, compared to 48% prior to completing lab.

Conclusion: Utilization of a systematic medication reconciliation process and simulated policy is an effective way to teach 2nd year pharmacy students how to conduct medication reconciliation. Preceptors on IPPE and APPE rotations can also utilize the process to ensure appropriate medication reconciliation and it can also help to define how pharmacists approach medication reconciliation compared to other health care professionals.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5b-206

Poster Title: Appropriateness of initial antibiotic therapy for community-acquired pneumonia in a small, community hospital

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Purpose: Previous research has shown that utilization of guidelines for antibiotic treatment of community-acquired pneumonia (CAP) is beneficial. Guideline utilization for CAP therapy reduces 30-day mortality, length of hospital stay, and readmission rate. Additionally, there is an economic benefit associated with utilization of CAP guidelines. To provide the best care for patients, providers should follow guidelines and local antibiograms to appropriately select initial antibiotic therapy when treating patients with CAP. The purpose of this study is to assess the appropriateness of initial antibiotic therapy for CAP in a small, community hospital.

Methods: All clinical research represented in the abstract was approved by the appropriate ethics committee or institutional review board. An electronic list of patients aged 18 years or greater with a discharge diagnosis of CAP between March 1 and August 31, 2016 was generated. The Infectious Diseases Society of America/American Thoracic Society (IDSA/ATS) 2007 CAP guidelines were used to identify initial appropriate antibiotic therapy. The initial antibiotic therapy administered to the patient was compared with the guidelines. Appropriate therapy was defined as therapy consistent with the guidelines. The rate of appropriate therapy was calculated per month and for the 6-month data period.

Results: There were 257 patients identified with CAP. Of those patients, 19 (7.39%) patients had organisms that were identified. The organisms identified included Methicillin-resistant Staphylococcus aureus (n=6; 31.6%), Escherichia coli (n=3; 15.8%), Klebsiella pneumoniae (n=3; 15.8%), Pseudomonas (n=2; 10.5%), other aerobic gram-negative bacteria (n=2; 10.5%), Haemophilus influenzae (n=1; 6.67%), Methicillin-susceptible Staphylococcus aureus (n=1; 6.67%), and Streptococcus pneumoniae (n=1; 6.67%). Of those 19 patients, 16 patients (84.2%) were treated with appropriate antibiotic therapy.

Conclusion: According to the IDSA/ATS CAP guidelines, an acceptable rate of appropriate initial antibiotic therapy is between 80-95%. The rate of appropriate antibiotic therapy is acceptable, however further data collection may reveal some risk factors for alterations to therapy to increase the initial appropriate antibiotic therapy rate.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 5b-207

Poster Title: Is It Time to Replace Warfarin with Novel Oral Anticoagulants (NOACs) for Treating Thrombotic Disorders?

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Purpose: To determine whether NOACs should be considered first-line treatments alongside warfarin for both VTE treatment and stroke/systemic embolism prophylaxis in patients with NVAF from a clinical and cost-effective viewpoint.

Methods: A decision tree was constructed for each of the indications: VTE treatment and stroke/systemic embolism prophylaxis in NVAF patients. Each tree compared five therapies: edoxaban, apixaban, rivaroxaban, dabigatran, and warfarin. The transition probabilities were derived from their respective phase 3 clinical trials. Costs were derived from various literature sources with a one-year time frame.

Results: In the VTE treatment analysis, apixaban was found to have the lowest average yearly cost of $7,755.91, followed by warfarin ($7,864.46), dabigatran ($8,903.02), edoxaban ($9,557.37), and rivaroxaban ($10,630.41). Effectiveness was measured by treatment response without a major bleeding or clinically relevant non-major bleeding event. Warfarin had the lowest efficacy of 0.87, followed by rivaroxaban (0.88), edoxaban (0.89), dabigatran (0.91), and apixaban (0.94). Apixaban is the most cost-effective option due to its superior price and efficacy profile.
For the analysis of prophylaxis in NVAF patients, warfarin was found to have the lowest average yearly cost of $1,119.71, followed by edoxaban ($3,596.70), dabigatran ($4,110.33), apixaban ($4,385.71), and rivaroxaban ($4,438.61). Effectiveness was measured by treatment response without a major bleeding event. Warfarin and Edoxaban had the lowest efficacy of 0.90, followed by rivaroxaban (0.91), dabigatran (0.92), and apixaban (0.94). Apixaban is the most efficacious option, but warfarin is the cheapest option. The incremental cost-effectiveness ratio

of dabigatran versus warfarin and apixaban versus dabigatran was $175,918.82 and $12,517.27 per additional treatment response without a major bleeding event, respectively.

Conclusion: From a clinical viewpoint, the NOACs are non-inferior to warfarin but are currently less utilized in practice. When cost-effectiveness analyses are integrated into clinical decision making, a need for change in the clinical guidelines is established due to the greater cost effectiveness of the NOACs compared to warfarin.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 5b-208

Poster Title: Ethanol lock therapy, a protocol for the prevention of catheter-related bloodstream infections in pediatrics.

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Purpose: Central venous access devices (CVADs) are frequently used for patients requiring long term venous access. Infections caused by biofilm formation on the inner surface of the catheter are responsible for significant morbidity and mortality in pediatric patients. Infections are a major complication for these patients with long-term indwelling catheters such as patients who require total parenteral nutrition (TPN) or chemotherapy. The objectives of this study are to evaluate the evidence regarding the use of ethanol lock therapy (ELT) for prevention of catheter-related bloodstream infection and to develop a protocol for use in a pediatric children's hospital.

Methods: A literature search was conducted using PubMed (January 2009-March 2016) with search terms: ethanol lock, ethanol locks, ethanol lock therapy, prophylaxis, prevention, catheter infection, line infection, catheter-related bloodstream infection, catheter-related infection, pediatrics and children. All English-language human studies included more than one patient and a primary outcome of rates of infection, rate of catheter removal or line salvage were included and evaluated. Review articles, in vitro studies, studies where ethanol lock therapy was not used for prevention of catheter-related bloodstream infection or the main outcome was not primarily focused on rates of infection were excluded. Data were obtained and reviewed. Strengths and weaknesses of each included study were discussed and noted. The primary outcome of the review is to establish a standardized ethanol lock therapy protocol to prevent the catheter-related bloodstream infections.

Results: A total of 12 studies with 140 pediatric patients were included. Two studies were conducted prospectively; nine studies were categorized as retrospective and one as case report. Studies reported a decreased rate of infection with ethanol lock therapy with a concentration of 70% in patients requiring an indwelling catheter who have experienced more than one episode of infection of their intravascular devices. Silicone was the most compatible material when ethanol lock solution was placed. Studies were consistent with a significant decrease in the rate of infection when the minimum of a 4-hour dwell time was used with the maximum of 24 hours. No serious adverse events were found. The protocol allows use of ethanol locks in patients over 6 months of age and receiving long-term TPN. Patients are excluded if they are allergic to ethanol or have a catheter that contains an antibiotic or polyurethane. The protocol includes lock administration procedure and required volumes based on catheter diameter sizes.

Conclusion: An evidenced-based protocol for the use of ethanol lock therapy to prevent catheter infections was created using 70% ethanol lock therapy for at least 4 hours with the maximum of 24 hours daily.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5b-209

Poster Title: Safety culture among Egyptian healthcare providers at a pediatric cancer center

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Purpose: A limited amount of data exists from developing and underdeveloped nations related to patient safety. The Safety Attitudes Questionnaire (SAQ) is the most widely used, self-administered, validated questionnaire measuring patient safety. To date, one Egyptian hospital has published results from the SAQ administered to nurses. The study revealed that nurses were neutral regarding the safety of the work environment. Job satisfaction, team work climate, and stress recognition rated highest on the survey. Perceptions of management and working conditions rated lowest. Baseline assessment of patient safety culture from other members of the healthcare team is lacking.

Methods: A total of 250 employees consisting of physicians, pharmacists, nurses, physical therapists, administration, assistants, and secretaries at two medical centers in Egypt voluntarily completed the 36-questioned SAQ over a 14-day period. Participants were given the choice to complete the survey on paper or online. All paper responses were then recorded online. To detect any differences from other cultures, the safety scores of Egyptian healthcare professionals were compared with international benchmark safety domains in SAQ. In addition, associations of mean scores of each SAQ safety domain were analyzed. For comparisons of mean scores between the safety scores of Egyptian healthcare professionals and international benchmark safety domains in SAQ, 95% confidence intervals were produced to detect whether two confidence intervals overlapped. Independent t-test and one-way analysis of variance (ANOVA) were performed to detect any differences between the mean scores of each safety domain according to demographic characteristics. Tukey's multiple comparison tests were produced for each level of the main effect if the result of ANOVA was significant for each

characteristic. In addition, Pearson's correlation coefficient was used to detect any correlation between the safety culture dimensions. Analyses were performed with SAS version 9.4 (SAS Institute, Cary, NC).

Results: The scores of Egyptian healthcare professional in all domains were significantly higher than the international benchmark. There was significantly positive correlations between each safety domain scores that were detected except stress recognition versus teamwork climate and stress recognition versus safety culture. Attending/Staff physicians (90.7) had a significantly higher mean score for job satisfaction than the study population (81.1). Additionally, participants who worked less than 6 months (87.5) had significantly higher mean score on their perception of safety culture in the hospital than the study population (75.5). Participants who worked 11-20 years in the hospital (91.7) had a significantly higher mean score in terms of their perception on sufficient hospital staffing than the study population (82.2). In contrast, nurses (75.4) had a significantly lower mean score than the study population (82.2) on this item. Resident physicians (67.3) had significantly higher mean score on their opinion on the availability of resources in the hospital to make therapeutic decisions than the study population (42.9). Finally, there was no significant difference among the mean scores for individual positions in job satisfaction, but the mean score of Attending/Staff physician (90.7) was significantly different from the mean score (81.1) of job satisfaction for the study population.

Conclusion: Overall, the scores of Egyptian healthcare professionals in each domain were higher than the international benchmark. Additionally, the correlations between the safety domains were mostly positive and the same was true for safety attitudes. The results show that the hospital staff in Egypt had a positive perception of patient safety. However, there can be bias in the results due to the employer's fear of repercussion for giving a negative image of the hospital. Additionally, most of the staff members who agreed to take the survey were ones that were supportive of the hospital and its administration.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 5b-210

Poster Title: Novel oral anticoagulants and risk of gastrointestinal bleeding: A systematic review

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Purpose: In recent years, a new class of anticoagulants, novel oral anticoagulants (NOACs) (e.g., dabigatran, rivaroxaban, edoxaban, apixaban), has been approved for treatment of atrial fibrillation (AF), providing advantages (e.g., no monitoring requirement) over warfarin treatment. However, recent post-marketing case reports and other observational data suggest NOACs may be associated with greater risk of gastrointestinal (GI) bleeding compared with warfarin. The purpose of this systematic review is to evaluate the risk of GI bleeding associated with NOACs compared with the warfarin treatment by examining published data from randomized controlled trials (RCTs).

Methods: Following a specific protocol, a systematic review of PubMed, EMBASE, and the Cochrane Registry of Clinical Trials was conducted to identify RCTs (in English) comparing NOACs to warfarin among non-valvular AF patients. Abstracts were triaged and independently reviewed by two researchers with a third reviewer providing input when necessary. Selected articles were reviewed in full.

Results: Out of 9 RCTs identified, rivaroxaban was each assessed in 3, edoxaban and apixaban were each assessed in 2, and dabigatran was assessed in 1. In one trial, high-dose edoxaban [1.51% vs. 1.23%, RR=1.23 (95% CI 1.02-1.50)], but not low-dose [0.82% vs. 1.23%, RR=0.67 (95% CI 0.53-0.83)], was associated with higher GI bleeding risk compared to warfarin. A phase 2 study of edoxaban showed that warfarin was associated with GI bleeding (1.33%) and no patients in the edoxaban treatment arm (both, high- and low-dose) had GI bleeding. In 2 rivaroxaban studies, major GI bleeding was more common in rivaroxaban-treated patients

compared with warfarin-treated patients (4.5% vs. 0.6%; 3.2% vs. 2.2%). By contrast, one study did not find higher risk of GI bleeding with rivaroxaban treatment. Compared to warfarin, dabigatran was also associated with higher risk [1.51% vs. 1.15%, RR=1.50 (95% CI 1.19-1.89)]. A phase 2 study demonstrated a higher risk of GI bleeding associated with apixaban 5mg (1.41% vs 0%). However, the phase 3 trial did not indicate a significantly higher risk of GI bleeding when compared to warfarin [0.76% vs 0.86%, HR=0.89 (95% CI 0.70-1.15)].

Conclusion: In this systematic review of RCTs among AF patients, rivaroxaban, edoxaban, and dabigatran appear to be associated with a greater risk of GI bleeding compared with warfarin. However, apixaban does not appear to be associated with a greater risk for GI bleeding. The risk may be dose-related, but that warrants further investigation.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 5b-211

Poster Title: Prophylaxis of thromboembolism in multiple myeloma patients receiving lenalidomide therapy at Peninsula Regional Medical Center

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Purpose: Lenalidomide is an immune modulating drug (iMD) used in treatment of multiple myeloma (MM). Cancer patients with MM receiving lenalidomide therapy are at elevated risk of thromboembolic events including venous thromboembolism (VTE). The pathophysiology of increased risk is unclear, but several factors have been implicated such as increased von Willebrand factor, fibrinogen, endothelial stress markers, and impaired fibrinolysis. National Comprehensive Cancer Network (NCCN) guidelines recommend thromboprophylaxis in all diagnosed MM patients receiving lenalidomide and other iMD therapy. This study assessed adherence to NCCN guidelines for VTE prophylaxis in MM patients on lenalidomide therapy at Peninsula Regional Medical Center (PRMC).

Methods: This study was approved by the PRMC research comittee. All MM patients entering the PRMC outpatient infusion center from January 1, 2016 through August 31, 2016 were screened. The inclusion criteria were patients ages 18 and older and history of treatment with lenalidomide for MM. Exclusion criteria included patients with absolute contraindication to VTE prophylaxis including true aspirin, warfarin, or enoxaparin allergy, active bleeding, recent major surgery, or documentation of other contraindication by prescriber. Patients meeting criteria were then assessed for risk of thromboembolism using the risk factors specified by NCCN: obesity (BMI greater than or equal to 30 kg per m2), prior VTE, central venous access device or pacemaker, cardiac disease, chronic kidney disease (CKD), diabetes, acute infection, immobilization, surgery, use of erythropoietin, blood clotting disorders, diagnosis of myeloma, or hyperviscosity. Patients with one or fewer risk factors would require aspirin (81–325 mg) prophylaxis, while those with two or more risk factors as well as using lenalidomide in combination with high dose dexamethasone (greater than 480 mg per month), doxorubicin, or

multi-agent chemotherapy would require anticoagulation with warfarin or a low molecular weight heparin (LMWH). All patients were then assessed to determine whether they received any thromboprophylaxis and if prophylaxis was appropriate according to NCCN guidelines. Record of VTE while on lenalidomide therapy was also documented. Descriptive statistics were used to analyze results.

Results: Of the 56 MM patients screened, 40 patients received lenalidomide therapy. Four of these patients were excluded because lenalidomide was withdrawn due to allergy or intolerance. VTE prophylaxis with any recommended agent was used in 55.6 percent of patients. The appropriate VTE prophylaxis according to NCCN guidelines was used in 19.4 percent of patients. The most common anti-thrombotic agent prescribed was aspirin used in 65 percent of patients receiving prophylaxis. Prophylaxis with warfarin and LMWH was lower, with an incidence of 25 percent and 5 percent respectively. The average number of risk factors identified in the 36 patients meeting criteria was 2.8. Other than diagnosis of MM, the most commonly identified risk factor was obesity occurring in 44.7 percent of patients. Risk factors including cardiac disease, diabetes, prior VTE, and CKD were identified in 31.6, 31.6, 26.3, and 21.1 percent of patients respectively. Other risk factors (immobilization, pacemaker, erythropoietin use) were also identified in 18.4 percent of patients. Five cases of VTE occurring during lenalidomide therapy were identified. Four of these patients received inappropriate VTE prophylaxis according to NCCN guidelines, while one did receive any prophylaxis.

Conclusion: Many MM patients on lenalidomide are not receiving appropriate thromboembolism prophylaxis. The use of warfarin and LMWH was low in MM patients receiving lenalidomide, indicating the need for routine risk assessment. There was minimal documentation of thromboprophylaxis assessment by prescribers at PRMC, and all risk assessments may not have been found if they were not documented. Prescribers should be prompted automatically to add prophylaxis when prescribing lenalidomide to MM patients and required to document rational for withholding prophylaxis. These recommendations should be implemented rapidly considering five patients at PRMC developed a VTE without proper prophylaxis.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-212

Poster Title: Effect of socioeconomic factors on patient beliefs of treatment and control of hypertension in elderly US adults

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Purpose: Patient perceptions of personal health issues, self-efficacy, and perceived barriers to action, are all factors in the Health Belief Model to explain engagement in health-promoting behavior. However, there is a lack of understanding on the barriers to adherence for the elderly population regarding hypertension and how socioeconomic factors influence their beliefs on blood pressure control. The objective of this study is to evaluate potential disparities due to income and education on the confidence levels of older patients in hypertension management and their ability to pay for antihypertensives.

Methods: The institutional review board approved this cross-sectional study. Data from the Medicare Current Beneficiary Survey (MCBS) were used to study hypertensive adults from 2007 to 2011. Eligibility criteria for this study were community-dwelling beneficiaries with hypertension aged over 65 years. Institutionalized beneficiaries were excluded from this study due to the lack of questions on drug coverage in the MCBS Cost and Use files from 2007 to 2010. The primary explanatory variables were income and education levels, and the key dependent variables were answers to MCBS survey questions regarding confidence in blood pressure control and ability to pay for antihypertensive medications. Covariates included age, sex, race, geographic residence, and marital status. All data manipulation, tables, figures, listings, and analyses were documented and performed using SAS® Software v9.2. Chi-square and Fisher's Exact tests on demographic characteristics of beneficiaries showed differences between our population of interest versus beneficiaries without hypertension. Pearson's correlation coefficient was determined for income and education to test for potential multicollinearity. A proportional-odds cumulative logit model and a binary logistic regression

were used to assess differences in outcomes for each exposure variable, depending on the nature of the outcome.

Results: 4,054 beneficiaries fit our criteria. There was a positive, moderate correlation between income and education levels (Pearson coefficient: 0.4). Beneficiaries with an annual income of 10,000 to 24,999 dollars were most affected by hypertension, with 40 percent of all newly diagnosed beneficiaries falling into this income category. 64 percent of newly diagnosed beneficiaries had the equivalent of a high school diploma or lower levels of education. The results showed a statistically significant association between income and education levels on patients' confidence in blood pressure control. Beneficiaries in the highest income category were 1.42 times more likely to have higher confidence compared to those with an annual income of less than 10,000 dollars (95 percent confidence interval 1.08 to 1.86), and odds of greater confidence significantly increased with each rise in education level (OR: 1.26 and 1.64, respectively). Patients were less likely to report having difficulty paying for medications as income levels increased, with odds of reporting difficulty cut in half when annual income increased to 25,000 to 49,999 dollars (OR: 0.45, 95 percent confidence interval 0.29 to 0.71), and decreased even further with income greater than or equal to 50,000 dollars (OR: 0.2, 95 percent confidence interval 0.1 to 0.39).

Conclusion: Income and education levels affected both the patients' perception of blood pressure control and ability to pay. While many barriers to adherence and proper control have been identified in the general hypertensive cohort, the poorly understood mechanism affecting hypertension management remains a debilitating concern for a large proportion of elderly Americans. By identifying socioeconomic differences in patients' health perceptions, this study provides new insight to further examine what patient-centered barriers exist in effective blood pressure management in the elderly.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 5b-213

Poster Title: Pharmacists' and pediatricians' knowledge of codeine use in children

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Purpose: In 2011, approximately 1.7 million pediatric patients had a codeine containing prescription filled at US retail pharmacies. Numerous cases involving serious adverse effects or fatalities have been reported in children who have been prescribed codeine. In 2013, the FDA added a black box warning to avoid codeine in children after a tonsillectomy. However, it is unknown how the current warnings surrounding codeine have impacted practice. Therefore, the purpose of this study is to determine pharmacists' and pediatricians' knowledge of the black box warning for codeine in children.

Methods: A 16-item survey was administered via survey monkey to community pharmacists in Maryland. A separate 12-item survey was administered via survey monkey to pediatricians and pediatric residents at a single institution in Maryland. Both surveys consisted of questions regarding the knowledge of the black box warning for codeine in children and which conditions would be appropriate for codeine use. Participants were recruited using emails and professional meetings.

Results: There were 105 pharmacists and 82 pediatricians who responded to the survey and of those, 85 pharmacists and 67 pediatricians completed the full survey. The pharmacists worked in a variety of settings, including independent stores (22.9%), chains (39%), hospital outpatient (22.9%), hospital inpatient (9.5%) and other settings (11.4%). Of the 82 pediatricians, 43 were attending physicians (52%) and 37 (45%) were residents. There was no difference in the awareness of the black box warning between pharmacists (43 of 88 (48.9%)) and pediatricians (41 of 80 (51.3%), p=0.88). More pharmacists knew that ultra-rapid metabolizers have greater risk for increased adverse events from codeine (40.7% pharmacists vs. 20% pediatricians, p=0.01). Only 17% of pharmacists (15/89) and pediatricians (14/80) were able to correctly

describe the black box warning in an open ended question. Also, 36% of pharmacists and 33% of pediatricians noted it was never appropriate to use codeine in a child, p=0.73.

Conclusion: The knowledge of the codeine black box warning was similar in pharmacists and pediatricians, with approximately half of the respondents stating they were aware of the warning. Also, only one third of pharmacists and pediatricians in this study would never use codeine in a child as recently reinforced by the American Academy of Pediatrics. Therefore, more education is needed for pharmacists and pediatricians regarding the dangers of using codeine in children.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 5b-214

Poster Title: Incidence of denosumab induced hypocalcemia in patients with bone metastases of solid tumor

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Purpose: Denosumab is a human monoclonal antibody used to prevent skeletal related events (SREs) in patients with bone metastases from solid tumors. It inhibits receptor activator of nuclear factor kappa B ligand, which decreases osteoclast activity and bone resorption. Denosumab has been shown to cause hypocalcemia, and renal insufficiency has been proposed as a contributory factor. The objective of this study was to determine the incidence of hypocalcemia in patients receiving denosumab for prevention of SREs in bone metastases from solid tumors and the relationship to kidney function. This study also aimed to determine potential risk factors for denosumab induced hypocalcemia.

Methods: This retrospective analysis, approved by the institution's research committee, was conducted at Peninsula Regional Medical Center. A list of all patients receiving denosumab from January 2016 to August 2016 was obtained, and those charts were reviewed. Patients were included if they were 18 years of age or older, had been diagnosed with bone metastasis from a solid tumor, and had received denosumab for the prevention of SREs. Exclusion criteria were hypocalcemia at baseline and use of denosumab for treatment of hypercalcemia of malignancy, giant cell tumor of bone, or osteoporosis. Patient demographics and lab values were documented, and these included age, gender, type of tumor, serum calcium, albumin, magnesium, vitamin D, serum creatinine, and eGFR. Hypocalcemia was defined as ionized calcium less than 1.3 mmol per liter or corrected calcium less than 8.5 mg per dL. Severity of hypocalcemia was graded based on Common Terminology Criteria for Adverse Events (CTCAE). Patients were assessed for renal insufficiency, which was defined as eGFR less than 60 mL per minute per 1.73 m2. Supplementation with calcium and vitamin D during denosumab therapy

was also recorded. Descriptive statistics and logistic binary regression were used to analyze the data.

Results: A total of 135 patients received denosumab between January 2016 and August 2016. Of those, 75 patients were excluded based on established criteria, therefore 60 patients were included in the analysis. Hypocalcemia was observed in 10 patients (16.7 percent). Age range for the patients that developed hypocalcemia was 52-91 years, with 60 percent of these patients being age 70 and older. Of the patients with hypocalcemia, 5 were diagnosed with prostate cancer, 3 with lung cancer, 1 with breast cancer, and 1 with neuroendocrine cancer. A total of 25 patients had renal insufficiency during denosumab therapy, and 7 of these patients developed hypocalcemia (OR 3.81; 95 percent CI 0.88 to 16.53). Supplementation with both calcium and vitamin D was seen in 30 patients, and 5 of those patients developed hypocalcemia (OR 1.00; 95 percent CI 0.26 to 3.89). Thirty percent of patients received no supplementation, while 5 percent received only calcium and 15 percent received only vitamin D. Four of the 10 patients with hypocalcemia were hospitalized with an average length of stay of 8.25 days. Treatment of hypocalcemia consisted of oral therapy (4 patients) or both oral and IV therapy (2 patients). Hypocalcemia resolved without treatment in 4 patients.

Conclusion: Denosumab has been shown to cause hypocalcemia leading to hospitalizations, but the risk factors for developing hypocalcemia are not yet clear. Therefore, it is important to closely monitor both vitamin D and calcium levels before and during therapy in all patients. This study did not find a significant difference in the development of hypocalcemia based on renal function or supplementation, but this may be due to the small sample size. Tumor type and age may be important variables to consider in future research. Additional research is needed to determine other predisposing factors for denosumab induced hypocalcemia.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 5b-215

Poster Title: Assessing the impact of substance abuse education on student pharmacists' perspective of addiction: Utilization of a survey

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Purpose: As the country faces a prescription drug abuse epidemic along with an increase in heroin abuse and other substances of abuse, the United States Department of Health and Human Services has emphasized that training healthcare providers, such as pharmacists, is important to combat this problem. Pharmacy schools are looking to incorporate a comprehensive education on substance abuse into their curriculum. Therefore, this study assesses the changes in pharmacy students' perspective on various aspects of addiction after completing an elective course titled "Topics in Drugs of Abuse."

Methods: "Topics in Drugs of Abuse" is a 2-credit elective course offered to pharmacy students in their professional year two and three (P2 and P3). This course utilizes a lecture and presentation approach to explore the science behind drug abuse and addiction and various other areas involved in the neurobiology of addiction. It also explores the behavioral and neurobiological mechanism of action for common classes of drugs of abuse; opiates, sedative-hypnotics, anxiolytics, psychostimulants, marijuana, nicotine, and caffeine. This course was designed to expose students to the harmful consequences of drug use, focusing on the physiological, psychological, social, and economical impacts.
A survey was developed to assess the changes in (1) pharmacy students' perspective on addiction, (2) pharmacy students' perspective on addiction in a healthcare professional versus a patient, and (3) pharmacy students' motivation and ability to identify and treat a patient with addiction. The survey was administered to pharmacy students on the first day of the elective course, wherein responses were collected via TurningPoint clickers. On the last day of the

course, a paper copy of the survey was given, allowing written feedback to be added. Data were reported in quantitative (e.g., Likert scale) outcomes using narratives.
This study was approved by the Institutional Review Board for Research with Human Subjects at the Notre Dame of Maryland University.

Results: Overall, 31 responses were recorded in the 15-question post-survey results. 26 students agreed that their level of understanding of addiction would impact how they would practice as a pharmacist. 28 students agreed that a pharmacist plays a vital role in the care of addicted patients. 23 students disagreed that they would be likely to avoid a patient with addiction. 27 students responded that they disagreed that a patient with addiction can stop using drugs whenever they want. A majority of students also stated they were more comfortable in their ability to identify a patient with addiction after taking the course, compared to pre-survey results.

Conclusion: Based on the results of the survey, the course design and content altered pharmacy students' perspective about addiction and impacted how the students will identify, interact, and treat a patient with addiction. Thus, various aspects of this course could be used by other schools of pharmacy who are implementing substance abuse electives. The developed survey could serve as a useful tool for measuring the effectiveness of such courses in altering pharmacy students' perspective on various aspects of addiction.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Descriptive Report

Session-Board Number: 5b-216

Poster Title: Assessing adherence to the heparin protocol for the treatment of venous thromboembolism and acute coronary syndrome at a community teaching hospital

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Purpose: Unfractionated heparin (UFH) is used in the treatment of venous thromboembolism (VTE) and acute coronary syndrome (ACS). The CHEST (2012) and AHA/ACC (2014) guidelines recommended no maximum bolus dose for VTE treatment and a maximum bolus dose of 4,000 units for treatment of definite ACS. This has led institutions to develop a heparin protocol, ensuring its safe and appropriate use. The primary objective of this study was to assess adherence to the Prince George's Hospital Center (PGHC) Heparin Protocol for UFH bolus dose administration. The secondary objective was to determine if nonadherence resulted in supratherapeutic aPTT, and clinically significant bleeding.

Methods: A list of patients was obtained from the pharmacy dispensing database for any unfractionated heparin administration between January 1, 2015 and May 31, 2016. Patients were then randomized using Microsoft Excel. Patients included in this study must have received both bolus and infusion heparin doses for one of the three approved indications per protocol: VTE, ACS without fibrinolytic and ACS with thrombolytic. Additionally, patients must also have received UFH for at least 12 hours, and must have had at least 2 aPTT values measured. Patients were excluded if they received UFH for other indications such as surgery prophylaxis or hemodialysis. Other excluded patients were those whose orders were discontinued before administration or patients on heparin for less than 12 hours. Per PGHC protocol, VTE treatment bolus is 80 units/kg with a maximum of 10,000 units, ACS (without fibrolytics) treatment as a bolus of 70 units/kg with a maximum of 5,000 units, and ACS (with thrombolytics) treatment as a bolus 60 units/kg with a maximum of 4,000 units. Adherence to the heparin bolus dose protocol was determined by evaluating the bolus dose administered to patients using the

medication administration records. Measured aPTT was then evaluated to determine whether it was therapeutic (70-110 seconds), supratherapeutic (greater than 110 seconds), or subtherapeutic (less than 70 seconds). Physician and nursing progress notes were reviewed for any documented bleeding.

Results: A list of 1,005 patients were obtained and randomized, 277 patients were reviewed and 50 patients were included in this study. 31 patients received UFH for VTE treatment, 18 for ACS without thrombolytic, and 1 ACS with thrombolytics. In all three groups, 6 (12 percent) patients received a total UFH bolus that was higher than max recommended for each indication: one VTE (3.2 percent) and 5 ACS without thrombolytic (27.8 percent). Of these 6 patients, 4 achieved supratherapeutic first aPTT and 3 continued to have sustained supratherapeutic second aPTT. When looking at compliance to protocol based on the number of UFH units given per kg for bolus doses, a total of 5 patients (10 percent) got higher than 80 units/kg (VTE treatment) and 70 units/kg (ACS without thrombolytic). Of these 5 patients, 2 achieved sustained supratherapeutic aPTT despite of adjustment. Of all cases, 2 adverse events were recorded: one hematuria and one bruising on upper extremity. Both patients received UFH bolus under maximum recommended doses per protocol for VTE treatment. No documented bleeding events were found among patients who received above maximum heparin bolus dose.

Conclusion: Twelve percent of patients received higher than maximum bolus dose of UFH per institution protocol. Although there was no adverse event reported in these patients, this study revealed the need for provider education and an alert system to ensure patient's safety. It also showed that supratherapeutic aPTT did not translate into major bleeding. Future studies with larger sample size looking at the clinical significance of sustained supratherapeutic aPTT are suggested.

Submission Category: Preceptor Skills

Submission Type: Descriptive Report

Session-Board Number: 5b-217

Poster Title: Utilization of a validated opioid overdose knowledge and attitudes scale to assess education on opioid overdose training for pharmacists

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Purpose: In the state of Maryland, drug overdoses have become a serious public health challenge. In 2015 almost 86% of all overdose related deaths were opioid-related. The need to implement an overdose response program (ORP) focusing on educating pharmacists is apparent. Pharmacy faculty members and 4th year pharmacy students are working with a local ORP agency, Baltimore Student Harm Reduction Coalition, to develop an ORP focused on educating healthcare professionals. The purpose of this study is to describe the instructional design and evaluation of the training session on opioid overdose and naloxone distribution to pharmacists in the community and hospital setting.

Methods: Pharmacy faculty members and 4th year pharmacy students modified the Baltimore Student Harm Reduction Coalition presentation to include more active learning strategies to engage learners. Instructional design modifications to the ORP training consisted of the following: two placebo product instructional stations, simulated patient counseling case scenarios, assessment rubrics on appropriate counseling technique, and content on important dispensing information directed to pharmacists specifically. During the two-hour training session validated Opioid Overdose Knowledge (OOKS) and Attitudes (OOAS) Scales were administered before and after the training to measure training effectiveness. The OOKS score ranges from 0-45 points and the OOAS score ranges from 28 to 140 points. Learning outcomes included recognition of opioid overdose, assembly of naloxone delivery devices, and administration of naloxone. Formal presentation, video demonstrations, practical exercises on how to assemble and administer naloxone, Q&A discussion, and assessment and feedback were

used to educate the participants. Evaluation of education was assessed based on changes in knowledge and attitudes. The OOKS and OOAS scales were used to help instructors to assess the effectiveness of the modified ORP education training session for pharmacists.

Results: Sixteen pharmacists working in community and health-systems pharmacy settings participated in the ORP training. 43.8 percent of pharmacists were within the age range of 25-34 years and 50 percent of pharmacists have been practicing pharmacy for 6-10 years in various counties within Maryland. 62.5 percent of pharmacists reported that they had not previously provided counseling on opioid overdose and the use of naloxone to patients. The OOKS median pre-training score was 36 (IQR 32.5 - 39), while the median post-training score was 42 (IQR 39 - 42). The median OOKS scores improved by 6 points between pre and post-training surveys. The OOAS median pre-training total score was 104 (IQR 117.75 - 90.25) and the median post-training score was 122 (IQR 99-140). The median OOAS scores improved by 18 points between pre and post-training surveys.

Conclusion: Utilization of the OOKS and OOAS results provided insight on the effectiveness of the opioid overdose and naloxone administration educational program. The pharmacists who participated in the program demonstrated an overall score improvement on both the OOAS and OOKS. Improvement in OOAS scores from pre to post-training, can be correlated to an increase in pharmacists' readiness and willingness to intervene in an overdose situation, as well as confidence to counsel patients on overdose response. Results of this ORP program will provide insight on what changes should be made in future programming tailored towards pharmacists and healthcare professionals.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-218

Poster Title: National trends in the diagnosis and treatment of asthma in US youth by race and ethnicity before and after clinical guidelines changes

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Purpose: In 2014, approximately 8.6% of children in the United States were diagnosed with asthma. Previous literature in children shows there is racial disparity in asthma outcomes, requiring targeted intervention. In 2007, Expert Panel Report (EPR-3) guidelines have been updated to improve management of asthma. However, little is known about the impact of the guideline changes on diagnosis and treatment of asthma in US youth. The objective of this study was to examine national trends of asthma diagnosis and treatment by race/ethnicity in U.S. youth from 2001 through 2012.

Methods: The study was conducted using National Ambulatory Care Survey (NAMCS) and National Hospital Ambulatory Care Survey (NHAMCS), which are nationally representative surveys of office-based physician visits. First, we assessed asthma diagnosed visits as a proportion of total outpatient visits by race/ethnicity in three time periods (2001-2006, 2007, 2008-2012). Second, we assessed asthma medication prescribing in these asthma diagnosed visits by race/ethnicity across 12 years. The anti-asthmatic medication classes included long-acting beta-agonists (LABAs), fixed-dose LABAs, short-acting beta agonists (SABAs), leukotriene receptor antagonists (LTRAs), inhaled corticosteroids (ICS), oral corticosteroids (OCS) and other asthma medications. All analyses were population weighted to produce nationally representative findings.

Results: From 2001 to 2012, the percentage of outpatient visits with a diagnosis of asthma remained stable (from 4.5% to 4.6%). However, there were significant changes in treatment patterns in these asthma diagnosed visits. Overall, from 2001 to 2012, the proportion of asthma diagnosed visits with anti-asthmatic prescriptions increased from 70.2% to 83.1%. This growth occurred at a significantly greater rate for African Americans (from 58.7% to 83.8%) and Hispanic youth (from 66.9% to 84.5%) than white youth (from 73.9% to 82.0%). In terms of anti-asthmatic medication subclasses, there was an increase in prescribing of SABAs (54.5% vs. 65.9%), ICS (31.7% vs. 40.8%), and OCS (12.7% vs. 17.4%) –but not for other anti-asthmatic medication classes –in the 2008-2012 period compared with the 2001-2006 period.

Conclusion: Following the publication of expert panel guidelines for the management of asthma in 2007, there was a substantial increase in anti-asthmatic prescribing in nationally representative outpatient youth visits. This expansion was largely attributed to increased prescribing of anti-asthmatics, particularly for short acting beta agonists, in outpatient visits by African American and Hispanic youth.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 5b-219

Poster Title: Weight-based heparin dosing and time to therapeutic partial thromboplastin time: A comparison between Cardiac Heparin Protocol and Acute Coronary Syndrome Heparin Protocol at Hanover Hospital

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Purpose: Weight-based dosing of unfractionated heparin is the standard of care in the treatment of acute coronary syndrome. At Hanover Hospital, a 93-bed community institution located in Hanover, Pennsylvania, the heparin protocol was modified in April 2016 to reflect the updated guidance from American College of Cardiology/American Heart Association, which recommends a lower initial weight-based heparin bolus and infusion rate. Because attaining therapeutic partial thromboplastin time has been associated with improved outcomes in these patients, this analysis examines if the updated heparin protocol would result in a longer time to achieve therapeutic partial thromboplastin time.

Methods: The Cardiac Heparin Protocol used before the updated recommendations called for a max initial bolus of 65 units/kilogram intravenously (max 6800 units) and a 13 units/kilogram/hour infusion rate (max 1400 units/hour). The Acute Coronary Syndrome Heparin Protocol employs a max initial bolus of 60 units/kilogram intravenously (max 4000 units) and a 12 units/kilogram/hour infusion rate (max 1000 units/hour). Patients hospitalized in Hanover Hospital between May 2014-July 2014 or May 2016-July 2016 who were ordered a heparin protocol for a cardiac indication were selected in the analysis. Exclusion criteria included those who did not achieve a therapeutic partial thromboplastin time due to discharge from the hospital or discontinuation of heparin prior to attainment of a therapeutic level. The time to therapeutic partial thromboplastin time was observed for 67 patients who were ordered the Cardiac Heparin Protocol (active between May 2014-July 2014) and for 81 patients ordered the Acute Coronary Syndrome Heparin Protocol (active between May 2016-July 2016). In addition, gender, age, and weight were collected for each patient. Microsoft Excel (2010) was used to calculate the mean and median time to therapeutic partial thromboplastin time in each

group. Mean values were statistically compared with a t-test and the presence of a p value less than 0.05 was considered statistically significant. IRB approval was not required at this institution due to the retrospective nature of this study.

Results: Gender distribution was not found to be significantly different between the two protocols, chi square (1, N equal 148) equals 5.98, p value less than 0.014. There was also no significant difference in mean age between the two protocol groups (p greater than 0.05). In addition, weight did differ significantly between the two treatment groups (Cardiac Heparin Protocol equals 82.1 kg. Acute Coronary Syndrome Heparin Protocol equals 92.1 kg: p values less than 0.05). However, the proportion of patients who would have received the initial max dose of either protocol was numerically similar when normalized for those exceeding the maximum recommended initial weight-based dose in the Acute Coronary Syndrome Heparin Protocol based on a weight of 82 kilograms or greater. The mean time to a therapeutic partial thromboplastin time was 18.5 hours for the Cardiac Heparin Protocol group and 14.5 hours for the Acute Coronary Syndrome Heparin Protocol group (t stat equal 1.63, p value greater than 0.05) indicating that the difference in the time to achievement of a therapeutic partial thromboplastin time value between the two groups was not statistically significant.

Conclusion: The numerical difference in time to achievement of a therapeutic partial thromboplastin time between the two protocols was not statistically significant. While the Acute Coronary Syndrome Heparin Protocol employs a lower initial weight-based bolus dose and infusion rate, the time to achievement of a therapeutic partial thromboplastin time was shorter for patients placed on Acute Coronary Syndrome Heparin Protocol than in those placed on Cardiac Heparin Protocol.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-220

Poster Title: Evaluation of the use of tirofiban in a community hospital

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Purpose: Tirofiban is a glycoprotein (GP) IIb/IIIa inhibitor that inhibits platelet aggregation by preventing fibrinogen from binding to the GP IIb/IIIa receptors. It is used for the treatment of unstable angina, NSTEMI, and in patients undergoing PCI in stable ischemic heart disease or STEMI (off-label). Recently, tirofiban replaced another GP IIa/IIIa inhibitor, eptifibatide, as the formulary agent at Adventist Healthcare Shady Grove Medical Center. The purpose of this study was to characterize tirofiban prescribing patterns, observe dosing and adjustments patterns, assess for adverse events and determine total cost savings from the formulary switch.

Methods: In this analysis, a total of seventeen adult patients admitted to this community hospital were placed on tirofiban from January 2016 to June 2016. Variables that were assessed include dosing, indication, infusion duration, adverse effects, renal function, appropriateness of medications administered with tirofiban, and cost of tirofiban. The equivalent dosing of eptifibatide was determined based on the indication, patient's weight, renal function, and duration of continuous infusion. The cost saving was then estimated based on eptifibatide's equivalent dosing.

Results: The mean age of the observed patients was 58.6 years and 78 percent of the patients were male. Patients on tirofiban during the six month period from January 2016 to June 2016 were admitted to the progressive care unit (PCU), intensive care unit (ICU) and the medical/surgical unit. A majority of 64.7 percent were patients admitted to the ICU. Patients experiencing STEMI who underwent a PCI was the most frequent indication for tirofiban (71 percent). Prescribing patterns have been appropriate in use, which was shown through co-administration with heparin or bivalirudin. In addition, dosing have generally been appropriate, except for one case where the continuous infusion dosing was not renally adjusted. In another

case, the dose was adjusted after the pharmacist's intervention. Other indications that were used within this patient population were use in unstable angina (5.9 percent) and NSTEMI (17.6 percent). No cases of serious side effects occurred, although a few mild side effects were observed in this patient population. Since the formulary switch from eptifibatide to tirofiban, this institution saved 4240 dollars and 18 cents in medication costs from the seventeen patients who received therapy throughout the six month period.

Conclusion: Overall, tirofiban use has been appropriately prescribed and administered at this community hospital. Tirofaban use was more cost effective than eptifibatide.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5b-221

Poster Title: Assessment of the impact of medication history technicians on admission medication reconciliation workflow in a community-based hospital: a descriptive quality assurance/medication safety study

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Purpose: In January 2016, a medication history technician role was established to collect home medication lists from 11 am to 11 pm for patients admitted through the Emergency Department. The role supports inpatient admission nurses, who were previously solely responsible for collecting medication lists, in an effort to provide physicians more immediate access to home medication lists for admission orders. The purpose of this review is to evaluate medication history technician impact by assessing overall medication list completion rate, and completion rate prior to input of admission orders, and medication list collection turn-around time after decision to admit.

Methods: Data was collected from the medical record for all patients admitted though the Emergency Department in June 2016. For the review of overall medication list completion rate, the percent of medication histories collected during medication history technician working hours and during technician-off hours (nursing-only hours) was evaluated. To assess turn-around time, the time difference between the decision to admit and the medication history list completion was evaluated for both the technicians and nurses. The number of medication lists collected by technicians and by nurses prior to physicians inputting admission orders was also evaluated.

Results: In June 2016, the medication history technicians collected __percent of medication lists from patients admitted during their shift. Similarly, nurses collected __percent of medication lists from patients admitted during technician off-hours. Technicians completed __percent of medication histories within 60 minutes of decision to admit and nurses completed __percent of medication histories within the same time period. The average turn-around time for technicians and nurses was __ minutes and __ minutes, respectively. The medication history technicians were able to collect __percent of medication histories prior to physicians inputting admission orders while nurses were able to collect __percent.

Conclusion: Establishing the medication history technician role has positively impacted the inpatient admission medication reconciliation process. Compared to the time when they are not staffed, medication history technicians collected __percent more home medication lists overall and __percent more lists prior to input of admission order. The average turn-around time of medication list collection following decision to admit time has also decreased by __ minutes. The addition of medication history technicians has improved workflow and provides physicians access to up-to-date medication histories, facilitating admission orders and reduces the potential for medication errors, ultimately creating a safer environment for patients.

Submission Category: Oncology

Submission Type: Descriptive Report

Session-Board Number: 5b-222

Poster Title: Assessment of a multi-discipline implemented pegfilgrastim cost-minimization guideline: knowledge, adherence, safety, and patient-reported satisfaction

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Purpose: National Comprehensive Cancer Network (NCCN) recommends use of granulocyte colony stimulating factors (G-CSFs) for use with chemotherapy regimens that are high risk, defined as greater than 20 percent, for febrile neutropenia. University of Maryland Medical Center (UMMC) recently developed a pegfilgrastim use guideline in January 2015 to identify patients who are candidates for self-administration at home via outpatient prescription sent to University of Maryland Medical System (UMMS) Ambulatory Pharmacy. This study was designed as a pilot evaluation of patient-reported knowledge, adherence, safety, and satisfaction of pegfilgrastim administration at home or administration at UMMC's outpatient infusion center (OIC).

Methods: This pilot study was prospective in design and included adult patients (18 years and older) prescribed pegfilgrastim at the University of Maryland Marlene and Stewart Greenebaum Cancer Center (UMGCC) between March and July 2016. Through the use of a recently developed pegfilgrastim prescribing guideline created at UMMC, patients were divided into two groups: those who would receive a prescription through UMMS outpatient pharmacy service to be administered at home and those who would be administered pegfilgrastim at OIC between 24 and 72 hours after chemotherapy per the guideline. For patients administered pegfilgrastim at OIC, a telephone survey was conducted within 3 days post-pegfilgrastim administration. Patients who were prescribed to self-administer pegfilgrastim at home, utilizing the UMMS Ambulatory Pharmacy Service (APS), two telephone surveys were conducted: an initial telephone survey within 3 days after scheduled delivery and a follow-up survey within 3 days after scheduled chemotherapy. The components of the survey included questions

regarding confidence in the knowledge of various factors related to pegfilgrastim, including timing of pegfilgrastim administration and side effects, as well as satisfaction with pharmacy services. The two primary outcomes evaluated were overall patient satisfaction with OIC's and UMMS APS's pharmacy services as well as time of pegfilgrastim administration in respect to chemotherapy administration.

Results: Twenty patients were included in the final analysis: twelve patients with administration from OIC and 8 patients utilizing the UMMC APS. Satisfaction with the pharmacy service was rated as 10 on a scale of 0 to 10, 9 (75 percent) of patients from the OIC arm and 5 (71 percent) patients from the UMMS APS arm. Seven (58 percent) patients experienced side effects from pegfilgrastim in the OIC arm, and all of these patients experienced bone pain, while 3 (43 percent) patients with side effects experienced both bone pain and left upper abdominal or shoulder pain. Two (40 percent) patients who completed the follow-up survey in UMMC APS arm reported experiencing side effects, all reporting bone pain. The number of patients reporting very confident on all knowledge questions was 4 (33 percent) and 4 (50 percent) in the OIC and APS arms, respectively. Pegfilgrastim administration occurred in 5 (100 percent) of the home administration arm within the recommended 24-72 hours after chemotherapy compared to 11 (92 percent) in the OIC administration arm.

Conclusion: UMMS APS was utilized to dispense pegfilgrastim for prevention of neutropenic fever in patients who met guideline criteria. Patients administered all planned doses of the prescribed injections without problems other than the most commonly reported adverse effects. Patient self-administration of pegfilgrastim at home is a viable option for patients with intermediate to high risk of febrile neutropenia after treatment with chemotherapy.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 5b-223

Poster Title: Comparison of medication palatability and flavoring knowledge of healthcare professional students

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Purpose: Medication palatability is a significant factor impacting medication adherence in children. Studies suggest 79 percent of children complain about poor tasting medication, leading to difficulty administering medications. Medication flavoring may increase compliance from 53 to over 90 percent. Currently, there is no literature documenting healthcare professional and students' knowledge of medication palatability. The primary objective of this study is to compare medication palatability and flavoring knowledge of different healthcare professional students. Secondary objectives seek to determine if current curriculums devote appropriate time covering these topics and to compare the confidence level of students in making recommendations to improve palatability.

Methods: The University of Maryland institutional review board approved this convenience sample survey study. Pharmacy, medical, dental, and graduate nursing students in the final year of their programs at one University were emailed to participate in an anonymous online survey about their knowledge of medication taste and flavoring. Exclusion criteria included inability to read English and age under 18 years. Demographic data collected from each subject included age, gender, ethnicity, years of work experience in healthcare field, and employment setting. Subjects were asked to rate their familiarity with medication taste and their confidence in suggesting medication flavoring using a Likert scale (1 indicating no familiarity/confidence and 5 indicating extremely familiar/confident). Participants were asked to rate the taste of twelve medications as "good," "bad," or "I don't know," as well as choose the best and worst tasting medication from the twelve selected medications. Additional questions were asked about

where they obtained their knowledge of medication taste and number of content hours covering medication palatability in their curriculum. Results from previous taste studies were used to predetermine answers related to these twelve medications. Mean familiarity and confidence levels were compared using student T-tests and correct answers for medication tastes were compared using chi-squared. A p-value less than 0.05 was considered significant.

Results: Seventy-seven students completed the survey (22 pharmacy, 22 medicine, 16 dental, and 17 graduate nursing). The mean Likert scale score was 2.09 for medication palatability familiarity and 1.68 for confidence in suggesting flavoring. No lecture hours on medication palatability were in required (55 percent) and elective curriculums (51 percent). Knowledge was primarily acquired from work experience as reported by 25 percent.
Twenty-nine percent of questions concerning specific medication palatability were correctly answered with the remainder of responses either incorrect or “I don’t know.” Pharmacy students were most likely to correctly identify the taste of a medication. Pharmacy, medical, dental, and graduate nursing students answered 41, 31, 10, and 31 percent correctly, respectively. A chi-squared test of independence was performed and revealed a significant relationship between field of study and correct taste identification, chi-squared (6, N equals 780) equals 60.5, p less than 0.001. The correct identifications of the best and worst tasting medications were as follows: 52.6 and 57.9 percent for pharmacy, 47.1 and 41.2 percent for medical, 26.7 and 53.4 percent for dental, and 50.0 and 57.1 percent for graduate nursing.

Conclusion: Pharmacy students had more knowledge regarding the palatability of individual medications as well as determining the best and worst tasting medications. A significant correlation was found between field of study and correct answers for the more commonly used medications. All health professional schools should consider providing curriculum content on adherence related to medication palatability.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5b-224

Poster Title: Impact of inservice education on pharmacist competency to identify medication fall risk in patients of a rural community hospital

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Purpose: Patient falls are a major safety concern in the acute care setting, particularly in a rural community with a significant elderly population. Falls lead to greater length of stay and increased risk of injuries and mortality. New Joint Commission recommendations encourage medication safety assessments in patient post-fall reviews, although to date they are not always incorporated in falls prevention programs. We have established tools to assess medications, but they still require the clinical evaluation of pharmacists to investigate patient cases. The intent of this study is to assess pharmacist competency and success in assessing patients for medication-induced fall risk.

Methods: A student pharmacist developed a case scenario competency examination on medication fall risk, along with an inservice education on the topic. The inservice education highlighted common drug classes associated with falls and an established medication fall risk scoring tool intended to use in conjunction with the Morse Fall Scale. The post test examination comprised of the original pretest examination, but also included an additional section asking to perform two fall risk calculations using the available fall risk scoring tool (100 percent required to pass). The calculations section was held independent of the subject's post test competency score. All materials were reviewed by a clinical pharmacy specialist with advanced training in medication safety and geriatric pharmacotherapy.
The pretest examination was administered to eight staff pharmacists of varying experience in a rural community hospital, followed by the inservice education and post test examination one to two days later. Pharmacists needed to score at least 80 percent or higher on the post test examination to pass the competency assessment. The primary outcome measure is the percentage of pharmacists who passed the competency assessment following the post test. Secondary outcome measures include percentage of pharmacists whose scores improved

following the inservice, and percentage of pharmacists who passed the calculation section with 100 percent. Statistical analysis was performed on score improvement measure by using the Wilcoxon Rank Sum Test.

Results: Seven of the eight staff pharmacists passed the post test assessment with an average of 88 percent and a standard deviation of 10 percent, which is well over the 80 percent minimum. This is in large contrast to the pretest assessment, which reported an average of 66.8 percent and a standard deviation of 7 percent.
All of the eight staff pharmacists showed significant improvement in their post test score with an average improvement score of 21.09 percent from baseline (p value less than 0.5).
Four of the eight pharmacists were able to pass the fall risk calculation section (two out of two calculations correct). The other four pharmacists all had 50 percent (one out of two calculations) correct, and none of the pharmacists received a score of zero correct.

Conclusion: The results of this study show the unit pharmacists of the hospital demonstrated competency on potential medication fall risk. This is important to first establish, since it gives credibility toward our pharmacists' capability to consult and evaluate on patient falls on the units. It is true not all falls are necessarily medication-related, but using medication assessments can also help to rule out a potential fall risk patient or to investigate the potential risk factors leading to a patient fall. This is not a highly studied pharmacy topic, but it is a critical safety issue that deserves pharmacy to implement interventions.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 5b-225

Poster Title: Development and implementation of medication cards highlighting purpose and side effects to nursing units in an academic medical center

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Purpose: The purpose of this project was to develop and implement unit-specific medication cards for use by nurses for patient education during medication administration. Medication education is vital to patient care. The Center for Medicare and Medicaid includes specific questions about both purpose and side effects in their Hospital Consumer Assessment of Healthcare Providers and Systems Survey (HCAHPS). All members of the healthcare team play an important role in patient education, however, the pharmacist's medication knowledge and the nurse's relationship and time spent with the patient make these two members of the team uniquely suited to assist in medication teaching.

Methods: Medication orders were assessed for each of the nursing units and the emergency department at The Johns Hopkins Hospital. The top 100 medications from each unit were gathered and combined into a "Medication Database". The database was further developed by 5 pharmacists from different specialties to include the purpose and side effects of each identified medication. Pharmacists from each respective nursing unit utilized the Medication Database to develop medication cards that contained the most appropriate and most frequently ordered medications on that unit. Following final edits, the medication cards were then printed and distributed to each hospital unit. One card was hung in each patient room adjacent to the computer where the nurse would document medication administration. The pharmacist for their respective unit worked with nursing leadership to educate the nursing staff to use the newly developed medication card to educate patients on the purpose and potential side effects of their medications at the time of administration.

Results: A comprehensive medication database was compiled containing the name, purpose, and potential side effects of the top 356 medications ordered at The Johns Hopkins Hospital. From this database, a total of 47 unique medication cards were developed containing a welcome statement as well as the information from the medication database. Each medication card includes the 57 most appropriate and frequently used medications from each hospital unit and the adult emergency department. A total of 941 medication cards were printed and placed in patient rooms.

Conclusion: Medication education is critical to patient satisfaction. Pharmacists are uniquely trained to have the medication knowledge to complete this education, and nurses are in an ideal role to partner with pharmacists to deliver this education. By working as a multidisciplinary team, The Johns Hopkins Hospital has developed a patient education model that could potentially improve both HCAHPS scores and staff satisfaction. The methods and model presented can be utilized as a framework within which to implement the expansion of medication education within a hospital system.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Case Report

Session-Board Number: 5b-226

Poster Title: Clustered Regularly Interspaced Short Palindromic Repeats with associated Cas genes (CRISPR-Cas) system and insurance coverage if it obtains orphan drug or humanitarian use device status

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Purpose: There is no doubt that technology as a whole has continued and will continue to advance in the coming years with medicine advancing alongside it. One of the biggest advances in medicine is genome editing, with the newest being the CRISPR-Cas system. CRISPR-Cas is going through its first clinical trial in augmenting cancer therapies that involve a patient's T-cells. Once all the trials, safety testing, approval, and classification by the Food and Drug Administration (FDA), there is the question: will insurance cover this?
CRISPR-Cas is a gene-editing tool that can target and modify parts of specific deoxyribonucleic acid (DNA) sequences. It is based on a system used by bacteria to protect themselves from viral infections. To use the CRISPR-Cas system, scientists input a small part of pre-designed ribonucleic acid (RNA) sequence into the single guide RNA which bind to DNA and guide the Cas9 enzyme to the correct site. Cas9 then cuts both strands of DNA, triggering DNA repair. However, mutations can occur during the DNA repair process. This system may have a large impact on medical conditions that involve a genetic component, such as cancer, hepatitis B, or high cholesterol. There would be two ways that the system would work: 1) by silencing or disrupting the gene using the cell's natural but imperfect DNA repair mechanism causing a mutation or 2) by including a repair template with a specific change.
The Orphan Drug Act provides orphan status to drugs and biologics for those intended to treat, diagnose, or prevent rare diseases or disorders that affect less than 200,000 people or affect more than 200,000 people but are not expected to recover the cost of development and marketing. The Humanitarian Use Device (HUD) program creates another approval pathway for "medical devices intended to benefit patients in the treatment or diagnosis of a disease or condition that affects or is manifested in fewer than 4,000 individuals in the United States per year".

Each insurance prescription drug plan has its own formulary that can be placed in three to five tiers. Medicare Part D's SilverScript Plus plan has five tiers: Tier 1 (preferred generic, low cost preferred generic drugs), Tier 2 (generic, includes preferred generic and some preferred brand drugs), Tier 3 (preferred brand, includes preferred brand and non-preferred generic drugs), Tier 4 (non-preferred brand and non-preferred generic drugs), and Tier 5 (specialty tier, including high cost generic and brand drugs). CRISPR-Cas will likely fall into the specialty tier of formularies: Tier 5 in 5 tier plans and Tier 4 in 4 tier plans. Medicare Part D's SilverScript Plus plan has a coinsurance of 33 percent for up to a 30-day supply9 for its specialty tier. Kaiser Permanente's Point-of-Service Plan has two payment options: 1) 20 percent coinsurance up to 150 dollars at the Kaiser Permanente pharmacy or 2) 30 percent coinsurance up to 200 dollars for preferred specialty drugs or 30 percent coinsurance for non-preferred specialty drugs at MedImpact pharmacy. Medicare coverage and claims for HUD utilization is determined by local Medicare Administrative Contractors, resulting in variation in reviewing and processing claims. However, the pharmacy benefits manager that assist in developing an insurance plan's formulary and managing drug benefits by negotiating with pharmacy networks and analyzing medication data. Some issues addressed include quality-of-life improvement, cost-benefit analysis, and supporting evidence deficiencies.
CRISPR-Cas can potentially revolutionize treatments of disease states, however, access to these novel technologies is somewhat uncertain due to payers' actions in the areas of prior authorization, patient cost-sharing and dollar limits on coverage.

Methods:

Results:

Conclusion:

Submission Category: Clinical Services Management

Submission Type: Descriptive Report

Session-Board Number: 5b-227

Poster Title: Role of the pharmacist in reducing 30-day hospital readmission rates: a literature review

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Purpose: Because the majority of medication errors occur while transitioning patients from one setting of care to another, hospitals have been working diligently to develop new programs that assure these transitions run as efficiently as possible. As the medication experts of hospital teams, pharmacists have become increasingly involved in the effort to reduce the medication errors leading to early readmissions. This review explores pharmacist involvement in different TOC programs aimed at reducing 30 day readmissions.

Methods: This literature review was completed using the PubMed, Web of Science, Embase and Scopus databases. The MESH terms “pharmacy”, “reduce” and “30-day hospital readmissions” were all used along with Boolean terms in order to conduct this search. Inclusion criteria consisted of human clinical trials or case studies published in English on or after the year 2009. Studies that did not use 30-day readmission rate as one of the endpoints and or examine the pharmacists’ role in the TOC process were excluded from the review.

Results: A total of 26 studies were found to fit the criteria for this literature review. Almost all programs offered bundled packages of TOC services, making it difficult to identify the direct impact of each individual intervention. However, analysis of the data revealed that bundled services requiring more patient involvement were only capable of significantly reducing 30-day readmissions for the minority of patients able to complete the programs. Patients appeared less likely to drop out of programs that required less commitment from them.

Conclusion: While many TOC programs proved to be efficacious under ideal circumstances, a closer look at study dropout rates reveals that a large percentage of patients may not have the motivation or ability to complete these programs. This is very important when considering which interventions will yield results widespread enough to reduce overall 30-day readmission rates and avoid financial penalties for hospitals. Future studies should examine whether TOC programs designed to operate regardless of patient-specific factors can potentially result in more universal reductions in 30-day readmissions.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-228

Poster Title: Use of topiramate for the treatment of substance abuse: a systematic review

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Purpose: Substance use disorders (SUD) are a rising issue in the United States, costing approximately 700 billion dollars annually; the most common substances abused include alcohol, tobacco, cannabis, stimulants, and opioids. Topiramate, an antiepileptic also indicated for migraine prophylaxis, has been used in treating SUD because of its potential to increase GABAergic activity, possibly reducing reward and craving sensations, thus making users less likely to abuse their substance of choice. However, its efficacy and safety for treating SUD have not been clear. The purpose of this systematic review is to comprehensively review the evidence for topiramate use in SUD.

Methods: A systematic review was conducted with a comprehensive literature search in PubMed (keyword and MeSH), Medline, PsychInfo, CINHAL, Embase, and Google Scholar. A combination of the following keywords were searched in each database: "topiramate," "substance abuse," "dependence," "dependency," "addiction," "drugs of abuse," "street drugs," "cocaine," "alcohol," "methamphetamine," "opiate," and "tobacco." Studies were included in the review if they (1) used topiramate as a main or singular treatment for substance abuse, (2) were published as clinical trials, either observational or controlled trials, (3) reported patient outcomes, and (4) were written in English. Studies were excluded if (1) their focus was to explore the pharmacogenomics of topiramate use, (2) they used topiramate as adjunctive therapy, or (3) they used topiramate as treatment for psychiatric disorders. Four investigators independently searched, reviewed, and extracted data from the studies for their quality, appropriateness, and description of methods and results. Based on consensus, one investigator compiled the final articles selected for this review. The outcomes of the review included (1) cessation or quit rates, (2) a decrease in positive use-days or craving intensity, or (3) duration or

frequency reduction compared with placebo or standard therapy. Data were reported in either quantitative data using descriptive statistics or qualitative data using narratives.

Results: After screening for titles and abstracts, 168 studies were retrieved and reviewed. Studies were excluded because they were not a clinical trial (n=109), focused on pharmacogenomics of topiramate or substance use (nequals8), used topiramate as adjunctive therapy (nequals4), and used topiramate to treat psychiatric disorders (nequals12). The remaining 35 articles comprised of 7 studies on cocaine, 15 on alcohol, 4 on methamphetamines, 3 on tobacco, and 6 on other substances. The studies reported objective measurements such as urine drug screenings, serum drug levels, and subjective measurements such as cognitive performance, withdrawal symptoms, or patient-reported abstinence, cravings (intensity, frequency, duration), and behavioral changes. Overall, topiramate was shown to (1) reduce craving duration (pequals0.018) and intensity (pequals0.012) in cocaine-dependent individuals, without affecting the frequency of abuse, (2) reduce the amount of cigarettes smoked (pless0.01) in alcoholic individuals, and (3) enhance nicotine withdrawal and reward in non-alcoholic individuals (pless0.01). Compared with placebo, topiramate-treated patients had 2.88 fewer drinks per day (pless0.01) and 27.6 percent fewer heavy drinking days (pless0.01). However, topiramate did not (1) increase abstinence from methamphetamine (pequals0.13) or cocaine (pequals0.23), (2) reduce cocaine use or cravings in alcoholic individuals (pgreater0.19), or (3) reduce alcohol use in cocaine users (pequals0.19).

Conclusion: Topiramate was effective in reducing the amount of drinks per day and heavy drinking days in alcoholic individuals, and reduced craving duration and intensity in cocaine-dependent individuals. It also enhanced nicotine withdrawal and reward in tobacco-dependent individuals. However, topiramate did not reduce the amount of methamphetamine or cocaine abuse. When an individual is dependent on more than one substance, topiramate was not effective in reducing substance use, with the exception of treating tobacco dependence in alcoholic individuals. More research is necessary for prescribing topiramate to treat SUD with methamphetamine, cocaine, or tobacco, and for finding effective therapeutic dosages for SUD.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 5b-229

Poster Title: Evaluation of pharmacist-driven dosing guidelines for Staphylococcus aureus bloodstream infections

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Purpose: Bacteremia caused by Staphylococcus aureus is a serious infection that is associated with high morbidity and mortality. Dose optimization of vancomycin by pharmacists using the recently updated Henry Ford Health System vancomycin dosing guidelines is essential in the successful treatment of patients presenting with Staphylococcus aureus bacteremia. This study was designed to evaluate the appropriate use and safety of these guidelines in patients with Staphylococcus aureus bacteremia at our health-system.

Methods: This retrospective chart review was IRB approved at Henry Ford Health System. Patients included were greater than or equal to 18 years of age, with a positive Staphylococcus aureus blood culture from April 2016 to August 2016, receiving vancomycin with a trough level drawn, and without pre-existing renal dysfunction. Upon initiation of vancomycin, a pharmacist will perform dosing and document in the medical record all the details used to calculate the initial dosing regimen. The primary endpoint was to identify whether an appropriate initial vancomycin regimen was selected and was assessed through a composite outcome of appropriate trough goal selected, accurate calculation of creatinine clearance, and consideration of a patient's individual history of vancomycin use. The secondary endpoints included safety of vancomycin use evaluated by incidence of nephrotoxicity and incidence of supratherapeutic and subtherapeutic troughs. The incidence of nephrotoxicity was defined as an increase in serum creatinine (SCr) by 0.5 mg/dL in 48 hours or by 50 percent from baseline. Descriptive statistics were utilized.

Results: Of the 130 patients who were screened, 30 patients met all inclusion criteria. Of those excluded, 33 were excluded due to inappropriate monitoring of first steady state trough level. Of the patients included, 21/30 (70 percent) were initiated on an appropriate vancomycin regimen. 22/30 (73 percent) had an appropriate selection of trough goal of 15-20 mcg/ml and 20/30 (66 percent) had an appropriate creatinine clearance calculation. Of the 12 patients with a history of vancomycin use within the last 2 years 10/12 (83 percent) had documentation and consideration of a patients' previous vancomycin use. 6/30 (20 percent) of patients experienced nephrotoxicity while on vancomycin therapy. Incidence of supratherapeutic troughs was 7/30 (23 percent) and subtherapeutic was 17/30 (56 percent).

Conclusion: Through this evaluation of appropriate use and safety we were able to identify areas of success and areas for improvement in our pharmacists' vancomycin dosing strategies. Areas of success included evaluation of prior vancomycin use and selection of appropriate trough goal. Areas identified for future education include timing of appropriate troughs and calculation of appropriate creatinine clearance with selection of appropriate weight.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Descriptive Report

Session-Board Number: 5b-230

Poster Title: Identifying key stakeholders and their roles in the implementation of a learning healthcare system

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Purpose: The current healthcare system is often criticized as riddled with inefficiencies. Information does not always flow completely through the translational stages between science, evidence, care, and ultimately, patient outcomes and quality of life. The continuously learning healthcare system (LHS) model integrates research and patient care to develop a positive feedback loop in which research both informs and relies on patient care. This project was designed to determine how to implement an innovative LHS model by identifying key stakeholders and their roles. This will provide a structure of outlined responsibilities for organizations that are ready to pursue a LHS.

Methods: A literature review of PubMed was performed to identify articles 1) elucidating specific stakeholders and their roles in LHS development or implementation, whether conceptual or in practice; and 2) identifying requirements for the development and implementation of learning healthcare systems.

Results: Key stakeholders include healthcare delivery organizations, clinicians, patients and families, patient advocacy organizations, health professional education programs, public and private insurers, health care product manufacturers, standards organizations, digital technology developers, research funding agencies, health economists, health service researchers, and governing boards of health care delivery organizations. Roles span the full spectrum of healthcare including adjusting payment models, capturing data at the point of care delivery, and reworking ethical and practical frameworks currently segregating research and clinical care.

Conclusion: Roles were identified for virtually all members involved in the patient care process, from research and education to the delivery of care. Great change is necessary in the culture and practice of data collection, sharing, and utilization. Key roles revolve around creating a digital infrastructure to harness and translate data, dedicating care toward patient-centricity, and providing incentives at all levels to reward value and improvement. Stakeholders must align goals to overcome barriers such as technical complexity, integrating research and clinical care, potential lack of patient-engagement, and funding.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5b-231

Poster Title: Improving Communication about Medication HCAHPS Scores: A Collaboration of Pharmacists and Nurses on Patient Education at a Community Teaching Hospital

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Purpose: The Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) is a standardized, nationwide survey that measures the quality of a patient's hospital stay. Administered to patients after discharge, HCAHPS scores have been increasingly used for the evaluation of patient experiences and healthcare reimbursement. At Sinai Hospital (Baltimore, MD), the "Communication about Medication" survey responses had been suboptimal despite multiple attempts to improve HCAHPS scores. The purpose of this study was to determine whether the implementation of a medication education protocol by nurses who have been trained by pharmacists improve medication-related HCAHPS scores in a community teaching hospital.

Methods: The institutional review board approved this prospective observational study, which consisted of two phases. In Phase 1, pharmacists trained nurses to provide medication education. All nurses on the Pulmonary/Infectious Disease Unit received group training and educational materials, including side effect information sheets for commonly administered medications. Day shift nurses subsequently received individual training by pharmacists. Night shift nurses were excluded from individual training due to pharmacist staffing limitations during these hours. Nurses completed a pre- and post-survey that assessed the outcome of the intervention on nursing perceptions and practice. In Phase 2, the sustainability of the intervention in Phase 1 was assessed by standardized patient interview and direct observation. Fifteen patients were randomly selected each week; data was collected for two, five-week blocks. Patients with altered mental status and/or those receiving mechanical ventilation were

excluded. Between the two blocks, a sign-off sheet that included nurse and patient signatures was introduced to improve accountability and adherence to the study protocol. The primary outcome measure compared HCAHPS medication communication responses prior to the intervention to HCAHPS responses at 3 months after the intervention. Secondary outcomes include the change in HCAHPS responses at 6, 9, and 12 months post-intervention, the results of nursing pre- and post-surveys, and patient responses to interview questions posed during Phase 2. All data was compared using descriptive statistics.

Results: Three months after the intervention, there was no change in HCAHPS medication communication responses compared to baseline (P equals 0.9345). Data for 6, 9, and 12 months post-intervention are pending. Twenty-three nurses completed the pre-survey and seventeen nurses completed the post-survey. Following the intervention, nurses reported a greater responsibility for providing medication education (median Likert 4 pre- vs. 5 post-, P equals 0.0383) and improved confidence with performing this task independently (median Likert 4 pre- vs. 5 post-, P equals 0.0284). Nurses also reported using the "teach-back method" more frequently to assess patient understanding about their medications (median Likert 3.5 pre- vs. 5 post-, P equals 0.0034). Nursing satisfaction with the medication education process at the hospital improved (median Likert 4 pre -vs. 5 post-, P equals 0.0009). The sign-off sheet increased the number of patients who reported learning about their medications from nurses (72% vs. 97.3%, P equals 0.0001). The sign-off sheet was also associated with the presence of more side effect information sheets in patient rooms (37.3% vs. 81.3%, P equals 0.0001) and an increase in the number of patients who reported learning about medication side effects (33.3% vs. 77.3%, P equals 0.0001).

Conclusion: The process of pharmacists training nurses to provide medication education did not significantly impact HCAHPS scores at 3 months post-intervention. However, there were favorable effects on nursing perception and practice as well as improvements in patient reports of education received. HCAHPS scores for 6, 9, and 12 months post-intervention are pending.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-232

Poster Title: Evaluation of conversions between direct oral anticoagulants and subcutaneous anticoagulants in hospitalized patients

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Purpose: The development of the new direct oral anticoagulants (DOACs) has expanded venous thromboembolism treatment and prophylaxis options. The addition of this new class has increased the opportunity for medication errors especially for patients transitioning through various levels of hospitalized care. Surgical procedures, medication failure, change in kidney function, change in patient preference or NPO status, or emergence of a new thrombus are all reasons for transitioning agents. Inappropriate medication administration times place a patient at increased risk of bleeding or clotting which may result in significant morbidity or mortality.

Methods: A retrospective analysis was conducted in patients converting between a DOAC (rivaroxaban, edoxaban, dabigatran, apixaban) and a subcutaneous anticoagulant (enoxaparin, heparin) on a single calendar day of hospitalization. These transitions occurred from January 2015 to July 2016 at Sinai Hospital and from January 2016 to June 2016 at Northwest Hospital. Basic data collection included medical service, medications, doses, month of conversion, type of conversion and number of days of medication overlap. The appropriateness of anticoagulant transition was assessed using a package insert recommendations. The conversion was considered in error if the patient was placed at increased risk of bleeding or clotting based on time of administration. For patients transitioned incorrectly, a degree of risk was assigned to the patient. The risk was classified as high risk (two active orders for 2 different anticoagulants given together), medium risk (incorrect overlap of two anticoagulants at full therapeutic doses), low risk (incorrect overlap of two anticoagulants at prophylactic doses) and clotting risk (lapse of any anticoagulation therapy for period of time during conversion). Patients on heparin drips, patients receiving fondaparinux or patients switching to warfarin were excluded from the study.

Results: Two hundred and four patients at Sinai Hospital and 40 patients at Northwest Hospital were converted between anticoagulants during the study period. All (n equals 36) of the patients at Northwest and 74 percent (n equals 150) of the patients at Sinai were on the medicine service. The most common anticoagulant transitions were between enoxaparin and apixaban at Sinai, and between enoxaparin and rivaroxaban at Northwest. Ninety patients (44 percent) were correctly and 114 patients (56 percent) were incorrectly converted between agents at Sinai Hospital. At Northwest, 15 patients (37.5 percent) were correctly converted and 25 patients (62.5 percent) were incorrectly converted between agents. Of the 114 incorrect conversions at Sinai, 42 patients (37 percent) were assigned to the high risk category, 7 patients (6 percent) to the medium risk category, 32 patients (28 percent) to the low risk category and 33 patients (29 percent) to the clotting risk category. At Northwest, 6 patients (24 percent) were assigned to the high risk category, 9 patients (36 percent) were assigned to the medium risk category, 6 patients (24 percent) were assigned to the low risk category and 4 patients (16 percent) were assigned to the clotting risk category.

Conclusion: Fifty to sixty-three percent of patients were placed at increased risk of bleeding or clotting when converting from one anticoagulant medication to another. The number of incorrect transitions continued to occur at the same frequency although educational interventions were deployed in the middle of the study period. Forty-eight patients were placed at high risk of bleeding. An action plan utilizing clinical decision support during anticoagulant ordering, verification and administration, anticoagulant education and standardizing anticoagulant medication administration times is in development. Education will be ongoing and a prospective audit will be conducted to assure safer anticoagulant transitions for our patients.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 5b-233

Poster Title: Evaluation of quality and safety of anticoagulation services of a Veterans Affairs community living center

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Purpose: Management of warfarin therapy is complex due to its narrow therapeutic index and many drug-drug and drug-food interactions. The purpose of this study was to evaluate the efficacy and safety of warfarin treatment in an inpatient Veterans Affairs (VA) community living center in order to compare to other settings described in the literature. Additionally, this study was performed to identify methods to improve the outcomes rendered by the anticoagulation service at this facility.

Methods: This retrospective investigation was deemed to be exempt from IRB approval and that informed consent was unnecessary. Subjects were included if they had documented BCMA administration of warfarin between May 1, 2015 and January 31, 2016 at the VA Loch Raven community living center. International normalized ratio (INR) was measured by blood draw or portable INR monitoring device. The interval between INR values for all subjects did not exceed fifty-six days.

For medication efficacy, three main measures were used: percentage of INR readings within range, percentage of time in therapeutic range (TTR), and INR variability. Therapeutic range was determined from the patient's medical record. TTR was used to extrapolate the number of days within range using the Rosendaal method. The percentage of days with an INR value within therapeutic range was calculated. INR variability was assessed by calculating the average INR reading and its associated standard deviation. Subjects were subdivided into three groups for both percentage of INR readings within range and TTR as follows: poor control was under 60 percent, good control was between 60 and 75 percent, and excellent control was over 75 percent.

Documented cases of venous thrombus embolism (VTE) (which was used to encompass thromboembolic events such as stroke, systemic embolus, and VTE), bleeding (major and minor

hemorrhage), and anticoagulation-related hospitalizations in patient's medical records were used to assess medication safety.

Results: Similarities were observed between different efficacy measures of warfarin. 43 percent of INRs and 53 percent of days were within therapeutic range. The majority of patients were deemed poor responders according to both INR reading and TTR. There was a positive correlation between percentage of INR readings within range and percentage of days within range (R2 equals 0.67). Nursing home and rehab patients had similar efficacy results, as well as different age groups. Interestingly, patients on warfarin with indications for anticoagulation of atrial fibrillation or atrial flutter seemed to become less efficacious over the observed time frame, while prophylaxis for DVT and pulmonary embolism became more efficacious in the same time frame.
Most of the subjects did not have any safety event occurrences. The majority of safety events were related to bleeding. There were no VTE events or anticoagulation-related hospitalizations. Bleeding events did not correlate with the degree of control. Occurrence of safety events was not correlated to anticoagulation indication. More bleeding events occurred in nursing home patients rather than rehab patients. A larger amount of safety events occurred during warfarin therapy between May 1, 2015 and July 31, 2015 when compared to the other three month time periods.

Conclusion: Warfarin, a narrow therapeutic window drug, has complex associated management that can lead to great harm with both excessive and insufficient anticoagulation. The TTR found in this study was within the range observed in the VA healthcare system but was below the level associated with beneficial outcomes. However, minimal numbers of safety events were observed but this may be due to the low number of subjects. Strategies that could be implemented to achieve a higher TTR include decreasing time to next INR reading, identification of therapy barriers, and use of an algorithm to manage sub- and supra-therapeutic INR values.

Submission Category: Oncology

Submission Type: Descriptive Report

Session-Board Number: 5b-234

Poster Title: Analyzing oncology product medication waste in a regional medical center

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Purpose: Reducing specialty drug product waste is a top priority for institutional pharmacy departments. This project was designed to estimate the amount of oncology product waste saved by the use of the Gri-Fill 3.0 (Grifols, SA) system and implementing protocol-driven dose rounding system. Specifically, overall pharmacy drug costs pre- and post-implementation, adjusted for patient volume, were recorded along with breakdowns by specific chemotherapeutic agent.

Methods: The Gri-Fill 3.0 system uses a 0.22-micron filter to sterilize medication waste and extend their shelf life. The pharmacy department recorded weekly data for drugs that were saved through the Gri-Fill 3.0 system. The product volumes saved per week were calculated into cost savings. The pharmacy department also developed dose-rounding protocols in which practitioners round to the nearest vial size to eliminate waste completely or decrease waste from partial vials as much as possible. Data was collected from the partial vial waste log and was analyzed to see if there was a correlation between the start of the dose-rounding protocols and a decrease in waste.

Results: From July 2015 to August 2016 the Gri-Fill 3.0 system saved a total cost of $77,055.36. Due to implementing dose-rounding protocols on chemotherapeutic agents and other expensive products, three drug products decreased to zero waste, three drug products continue to decrease in waste, and three drug products are fluctuating but have decreased from January 2014.

Conclusion: Oncology product medication waste can be decreased in a regional medical center by using the Gri-Fill 3.0 system and implementing dose-rounding protocols.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 5b-235

Poster Title: Evaluating the appropriateness of stress ulcer prophylaxis in the adult intensive care unit at a community teaching hospital

Primary Author: Elissa Lechtenstein, University of Maryland School of Pharmacy, Maryland; **Email:** elechtenstein@umaryland.edu

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Purpose: Stress ulcer prophylaxis (SUP) is commonly administered to critically ill patients for the prevention of stress-related mucosal bleeding and clinically important gastrointestinal bleeding. However, SUP is often over utilized in the intensive care unit (ICU). The decision to initiate and continue acid suppressive therapy should be carefully considered as it has been associated with Clostridium difficile infection and hospital-acquired pneumonia. The purpose of this study is to evaluate the appropriateness of stress ulcer prophylaxis in the adult intensive care unit (ICU) at Prince George's Hospital Center.

Methods: This single center, retrospective observational study was exempt from review by the institutional review board as it was considered as a quality improvement project. Patients were identified using the pharmacy dispensing database. Patients aged 18 and older who were admitted to the ICU between May 1, 2016 and June 30, 2016, and had at least one SUP medication were included in this study. Patients with an active upper gastrointestinal bleed, active peptic ulcer disease, or receiving dual antiplatelet therapy or concurrent antiplatelet/anticoagulation therapy were excluded. Patients with acid suppressive therapy on medication reconciliation were also excluded. The primary objective of this study was to evaluate the frequency of the appropriate indication for SUP. The secondary objectives were to identify the proportion of appropriate SUP discontinuation when the risk factor resolved and upon transfer out of the ICU. Appropriateness of SUP was assessed based on the 1999 American Society of Health-System Pharmacists Therapeutic Guidelines on Stress Ulcer Prophylaxis.

Results: Of the 183 patients initially reviewed, 105 patients were included in this study. The majority of patients were excluded due to having an antiplatelet/anticoagulant, dual anticoagulants, or acid suppressive therapy prior to admission. SUP was indicated in 78 percent (82 of 105) of patients. Mechanical ventilation for more than 48 hours was the most common indication for SUP (48 percent of patients). When the initial risk factor requiring SUP had resolved, only 10 percent (10 of 105) of patients were appropriately discontinued. Additionally, upon transfer out of the ICU, SUP was appropriately discontinued in only 14 percent (15 of 105) of patients.

Conclusion: Stress ulcer prophylaxis is over utilized in the adult intensive care unit of Prince George's Hospital Center. While the majority of SUP indications were appropriate, a significant proportion of SUP was inappropriately continued in patients when the initial risk factor resolved and upon transfer out of the ICU. Both an institutional guideline and physician education need to be implemented in order to reduce inappropriate use of SUP.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 5b-236

Poster Title: Let's talk about it. Can palliative care clinical pharmacists impact family satisfaction by attending goals of care conversations?

Primary Author: Ashley Fan, The University of Maryland School of Pharmacy, Maryland; **Email:** ashley.fan@umaryland.edu

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Purpose: A palliative care clinical pharmacist is known as a valuable team member in managing symptoms but is not always recognized for their role in supporting goals of care discussions. Many goals of care conversations include breaking bad news about the lack of effective treatment options, discussing transitions in care involving significant medication changes, strategizing the risks and benefits of further treatments, and the options for symptom management. The objective of this study was to compare families' satisfaction with communication after a palliative team goals of care meeting with and without a trained palliative care clinical pharmacist.

Methods: After approval from our Institutional Review Board, a convenience sample of 28 patients receiving an initial palliative care family meeting at MedStar Union Memorial Hospital between June 23- July 24, 2015 were approached for inclusion in this study. Families consenting to participate were surveyed using an electronic tablet after the goals of care meeting regarding their satisfaction of communication, listening, trust, meeting needs, explaining or understanding, and courtesy or respect. Clinicians involved in the meeting were also surveyed to record perceptions of family and topics discussed during the meeting. No more than 5 family members and 5 clinicians were asked to complete the survey per meeting. Responses were rated via a Likert scale and a net promoter scores (NPS, range negative 100 to positive 100) was calculated to use in comparisons between groups. Data was analyzed using descriptive statistics.

Results: Twenty-eight families with fifty-eight representatives (n=58 respondents) participated this study. Most were the patient's primary spokesperson (58 percent). The most common topics discussed in the goals of care meetings were prognosis and overall goals of care. In the meetings with a clinical pharmacist involved, pain and symptom management was discussed more often than in meetings without a clinical pharmacist (88 percent vs 30 percent). The goals of care meetings with pharmacists showed improvement in family satisfaction in the following areas: trust (delta 35), listening (delta 17), explaining or understanding (delta 13), met needs (delta 13), and courtesy or respect (delta 3).

Conclusion: Families reported high levels of satisfaction in goals of care meetings with palliative care clinical pharmacists present. Areas of greatest impact included trust, listening, explaining/understanding and meeting families' needs. Courtesy and respect were high in both groups. Future research should further describe the role of clinical pharmacists in participating in family meetings and the impact of care.

Submission Category: Leadership

Submission Type: Evaluative Study

Session-Board Number: 5b-237

Poster Title: Evaluating the availability of leadership positions at different PharmD programs with main and satellite campuses.

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Purpose: To compare the leadership opportunities that are accessible for PharmD students at the main and satellite campuses.

Methods: Schools listed on the ACPE website with branch campuses were classified into two general models: “sequential” where all PharmD students start on the main campus and finish at a branch campus, and “mothership/ satellite” where one large cohort and smaller cohort(s) complete their entire education at their assigned campus. School websites were used to determine the number of student organizations. Descriptive statistics was used to analyze the results.

Results: There are 33 schools of pharmacies that have at least one branch campus [24 have one branch campus, 5 have two branch campuses, 4 have three branch campuses]. Of these, 22 (69%) use the “mothership/satellite” model. There are slightly more opportunities for student involvement in pharmacy student organizations at main campuses: average of 11.5 student organizations (range 6-20) at main campuses, average of 10.7 student organizations (range 4-19) at branch campuses. Despite having similar opportunities, anecdotal feedback was that satellite students are less active in organizations.

Conclusion: ACPE mandates that schools with branch campuses provide comparable educational and extracurricular opportunities, and leadership experiences are emphasized for

well-rounded residency applicants. Schools should encourage satellite students to take advantage of leadership opportunities as part of career preparation.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 5b-238

Poster Title: Evaluation of medication use among inpatients discharged to home hospice: Potential for deprescribing?

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Purpose: As goals of care change, therapies should be evaluated to ensure they are consistent with patient preferences and appropriate given the patient's clinical status. While medications used to manage chronic diseases have potential benefits of slowing disease progression, at some point the burdens of therapy may outweigh these potential benefits. Deprescribing is a process of stopping medication therapy whose potential harms outweigh potential benefits. The purpose of this study is to determine whether patients discharged from the University of Maryland Medical Center to home hospice care are receiving medications that could potentially be deprescribed.

Methods: A retrospective chart review was performed for inpatients discharged from the University of Maryland Medical Center to home hospice care between 7/1/2015 and 12/31/2015. A list of medications that can potentially be deprescribed was developed based on a review of current literature related to deprescribing. Patient medical records were screened for the medications on this list. Medications classified as those that could potentially be deprescribed included: aspirin, histamine blockers, pentoxifylline, proton pump inhibitors, statins, metformin, sulfonylureas, angiotensin converting enzyme (ACE) inhibitors, alpha blockers, angiotensin receptor blockers, beta blockers, calcium channel blockers, diuretics, and nitrates. The frequency of patients being discharged on IV fluids, supplements, and vitamins were also documented.

Results: A total of 23 patients discharged to home hospice between 7/1/2015 and 12/15/2015 were included. The frequency of patients discharged to home hospice on aspirin, proton pump inhibitors, statins, and sulfonylureas were 4 (17.4 percent), 4 (17.4 percent), 5 (21.7 percent)

and 2 (8.7 percent), respectively. No patients were discharged on metformin. Histamine blockers were prescribed to 2 patients (8.7 percent) and pentoxifylline was prescribed to 1 patient (4.3 percent). The number of patients being discharged on angiotensin converting enzyme (ACE) inhibitors, alpha blockers, angiotensin receptor blockers, calcium channel blockers, diuretics, and nitrates was 2 (8.7 percent), 1 (4.3 percent), 2 (8.7 percent), 4 (17.4 percent), 5 (21.7 percent), and 2 (8.7 percent) times, respectively. In addition, 11 patients (47.8 percent) were discharged to home hospice on beta blockers (with one patient receiving 2 beta blockers). Five patients (21.7 percent) were discharged with zero potentially-deprescribable medications.

Conclusion: Despite the growing body of literature regarding deprescribing, a significant amount of patients (78.3 percent) are discharged to home hospice on medications that may have little benefit and may have increased burden. Individual clinical judgment plays a role in which medications are deprescribed; however, these results suggest a need for more education of healthcare providers to improve medication use at the end of life.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-239

Poster Title: Evaluation of inpatient medication use and its potential in increasing fall risk

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Purpose: Falls can result in serious injury such as fractures, broken bones, head injuries, and even death. It is particularly important to assess fall risk in the hospital setting as the patient is in a more fragile state. Fall risk is based on factors such as age, history of falls, medications, and chronic conditions. Medications may increase fall risk through side effects like dizziness. The purpose of this study is to determine which medication classes may contribute to an increased risk of fall in a patient within 24 hours of use.

Methods: This study is a descriptive, retrospective chart review of quarterly documented falls in patients admitted to inpatient unit from July 2015 to March 2016 within a small community hospital. Documented falls were reported in the following intervals: July to September 2015, October to December 2015, and January to March 2016. The AGS Updated Beers Criteria for Potentially Inappropriate Medication Use in Older Adults was used to help target medications that increase patients' fall risk. Although the AGS Beers Criteria is focused on older adults, the resource is generally still applicable to patients of all ages. Data collection included the medication name, dose, and time and frequency of administration within the 24-hour period following medication administration. Patients were admitted if they were admitted to the inpatient unit and had a documented fall after the use of a medication under the AGS Beers Criteria. Patients were excluded if they were seen in outpatient clinics, had documented falls that followed the use of medications not under the AGS Beers Criteria, or had documented falls with no medication-related cause.

Results: From July to September 2015, there were 50 medication-related falls. The medication administration frequencies showed the following: opioids 27.85%, benzodiazepines 24.05%, cardiovascular agents 17.72%, antihistamines 16.46%, antipsychotics 6.33%, and nonbenzodiazepine hypnotics 2.53%
From October to December 2015, there were 20 medication-related falls. The medication administration frequencies showed the following: opioids 26.32%, cardiovascular agents

21.05%, benzodiazepines and antihistamines 15.79%, antipsychotics 13.16%, and nonbenzodiazepine hypnotics 5.26%.
From January to March 2016, there were 22 medication-related falls. Of these falls, cardiovascular agents had the highest administration frequency of 29.03%. Benzodiazepines were 19.35%, opioids were 16.13%, antipsychotics and antihistamines were 12.90%, and antidepressants were 9.68%.
The overall results from July 2015 to March 2016 showed a total of 92 medication-related falls with the following medication administration frequencies: opioids 25%, benzodiazepines and cardiovascular agents 20.95%, antihistamines 15.54%, antipsychotics 9.46%, antidepressants 6.08%, and nonbenzodiazepine hypnotics 2.03%. Over time, there was a decreasing trend in the use of opioids and an increasing trend in the use of cardiovascular agents. With regards to the cardiovascular agents, it was noted that the falls were possibly linked to a dose increase.

Conclusion: Analysis of chart reviews from July 2015 to March 2016 showed that 2/3 of the documented falls occurred after the administration of medications from 3 main drug classes: opioids, benzodiazepines, and cardiovascular agents. These results suggest that use of opioid, benzodiazepine, or cardiovascular agents are associated with increased risk of falls. Based on this analysis, it is recommended that a medication evaluation component, focusing on the aforementioned drug classes, be incorporated into the current fall risk scoring tool to help reduce the patients' fall risk.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5b-240

Poster Title: Real life medication adherence with newer hepatitis C treatments and their effect on sustained virologic response (SVR)

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Purpose: It is known that older hepatitis C virus (HCV) regimens including interferon and ribavirin required greater than 80% adherence in order to achieve 50-70% cure rates. Newer HCV treatments such as ledipasvir/sofosbuvir (LDV/SOF) and paritaprevir/ritonavir/ombitasvir plus dasabuvir (PrOD) have shown sustained virologic response rates at 12 months after treatment cessation (SVR12) of about 95%. What is unknown is the amount of adherence needed for newer HCV therapies to achieve optimal outcomes such as SVR12. This study aims to assess real-life adherence rates to newer HCV regimens to determine its effect on patient's ability to achieve SVR12.

Methods: The institutional review board approved this observational study. Patients were identified by having either LDV/SOF or PrOD filled by the University of Maryland Medical System Pharmacy between October 2014 and September 2015. Patients were excluded if they did not have any HCV viral load results, if they did not begin and complete their therapy between the dates above and if their charts did not state their exact start and stop date of the medication. Medication refill data was provided by the pharmacy. Adherence rates were calculated based on the start and stop date of the medication states in the medical chart and the number of refills provided by the pharmacy. The primary outcome was to assess real-life adherence rates to newer HCV treatment. The secondary outcome was to assess how adherence rates effect achievement of SVR12.

Results: One hundred and two patients met the inclusion criteria with 95 having been prescribed LDV/SOF and 7 prescribed PrOD. The overall mean adherence rate was 92%, with 94% adherence for LDV/SOF and 86% for PrOD. Seventy-nine patients achieved an SVR12 with 73 in the LDV/SOF group and 6 in the PrOD group. Twenty patients in the LDV/SOF group could not be assessed for SVR12 because they did not have a viral load drawn. Twelve patients had adherence rates of less than 80%. Of those, fifty-eight percent achieved SVR12 and only 1 did not. The other 4 patients did not have a viral load drawn to assess SVR12.

Conclusion: New HCV treatments such as LDV/SOF and PrOD show SVR12 rates of 77% with real-life adherence. This study found that real-life adherence is greater than 85% with LDV/SOF and PrOD. Even in cases with low adherence of less than 80%, high rates of SVR12 are still seen. Use of the newer HCV medications requires the patient to have a viral load level drawn 12 weeks after the end of therapy, an area that data was missing. The clinical significance of these effects must be determined in larger clinical trials.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Evaluative Study

Session-Board Number: 5b-241

Poster Title: Why are specialty pharmaceuticals so special?

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Purpose: Specialty pharmacy has experienced rapid growth compared to traditional drug utilization in 2015. Despite significant growth there is no industry consensus on the definition of specialty drugs. Pharmacy benefit managers use certain characteristics in their definitions, including: special handling and administration requirements or intensive clinical monitoring, intensive patient training, limited distribution, cost, and biologics as a whole. The purpose of this study was to compare prescriptions dispensed from a closed door mail-order specialty pharmacy and traditional community pharmacy based on financial and operational characteristics.

Methods: A retrospective cross-sectional study was conducted by collecting dispensing records from a community pharmacy and closed door mail-order specialty pharmacy owned by the same academic medical center from May 1, 2016 – May 31, 2016. Variables collected included total revenue, total prescriptions dispensed, National Drug Code (NDC), day supply, therapeutic category, and dosage form. Projected margins were calculated as a percentage of revenue per prescription using various estimated gross margin percentages. Prescriptions were identified as specialty if revenue per 30-day supply met the Centers for Medicare and Medicaid Services' Specialty Tier criteria of greater than 600 dollars per 30-day supply. Prescriptions were categorized as requiring Risk Evaluation and Mitigation Strategies by their inclusion in the United States Federal Drug Administration's Approved Risk Evaluation and Mitigation Strategies (REMS) website. Statistical analysis was done in SAS Version 9.4 (Cary, NC) to determine differences by pharmacy type. Continuous variables were assessed using Student t-tests and categorical variables were assessed using Chi-Square.

Results: A total of 4,808 and 5,583 prescriptions were identified at the community and specialty pharmacies, respectively, for total revenues of 1,596,977 and 4,181,550 dollars. Mean revenues per prescription were 332 dollars (SD 1915) and 749 dollars (SD 3,277), (p-value less than 0.0001). Specialty pharmacy median revenues per prescription were approximately three fold greater, 42 vs 13 dollars. Projected margins at 10, 15, and 20 percent between the community and specialty pharmacies were 159,698 and 418,155 dollars (p-value less than 0.0001), 239,547 dollars and 627,233 dollars (p-value less than 0.0001), and 319,395 and 836,310 dollars (p-value less than 0.0001) respectively. The community pharmacy filled a greater percentage of prescriptions requiring REMS (4.8 vs 3.62 percent, p-value of 0.0035). There was no difference in proportion of dosage forms other than oral tablets or capsules between the types of pharmacy (p-value of 0.18). The specialty pharmacy had a greater number of prescriptions that met the CMS' Specialty Tier criteria of greater than 600 dollars per 30-day supply, 1026 (18 percent) vs 528 (11 percent), (p-value less than 0.0001).

Conclusion: Dispensing specialty pharmaceuticals significantly increases overall revenue, revenue per prescription and median revenue. Mean revenues and median revenues per prescription were approximately 2.25 and 3 times greater at the specialty pharmacy. Additionally, the specialty pharmacy filled only 775 more prescriptions yet its' revenue exceeded the retail pharmacy's by 2.5 million dollars. The difference in the revenue can be accounted for by the 7 percent increase in the number of prescriptions meeting the specialty by cost criteria filled by the specialty pharmacy.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 5b-242

Poster Title: Probiotic protocol utilization in an inpatient geriatrics unit

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Purpose: Clostridium difficile (C. difficile) is an infection resulting in severe diarrhea commonly associated with antibiotic use in healthcare facilities. Hospital acquired C. difficile can increase length of stay and healthcare costs. Recently, data has shown decreases in C. difficile associated diarrhea in patients using antibiotics and probiotics concomitantly. Anne Arundel Medical Center has incorporated a protocol in which pharmacists initiate probiotics in patients indicated for antibiotic use greater than 48 hours. The purpose of this study is to evaluate the use of probiotics initiated by the pharmacy probiotic protocol and investigate the continued use of probiotics at discharge.

Methods: This study is a retrospective observational study of patients that were given lactobacillus acidophilus probiotics (administered three times a day) during an inpatient stay at Anne Arundel Medical Center as a part of the Pharmacy Protocol: Probiotics Ordering in Select Adult Patients Receiving Antibiotics. This pharmacy protocol facilitates provision of probiotics to certain adult inpatients on systemic antibiotics in order to reduce the incidence of C. difficile. To evaluate the use of the probiotic protocol, medication charge data during August 1st to 31st, 2016 was utilized to identify patients exposed to probiotics, and the electronic health record was examined for patient demographics and outcomes with the use of probiotics. Specifically, the probiotic use in patients from the geriatrics unit was analyzed and descriptive statistics were employed.

Results: There were 7,500 doses of probiotics administered to 874 patients during the month of August 2016. Ninety-two patients were admitted to the acute care/elderly unit. Only 15 (16 percent) patients had probiotics initiated by the pharmacy protocol. The average age was 78 years, 50 percent male, and 1 (0.067 percent) patient had a previous C. difficile infection. Among the 15 patients, 7 (47 percent) patients were discharged on antibiotics but 4 (27

percent) were also discharged on probiotics, both with the set end dates. Two patients (0.13 percent) experienced diarrhea after antibiotic initiation and all the patients tested for C. difficile were negative. The remaining 73 patients received probiotics that were initiated by the prescriber or automatically initiated via infection order sets which included both antibiotics and probiotics.

Conclusion: This preliminary study shows the importance of probiotic use in patients receiving antibiotics. Of the patients in this data set, all were negative for the development of C. difficile. In addition, 27 percent of patients were discharged on probiotics however all were also discharged on antibiotics. It is unknown whether the probiotics were stopped once the antibiotic treatment was completed. Since probiotics are available over the counter, discharge on probiotics unnecessarily can result in improper administration and avoidable costs. Further studies are needed to evaluate the proper use and discontinuation of probiotics after discharge and its effects on medication costs.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-243

Poster Title: Bioanalytical approaches to determine the variability in physiochemical properties and stability between brand and generic colloidal iron products

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Purpose: Recent studies have questioned the equivalency between brand and generic iron colloidal complexes. Iron nanoparticles are known to have a large variation in particle size that may attribute to the assembly of the ferric iron core and the type of carbohydrate used in the core. If the physiochemical properties of Nulecit differ from those of Ferrlecit, there will be cellular consequences such as iron uptake and iron related toxicity. A more detailed investigation is warranted to ensure the comparability of the physiochemical properties between all generic and brand iron products.

Methods: The assembled research team will collect marketed brand and generic sodium ferric gluconate products and compare them in terms of potency, impurity, and other drug product quality attributes. Molecular weight and stability of each drug will be determined using high performance gel permeation chromatography method (HP-GPC), dynamic light scattering (DLS), colloid osmomerty, inductive coupled ray powder diffraction (XPD) and atomic force microscopy (AFM). The core components of iron will be characterized using various methods such as inductively coupled plasma mass spectrometry (ICP-MS) and UV-visible spectroscopy. ICP-MS high sensitivity will enable one to measure the periodic table of transition metal ions (including iron) at ng/l concentrations. Secondly, the team will develop bio-analytical methods to determine plasma iron components such as labile iron, non-transferrin bound iron (NTBI), total iron (TI) and transferring bound iron (TBI).

Results: The primary outcome tested was the assessment of non-inferiority of the generic colloid product against the reference colloid product with respect to non-transferrin bound iron (NTBI). NTBI can be measured using various methods including a chelation-ultrafiltration-

detection approach that uses nitrilotriacetate to chelate with iron. The chelated NTBI can then be detected by colorimetry or high performance liquid chromatography. NTBI can also be measured using bleomycin that forms a complex with DNA and a redox active ferrous iron. The secondary outcomes include the comparison of generic colloid product against the reference colloid product with respect to TI and TBI by employing novel analysis methods. TBI requires a separation and exclusion from free iron and drug-derived iron. It can then be separated through a Spectrophotometric analysis and later quantified through colorimetric procedures.

Conclusion: Many novel methods have been proven reproducible in comparing the plasma iron components such as labile iron, non-transferrin bound iron, total iron and transferring bound iron. Further research is necessary to develop more robust methods to successfully compare colloidal complexes and other nanoparticles.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5b-244

Poster Title: Patient characteristics and post epinephrine management of anaphylaxis when treating allergic reactions according to a statewide school based emergency treatment protocol

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Purpose: Anaphylaxis is a life-threatening allergic reaction requiring immediate recognition and management. Although rare, anaphylactic fatalities worldwide have been associated with medical care gaps. Further emergency medical care is required to monitor for delayed reactions and side effects following epinephrine administration. In 2012, Maryland passed legislation mandating that schools stock epinephrine and follow an anaphylaxis treatment protocol that includes transport to the Emergency Department (ED) post epinephrine administration. Our objective was to determine differences between patients transported to EDs following epinephrine administration versus those who were not transported per the protocol.

Methods: Data were obtained from reports of epinephrine administration submitted from schools throughout Maryland over four academic years (2012 - 2016). Data included demographics, patient and reaction characteristics and transportation to a medical facility. Patient and reaction data included presenting symptoms, outcomes, history of allergies, time of onset and treatment. Form data was entered into an Access database. Highly skewed continuous data were reported as mean plus/minus interquartile range (IQR) and analyzed using Wilcoxon rank-sum test. Normally distributed continuous data were analyzed using Student's t-test. Categorical data were analyzed using Chi-Square or Fisher's exact test. Significance was set at p less than 0.05.

Results: Of 799 epinephrine administration reports, 759 (95 percent) were for students. Median sample age was 12 (plus/minus 6) years. Patients experienced median 4 (plus/minus 3) symptoms of anaphylaxis, including respiratory, gastrointestinal, cardiovascular, skin or other anaphylaxis symptoms (range: 0-19).
ED transport post epinephrine was not completed per protocol in 74 (9.3 percent) patients. The most common reasons included parent refusal (78.6 percent) and EMS recommendation after assessment post-treatment (16.1 percent). Transported patients had more symptoms (p equals 0.0016), but did not differ in age (p equals 0.1091), gender (p equals 0.4569), race (p equals 0.6054) or Latino ethnicity (p equals 0.1304). Physiologic characteristics of diastolic blood pressure (p equals 0.8806), systolic blood pressure (p equals 0.9694), respiration (p equals 0.1091) or pulse (p equals 0.5256), did not differ by group.
No between-group differences in documented allergy history (p equals 0.1292), having healthcare provider emergency action plan (p equals 0.8085), asthma history (p equals 0.9709), anaphylaxis history (p equals 0.4266) or prior epinephrine use (p equals 0.4273) were detected. Of patients transported, 36.7 percent had an epinephrine order versus 63.3 percent with no healthcare provider epinephrine order (p equals 0.0274).

Conclusion: There were no statistically significant differences in demographics between patients transported to EDs post epinephrine administration versus those not transported. Although physiologic characteristics did not differ between groups, the number of patient symptoms was statistically significant. Caregiver and healthcare provider education regarding post epinephrine treatment is an important component of anaphylaxis management. A limitation of this study is that our analysis only uses information that is available on the submitted anaphylaxis report form. Additional analysis is required to confirm patients receiving epinephrine had true anaphylactic reactions.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 5b-245

Poster Title: Effects of glucagon-like peptide-1 receptor agonists in patients with type 2 diabetes mellitus at the Veterans Affairs Maryland Health Care System

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Purpose: Glucagon-like peptide-1 (GLP-1) receptor agonists are a newer class of medications that are increasingly being utilized for diabetes management, as they are associated with weight loss and low hypoglycemia risk. At the Veterans Affairs Maryland Health Care System (VAMHCS), they are classified as non-formulary, with exenatide being a preferred non-formulary agent within the class. Literature evaluating the efficacy of GLP-1 receptor agonists within the Veteran population is limited. The purpose of this study is to describe the effects of exenatide on diabetes control, weight, and blood pressure in patients with Type 2 Diabetes Mellitus at the VAMHCS.

Methods: This descriptive, retrospective study has been approved by the University of Maryland Institutional Review Board and the VAMHCS Research and Development Committee. Data was collected from electronic medical records for patients who had a diagnosis of type 2 diabetes mellitus and an index prescription for exenatide between April 1, 2005 and September 1, 2015. Patients were excluded from the study if they had a diagnosis of type 1 diabetes, initiated insulin therapy or other diabetes medications during the study period, initiated or discontinued use of medications that cause clinically significant changes in weight and/or glycemic control during the study period, discontinued exenatide during the study period, or had a history of bariatric surgery. The primary outcome measure was the change in A1c from baseline after 3 and 6 months of treatment. Secondary outcomes included changes in weight, body mass index (BMI), and blood pressure from baseline after 3 and 6 months of treatment. Descriptive statistics, t-test, and chi-square analysis were performed in Microsoft Excel 2010 to analyze collected data.

Results: The medical record review identified 41 patients meeting criteria for selection. The mean change in A1c from baseline at 3 and 6 months was -0.82±1.18% (p= < 0.05) and -0.52±1.67% (p>0.05), respectively. The mean change in weight from baseline at 3 and 6 months was -6.98±7.69 lbs (p= < 0.05) and -7.02±10.74 lbs (p= < 0.05), respectively. The mean change in BMI from baseline at 3 and 6 months was -1.01±1.25 (p= < 0.05) and -1.03±1.51 (p= < 0.05), respectively. Finally, at 3 and 6 months from baseline, the mean change in systolic blood pressure was 1±15 mmHg (p>0.05) and 2±18 mmHg (p>0.05), respectively. On the other hand, at 3 and 6 months from baseline, the mean change in diastolic blood pressure was 4±10 mmHg (p= < 0.05) and 3±9 mmHg (p>0.05), respectively.

Conclusion: Use of exenatide in patients at the VAMHCS resulted in statistically significant decreases in A1c at 3 months, weight at 3 and 6 months, and BMI at 3 and 6 months. As there was no statistically significant change in glycemic control observed at 6 months, this patient population may benefit from continued interventions to improve adherence and optimization of their diabetes regimen after initiation of exenatide.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-246

Poster Title: Driving practice changes by utilizing quantitative analysis of available Health-System pharmacy data

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Purpose: The explosion in the availability of "big data" has created a unique opportunity for the administrative pharmacist. Pharmacy data can be methodologically gathered and analyzed to drive administrative practice decisions, which could improve outcomes or reduce cost. Two specific use-cases where acquisition, physician ordering, compounding, and dispensing electronic medical record data are presented to show how data can be used to elucidate problems and provide a solution.

Methods: Using Microsoft Excel and the "R" programming language, several sources of data were analyzed, and visualized, including de-identified electronic health records (EHR) from Holy Cross Hospital, a 443 bed hospital. A medication "dashboard" was built to reproducibly visualize spending trends and identify cost-saving targets. Based on the results, intravenous immunoglobulin (IVIG) and epoetin were identified as drugs of interest and were further investigated using these sources of raw data, including Dose-Edge, Quality Compass, Clarity, and Cerner. Potential cost savings by switching from an actual body weight (ABW) to ideal body weight (IBW) dosing approach for IVIG were evaluated. Utilizing dispensing data and the National Health and Nutrition Examination Survey (NHANES) demographic dataset, artificial patients and administration intervals were generated which reflect settings similar to our hospital. Cost savings over time were simulated using Monte-Carlo methods. For both dosing regimens, 95, 50 and 5 percent utilization intervals were generated non-parametrically and compared. Several sources of data were used to identify the compounding, dispensing, and administration trends of epoetin in patients and in adjunct outpatient settings. Trends amongst prescribers, wards, and patient populations were analyzed to find potential targeted opportunities, and potentials for savings.

Results: Our dashboard identified two drugs, epoetin and IVIG, to have the largest potential for cost savings using criteria of total expenditure and proportional increase from the prior year. Using EHR data, there were no trends suggesting changes in prescribing habits in inpatient due to relatively low utilization in this sector, but suggested increase in use in adjunct facilities. The same analysis provided a list of providers who prescribed the most, allowing for a targeted audit and chart review. Dosing protocol change from ABW to IBW resulted in a reduction in utilization of IVIG. Based on the analysis, the multi-dose epoetin approach significantly reduced cost as compared to individualized vial dosing.

Conclusion: By identifying the strongest contributors to the pharmacy budget, and being backed by robust, quantitative analysis, practice changes were proposed and implemented to minimize the overall cost of care for the patients that require these agents, while maintaining the delivery of quality care. Such strategies included protocol changes to reflect IBW dosing for IVIG and pharmacy to dose epoetin from multi-dose vials.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Descriptive Report

Session-Board Number: 5b-247

Poster Title: Evaluation of medication usage after revisions to non-formulary medication policies

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Purpose: Formulary management is one of the cornerstones in the safe, efficacious, and cost-efficient usage of drug therapies. The primary purpose of this study was to determine how major revisions to an academic medical center's policies on the usage of non-formulary therapies affected medication use through the analysis of purchasing data. The revisions included changes to non-formulary approval, modification to non-formulary inventory management, and overall reorganization of the formulary. The secondary purpose was to develop workflow and tools to quantify and monitor future non-formulary drug spend.

Methods: The hospital policy revisions that impacted non-formulary medications occurred in the first and second quarter of 2016. Monthly purchase invoices were collected from all satellite pharmacies at the hospital and compiled into a database ranging back to the first quarter of 2015. This range was to allow sufficient run-in time to establish baseline drug spend trends prior to changes in policy. This purchasing data was run through an automated computer script against a formulary index to classify each medication purchase as formulary, formulary with restrictions, and non-formulary. Descriptive analysis was completed on this data set using business intelligence analytic tools to generate non-formulary purchasing trends.

Results: Since the implementation of the revisions to the non-formulary medication policy, the data shows a significant decrease in the purchase of non-formulary items throughout all divisions of the hospital. In addition, subgroup analysis of high cost medications such as biologics, chemotherapy, antivirals, and single-source generics show decreases in their purchase as usage restrictions were placed on individual medications in these drug classes or

when the medications were classified as non-formulary. Results from the data analysis correlate well temporally with the changes and implementation of changes to hospital policy. Overall the data does well to highlight the importance of proper formulary management by demonstrating that while formulary medication purchases make up the bulk of the quantity amount purchased, non-formulary medication purchases greatly eclipse formulary purchases in dollar cost on a monthly basis.

Conclusion: Revisions made to hospital non-formulary medication policies showed significant impact in decreasing non-formulary medication purchases after implementation. As a result, the data establishes the importance of formulary management in controlling drug expense. The tools and processes used to complete data analysis can be employed to monitor future drug utilization and to identify medications in the formulary that require management. Since medication purchasing data is a surrogate for medication usage, medication administration data generated from computerized order entry systems should be analyzed as follow-up to validate these results.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 5b-248

Poster Title: Assessment of a statistics review for third year pharmacy students

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Purpose: The purpose was to evaluate the improvement in comprehension and interpretation of clinical statistics from the beginning of the third year of pharmacy school to the end of the year after exposure to multiple statistics reviews. Our hope was to provide third year pharmacy students with practice interpreting different aspects of statistical analysis to improve their ability to evaluate the statistical components of medical research.

Methods: To measure the outcomes of this study, student-led journal club sessions were held throughout the school year. At least once a month, a statistics session was held concurrently with the journal club session to review key statistics information from the journal articles. A 14-question, multiple-choice, pre-test examining students' knowledge of statistics was given at the first journal club session and then, a post-test with the same questions was given at the last session. The average score of correctly answered questions was calculated for each test. Participation in the tests was voluntary and topics tested included confidence intervals, hazard ratios, absolute risk reduction, relative risk reduction, number needed to treat, number needed to harm, internal/external validity, various trial designs (case crossover, cohort, randomized control trials, etc.), composite endpoints, surrogate endpoints, clinical vs. statistical significance, and non-inferiority vs superiority trials. The study population was made up of South Dakota State University third-year pharmacy students during the 2015-2016 academic year. The primary endpoint was the difference in average scores between the pre-test and post-test in the total population. A secondary endpoints included the difference in average test scores among a population subset of students who participated in both the pre-test and post-test (determined by matching student identification numbers).

Results: During the fall semester, 30 third year professional students completed the pre-test assessment in the fall semester compared with 35 students that completed the post-test in the spring semester. The average percent correct increased by 11.4% from the pre-test to the post-test from an average of 51.4% on the pre-test to an average of 62.7% on the post-test. A total of 12 students were identified as completing both the pre-test in the fall semester and the post-test in the spring semester. The average percent correct for this subset of students also increased by 11.4% from 56.5% on the pre-test to 67.9% on the post-test. Out of the 12 students participating in both assessments, 58.3% (n=7) of students received a higher score for the post-test, 33.3% (n=4) of students received the same score on the pre-test and post-test, and 8% (n=1) of students received a higher score on the pre-test.

Conclusion: There was a numerical increase in the average percent correct on the statistics assessment from the beginning of the third year of the professional program to the end of the year. This increase suggests that third year students in the professional program benefit from statistics reviews throughout the year. Further analysis is required to determine more effective methods to increase student understanding of the statistical components of medical research.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 5b-249

Poster Title: Impact of metformin on ROS and inflammatory signaling in breast cancer

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Purpose: The first line anti-diabetic drug metformin has been under intense investigation recently for its ability to prevent or treat numerous neoplastic diseases including breast cancer. Various mechanisms have been postulated for metformin's effect in tumorigenesis, including induction of apoptosis. Here, we propose that at low concentrations, metformin fails to induce apoptosis or proliferative arrest, but instead functions by repressing the production of reactive oxygen species and dampening inflammatory signaling in breast cancer/ breast cancer microenvironment.

Methods: The impact of metformin on cell viability was ascertained by DNA content analysis, fluorescent vital dye exclusion, and dye-dilution proliferation assays. In order to determine the effects of metformin at sub-apoptotic concentrations, migration and invasion assays were performed using BCFA (Boyden chamber-Flow Cytometry Assay). NF kappa B activity was determined using a MDA-MB-231-derived, RELA responsive luciferase reporter cell line. The expression of the inflammatory, NF Kappa B-target proteins COX2 (cyclooxygenase 2) and ICAM (intercellular adhesion molecule 1) were determined by immunostaining and flow cytometry. Reactive oxygen, a major regulator of NF kappa B activity, was determined in the presence and absence of metformin using CELLROX assay, followed by flow cytometry.

Results: In the milliMolar (mM) concentration range, metformin caused decreased cell viability and G2 cell cycle arrest. At 100 microMolar (µM) however, metformin failed to induce apoptosis. However, metformin exposure was associated with a greater that 60% reduction in migration, and approximately 40% invasiveness in breast cancer cells. Metformin's ability to disrupt invasions and migration was correlated with a suppression of induced and constitutive NF kappa B transcriptional activity. Additionally we observed 60% and 30% decrease in the

expression of the NF-Kappa B target genes ICAM and COX2, supporting the contention that metformin inhibited NF-kappa B transcriptional activity. Reactive oxygen, a primary regulator of NF-kappa B activity, was also suppressed by metformin, suggesting that metformin reduced NF-kappa B transactivation by repressing endogenous production of reactive oxygen species.

Conclusion: At sub-apoptotic concentrations, metformin inhibits ROS and NF Kappa B signaling in breast cancer cells, resulting in decreased migration and invasiveness. These findings suggest that the anti-neoplastic effects of metformin in the breast may be a result of its ability to prevent invasiveness and metastasis, as opposed to the induction apoptosis which occurs at arguably supra-pharmacologic concentrations.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5b-250

Poster Title: Pilot study to assess the dose accuracy of compounded electrolyte intravenous (IV) admixture solutions

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Purpose: IV admixtures are commonly compounded by pharmacists in various healthcare settings. In recent years, there have been serious concerns about the quality of compounded sterile preparations (CSPs), ranging from sterility to dose accuracy. At the authors' institution, St. John Fisher College, pharmacy students receive rigorous training on aseptic techniques to ensure the sterility of CSPs. However, they are not exposed to any analytical methods for assessing dose accuracy. The purpose of this project was to develop a sterile compounding training module with an analytical component to increase the awareness of CSPs quality assurance among pharmacy students.

Methods: Practice prescriptions were created for 79 second year pharmacy students to prepare a 1 gram calcium gluconate or magnesium sulfate IV bag in 50 mL 0.9 percent sodium chloride injection. Once the compounding activities were completed, ten bags each of calcium gluconate and magnesium sulfate were randomly selected for analysis by two fourth year pharmacy students. Due to the variability of IV bag overfill and additive volume, each bag was first cut open, and the entire content was transferred to a graduated cylinder for accurate measurement of the total volume. Three aliquots from each sample were then analyzed for electrolyte concentration using the titration methods described in the United States Pharmacopeia (USP) monographs. Ethylenediaminetetraacetic acid disodium salt (EDTA) was used as the titrant for both electrolytes. Hydroxynaphthol blue and eriochrom black T were used as the indicators for calcium gluconate and magnesium sulfate, respectively. The concentrations of the three aliquots were calculated and averaged for each bag. The final

strength (dose) of the bag was calculated by multiplying the concentration and the total bag volume.

Results: All 79 students completed the calculations and compounding activities according to the practice prescriptions. The calculations were checked by teaching assistants prior to compounding. Out of the ten randomly selected bags, the volume ranged from 65 to 67 mL for calcium gluconate bags and 56 to 59 mL for magnesium sulfate bags. The titration of the calcium gluconate bags was carried out smoothly, and the final strengths of the ten bags ranged from 0.953 to 0.988 grams, 95.3 to 98.8 percent label claim. The titration end point of magnesium sulfate was more difficult to observe than that of calcium gluconate, which resulted in more data variability. The final strengths of the ten magnesium sulfate bags ranged from 0.941 to 1.015 grams. Nevertheless, they were all within the standard acceptance range of 90 to 110 percent label claim as specified in USP 797 general chapter for CSPs.

Conclusion: A new training module on sterile compounding has been successfully developed. The module includes the calculation and preparation of calcium gluconate and magnesium sulfate IV admixtures followed by the USP titration analysis to confirm the dose accuracy. This module will be incorporated in future compounding training for second year pharmacy students at the authors' institution with an intention to increase the students' awareness on quality assurance of compounded sterile preparations.

Submission Category: Pain Management

Submission Type: Evaluative Study

Session-Board Number: 5b-251

Poster Title: Deciphering Pharmacy Students' Attitudes, Comfort Level, and Knowledge of Substance Use Disorders

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Purpose: To date, there is minimal research on pharmacy students' attitudes, comfort level, and knowledge of substance use disorders (SUD). Pharmacists play a crucial role in screening and treating SUDs as they are on the front-lines in the community. There is a shortage of addiction-related curricula in most pharmacy programs throughout the United States, and pharmacy students' comfort level and attitudes on SUD topics remain largely unknown.
Learning Objectives:
1. To understand pharmacy students' attitudes and comfort level discussing addiction.
2. To assess pharmacy students' knowledge of SUD
3. To evaluate pharmacy students' preparedness in screening, recognizing, and treating SUDs.

Methods: A 15 question survey utilizing Survey Monkey technology will be administered to 5th and 6th year pharmacy students at St. John's University School of Pharmacy. Questions will be in the following multiple choice format: 5 questions on students' comfort level with addiction, 5 questions on students' knowledge base of addiction, 5 patient cases further exploring students' knowledge of SUDs.

Results: Results will be collected in an ongoing fashion as results from the survey are acquired.

Conclusion: Pharmacy students' comfort level and attitude towards addiction-related topics is deficient. The frequency of screening for SUDs in the community is lacking. More research is needed on this topic as pharmacists can play an important role in screening and treating patients with SUDs. Instituting curricula on addiction in pharmacy programs is fundamental to producing pharmacists knowledgeable on SUD assessment and pharmacotherapy.

Submission Category: Infectious Diseases

Submission Type: Case Report

Session-Board Number: 5b-252

Poster Title: Meropenem-induced hypoglycemia: a case report

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Purpose: This case report discusses the importance of drug-induced hypoglycemia and the relevance of reporting adverse drug events. More specifically, the report will go over in detail the uncommon side effect of a commonly prescribed antibiotic: Meropenem.
A 77-year-old Caucasian male is presented to the emergency department with a gastrointestinal bleed. His past medical history includes atrial fibrillation, prostate cancer, gastroesophageal reflux disease (GERD), insomnia, thiamine/ vitamin C deficiency, recent case of aspiration pneumonia, recurrent Clostridium Difficile (c.diff) infections, respiratory failure, and cardiogenic shock. Medications prior to admission include: acetaminophen 325mg every four hours as needed for pain, albuterol sulfate 2.5mg/3ml every four hours as needed for shortness of breath, apixaban 5mg twice a day, ascorbic acid 500mg daily, atorvastatin 40mg daily, bisacodyl 10mg daily as needed for constipation, cholestryamine 4g daily, cilostazol 100mg daily, digoxin 250mcg daily, enalapril maleate 5mg daily, folic acid 1mg daily, Lactobacillus Acidophilus twice a day, metoprolol tartrate 100mg twice a day, omeprazole 20mg daily, quetiapine sulfate 25mg daily, magnesium hydroxide 500mg/5ml 30ml as needed for constipation, quetiapine sulfate 12.5 mg twice a day, thiamine 100mg daily, and trazadone 25mg daily.
There were no known drug allergies. On admission, the patient was 5’8” and weighed 68.4 kg. Vital signs at the time of admission were: oral temperature of 98.9 °F, blood pressure of 119/53 mmHg, heart rate at 57 beats/min, respiratory rate of 29 breaths/min, and oxygen saturation of 100% on two liters oxygen via nasal cannula. Physical examination revealed unresponsive mental status at bedside. The patient lab results were consistent with increased lactate levels indicative of sepsis. His white blood count was 16.9x103/µL, platelets 81x103/µL, hemoglobin 9.5g/dL, and hematocrit of 29.4%. His basic metabolic panel was sodium 139 mEq/L, potassium 2.6 mEq/L, blood urea nitrogen 41 mg/dL, serum creatinine 1.03 mg/dL, and blood glucose was 30 mg/dL. He was admitted to the intensive care unit and received IV fluids, thiamine 100mg IV,

famotidine 20mg IV, meropenem 1g, dextrose 10% in water, albuterol sulfate 0.083%, midazolam 1mg IV, dextrose 50% syringe 50ml as needed, and acetaminophen 650mg rectally. Upon administration of meropenem on day 1, the patient's blood glucose was reported to be 50 mg/dL at 8pm, two hours after the initial dose. The patient was given bolus dose of dextrose D50W, which elevated the blood glucose to 77 mg/dL at 10:45pm. On day 2, the patient was given another dose of meropenem at 2 pm, and the blood glucose dropped to 28 mg/dL. The blood sugar was checked 3 minutes later and found to be 24 mg/dL. The patient was administered D50W, which brought the blood glucose back to 96 mg/dL. The patient continued to receive his medications, including meropenem, and four hours later the blood sugar was 27 mg/dL. At this point, it was suspected that meropenem caused the hypoglycemia. The decision was made to discontinue meropenem and start ertapenem 1g IV.

It is unlikely that the hypoglycemia was caused by any other concomitant drugs or due to the patient's dietary restrictions because the adverse effect was resolved upon discontinuation of the meropenem. There are only a few reports of meropenem-induced hypoglycemia identified in the literature. However; meropenem-induced hypoglycemia appears to occur more often than reported in post-marketing clinical trials. This case study shows the importance of reporting adverse drug events. It demonstrates how conscientious health care providers can make a difference in the safety of a drug after it has been approved as well as serve to protect the public's health. Therefore, reporting adverse events in clinical practice are invaluable.

Methods:

Results:

Conclusion:

Submission Category: Infectious Diseases

Submission Type: Case Report

Session-Board Number: 5b-253

Poster Title: Dose management of dolutegravir in those who are concurrently being treated with rifapentine

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Purpose: 51 year-old-male with a history of Acquired Immunodeficiency Syndrome (AIDS) is recently diagnosed with latent tuberculosis (TB). According to the University of Liverpool guidelines, the patient's scheduled therapy with rifapentine will compromise the bioavailability of his current antiretroviral (ARV) drug regimen. The University guidelines suggest administering dolutegravir (50 milligrams) twice daily instead of once daily in efforts to maintain therapeutic drug concentrations.

An obese 51 year-old-male has a history of AIDS, hypertension and pre-diabetes. He returns to the clinic following his recent diagnosis of latent tuberculosis via Quanteferon TB-Gold Test wishing to start Directly Observed Therapy (D.O.T) with rifapentine, isoniazid, and vitamin B6. The patient's original ARV drug regimen included Triumeq (Abacavir/Dolutegravir/Lamivudine) once daily. An additional dose of dolutegravir (50 milligrams) was given to neutralize the suspected induction of enzymes - responsible for decreasing plasma levels of dolutegravir - caused by rifapentine. Along with his adjusted dolutegravir regimen, the patient began his therapy with rifapentine on 2/29/16. The patient's viral load was undetectable at the start of his therapy with rifapentine. The patient's viral load was tested every four weeks throughout the course of his therapy with rifapentine, which served as a clinical marker for the management of his AIDS infection in the wake of his newly adjusted dolutegravir dose. The patient's viral load remained undetectable with each subsequent visit. Additional monitoring parameters included a complete metabolic panel, complete blood count and chest X-ray - all of which were within normal limits at baseline and throughout the course of D.O.T.

The patient started D.O.T for TB on 2/29/16. The D.O.T regimen lasted twelve weeks. The patient received 900 milligrams of rifapentine, 900 milligrams of isoniazid, and 50 milligrams of vitamin B6 every Monday until the end of treatment on 5/16/16. The patient was provided daily doses of vitamin B6 (50 milligrams) in pill trays for the remainder of each week. His ARV drug regimen was adjusted due to potential drug interactions between rifapentine and dolutegravir. The supplementary dose of dolutegravir (50 milligrams) was added on at bedtime in efforts to compensate for the heightened metabolism - of dolutegravir - induced by rifapentine. Aside from mild episodes of joint pain and headache, the medications were well tolerated by the patient. The patient completed 12 weeks of D.O.T with no missed doses. Following the completion of D.O.T, the patient returned to taking Triumeq once daily and discontinued the bedtime dose of dolutegravir.

Treatment of both TB and Human Immunodeficiency Virus (HIV) among coinfected patients is now the standard of care. The metabolism of dolutegravir is expected to increase when coadministered with potent metabolic inducers such as rifapentine. The pharmacokinetic profiles highlight the risk of subtherapeutic levels of dolutegravir when administered with rifapentine. Subtherapeutic plasma levels may encourage the risk of virologic failure and resistance development in the management of HIV. The current literature highlights clinically significant interactions between dolutegravir and various antimycobacterials such as rifampin, rifampicin, and rifabutin; But fails to address the clinical relevance of coadministering dolutegravir with rifapentine. The University of Liverpool's suggestions stem from dolutegravir interaction studies with rifabutin and rifampicin, rather than with rifapentine. This case demonstrates the therapeutic value of an additional dose of dolutegravir (50 milligrams) when coadministering rifapentine. Our case shows that virologic maintenance of HIV/AIDS can be accomplished - without signs of toxicity - when administering an additional dose of dolutegravir. Our case study addresses an important void in the literature surrounding dose management of dolutegravir in those who are concurrently being treated with rifapentine.

Methods:

Results:

Conclusion:

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-254

Poster Title: Cost-Analysis of Pharmacologic Management of Gastroparesis-Related Symptoms

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Purpose: Gastroparesis is a syndrome characterized by delayed gastric emptying and is associated with early satiety, postprandial fullness, nausea, vomiting, bloating, and upper abdominal pain. Diabetic gastroparesis has one FDA-approved medication for its management, metoclopramide. A number of prescription and over-the-counter medications are used intermittently by patients for treatable symptoms including prokinetic agents (e.g., domperidone and erythromycin), anti-emetic agents (e.g., prochlorperazine, promethazine, ondansetron, aprepitant, dronabinol, and transdermal scopolamine), intrapyloric botulinum toxin injections, and nutritional supplements. The economic burden of gastroparesis is notable and increasing in the United States. This study quantified medications' costs used for management of gastroparesis symptoms.

Methods: Key gastroparesis-related symptoms and recommended medications (metoclopramide, domperidone erythromycin, prochlorperazine, promethazine, ondansetron, aprepitant, dronabinol, transdermal scopolamine, intrapyloric botulinum toxin, and multivitamins) used for symptom control were found in the American College of Gastroenterology's 2013 Management of Gastroparesis guidelines. Micromedex RedBook was used to determine the average wholesale price (AWP) of each drug. Healthcare Bluebook was used to find the injection fee of botulinum toxin. Package inserts were utilized to determine the daily frequency and maximum possible duration of treatment. Since there is no current symptom severity scale for gastroparesis, two hypothetical patient cases were created to provide an understanding of how patients may present with symptoms, their potential treatment courses, and the yearly medication costs associated with symptom control. When creating patient cases, a literature search was conducted to determine the prevalence of each gastroparesis-related symptom. A minimum and maximum analysis was used to determine the potential costs of treatment based on treatment failure and persistent symptoms.

Results: Since patients with gastroparesis can experience a wide range of frequencies and severities of gastroparesis-related symptoms, their medication pathways can vary. Medications often used to treat the symptoms associated with gastroparesis include prokinetic agents (e.g., metoclopramide, domperidone and erythromycin), anti-emetics (e.g., prochlorperazine, promethazine, ondansetron, aprepitant, dronabinol, and transdermal scopolamine), intrapyloric botulinum toxin, and multivitamins. A patient with mild abdominal pain, post-prandial fullness, three to four bouts of nausea per week, and one vomiting episode per week had an average a cost of $1,424.79 based on AWP. A patient with abdominal pain, post-prandial fullness, decreased appetite, weight loss, nausea after each meal, and three episodes of vomiting had a cost of $8,708.13. Depending on the medication, duration, frequency of medication use, anti-emetics can cost from $8.58 to $40,203.07 per year, prokinetics can cost $17.94 to $325.49, and intrapyloric botulinum toxin injections can cost $1.450.60 to $2,901.20. This study shows a conservative societal cost of the medication burden in patients with gastroparesis.

Conclusion: Gastroparesis is an understudied disease state with primary pharmacologic treatment options that have limited duration of use (metoclopramide and domperidone) and availability (domperidone). Additionally, depending on the patient's gastroparesis-symptoms, this disease state can result in a significant financial burden of pharmacologic treatment. After evaluating the symptomology and the frequency of these symptoms, we attempted to provide an understanding of the disease state, as well as calculate the potential medication costs. While this study highlights the potential financial burden of the medications used to treat gastroparesis symptoms, the financial effects of gastroparesis on quality of life should be further explored.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5b-255

Poster Title: Quantifying the minimum adherence threshold associated with the development of reverse transcriptase resistance mutations among HIV-infected Veterans' Affairs patients receiving antiretroviral therapy

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Purpose: Poor adherence (ADH) to antiretroviral therapy (ART) can lead to deleterious patient outcomes including development of resistance among patients infected with human immunodeficiency virus (HIV). The primary objective of this study was to quantify the minimum ADH threshold associated with development of reverse transcriptase (RT) resistance mutations among Veterans' Affairs patients receiving combination ART. The secondary objective was to determine if the minimum adherence threshold was independently associated with development of RT resistance mutations after adjustment for confounding variables.

Methods: A retrospective cohort study, utilizing repeated subject sampling strategies, was conducted among patients receiving care at the Upstate New York Veterans' Healthcare Administration (VISN-2) between 2000 and 2013. Inclusion criteria were: 1) age ≥ 18 years, 2) diagnosis of HIV infection, 3) receipt of ≥ 3 ART medications for ≥ 3 months, 4) availability of pre-treatment resistance tests, and 5) availability of post-treatment resistance tests. Patients' ART regimens must have included ≥ 2 classes. Data were obtained from patients' medical records and the following variables were collected: demographics, history of HIV infection, antiretroviral history, genotypic test results and dispensing records. Medication ADH was captured using pharmacy refill records in order to calculate medication possession ratios as a percentage. Times in which patients were in possession of < 3 ART medications were considered periods of non-adherence. The outcome of interest in this study was new mutations in RT as indicated by genotypic test results. Classification and regression tree (CART) analysis was performed to identify the minimum ADH threshold associated with development of

incident RT mutations. Logistic regression was used to determine if the minimum ADH threshold was independently associated with development of RT resistance mutations.

Results: Among the 65 included subjects, mean ± standard deviation (SD) age was 49.2 ± 8.7 years. Subjects were primarily male (98.5%). Distribution of ART regimens was: protease inhibitor-based (40.0%), followed by mixed class (≥ 3 ART classes, 30.8%), non-nucleoside reverse transcriptase inhibitor-based (26.2%) and integrase strand transfer inhibitor-based regimens (3.1%). The median (IQR) ART ADH was 70.0 (47.1 – 83.6%). Mutations in RT were observed in 25 (38.5%) patients with the most common being K103N (36.4%), M184V (27.3%), T215Y (13.6%) and L74V (9.1%). Only 1 (4.5%) patient had a 69 insertion complex. The CART-derived ADH threshold associated with development of RT mutations was 80.5%. Patients above this threshold were less likely to develop RT mutations than those below (13.6% versus 51.2%, p=0.003). Among treatment-naïve individuals, patients above the CART-derived threshold were less likely to develop RT mutations than those below (0% versus 69.2%, p=0.002). Among treatment-experienced individuals, development of RT mutations did not differ for those above/below the CART thresholds (23.1% versus 43.3%, p=0.31). In multivariate analyses, ART ADH ≥ 80% (adjusted odds ratio: 0.15, 95% confidence interval: 0.04–0.60, p=0.007) was independently associated with development of RT mutations after adjustment for regimen type and number of non-ART medications.

Conclusion: ART ADH continues to be an important predictor of clinical outcomes among patients with HIV infection. Patients with an ART ADH threshold of ≥ 80% were significantly less likely to develop RT resistance mutations than patients below this threshold. After adjustment of confounding factors, ART ADH ≥ 80% was independently protective against developing RT resistance mutations. Clinicians should advocate strong ART ADH among patients receiving combination ART. These data need to be incorporated with the ART ADH thresholds associated with virologic suppression and other important HIV outcomes.

Submission Category: Pharmacy Law/ Regulatory/ Accreditation

Submission Type: Case Report

Session-Board Number: 5b-256

Poster Title: Risk of using mislabeled and unregulated cannabidiol products for pain management.

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Purpose: On 06/21/16, the Consumer Complaint Coordinator division of the Food and Drug Administration (FDA) received a report from a consumer that had discovered an online seller of dietary supplement, www.hemplife.com, and purchased the product CannazAll. CannazAll is a hemp cannabidiol (CBD) tincture, 250 mg, liquid that is used widely for its pain relieving claims and minimal side effects. CannazAll is labeled to contain negligible levels of THC, the main psychoactive compound found in marijuana. The consumer was taking the tincture and stated that one bottle would last for approximately one month. His dose was 2-3 drops of the liquid orally, 2-3 times a day, and has been doing so for approximately 6 months. The consumer was taking this product because of his chronic back pain, to which he was taking hydrocodone. The opioid medication would blunt his pain, but also give uncomfortable adverse effects such as GI disturbances and day time drowsiness. The consumer claimed the tincture relieved his pain and made him comfortable enough to carry out his activities of daily living.
In April 2016, he had been referred to a back specialist, who prior to treating any patient, requires a complete blood and urine panel checking routine lab values and a drug screen. The consumer submitted to the doctors requirements, submitted a blood and urine sample and disclosed his prescribed opioid pain medications to the doctor.
When he met with the doctor to discuss his analysis, he was shocked to learn that his blood panel showed that he had 83 ng/ml of THC within his blood. According to the complainant the standard cut off is 50 ng/ml which, the doctor explained to him that because of this level of THC, the consumer met criteria to be classified as a “drug addict”. This now means the doctor cannot prescribe any medications to him for pain because of the possibility he will continue his “addict” habits. This was a very troublesome time for the consumer who had stopped talking the CannazAll and is unable to receive supplemental pain medication which he needs. The doctor had to refer him to a Pain Management Treatment Center for drug addicts for further treatment. The consumer stated that he does not smoke or eat marijuana, he does not use other hemp product, and he has not been around other people smoking it or using it. He was

very shocked to find out that the CannazAll would contain such high levels of THC, since according to his doctor, his levels showed that he was a very active cannabis user. The patient exclaimed that if he would have gotten into a car accident and was screened for drugs he would have been charged with driving under the influence.
CBD products are considered dietary supplements and are not regulated by the FDA. Since there is no regulation, it is uncertain what is actually going into the products that are shipped out to those who purchase them. It is legal to purchase CBD in all 50 states, as long as there is a minimal THC content. The mislabeling and no regulation of this product has uprooted an individual's life and has the potential to do the same if there is no action taken to either regulate the product to ensure its contents or removal from the market.

Methods:

Results:

Conclusion:

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-257

Poster Title: Evaluation of tamsulosin use for urolithiasis at an academic teaching hospital

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Purpose: The American Urological Association recommends the use of alpha-blockers, particularly tamsulosin, for patients with distal ureteral stones measuring 10mm or less. Ideal candidates for medical expulsive therapy include those with optimized pain control and without renal insufficiency. Patients with compromised renal function are recommended to undergo immediate surgical intervention, since awaiting spontaneous stone expulsion with tamsulosin may further worsen their kidney function. The purpose of this study was to assess the utilization of tamsulosin in treating urolithiasis at Long Island Jewish Medical Center (LIJMC).

Methods: Following Institutional Review Board approval, a retrospective chart review of patients who were prescribed tamsulosin for suspected urolithiasis in LIJMC from December 2015 to May 2016 was performed. Data was accessed through electronic medical records and patients were identified with the ICD 10 code “urolithiasis.” Inclusion criteria consisted of adult patients, aged 18 to 89 years, with an identified stone in the urinary tract who received tamsulosin. Data collection included: patient age, gender, race, BMI, the number of stones present, the size and location of the stones, estimated glomerular filtration rates (eGFR), previous history of urolithiasis, dose and frequency of tamsulosin administered, the type of imaging received, the amount of pain medications received and the need for surgical intervention. Descriptive statistics were used to analyze the data. After data collection was completed, it was de-identified in order to maintain patient confidentiality at all times.

Results: The charts of 134 patients were reviewed (69.4 percent male, mean age 51.8 years). Sixty-five patients (48.5 percent) had a history of urolithiasis in the past, whereas 69 patients (51.5 percent) were newly diagnosed with urinary tract stones. The mean stone size and number of stones was 6.2mm and 1.6, respectively. The mean eGFR was 73.6mL/min/1.73 m2. The majority of patients had stones localized to the ureter (77.6 percent) and most had unilateral stones (74.6 percent). Eighteen patients (13.4 percent) were offered tamsulosin for stones measuring greater than 10mm. Additionally, 17 patients (12.7 percent) were offered tamsulosin for stones located in the kidney and bladder, without evidence of ureteral stones. There were 45 patients (33.6 percent) identified with an eGFR of less than 60.0ml/min/1.73 m2 who had received tamsulosin during their acute episode. The mean number of pain medications administered was 3.9. Thirty-five patients (26.2 percent) were admitted for surgical intervention, while 108 patients (80.6 percent) were discharged with a prescription for tamsulosin for a mean duration of 16.1 days.

Conclusion: Despite the current American Urological Association guidelines, a subset of patients was offered tamsulosin for stones measuring greater than 10mm in size. A small subset of patients was offered tamsulosin for non-ureteral stones. Finally, we identified a substantial amount of patients with renal insufficiency that was prescribed tamsulosin for urolithiasis. We recommend stronger adherence to current guidelines and a more established protocol for tamsulosin use at our medical center.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5b-258

Poster Title: Post-hoc evaluation of drug-allergy alert reduction strategies and prescriber override rate through of suppression of inactive ingredient match: One year later

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Purpose: Clinical decision support systems (CDSS) with interruptive drug-allergy alerts has become an integral part of most healthcare systems utilizing electronic medical records (EMR). While CDSS are thought to be helpful to prescribers, clinical data shows that override rates of drug-allergy alerts have been steadily increasing overtime. There are currently no novel reduction strategies of drug-allergy alerts. Initial data-mining at our site, identified a significant amount of drug-allergy alerts triggered due to inactive ingredients. The purpose of this project was to evaluate prescriber override rates one-year after the suppression of drug-allergy alerts identified secondary to inactive ingredients.

Methods: Drug allergy alert data was extracted from a report encompassing all medication order via the EMR at affiliated inpatient and ambulatory practice settings within the University of Rochester Medical Center (URMC). Allergy alerts consisted of three severities: cross-sensitive class match, drug class match, and ingredient match. For the purposes of this review drug ingredient allergens were classified as active or inactive ingredient via the FDA ingredient database. Inactive ingredients characterized as dye based or non-dye based ingredient. All data were filtered by warning showed to user, warning status, severity of alert, drug-allergy matching reason, and number of alerts. Initial data was collected from June 2015 through July 2015 to serve as a benchmark to quantify prescriber override patterns and percentage of allergy alerts due to the type of drug ingredient match (active or inactive). Alert reduction strategies were implemented through custom suppression of inactive drug ingredients within Medi-span drug database of all drug allergen. Inactive ingredients triggering drug-allergy alerts were identified through initial data collection process. Reduction strategies were implemented

gradually from August 2015 until June 2016. Medication order alerts and prescriber override patterns from URMC were collected one year after initial baseline data from June through July 2016 to validate alert reduction strategies.

Results: Alert sample data before and after intervention yielded a total of 95,853 alerts and 94,053 alerts. Initial data samples prior to intervention indicated inactive ingredients contributed to 20.8 percent of all drug allergy alerts, of which dyes contributed 12.9 percent. Data sampled one year after the implementation of the intervention showed that inactive ingredients contributed to 4.5 percent of all drug-allergy alert and dyes contributed 1.6 percent. Muting inactive ingredients as a possible drug-allergen match contributed to a 16 percent reduction in related alerts. Initial data analysis of allergy severity revealed that drug-allergy alert due to drug class matches had highest override rate of 80.8 percent followed by cross-sensitive class matches and ingredient matches with override rate of 76.7 percent and 76.4 percent. Post-deployment, drug-class matches had the highest override rate of 82.3 percent, followed by cross-sensitive class match and ingredient match with override rate of 76.2 percent and 67.8 percent. Override rates of drug-allergy severity did not achieve statistical significance with the exception of the ingredient match, which saw an 8.9 percent reduction in override rate. Sub-analysis revealed inactive ingredients contributed to 20.8 percent of all ingredient matches initially and 2.2 percent after the reduction strategy was implemented.

Conclusion: Implementation of drug-allergy suppression intervention resulted in significantly less total number of overall allergy alerts being displayed to ordering providers during the study period. This suppression also provided provider with more meaningful drug-allergy alert. Post-hoc analyses one year of implementation revealed the benefits of alert reduction strategies and provided further insight into provider override patterns.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5b-259

Poster Title: Continuation of outpatient medications upon admission to a general medicine unit at a community teaching hospital

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Purpose: Completing accurate and thorough medication reconciliations, in a timely manner, is crucial to providing high-quality patient care in the inpatient setting. When a complete list of outpatient medications is not available upon admission to the hospital, this information gap leaves patients at risk for multiple medication-related errors. The purpose of this evaluation was to determine the average percentage of patients' outpatient medications that are restarted/continued within two business days of being admitted to a general medicine unit at Rochester General Hospital (RGH). RGH is a 531-bed, community hospital with a general medicine residency program.

Methods: The Institutional Review Board at RGH approved this prospective, observational review. One hundred unique, adult patients, admitted to the same general medicine unit at RGH between June 1, 2016 and September 1, 2016, were randomly selected based on a convenience-sample model. Patients must have had a medication-reconciliation completed within two business days of being admitted. Patients who were transferred to the unit from an intensive care unit or step-down unit were excluded. Investigators used a random number generator to identify which patient's data would be collected each day. All data was collected from the electronic medical record, so no direct patient contact occurred. Data collected included demographic information, admission related data, the type of health care professional that completed the medication reconciliation, the time between admission and the completion of the medication reconciliation, specific medications each patient was taking as an outpatient, and specific medications each patient was taking within two days of admission. Data was logged into a secured spreadsheet. The primary outcome was the average percentage of patients' outpatient medications that were restarted within two business days of being admitted. Secondary outcomes were to observe whether or not the primary outcome was impacted by

factors such as patient population, type of health care professional completing the medication reconciliation, or admission via a specific interdisciplinary admission service in the emergency department.

Results: The median age of included patients was 69 years; 58 percent were male. The primary spoken language was English for 95 percent of patients. The average percentage of patients' outpatient medications that were restarted/continued within two business days of being admitted was 60 percent. The average number of outpatient medications was 10.9 and average time to complete medication reconciliation was 7.2 hours. The highest average percentage of restarted medications, 70 percent, was seen in patients who were admitted via a specific admission team; these patients had medication reconciliation completed by a pharmacist. Interestingly, patients with fewer comorbidities and fewer than five outpatient medications experienced the lowest average percentage of continued medications (55 percent and 33 percent, respectively), while patients with greater than five comorbidities and at least ten outpatient medications had relatively higher average percentages of continued medications (67 percent and 65 percent, respectively).

Conclusion: Overall, the average percentage of medications continued in this observational evaluation seems low at 60 percent. Trends seen suggest that patients who are admitted via interdisciplinary admission teams and have medication reconciliation completed by a pharmacist, experience the highest percentage of continued medications. It is unclear why patients with minimal comorbidities, who are taking fewer medications as an outpatient, experienced lower average percentages. Results of this evaluation warrant larger, more in-depth study to determine how the medication-reconciliation process during hospital admission can be further improved.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Descriptive Report

Session-Board Number: 5b-260

Poster Title: Evaluating Variation in Pharmacy Student Learning Styles Using H-PILS

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Purpose: To determine student preferred learning style utilizing the Health Professional Inventory of Learning Scale (HPILS). The research will hopefully identify learning style preferences that can be used to create learning environments to enhance student learning.

Methods: An electronic survey was emailed to all ULM pharmacy students using their school email addresses. Participation was strictly voluntary and no additional incentives were given for completing the survey. This research study was approved by the institutional review board at ULM. The Health Professionals' Inventory of Learning Styles (H-PILS) was used to allow students to think about a few situations where they had to learn something new to solve a problem. The situations include but not limited to: while they were taking course at school, learning to use new software, or figuring out how to assemble a barbecue. The survey contained 17 questions with 4 answer choices – A, B, C, or D (A=Accommodator, B=Assimilator, C=Converger, D=Diverger) which characterizes the students preferred learning style. The students were given approximately two months to anonymously complete the survey and submit their responses. The data was collected from the completed survey, compiled, and analyzed.

Results: A total of 67% of students from the University of Louisiana at Monroe School of Pharmacy completed the survey. Analyzing the data for dominant and secondary learning styles revealed a dominant style of assimilator and secondary learning style of converger. The cumulative results indicate that 67% of students dominant method of learning is assimilator; they prefer working by themselves, at their own pace and time, or with small groups of like-minded people. The secondary learning style was Converger, which indicates that 43% of

students are focused, practical, and to the point. These 112 students usually find themselves in a leadership role and enjoy the challenges.

Conclusion: These results indicate that although students have a variety of learning styles, there may be a "majority" preferred learning style that is prevalent among pharmacy students i.e. Assimilator. This may be due to the selection process for pharmacy school or possibly due to generational differences in learning. This information may provide opportunities to faculty members to best enhance their learning activities to appeal to these learning styles.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Descriptive Report

Session-Board Number: 5b-261

Poster Title: Impact and feasibility of prospective medication review in the emergency department

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Purpose: Clinicians in the Emergency Department (ED) often find themselves working in a crowded, fast-paced and stressful environment that is typically defined by high patient volume, complex patient acuity, and staff shortages. These factors have been attributed to the cause of frequent medication errors in EDs. Prospective medication review (PMR) allows a pharmacist to capture medication errors prior to reaching the patient. However, the necessity and practicality of PMR is constantly questioned due to concerns of delays to patient care and increased length of stay. The purpose of this study was to evaluate the feasibility of PMR in the ED.

Methods: This was a retrospective study designed to evaluate the feasibility and impact of prospective medication review in the ED. Electronic medical records (EMR) of patients who presented to the ED at any time from September 2014 to September 2015 were reviewed. Adult and pediatric non-admitted ED patients who were prescribed medication orders by ED clinicians were included in the study. All medication orders that were evaluated had to be dispensed from an automated dispensing cabinets (ADC) located within the ED.
The primary outcome was the time interval from medication order entry by ED clinician to order verification by the pharmacist. The secondary outcomes included: time interval from order verification to dispense of medication from an ADC, time interval from dispense of medication from an ADC to time of administration as documented in the EMR, the total time interval for the entire medication use process, the number of interventions conducted by the pharmacist that were accepted, and cost-avoidance accrued with the accepted interventions.

Results: A total of 834 medication orders were included for evaluation. The median time for order verification, order verification to dispense, and dispense to administration were 3 mins (interquartile range [IQR]= 1-7 mins), 20 mins [IQR= 7-45 mins], and 10 mins [IQR= 6-16 mins]. The median time interval for order verification to dispense was longer during the overnight pharmacy shift (median=5 mins, IQR=2-9 mins) compared to the day and evening shifts (median=3 mins, IQR=1-6mins) A total of 563 interventions were recommended by the pharmacists and accepted by ED clinicians. These interventions equated to $47,585 worth of cost-avoidance.

Conclusion: Our data suggested that PMR is a feasible process which positioned pharmacists to make positive impacts on patient safety and therapeutic efficacy without causing delays to patient care. We found that the time intervals from medication dispense after verification of order and from medication dispense to administration composed of the majority of total time needed to complete the medication use process.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5b-262

Poster Title: Significance of new metformin renal dosing recommendations: a retrospective study comparing previous and updated guidelines

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Purpose: Metformin, a first-line antidiabetic agent, requires monitoring to avoid toxicity in patients with impaired renal function. Traditionally, serum creatinine (SCr) was used for eligibility; however, Scr is an imprecise measure when used alone. These criteria have prevented many otherwise eligible patients from receiving metformin. The U.S. Food and Drug Administration released new recommendations using estimated glomerular filtration rate (eGFR), citing that data indicate metformin has been safely used in patients with mild-moderate renal impairment and practitioners often use it despite SCr criteria. This study was conducted to determine whether a clinical difference exists in metformin eligibility using the different methods.

Methods: The institutional review board approved this retrospective chart review. Adult patients aged 18-89 were eligible for this study. Patients were included if an active order for metformin was entered while admitted at Long Island Jewish Medical Center (LIJMC) from April 8th to August 12th 2016. Patient information was de-identified prior to exporting to a Microsoft Excel spreadsheet. A data collection sheet was created and collected the following: age, sex, race, and SCr as well as eGFR as calculated by the hospital laboratory department using the Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) equation. Patients were excluded if any one of the four parameters were not reported. The patient parameters were used to calculate eGFR for each patient via the Modification of Diet in Renal Disease-4 (MDRD-4) equation. Patients with a SCr of at least 1.5 mg/dL (males) or 1.4 mg/dL (females) or an eGFR of less than 30 mL/min/1.73m2 (calculated using both CKD-EPI and MDRD-4 equations) were considered contraindications for metformin therapy. The primary outcome of the study was

difference between number of patients contraindicated based on SCr criteria and eGFR criteria as calculated by MDRD-4. In addition, discrepancies between outcomes with MDRD-4 and reported CKD-EPI will be explored.

Results: Of 261 patients screened, 250 patients met inclusion criteria. Eleven were excluded because one or more parameters were not reported. Sixty percent were female, 30 percent were African American and the mean age was 60 years. The mean SCr and eGFR, as calculated using both MDRD-4 and CKD-EPI equations, were 0.90 mg/dL, 85 mL/min/1.73m2 and 86 mL/min/1.73m2, respectively. Metformin use was contraindicated in 11/250 (4.4 percent) of patients using SCr criteria compared to 1/250 0.4 percent patients using eGFR recommendations. No differences were detected between eGFR reported using CKD-EPI and MDRD-4. Seven and eight patients had reported eGFR between 30 and 45 mL/min/1.73m2, as reported using the CKD-EPI and MDRD-4 equations, respectively. Of these patients in the reported eGFR range, 85.7 percent and 87.5 percent patients were contraindicated based on SCr cutoffs but were eligible to continue with close monitoring based on eGFR recommendations calculated using CKD-EPI and MDRD-4, respectively.

Conclusion: The use of eGFR criteria for metformin eligibility allowed more patients to continue therapy with metformin compared to using SCr alone as a marker for renal function. However, limitations such as including patients with an active sickness may have reflected an acute reduction in renal function. Additional long-term studies with larger study populations are required to determine the true difference between renal function estimating methods with respect to increased eligibility and the incidence of lactic acidosis.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Evaluative Study

Session-Board Number: 5b-263

Poster Title: The use of sub-dissociative dose ketamine (SDDK) for the management of sickle cell crisis: a case series

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Purpose: Sickle cell crises or vaso-occlusive crises (VOC) are the most common and urgent complication of sickle cell disease, as well as the primary reason for emergency room visitations. Opioids had been traditionally recommended for the management of acute pain. However, there are growing concerns with the abuse and misuse of opioids. Ketamine has been used for acute pain, with limited literature suggesting its use for VOC. The purpose of this study was to explore whether the utilization of sub-dissociative dose ketamine (SDDK) as an adjunct to standard opioid therapy would result in satisfactory pain control while decreasing subsequent opioid consumption.

Methods: A 5 month retrospective chart review was conducted in a 350-bed urban community teaching hospital. Adult sickle cell patients that presented to the ED with acute pain secondary to vaso-occlusive crisis (VOC) who received intravenous sub-dissociative ketamine (SDDK) as identified by the pharmacy record were included. Exclusions included any incomplete documentation of data, and past medical history of malignancy or recreational drug usage. The data was reviewed from the electronic medical record (EMR) and extracted onto a standardized collection form. Pain control was measured using the Numerical Rating Scale (NRS), subsequent opioid consumption was measured by repeat doses of opioids and adverse events were identified. Data were analyzed descriptively.

Results: A total of 14 patients were identified to have received an intravenous ketamine infusion of 0.1mg/kg/hr. The use of SDDK in conjunction with standard opioid therapy decreased 85.7% (12/14) of the patient's perception of pain as measured by the Numerical Rating Scale (NRS). The mean pain reduction was 2.2 points with 78.6% (11/14) of the patients who had a pain score reduction of >2 points and 42.9% (6/14) with >3 points. One patient had no change in pain from baseline and another had increased 2 points in pain score. Half of the patients (7/14) received rescue doses of opioids after a mean of 119 minutes into the ketamine

infusion. Adverse drug events experienced were mild and infrequent. The most common occurrence was headache (14.2%), agitation (7.1%) and nausea (7.1%).

Conclusion: SDDK provided effective pain relief with a tolerable side effect profile of no reported emergence phenomena in patients who presented with VOC.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 5b-264

Poster Title: Association between dialysate calcium concentration and parameters of chronic kidney disease- mineral and bone disorder in hemodialysis patients

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Purpose: Hemodialysis (HD) is a life-saving procedure for patients with end-stage renal disease (ESRD) and it is performed to restore electrolyte and fluid balance. Abnormalities in chronic kidney disease-mineral and bone disorder (CKD-MBD) such as calcium (Ca), phosphorus (Pi) and parathyroid hormone (PTH) are common in patients with ESRD. Ca concentration in dialysate fluid can be adjusted during HD. Therefore, we investigated effects of two dialysate Ca concentrations ("a standard" 2.5 mEq/L and "a higher" 3 mEq/L dialysate Ca concentrations) on serum Ca, Pi, and PTH in HD patients.

Methods: This was a retrospective study that included 72 veterans undergoing chronic HD for ESRD at the Stratton VA Medical Center, Albany, NY. Patients were included into analysis if they received HD between January 1, 2013 and June 30, 2016 and underwent 3-times weekly HD for at least 6 months using two different Ca dialysate concentrations of 2.5 and 3.0 mEq/L for at least 3 months. Time-averaged total serum Ca, albumin-adjusted Ca (adjCa), phosphorus (Pi), and intact PTH (iPTH) were analyzed during the use of 2.5 and 3.0 mEq/L Ca dialysate concentrations. Linear regression analysis was used to examine the strength of association between iPTH and time-averaged adjusted total serum Ca, adjCa, and Pi.

Results: The mean (SD) age for the total cohort was 62.9 (9.3) years, 97.4% were men, 18.4% and 81.6% were African-American and White, respectively, and 52.5% had diabetes as a cause of ESRD. Total Ca and adjCa were higher on lower Ca concentration dialysate: total Ca was 8.8 and 8.6 mg/dL, while patients were dialyzed on 2.5 versus 3 mEq/L Ca dialysate, respectively

(p=0.009 for difference), and adjCa was 9.3 and 9.2mg/dL, respectively (p=0.03 for difference). There was no difference in Pi concentration with different Ca dialysate concentrations (4.9 and 4.7 mg/dL on 2.5 and 3 mEq/L Ca dialysate, respectively, p=0.5); while, iPTH concentration was lower on 2.5 mEq/L Ca dialysate as compared with 3 mEq/L Ca dialysate (460.2 and 364.9 pg/mL, respectively, p=0.009). In linear regression analysis, iPTH did not correlate with total Ca or adjCa (p was not significant), and was weakly negatively correlated with Ca dialysate concentration (r=-0.16, 95% Confidence interval (CI) -0.27- -0.05, p=0.007) and positively correlated with serum Pi concentration (r=0.32, 95% CI 0.21-0.42, p < 0.001).

Conclusion: In this retrospective analysis we found that the use of higher 3 mEq/L Ca dialysate resulted in lower levels of iPTH without raising total and albumin-adjusted serum calcium levels and phosphorus levels. Elevated serum Pi positively correlated with iPTH, therefore control of Pi is paramount in achieving control of secondary hyperparathyroidism in ESRD patients.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 5b-265

Poster Title: Vitamin D Supplementation in Cancer Patients: Safety and Benefits

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Purpose: The roles of vitamin D in the pathogenesis and progression of cancer and many chronic conditions have been studied in in-vitro, animal and epidemiologic studies. Potential health benefits of vitamin D are receiving increased attention in medical research as well as social media. Due to the conflict in evidence, there is currently no consensus regarding vitamin D recommendations beyond dosages recommended by the Institute of Medicine (IOM), especially in cancer patients. This article reviews both prospective and retrospective studies with supplementation of Vitamin D in cancer populations for efficacy and toxicity.

Methods: Literature search was performed on vitamin D supplements by using PubMed. We selected key terms to capture vitamin D supplementation and cancer outcome. Terms selected included vitamin D and cancer, vitamin D supplementation. We restricted the search to articles published in English, studies of humans, and randomized controlled trials published in the last 10 years. We also manually searched reference list of some retrieved articles for additional studies relevant to the review.

Results: A total of 12 studies were selected for analysis (8 prospective, 3 retrospective, 1 epidemiologic). There are no inherent toxicities observed with supplementing Vitamin D up to greater than 10,000 International Units (IU) daily, but with benefits especially in breast, prostate, and colorectal cancer. Ten of the studies showed inverse association between vitamin D status and risk of cancer occurrence or progression. Five of the studies showed that vitamin D supplementation at doses higher than the current recommended dose by IOM were successful at reaching the primary outcomes. Two studies observed no effect of vitamin D supplementation on cancer outcomes, but concluded that the dose was too low. The most

common expected adverse effects of hypercalcemia and hypercalciuria were rare and precipitated by other co-existing conditions.

Conclusion: The literature shows that supplementing vitamin D at a higher than currently recommended dose has been shown to be safe and without significant related toxicities. Because of its prevalence, ease of detection, array of associated adverse events, and the ease to which it can be supplemented, vitamin D insufficiency should be of concern to all oncologists and proper supplementation to an adequate level should be first priority to better outcomes.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-266

Poster Title: Evaluation of pharmacists' and student pharmacists' perception of the use of a medication therapy management based medication falls risk assessment tool

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Purpose: The Medication Falls Risk Assessment Tool (MFRAT) is a prototype clinical decision support tool designed to be integrated into a medication therapy management (MTM) encounter. This tool has been used by students at the University at Buffalo (UB) School of Pharmacy and Pharmaceutical Sciences (SPPS) and by practicing pharmacists in the community. The purpose of this study is to assess users' perceptions of the MFRAT in terms of its usability in workflow, clinical utility, patient usability of the generated reports and technical difficulties encountered. Differences in perceptions of respondents based on users' experience with the tool was also of interest.

Methods: In this UB IRB approved cross-sectional study, a survey of pharmacists and student pharmacists with relevant experience using the MFRAT captured demographic information, number of uses of the MFRAT for each respondent, and a series of Likert scale questions investigating the tools perceived performance in workflow, clinical utility, and patient usability from. Workflow items assessed the compatibility with established pharmacy MTM operations. The clinical utility domain evaluated the tools ability to provide an assessment of a patient's fall risk. The patient usability items probed patients' reaction and ability to use information provided by the tool. Additionally, analysis included grouping respondents into "educational" and "clinical" group based upon the MFRAT application and number of uses. The educational group consisted of third year students who used the tool solely as part of coursework (n=88, mean uses = 1.1) and a combined group with clinical application of the tool (n=26, mean uses = 7.8) which included third year student users as part of a MTM clinic (n=19), fourth year student users completing advanced pharmacy practice experiences (n=3), pharmacists with a Bachelor of Science in Pharmacy degree (n=2), and pharmacists with Doctor of Pharmacy training (n=2).

Differences in positive (strongly agree/agree) and non-positive (strongly disagree/disagree/neutral) responses between groups were analyzed using Minitab 17.0 with the chi-squared and Fisher's exact tests as appropriate.

Results: A total of 131 surveys were sent out during the study period and 114 surveys were submitted for a response rate of 87 percent. Positive responses were the most frequent responses across all three survey domains. Overall, all uses provided positive responses to workflow, clinical utility, patient usability domains which ranged between 65.8% to 82.3%, 52.1% to 85.8% and 73.3% to 86.6%, respectively. When the clinical and educational groups were compared, only two items differed. One workflow item found that the clinical group perceived the rate of data entry improved with more uses of the MFRAT versus the educational group (66.67% vs. 33.33%, p=0.0046). The clinical group also responded more positively when asked about the patient's ability to understand their medication action plans (85.7% vs. 33.3%, p=0.0203). The lowest positive response rate of 51.1% in the clinical utility domain was an item that probed the speed of medication list evaluation and utility to the user. User comments for this domain included that dose and patient comorbidities were not incorporated into the MFRAT. Qualitative feedback on technical difficulties included inability to use the tool with specific operating systems and problems with information input and formatting.

Conclusion: Participants responded positively about the MFRAT's utility in workflow, clinical utility and patient usability. Clinical users of the MFRAT with multiple patient encounters perceived an improved rate of data entry as well as increased patient comprehension of their action plan compared to educational only users. Few significant differences were identified based on grouping with the MFRAT suggesting that the aggregate response data is not skewed by the larger student group. Barriers with this prototype such as incompatibility with certain operating systems were identified. Continued development of the MFRAT is reasonable based on these findings to improve provider and patient satisfaction.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-267

Poster Title: Effects of fructose advanced glycation end products (AGEs) on microglia and neuronal cell lines

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Purpose: Microglia are innate immune cells in the brain that are responsible for maintaining a healthy environment for neurons. Microglia can become chronically activated which may lead to neuronal damage. Research has shown that sugars can activate microglia. In addition to direct sugar effects, glucose and fructose produce advanced glycation end products (AGEs) during the catabolic process which are known to be damaging to the body. Due to its high reactivity and increasing presence in the American diet, fructose is the focus of this research. The effects of fructose AGEs on microglia and neuronal cell lines in vitro was evaluated.

Methods: Experiments were conducted in rat HAPI microglia and rat B35 neuroblastoma cell lines. Varying concentrations of fructose AGEs were used as treatments for all experiments as follows: 0.8, 0.4, 0.2, 0.1 mcg/mcl. After a specified treatment period (3 or 24 hours), the cells were analyzed using one or more of the following methods: MTT assay for cell death, protein expression via Western Blot, or reverse transcription polymerase chain reaction (RT-PCR) to measure gene expression. The protein of interest for the western blot analysis was the receptor for AGEs (RAGE). The following genes were measured using RT-PCR: RAGE, sweet taste receptor (Tas1R3), nuclear factor kappa B (NFkB), and enolase 2 (ENO2). Microglia and neurons were analyzed after direct treatment. To assess the impact of microglial activation on neuronal function and survival, HAPI microglia were treated first and incubated for varying time intervals (3 to 24 hours). After the desired time, the cell culture media was removed from the HAPI cells and placed onto the B35 cells for 24 hours to examine the effects of soluble factors released by microglia (a surrogate co-culture method) using the methods listed above.

Results: Direct treatment of neurons with fructose AGEs showed variable effects on cell survival, with the 0.2 mcg/mcl dose significantly decreasing cell survival, and higher doses having no significant change in survival. However, the co-culture of neurons and microglia soluble factors showed improved survival, up to a 17% increase in the 0.4 mcg/mcl treatment. Next, gene expression was examined to look for changes in neuronal function. Direct fructose AGE treatment on neurons increased RAGE expression by up to 15%, while decreasing ENO2 by up to 37%. Expression of NFkB remained largely unchanged. Co-culture treatment of neurons and microglia soluble factors decreased expression of RAGE (up to 39%) and NFkB (up to 29%). Expression of ENO2 in this experiment was decreased by 12% and 26% in the 0.8 mcg/mcl and 0.1 mcg/mcl doses, respectively, but was unchanged at medium concentration doses. In microglia treated directly with fructose AGEs, protein expression of RAGE was also measured. Results showed a decrease in levels of glycosylated (mature) RAGE by up to 59%, of unglycosylated RAGE by up to 39%, and of degraded RAGE by up to 52%.

Conclusion: Normal fructose metabolism produces AGEs, which can be harmful to the body. It is hypothesized that accumulation of these AGEs plays a role in neurodegenerative diseases. The results of this research were conflicting. Certain markers, NFkB and RAGE, revealed there was damage to the neurons. On the other hand, ENO2 results implied there was an increase in survival. These results suggest that microglia may be releasing molecules that are harming neurons or causing cellular dysfunction, but not causing them to undergo apoptosis. Further studies will elucidate the exact mechanisms that altered cell function.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Case Report

Session-Board Number: 5b-268

Poster Title: Use of intravenous lidocaine for ankle fracture and dislocation

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Purpose: This case report illustrates the safe and effective use of intravenous lidocaine in a patient with acute pain secondary to ankle fracture. A 17-year-old Asian male (100kg, 188cm) presented to the Emergency Department (ED) from school with a chief complaint of severe pain and distress secondary to left ankle and foot deformity. The patient was playing volleyball at school and injured his ankle from an awkward landing. In the field, the ankle was immobilized and an ice pack was applied. Upon arrival to the ED, patient was crying in acute distress, tachypneic, and reported a pain score of 10/10. His past medical history was not significant. Upon physical examination, all parameters were within normal limits with positive findings of a deformed left ankle. Upon further examination of the ankle, there was severe swelling, limited range of motion, and intact skin with soft tissue tenderness. The dorsalis pedis pulse was felt with sensation intact. No other injuries were noted on the left leg. After the physical examination, the ED clinical pharmacist conducted an extensive bedside medication reconciliation and allergy review. There were no known drug allergies and the patient was not on any medications at home. No use of herbal supplements or over-the-counter medications was reported. Initial X-ray imaging of the ankle noted a possible fracture through the body of the talus and a complete medial subtalar dislocation. Morphine 4mg intravenous push (IVP) was immediately administered for pain control. Fifteen minutes after morphine, SK was still diaphoretic, crying in severe distress, and reported a numeric pain score (NRS) of 10/10. Since SK did not respond to initial therapy, a decision was made to initiate lidocaine at 1mg/kg/dose (total dose 100mg) IV piggyback over 15 minutes for pain. Prior to administration of lidocaine, the pain score was 10/10. Five minutes after lidocaine was administered, the pain decreased to 6/10. At 20 minutes, the pain score was 3/10 and remained 3/10 until 75 minutes after

initiation of drug (IOR). His blood pressure and respiratory rate decreased to normal limits and no arrhythmia was noted on the monitor. No adverse events were reported. Patient appeared comfortable and manipulation of his ankle for examination by podiatry was performed. At 90 minutes post-infusion, his pain was 9/10 and he required rescue analgesia with morphine 4mg IVP and ketorolac 30mg IVP. Shortly after, podiatry performed closed reduction of ankle under conscious sedation with fentanyl and midazolam. Posterior splint was applied and patient was discharge home with follow-up to clinic. In this case, the utilization of intravenous lidocaine was safe and effective for the management of acute pain secondary to trauma. Our case report adds to the limited available literature and highlights the importance of bedside patient care from pharmacists to identify and alternative agents to provide safe and effective analgesia in the ED.

Methods:

Results:

Conclusion:

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-269

Poster Title: Poly lactide-co-glycolide (PLGA) microcapsules for controlled delivery of buprenorphine

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Purpose: Buprenorphine hydrochloride is an opioid medication used in the treatment of opioid addiction. A controlled release formulation of buprenorphine may improve the effectiveness of the compound by reducing the potential for abuse and reducing variations in efficacy. The purpose of this study was to investigate the applicably of utilizing our patented microencapsulation technique to prepare a 30-day sustained release microcapsule injectable formulation.

Methods: In this study, a modified double emulsion solvent evaporation technique was utilized to produce poly lactide-co-glycolide (PLGA) loaded microcapsules with buprenorphine hydrochloride intended for an extended 30-day release formulation. Two ester-terminated PLGA polymers, a 7,000-17,000 molecular weight polymer and a 54,000-69,000 molecular weight polymer, and an acid-terminated 7,000-17,000 molecular weight PLGA polymer were formulated with three drug loadings (5 percent, 10 percent, and 20 percent weight/weight) of buprenorphine hydrochloride. The freeze-dried formulations were evaluated for their physical properties (morphology, particle size distribution, and thermal properties), and drug loading and drug release profiles were determined.

Results: All ester-terminated formulations resulted in particles which were smooth and spherical, but some contained a small percentage of broken particles. The acid-terminated formulations had only a small number of smooth spherical particles with the bulk containing small, irregularly shaped particles and porous spheroids. Encapsulation efficiency ranged from

49 percent, for the high molecular weight ester-terminated PLGA particles with 10 percent drug loading, to a high of 73 percent, for the high molecular weight ester-terminated PLGA particles with 20 percent drug loading. Both ester-terminated polymers exhibited a delayed drug release with the bulk of drug release occurring after 8 days. The acid-terminated polymer, however, displayed a much more rapid release with the bulk of release drug occurring in the first 12 days. The total drug released from the acid-terminated polymer was low with no more than 25 percent drug release in the 30-day study period. The total drug release from the ester-terminated polymers ranged from 40 percent to 95 percent.

Conclusion: This patented formulation technique appears well-suited for the preparation of controlled release buprenorphine microcapsules. The optimal polymer for further study as a controlled release buprenorphine microcapsule formulation is the low molecular weight ester-terminated PLGA polymer, while a combination of the low molecular weight ester-terminated and the acid-terminated PLGA may result in a more sustained release over the entire 30-day study period.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-270

Poster Title: The identification of estrogen active chemicals in a pharmaceutical database using a novel pharmacophore paired docking search method

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Purpose: The application of virtual screening methods to identify estrogenic chemicals in databases of commercially available chemicals continues to be a challenge. We test the hypothesis that pharmacophore models coupled with ligand-receptor docking can identify estrogen active substances in a database of pharmaceutical chemicals.

Methods: Of the many Estrogen Receptor alpha Ligand Binding Domain (ERLBD) crystal structure complexes in the RCSB Protein Databank, most contain novel ligands. Taken together, all of these ERLBD ligand complexes represent a wide range of ligand-receptor interactions and binding pocket configurations. Thus, there is the potential to use each ERLBD complex as a unique pharmacophore model along with docking for virtual screening. Such a method should have higher reliability than docking alone since all of the experimentally determined ER ligand binding modes would be described from both ligand and receptor points of view in the screening process. In this study, multiple ERLBD crystal structure complexes containing novel ligands were each used to generate pharmacophore models that were then coupled sequentially with docking to the corresponding crystal structure in a virtual screening method. The NCGC Pharmaceutical Database (NCP) from the NIH NCATS was filtered by size and washed to remove counter ions using MOE (Chemical Computing Group). Reasonable 3D structures were then generated with Corina (Molecular Networks) and optimized in MOE (MMFF94). Screening of the NCP subset database with the Pharmacophore-Dock method using MOE produced hits that were then sorted by score.

Results: The highest scoring hits from the screen were selected for estrogen potential. These were then sorted and prioritized by relevance (current use pharmaceuticals or components) and obtained (when available) for validation testing in a cell-based estrogen responsive reporter gene bioassay. Compounds in the database with weak or previously uncharacterized estrogen activity were identified along with known estrogen agonist and antagonist drugs (positive controls). The database hits obtained for validation testing that induced estrogen agonist activity included propylparaben, ethylparaben, hexylresorcinol, genistein, resveratrol and monobenzone. Risocaine and tiabendazole did not produce agonist activity on their own, but induced synergistic effects once combined with estradiol. Methylparaben and dapsone were found to have antagonist activity.

Conclusion: The virtual screening process applied in this study appears to have utility in identifying estrogenic chemicals in large databases. This method has revealed compounds in current use pharmaceuticals or in clinical testing that have endocrine disrupting potential. Endocrine disrupting chemicals have been reported to cause birth defects, developmental disorders and may be related to the progression of hormone dependent cancer. Pharmacotherapies including the compounds identified in this study should likely be evaluated for hormonal disrupting impact on patients.

Submission Category: Leadership

Submission Type: Evaluative Study

Session-Board Number: 5b-271

Poster Title: Framing a pharmacy student congress from the pharmacy students' perspective

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Purpose: Student governments are essential components to the development of leadership skills and work toward driving student involvement in, and responsibility for, their own education. In this study we surveyed pharmacy students to identify the key aspects of pharmacy student government that impact student participation. Our aim was to identify a student government framework that students envision to identify an optimal model for a College of Pharmacy.

Methods: An online survey, focused on communication, inclusion, structure and function of a pharmacy student government, was developed and distributed to the acting pharmacy student presidents of The Rho Chi Society (pilot survey) and the current pharmacy students of St. John's University (follow-up survey). The pilot survey was distributed to 105 acting pharmacy student presidents of the Rho Chi Society, resulting in 33 responses. The follow-up survey was later distributed to 1139 current SJU pharmacy students, enrolled in years P3 through P6, resulting in 166 responses. SJU student responses were also compared to student presidents of The Rho Chi Society responses. Survey results have been anonymized and date reported aggregately. This study was reviewed by the SJU Institutional Review Board and was approved receiving exempt status.

Results: Over 85% of pharmacy students surveyed supported a pharmacy-specific student congress independent of a campus wide student government body. The majority of students indicated that a pharmacy student congress should include students in years P1 through P4 for membership, with an executive board consisting of a President, Vice President, Secretary, Treasurer and Student Class Representatives. Students selected a 3.0 minimum GPA required

for eligibility to be a member or to hold an executive board position. Elections for executive board positions would be held yearly. Students were also asked if a pharmacy student congress should develop a mentor/mentee program. An overwhelming 96% said yes and P3 students were identified as ideal mentors, with P1 students selected as benefitting the most from mentorship. The survey also asked the preferred process (i.e. appointment vs. election) in selecting students to serve on college committees. The majority of students (69%) preferred the election process and for students, faculty, and student, advisors to participate in this election. Improving communication between faculty and pharmacy students was cited as the most important factor in improving communication within a college of pharmacy. Email and text messaging were identified as most preferred for communicating high priority information to pharmacy students.

Conclusion: Our findings indicate that SJU pharmacy students want a dedicated and separate pharmacy student congress. Designing a pharmacy student congress based on the recommendations of these students may encourage them to participate in this congress fostering an environment to learn, develop and reveal leadership skills.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-272

Poster Title: Cost effectiveness of lenalidomide maintenance after autologous stem cell transplant in patients diagnosed with multiple myeloma

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Purpose: Lenalidomide, an immunomodulatory agent, is a common medication utilized in induction therapy for the treatment of multiple myeloma in both transplant and non-transplant candidates. In addition, single agent lenalidomide is a category 1 preferred recommendation per NCCN guidelines for maintenance therapy to delay relapse and prolong remission. To our knowledge, no current pharmacoeconomic studies have assessed the cost effectiveness of maintenance lenalidomide after autologous stem cell transplant. Also, overall survival outcomes vary amongst clinical trials. Lenalidomide maintenance remains a controversial topic due to outcomes, side effects including an increased risk of malignancies, and long-term cost.

Methods: The project was approved by the University Institutional Review Board. Our study analyzed two randomized control trials, Attal et al. and McCarthy et al., investigating efficacy of maintenance lenalidomide after autologous stem cell transplantation. We modeled cost-effectiveness analyses on previous studies of lenalidomide maintenance in non-transplant candidates. Using drug costs, office visit expenses, and lab costs, the average cumulative cost per progression free survivor (ACCPFS) was assessed. Medication costs from Redbook were used to determine total cost of lenalidomide capsules. Medicare and Medicaid HCPC (healthcare common procedure coding) and corresponding pricing were used to determine physician office visit and lab monitoring costs. Though the length of multiple myeloma maintenance is dependent on a patient's individualized disease course, we used a duration of three years in order to compare outcomes of the two studies. Prescription drug and physician service expenses were adjusted from 2011 to 2015 dollars using the consumer price index (CPI). The primary outcome for the analysis was incremental cost-effectiveness ratio (ICER)

comparing the maintenance lenalidomide versus placebo. ICER was computed for two similar clinical trials utilizing treatment costs for three years and progression free survival (PFS) at three years.

Results: Data from Attal et al. and McCarthy et al. allowed separate economic analyses of ACCPFS and ICER. For Attal et al., total costs per progression free survivor for 3 years in terms of drug, office visits, and labs were $694,500.09, $1091.11, and $1474.34, respectively. For McCarthy et al., total costs per progression free survivor for 3 years in terms of drug, office visits, and labs were $703,510.58, $1091.11, and $993.86, respectively. The ACCPFS combined these expenses for maintenance lenalidomide patients: $697,065.54 (Attal et al.) and $705,604.55 (McCarthy et al.). Drug expenses were omitted to determine the ACCPFS for the placebo group. Placebo costs per progression free survivor totaled $2565.45 (Attal et al.) and $2084.97 (McCarthy et al.). For Attal et al. and McCarthy et al., PFS at 3 years for lenalidomide maintenance (0.59 and 0.66) and placebo groups (0.35 and 0.39) was the outcome used to calculate the ICER for each study. Calculated ICER values were $2,893,750.38 (Attal et al.) and $2,605,628.07 (McCarthy et al.) per additional progression free survivor at 3 years.

Conclusion: This analysis highlighted the costs and improved PFS associated with maintenance lenalidomide compared to placebo. ICER values were large and positive, indicating that lenalidomide was more effective but with exorbitant costs for each additional progression free survivor at 3 years. Limitations noted in this analysis were the following: no analysis of adverse effects or quality of life, inconsistency of drug strengths and anticoagulation, and assumptions about treatment protocol. Future research to determine willingness to pay, allowing incremental net benefit analyses, would provide additional insight into the use of lenalidomide in multiple myeloma maintenance.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 5b-273

Poster Title: Oral anticoagulants in subjects eligible for bariatric surgery

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Purpose: Novel oral-anticoagulants (NOACs) have come into favor due to lack of monitoring requirements and favorable drug interaction profile versus warfarin. While many have benefited knowledge gap exists for safety and efficacy in people undergoing bariatric surgery. NOAC manufacturers note up to 60% reduction in AUC when delivered to the distal small intestine. Given anatomic and physiologic changes of the gastrointestinal tract after Roux-en-Y gastric bypass (RYGB) and Sleeve Gastrectomy (SG) potential exists for altered absorption. The purpose of this study was to characterize anticoagulation treatments of subjects presenting for bariatric surgery and to follow medication use and outcomes after surgery.

Methods: The protocol was approved by the State University of New York at Buffalo Institutional Review Board. A retrospective review was performed of patients presenting for bariatric surgery from 2014-2016. Subjects were included if they met age, body mass index and/or co-morbidity criteria for surgery. The primary outcome was prevalence of warfarin and NOACs at initial surgery evaluation. Secondary outcomes were post-surgical use of warfarin and NOACs including the percentage of patients that remained on warfarin or NOAC, converted from warfarin to NOAC or NOAC to warfarin and those that discontinued therapy. Safety and efficacy measures included major bleed requiring hospitalization, venous thromboembolus (VTE), stroke and mortality with a minimum follow-up period of 30-days.

Results: A total of 1298 patients met criteria for review. Twenty-seven subjects presented on oral anticoagulants at initial evaluation, 17 (63 percent) presented on warfarin and 10 (37 percent) on NOACs. NOACs included rivaroxaban (50 percent), apixiban (40 percent) and dabigatran (10 percent). Among the 27 patients, 11 (41percent) presenting for initial evaluation

did not proceed to surgery and the remaining 16 subjects underwent SG. Nine subjects (90 percent) remained on warfarin while one discontinued therapy after surgery. Two subjects (33 percent) remained on NOAC while two (33 percent) converted from warfarin to NOAC, one converted from NOAC to warfarin and one discontinued after surgery. No subjects had major bleed requiring hospitalization, VTE or stroke. No subjects died. Median follow-up duration was 237 days (range 43-456).

Conclusion: NOACs represented one-third of anticoagulant use in subjects presenting for bariatric surgery. After surgery treatment plans for subjects on NOACs were variable with an equal number maintaining pre-surgery NOAC and converting to warfarin. No bleeding or thrombotic outcomes were observed for subjects maintained on warfarin, NOAC, those therapeutically interchanged or discontinuing therapy. Efforts to combine data from high volume bariatric centers should be made to confirm the preliminary suggestion from this study that NOACs may be safe and effective after SG. RYGB was not represented and should be targeted given expectation that medication delivery is more distal than Sleeve Gastretomy..

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-274

Poster Title: Weight and metabolic outcomes of patients managed through gastric bypass and traditional care in a patient-centered medical home

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Purpose: Gastric bypass (GB) has been widely studied and reproducibly provides profound benefits on weight loss, blood pressure, cholesterol, blood glucose, cardiovascular events and medication requirements. Mortality is less than 0.5%. Paradoxically, less than 1% of obese adults seek consultation. This information should be of great interest to providers in health care models where disease prevention, outcomes and cost are paramount. While there is little need to add to an already substantial evidence base for disease modifying effects of GB, this study aims to bring awareness by presenting usual care and GB outcomes through the lens of a patient-centered medical home.

Methods: The protocol was approved by the State University of New York at Buffalo Institutional Review Board. A retrospective review was conducted by combining data from one patient-centered medical home and one bariatric surgery center in Buffalo, NY. Subjects that had gastric bypass were matched 1:1 with controls not undergoing surgery on the basis of gender, age ± 5-years and BMI ± 5 kg/m2. The primary outcome was the difference in excess body weight loss over 5-years of follow-up. EBWL is defined as the percentage of excess weight lost where excess weight is calculated as the total pounds above ideal body weight. Secondary outcomes included changes in T2DM, HTN and HLD disease status and medication use. Interim analysis of 1-year weight and medication outcomes are presented. Categorical variables were analyzed using Chi-square tests and continuous variables were compared with the Student's t-test. A $p < 0.05$ was considered significant.

Results: 162 RYGB and obese control subjects were included in the 1-year analysis. RYGB subjects had significantly greater EBWL at 1-year than their matched counterparts (41.0±8.7 vs. -0.95 ±9.5; $p < 0.0001$). RYGB subjects lost an average of 97.4 ± 30.0 pounds whereas obese controls gained 1.0±20.0 pounds ($p < 0.0001$). RYGB subjects on ACEI/ARB reduced use by 14%, statin by 10% and both basal and bolus insulin by 14%. Obese controls increased ACEI/ARB use by 1%, statin by 4%, basal insulin by 7% and bolus insulin by 3%.

Conclusion: This is the first study to report real-world comparative long-term outcomes of obese control and RYGB subjects managed in a patient-centered medical home. Primary care providers can expect that obese subjects in their population will not lose weight or gain slightly over a 1-year period whereas those undergoing GB will lose over 40% their excess body weight. Obese subjects will continue to maintain or require addition of ACEI/ARB, statin and insulin medications whereas RYGB subjects will have a reduction in these medication requirements.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5b-275

Poster Title: Impact of a novel digital education process on hospital readmissions in kidney transplantation

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Purpose: Early hospital readmissions within the first 30 days of discharge from the index admission for kidney transplantation are common. Furthermore, these episodes may be costly and are associated with morbidity and mortality. The most common reasons for readmission include rejection, infection, and failure to thrive. Poor health literacy and knowledge about medicines has been shown to be a predictor of hospital readmission. Through integration of technology into patient medication teaching, pharmacists have the unique ability to positively affect readmission rates. The impact of a digital medication teaching tool on readmission rates and related outcomes was evaluated.

Methods: Single-center, retrospective analysis of 312 adult (greater than 18 years) patients who received a kidney transplant only from January 2015 through July 2016. Medical charts were reviewed for demographic and transplant characteristics, hospital readmissions from the time of transplant through August 2016, and reason for readmission. Patients were stratified into two groups: intervention group, those who received digital tablet medication teaching in combination with in-person follow-up (n equals 189) and control group, those who received standard in-person medication teaching (n equals 123). Groups were examined for differences between readmission rates, time to first readmission after transplant, reasons for readmission, and patient and allograft outcomes.

Results: The study population consisted of primarily Caucasian (42.9 percent), male (61.9 percent) recipients with the majority of patients receiving dual maintenance immunosuppression with tacrolimus and mycophenolate sodium. The average length of stay for the index hospitalization was 9 days and 12 days for the intervention and control groups, respectively. Patients were more likely to have at least one early hospital readmission in the control group vs. the intervention group (35.8 percent vs. 27.5 percent). The average time to readmission was 58 days for the intervention group and 99 days for the control group. The control group was readmitted for GI disturbances, fever, elevated serum creatinine, and urinary tract infection more frequently than the group who received digital tablet education. During a mean follow-up of 287 days, 95.2 percent of patients of the intervention group had functioning grafts as compared to 93.5 percent of the control group. At the end of the study period survival rates were comparable between the intervention and control groups (97.9 percent vs. 96.8 percent).

Conclusion: Our novel digital medication teaching regimen tool provided a consistent message, enabled repeat sessions, and included knowledge assessment. The rate of rehospitalization in kidney transplant recipients was reduced in patients who received digital medication teaching. These results suggest that the use of digital technology to educate patients may reduce early hospital readmission, although more data is necessary to form concrete associations.

Submission Category: General Clinical Practice

Submission Type: Case Report

Session-Board Number: 5b-276

Poster Title: Olanzapine-induced seizure: a case report

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Purpose: Olanzapine is an atypical antipsychotic commonly used to treat schizophrenia and/or bipolar disorder. This case report describes a 19-year-old male who developed a new-onset seizure after starting olanzapine. The patient had no history of seizures prior to admission. He presented to the psychiatric unit with a diagnosis of unspecified psychosis versus schizophrenia versus schizoaffective disorder. His past medical history includes glucose-6-phosphate-dehydrogenase deficiency (G6PD), eczema, and thyroid dysfunction. His past psychiatric history consists of schizophrenia and autistic spectrum disorder. A number of different antipsychotics have been used in his treatment including haloperidol, chlorpromazine, risperidone, quetiapine, ziprasidone, and fluphenazine. The patient was only able to tolerate olanzapine but stated he was non-adherent and could not recall when he had stopped the medication. For the past five months, he was also taking clonazepam 1 mg three times daily, which he had stopped four days prior to admission. On admission, the patient was re-initiated on olanzapine 5 mg every 12 hours and daily folic acid supplementation. The olanzapine dose was increased to 15 mg daily (5 mg in the morning and 10 mg at bedtime). Four days after the increased dose, the patient had a generalized tonic-clonic seizure lasting about 1.5 minutes with a bitten tongue. The patient's vital signs were: blood pressure 124 mmHg / 68 mmHg, heart rate 136 bpm, fasting sugars 106 mg/dL, 98% oxygen on room air, and respiratory rate 16 bpm. The patient's initial rhythm was sinus tachycardia. When the rapid response team arrived, he had an altered state of consciousness, but was no longer seizing. Subsequently, two doses of intravenous (IV) lorazepam 2 mg and a 1 liter bolus of normal saline were given. He was then transferred to the medical floor for a neurological work-up. Labs drawn post-seizure showed elevated lactic acid (13.3 mmol/L) and bicarbonate (7 mmol/L) likely secondary to seizure activities. His arterial

blood gas and lactic acid level (1.9 mmol/L) improved with normal saline. A magnetic resonance imaging (MRI) performed one day post-seizure showed unremarkable findings; however, there were no baseline MRIs. An electroencephalogram (EEG) was performed two days after the seizure occurred and did not show any seizure or epileptiform features. Due to the patient's unstill behavior, a computerized tomography (CT) scan was not performed. The neurology team recommended the patient to continue olanzapine due to history of intolerance with other antipsychotics. The recommendation was accepted and clonazepam 1 mg every 12 hours was initiated three days post-seizure. However, the patient showed continued agitation, which led to a discontinuation of clonazepam and initiation of valproic acid 500 mg and chlorpromazine 50 mg twice daily for impulsivity and agitation. Upon review of the medication reconciliation the patient did not receive any new medications that could have induced the seizure. He had been consistently receiving folic acid and olanzapine while last receiving an "as needed" dose of haloperidol 5 mg and lorazepam 2 mg five days prior to the seizure. The urine toxicology and alcohol level were negative upon admission. The patient had no recurrence of seizures with this combination. One month later, the patient's most current medications consist of chlorpromazine 100 mg twice daily, valproic acid 750 mg every 12 hours, propranolol 10 mg three times daily, olanzapine 5 mg in the morning, 5 mg at 2:00 pm and 10 mg at night. A Naranjo adverse drug reaction probability score of 5 was obtained, indicating olanzapine as a probable cause of his seizure. Although more study is needed to further strengthen this potential causal relationship, it is important for healthcare providers to inquire about this risk with olanzapine therapy in the adolescent/adult population.

Methods:

Results:

Conclusion:

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5b-277

Poster Title: Prevalence of influenza vaccination and awareness of influenza on a college campus

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Purpose: The close-living quarters and volume of students present on college campuses creates an ideal environment for the spread of the influenza virus. The objective of this project was to investigate the prevalence and awareness of influenza vaccinations among students, faculty and staff on the D'Youville College campus, in Buffalo, NY. D'Youville College is unique in that it educates a variety of health professions including chiropractic, dietetics, nursing, occupational therapy, pharmacy, physician assistant, and physical therapy. The primary outcome was to identify factors that are associated with an increased likelihood that an individual will receive an annual influenza vaccination.

Methods: An anonymous, electronic survey was created with questions regarding demographic information, influenza vaccination information, and influenza awareness. This survey was sent to all students, faculty and staff at D'Youville College using an automated emailing system. The system reaches 2494 students, 860 faculty members and 366 staff members, for a total of 3,721 people. The survey was available from October 26, 2015 until November 23, 2015. The data was collected and analyzed using QualtricsTM software. Data were reported utilizing descriptive statistics for awareness of influenza vaccinations and associations between factors that may increase the likelihood of an individual to receive a vaccination. Several demographic factors were analyzed (age, ethnicity, academic standing, etc). Awareness questions included, "Per CDC guidelines, what age group is eligible to receive the influenza vaccine," "How many people are hospitalized each year with complications from influenza," "How long is an individual contagious after signs and symptoms of the flu have appeared," and "If someone does not have

any signs and symptoms of the flu, it is possible to infect other individuals." The factors analyzed for faculty and staff were similar to those analyzed for students, but looked at the department with which they were associated instead of major or academic standing.

Results: The primary outcome was identification of factors associated with an increase in the likelihood of an individual to receive an influenza vaccination. Out of 3,721 people that received the survey, 426 people responded; response rate of 11.4%. It was found that graduate students and upperclassmen were more likely to receive the influenza vaccination (67%) compared to lower class standings (7%). Those that received the vaccine for the 2015-2016 season, were more likely to have received the vaccine for the previous season (2014-2015), 87% vs. 41%. Several responses regarding why a participant chose not to be vaccinated were found to be common misconceptions; "makes me sick," "don't know why I need it," or "not effective." Participants who received the influenza vaccination were able to answer the awareness questions correctly more often than those who did not receive the vaccine. For example, 79% of people who received the vaccine knew the recommended age to receive the vaccine, while only 63% of people who did not receive the vaccine answered correctly. Encouragingly, it was found that 94% of participants knew they could receive their influenza vaccine at a community pharmacy and 50% of participants received their vaccination in a community pharmacy.

Conclusion: Influenza awareness is an important topic on college campuses. It was identified that older class standing may be associated with an increased likelihood of an individual to receive an influenza vaccination. In addition, a large number of participants knew they could receive an influenza vaccination in a pharmacy. This alludes to a positive awareness among patients that influenza vaccinations are available in community pharmacies. Further research may be warranted to elucidate other factors associated with an increased likelihood of an individual to be vaccinated. In addition, research into pharmacist's association with vaccine awareness in the community may also be beneficial.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Case Report

Session-Board Number: 5b-278

Poster Title: Vancomycin-induced drug reaction with eosinophilia and systemic syndrome (DRESS): A case report

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Purpose: The authors report a possible case of vancomycin-induced drug reaction with eosinophilia and systemic symptoms (DRESS). DRESS, although a rare occurrence, is a severe adverse drug reaction associated with fever, skin rash, eosinophilia, enlarged lymph nodes, and organ involvement. The patient is a 64-year-old female with a past medical history of diabetes, hypertension, chronic obstructive pulmonary disease, and hyperlipidemia who underwent a right total knee arthroplasty in April 2016 and was discharged three days later. She presented to the emergency department twenty-three days later with complaints of drainage at the surgical site and was started on empiric treatment with vancomycin and piperacillin/tazobactam pending culture and sensitivity results. Her antibiotic regimen was de-escalated on day 2 to vancomycin and ceftazidime when her blood cultures showed methicillin-resistant Staphylococcus aureus. The patient underwent irrigation and debridement of the site on days 3 and 10 of admission, where removal of the implant and placement of a non-biodegradable temporary tobramycin and vancomycin cement was placed on day 10. After placement of a PICC line, the patient was discharged on day 13 with intravenous vancomycin to be given for six weeks. After twenty-six days of vancomycin therapy the patient developed a red macular/morbilliform, erythematous, blanching rash on her groin, abdomen, and arm. On day thirty-six she was instructed to stop taking the vancomycin and received a new regimen for clindamycin, minocycline, and sulfamethoxazole/trimethoprim DS for which she only took two doses before returning to the emergency department with the rash now spread to all four extremities and her face. In addition to the full-body rash, the patient reported small blisters to her legs and lips that resolved prior to presentation. Labs were collected to assess hematologic abnormalities and signs of organ dysfunction. Pertinent findings that are consistent with the diagnosis of DRESS include slightly elevated temperatures ranging from 98.9°F to 101°F,

creatinine of 2.10 mg/dL (baseline 0.5-0.6), BUN 29 (baseline 7), CRP 6.4 mg/dL, and WBC of 24.6 K/µL with eosinophilic predominance of 15,000 K/µL. In contrast to typical DRESS findings, the patient did not have any elevations in liver enzymes. The more recently prescribed antibiotics were ruled out as a potential cause for DRESS due to their short duration of use and the patients report that her rash had progressed 2-3 days prior to their ingestion. The patient was placed on high-dose oral steroids (methylprednisolone 60 mg twice daily) with close blood sugar monitoring and discharged seven days later with a six-week taper and orders for follow-up. At her clinic appointment in July 2016 she had complete resolution of symptoms. As this case report suggests, vancomycin is the likely culprit for DRESS and recognition of these adverse effects should be sought early-on to prevent permanent organ dysfunction, patient decline, and associated mortality.

Methods:

Results:

Conclusion:

Submission Category: Infectious Diseases

Submission Type: Case Report

Session-Board Number: 5b-279

Poster Title: Prolonged asymptomatic Mycobacterium avium-intracellulare Complex (MAC) infection and potential reactivation disease in an HIV-negative patient

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Purpose: Non-tuberculous mycobacterial (NTM) infections such as Mycobacterium avium-intracellulare (MAC) are most common among immunocompromised HIV-positive patients. Infections are uncommon among HIV-negative/immunocompetent patients, but recent evidence shows an increasing prevalence. Unlike Mycobacterium tuberculosis (TB), NTM transmission occurs through environmental sources, and NTM organisms do not enter a latent stage (with subsequent reactivation disease) as seen in TB. Current evidence shows that cavitary MAC lung disease is typically a fast-progressing infection, leading to destruction of lung tissue and eventual respiratory failure within two years if left untreated. We present a case of prolonged asymptomatic Mycobacterium avium-intracellulare Complex (MAC) infection in an HIV-negative patient. The patient was a 53-year-old homeless male who presented with a chief complaint of shortness of breath for three weeks. He also reported night sweats, poor appetite, and subjective fevers without hemoptysis. Upon hospital admission, the patient had three positive Systemic Inflammatory Response Syndrome (SIRS) criteria and two positive quick Sepsis-Related Organ Failure Assessment (qSOFA) criteria. Although some SOFA criteria were unavailable, the patient still had a score of 3 indicating potential sepsis using this scale as well. The patient was administered NaCl 0.9% 1000 mL intravenous bolus on admission for fluid resuscitation due to sepsis and hypotension. Vancomycin, piperacillin-tazobactam, and ciprofloxacin were initiated as empiric therapy for suspected bacterial pneumonia-induced sepsis. Patient chart review showed a past medical history of chronic obstructive pulmonary disease (COPD) and a diagnosis of MAC three years prior without completion of appropriate therapy. During a previous hospital admission one-month prior, a chest CT was performed which showed a cavitary focus within the left upper lobe with surrounding regions of airspace

disease and diffuse pleural thickening. After discovering his past medical history, new radiographs and laboratory tests were obtained to diagnose continued MAC infection. Current chest X-Ray showed pleural-parenchymal opacities in the left apex, which were concerning for mycobacterial disease. Two induced-sputum acid-fast bacilli smears were collected and culture results were positive for Mycobacterium avium-intracellulare Complex. After X-Ray and culture results confirmed continued MAC infection, empiric pneumonia therapy was discontinued. He was then initiated on azithromycin 250 milligrams (mg) intravenously, ethambutol 1,200 mg (15mg/kilogram) by mouth, and rifampin 600 mg by mouth daily. After two days of inpatient treatment, the patient was discharged with prescriptions for these medications as daily oral therapy to be continued for at least 12 months after the first negative induced-sputum culture. Our team counseled him on the severity of his infection, importance of compliance with medications, and referred him to an outpatient clinic for follow-up. Our patient's current homeless status potentially created a greater risk of exposure to environmental contaminants, and COPD made him more vulnerable to development of MAC pulmonary disease. This patient had an untreated MAC infection for at least three years, with radiographic evidence of cavitation. Against typical expectation for progression in cavitary MAC infection, this patient did not present with evidence of severe lung destruction or respiratory failure. Although latency would not be expected with MAC, due to preservation of lung function, it is possible that the MAC infection in this patient became latent, delaying progression to respiratory failure. After discontinuation of COPD maintenance medications a few months prior to admission, the increase in COPD symptoms could have contributed to the reactivation of a potentially latent MAC infection. Studies indicate that NTM infections occur anywhere from 1 to 14.1 times in 100,000 person-years. Although they are relatively rare in immunocompetent patients, it is important for clinicians to understand that prevalence is rising, especially among individuals with chronic lung disease or those without access to purified drinking water.

Methods:

Results:

Conclusion:

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 5b-280

Poster Title: Barriers to metformin usage amongst type 2 diabetic patients in a rural Hispanic population

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Purpose: The American Diabetes Association (ADA) and the Latin American Diabetes Association (LADA) recommend Metformin use, along with lifestyle modifications, as first-line treatment for type 2 diabetes mellitus (T2DM). During a medical service trip to Puerto Penasco, Mexico in 2015, many patients with T2DM reported not using metformin for diabetes management due to associated side effects. A survey was developed to determine utilization and barriers to metformin use among type 2 diabetics in rural Mexico.

Methods: A team of six pharmacy students from Xavier University College of Pharmacy and one clinical pharmacist participated in a medical service trip to Puerto Penasco, Mexico. The trip was facilitated by International Service Learning (ISL), a company that coordinates international interdisciplinary medical mission trips and internships for health professionals and students. Each student participated in a week long service program and provided various services that included residential health screenings, diabetes education and a “pop up health clinic” in one of the community centers. Basic health screenings including blood pressure and blood glucose checks were offered and provided to patients the group encountered. A survey was created in order to determine the utilization and potential barriers to metformin use among type 2 diabetics in the community. Self-reported diabetic patients were offered the opportunity to participate in the survey and assured them that their level of care was not dependent on their decision. Patients were given the option to read and answer the survey questions on their own or allow a volunteer and translator discuss the questions. The surveys and informed consent forms were available in English and Spanish translations. Patient identifiers were not obtained or documented in the survey responses and each questionnaire

was assessed after the trip. All methods, the survey, and informed consent received approval from the Xavier University of LA Institutional Review Board.

Results: Survey responses from 16 patients were received; no self-reported diabetic patients declined participation. Overall, 11 of 16 patients (68.8 percent) reported current use of metformin, while 2 of 16 (12.5 percent) reported being past users. Among patients with a history of metformin use, 7 of 13 (53.8 percent) had experienced associated side effects, but only 4 of 13 (30.8 percent) reported side effects as a barrier for use (p=0.0699). Cost was a barrier to use in 6 of 16 (37.5 percent) of patients, and 5 of 16 (31.3 percent) reported stopping metformin when they run out of pills and do not have access to more. The results of the survey were shared with ISL, the company that works closely with the community in order to ensure health services are accessible. ISL was grateful to receive the information and has committed to obtaining resources in order to address these concerns.

Conclusion: In order to provide optimal care to patients, healthcare providers must overcome treatment barriers. ADA guidelines recommend metformin as the cornerstone of treatment for patients with T2DM. Among areas visited in 2016, a higher percentage of patients were using metformin than predicted. Many patients reported cost or running out of medication as their main barrier to usage. The survey results suggest that there is a disparity in access to metformin in this community. Identifying a method of providing free or discounted metformin to these patients would increase medication adherence, decrease diabetic complications, and improve overall health in Puerto Penasco.

Submission Category: Oncology

Submission Type: Descriptive Report

Session-Board Number: 5b-281

Poster Title: Pharmacy students' reflections on an oral targeted agents lecture and recitation quiz in an oncology drugs and diseases course

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Purpose: The first time students are introduced to chemotherapy agents in our curriculum is during the third professional year in the content-rich, intensive Oncology Drugs and Diseases course. Students attend class two hours per day, five days per week over six weeks and complete two assessments, a midterm and final exam. The purpose of this study was to evaluate student learning in the therapeutics lecture on oral targeted agents and to determine if additional assessments (i.e. quizzes) would help with student learning, attendance and performance in the course.

Methods: The institutional review board approved this study as exempt. Students in attendance during the Fall 2015 oral targeted agents therapeutics lecture were asked to write an anonymous one-minute reflection paper towards the end of the lecture reflecting on: what topic(s) were most clear to them during the lecture and what topic(s) were still confusing. The papers were analyzed to determine which lecture topics were well understood and which need to be explained differently in future presentations. The same students were asked to complete an anonymous SurveyMonkey as fourth professional year students during Summer 2016, reflecting on the quizzes that were administered during recitation on the day before the midterm and final exams.

Results: Of 275 students, 142 completed the reflection. Students listed 218 topics they learned best during the lecture and 139 topics that were still confusing. The clearest topics were multikinase inhibitor-induced hand-foot syndrome (32.4 percent), chronic myelogenous leukemia (27.5 percent), epidermal growth factor receptor inhibitor-induced acneiform rash (20.4 percent), side effects (12.7 percent), drug interactions (12.7 percent), and administration of epidermal growth factor receptor inhibitors (12 percent). Drug names, mechanisms of action

or drug targets, and choosing the best first line option were still confusing to 14, 12, and 10.6 percent, respectively. Another 10.6 percent noted nothing in the lecture confused them. The survey on quizzes administered during recitation was completed by 165 students. Overall, 44 percent found quizzes helpful, 23 percent found them not very helpful, 7 percent felt quizzes negatively affected learning, and 26 percent were neutral. Approximately 57 percent indicated that quizzes should continue to be given in the course. Nearly 59 percent of students attended recitation only because the quiz was being administered. In comparison to their exam grades, 38 percent of students stated their quiz scores were within 10 points, 15 percent scored higher, 22 percent scored lower, and 25 percent did not remember.

Conclusion: The topics students understood the most were those that contained visual aids, while most students struggled to take away knowledge of content requiring pure memorization, such as drug names. Student surveys indicated that most students found quizzes helpful or were impartial to the quizzes. The quizzes were an incentive for more than half of the class to attend recitation. Quizzes increased student attendance and more than half of the class believed quizzes should be continued in the course.

Submission Category: Leadership

Submission Type: Evaluative Study

Session-Board Number: 5b-282

Poster Title: Evaluation of curricular stress in doctor of pharmacy students and its impact on residency application

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Purpose: Pharmacy students are required to complete three to four years of didactic and experiential coursework before they are eligible to complete US practice licensure examinations. The Accreditation Council for Pharmacy Education requires programs to provide student services that facilitate the attainment of programmatic objectives, including services that address student stress and mental health. The purpose of this study was to investigate the relationship between pharmacy students' perceptions of stress during their didactic education and their desire to seek a postgraduate pharmacy residency.

Methods: Current first-year through fourth-year students at D'Youville College School of Pharmacy completed an anonymous online questionnaire that collected demographic information and assessed their perceived degree of stress before, during, and after didactic curricular assessments such as quizzes, examinations, projects, and presentations. Student demographic data included age, gender, duration of post-secondary education, and degree of interest in pursuing a post-graduate pharmacy residency. Students' degree of stress was rated on a continuous scale ranging from zero to 100, with zero being the minimum and 100 being the maximum level of stress experienced. Data was collected for each type of curricular assessment. Approval was granted by the D'Youville College Institutional Review Board prior to the commencement of this research and informed consent was obtained for all participants.

Results: Of 279 possible participants, 250 students completed the questionnaire, yielding a 90 percent response rate. Higher student-reported grade point averages were associated with a significantly higher degree of interest in pursuing a post-graduate pharmacy residency (P equals 0.019). Students reported their mean baseline degree of stress as 60.7 for any given time

during the academic year. The mean degree of stress one week before a scheduled exam, project, or presentation was 59.0. The mean time prior to quizzes, examinations, and projects or presentations that students reported feeling stressed was approximately two days, five days, and four days, respectively. The mean degree of stress when presented with quizzes, examinations, and projects or presentations was 49.8, 74.1, and 60.1, respectively. The mean degree of stress from the time of completing a curricular assessment and subsequently receiving a grade for that assessment was 42.9 for quizzes, 59.0 for examinations, and 37.6 for projects and presentations. Didactic course coordinators reported disseminating assessment scores to students approximately seven days following assessment completion regardless of assessment type. Preliminary analyses did not demonstrate any statistically significant correlations between student- reported curricular stress and degree of interest in pursuing a post-graduate pharmacy residency.

Conclusion: Students who reported higher grade point averages during their didactic pharmacy education reported a higher degree of interest in pursuing post-graduate pharmacy residencies. No significant differences were found upon comparison of the mean degree of student stress and the degree of interest in pursuing a post-graduate pharmacy residency. Further analyses should be conducted to identify subgroups within the population to determine if multiple factors may elucidate other significant relationships. Limitations of this study include self-reported data points; exclusion of assessments conducted during introductory and advanced pharmacy practice experiences; exclusion of longitudinal assessments; and exclusion of assessments conducted during elective coursework.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Evaluative Study

Session-Board Number: 5b-283

Poster Title: Impact of vacations on professional pharmacy students' perceived stress levels

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Purpose: Pharmacy and other health professions claim some of the highest potential stressors in the current job market. Students in professional schools across the United States face stressors every week inside and outside of the classroom. The primary endpoint of this study is to examine if taking a vacation positively impacts professional pharmacy students by reducing their overall perceived stress level during the professional pharmacy rigor. Secondary endpoints include determining if the number of vacations or the distance away from their current residence has any bearing on perceived stress, as well as if the students were 'unplugged' while on their vacation.

Methods: This survey was approved by the university's Institutional Review Board. A link to an anonymous questionnaire evaluating the perceived stress levels of professional pharmacy students and vacations taken was emailed to all currently enrolled students (n=377) in the School of Pharmacy (SOP). The first 10 questions of the questionnaire were the Perceived Stress Scale-10 (PSS-10), a questionnaire designed to place a numerical score associated with a person's stress level at the time of questioning. 15 other questions were asked to assess if students had taken a vacation or traveled to a professional pharmacy meeting in the previous year. If the students did go on either trip, they were prompted to answer questions evaluating the number of trips taken, anxiety level during their trip, distance away from their current residence, and if they checked their emails, calendar, or grades while on their trip. Each students' PSS-10 score was calculated and t-tests were used to determine statistical significance.

Results: 115 students completed the survey during the two-week open window. The perceived stress levels of students who did not take a vacation was not statistically higher than those that did take a trip during the previous year ($p = 0.1448$). Students who went on two or more vacations reported less stress than those students who only took one vacation ($p = 0.00056$). The distance away during the vacation and 'unplugging' while away did not demonstrate less perceived stress in the professional pharmacy students ($p = 0.3625$ and $p = 0.4556$, respectively).

Conclusion: Taking vacations during a professional pharmacy program, including trips to professional pharmacy meetings, may help to alleviate stress in pharmacy students. Taking more than one trip per year was shown to significantly reduce stress levels in pharmacy students at the SOP. Further studies could be done to include correlations with grade point averages, work outside of school, or family stressors.

Submission Category: General Clinical Practice

Submission Type: Case Report

Session-Board Number: 5b-284

Poster Title: Prolonged hypocalcemia in a patient with reduced renal function post denosumab injection

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Purpose: Denosumab (Xgeva), a RANKL inhibitor, is FDA-approved for the prevention of skeletal-related events in patients with bone metastases from solid tumors. Hypocalcemia is a well-known adverse effect of denosumab therapy, and appears to be of greater risk for patients with renal impairment. However, there are currently no dosage reductions recommended for patients with reduced renal function. This report describes the case of a 57-year-old female with a history of stage IV breast cancer (ER/PR positive, HER2 positive) with bone metastases who developed prolonged, denosumab-induced hypocalcemia.

Upon diagnosis of bone metastases, the patient had reduced renal function, with a creatinine clearance ranging from 50-60mL/min. She was initially started on zoledronic acid, but one month later her renal function further declined, and she was switched to denosumab 120mg subcutaneously every month. Thirty days post injection, the patient developed prolonged hypocalcemia with total serum calcium concentrations reaching 6.5mg/dL and ionized calcium reaching 0.94mmol/L. Clinical manifestations included facial tingling and a slightly prolonged QTc interval. The hypocalcemia persisted for over 3 months despite aggressive vitamin D and oral/IV calcium supplementation (35g of IV calcium gluconate required in total).

Growing literature demonstrates an increased incidence, duration, and severity of hypocalcemia in patients with renal impairment. Although the manufacturer recognizes that an increased risk exists in patients with renal dysfunction, only close monitoring of calcium and vitamin D levels and consideration for preemptive treatment is suggested. Dose reductions of denosumab are not currently recommended.

We recommend that all patients receiving denosumab obtain adequate treatment with calcium and vitamin D supplements throughout the duration of treatment to prevent the development of prolonged, severe hypocalcemia. Clinicians should consider that denosumab therapy poses

an increased risk of hypocalcemia in patients with reduced renal function. However, further studies are required to determine whether dose reductions mitigate this risk.

Methods:

Results:

Conclusion:

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-285

Poster Title: Characterization of stress management methods of doctor of pharmacy students

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Purpose: It may be beneficial that students learn how to cope with stress in order to perform successfully in pharmacy school, and ultimately in their future careers. The course load in a Doctor of Pharmacy program may be more intense than most students have previously experienced. With the addition of experiential training, pharmacy students are under extra pressure to efficiently manage their time and achieve balance between social life, family time, and academic performance. This study aims to identify the most common stressors experienced by student pharmacists and the methods they use to manage stress.

Methods: The institutional review board approved an email containing a link to an electronic survey that was presented to first-, second-, and third-professional year pharmacy students (total of 218 pharmacy students) at D'Youville College School of Pharmacy. The survey contained a range of both Likert-type and free response questions to assess demographic information, sources of stress, and stress management methods. At the end of the survey, students were also asked to answer questions based on the Cohen Perceived Stress Scale (PSS), an established and accepted form of gauging psychological stress. All data analysis was performed utilizing descriptive statistics with Qualtrics Survey Solutions and Microsoft Excel.

Results: A total of 86 students responded to the survey, giving a response rate of 39.45 percent. However, 3 respondents did not complete the survey (96.51 percent completion rate). Cohen PSS scores were similar between professional years and genders, with an overall mean of 21.01 out of a possible total of 36. For reference purposes, normative data gathered in 2009 shows a US average PSS of 15.21. The majority of respondents felt what they experienced was either

average stress (30/83; 36.1 percent) or above-average stress (38/83; 47.8 percent). When asked if they were comfortable at their current level of stress, 40 percent of respondents replied 'yes', while another 40 percent replied 'no' and the remaining 20 percent were unsure. The most common stressors observed were related to academics, such as exams (mean stress on scale of 1-5: 4.48) or grades (mean stress: 4.14), with financial concerns (mean stress: 3.72) also ranking quite high amongst respondents. The highest-ranked stress management methods were sleeping (mean ranking: 3.27), eating (mean ranking: 4.02), socializing (mean ranking: 4.07), and music (mean ranking: 4.30). Furthermore, when comparing between different variables such as professional year or gender, the top stressors and coping mechanisms remained consistent.

Conclusion: The results of our study suggest that student pharmacists may work under greater than average levels of stress based on a comparison of their Cohen scores to normative US data. While we were unable to compare actual academic performance to perceived stress, the most prevalent stressors seen in the survey results were related to academic performance. These results show that, as a whole, the students in this pharmacy program may have consistently elevated stress due to increased academic demands, and that only 40 percent of respondents felt comfortable at their current stress level.

Submission Category: Leadership

Submission Type: Evaluative Study

Session-Board Number: 5b-286

Poster Title: Assessing the perceived efficacy of an elective (PHRD 5065 Clinical Pharmacy Career Development) on the success of pharmacy students pursuing post-graduate residency training

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Purpose: Attaining a post-graduate residency position is becoming more difficult due to an increasing number of applicants versus residency positions. Our School of Pharmacy (SOP) offers an elective course to expose students to various clinical careers available after completing a residency. This course guides students on how to become a competitive candidate by writing CVs, letters of intent, and also guiding students through the Midyear experience and interviewing processes. The purpose of this study was to assess students' perceived preparedness toward post-graduate residency training after taking this elective and the likelihood of obtaining a residency position.

Methods: This survey was approved by the university's Institutional Review Board. A survey of 18 questions was emailed to a total of 63 alumni who participated in the elective course from 2011 to 2014. The survey was emailed using each student's personal email address that was provided to the SOP for post-graduate contact. The survey asked multiple choice and open-ended questions pertaining to feelings of preparedness on topics such as writing a CV, letter of intent, and the residency application process, as well as their success in the PGY1 application process, including number of applications submitted and interviews attained. The multiple choice portion used a Likert scale with 1 corresponding to not at all helpful and 5 being extremely helpful. Students were given approximately 1.5 weeks to complete the survey. The data were collected from the completed survey, compiled, and analyzed.

Results: The data collected were reported using descriptive statistics. Among the 63 students that were emailed the survey, 40 students voluntarily participated in the survey, two of the emails were undeliverable, and 21 students did not respond to the request. Of the 40 students that participated in the survey, 24 students (60%) applied for a PGY1 residency and of those students 20 (83.3%) were successful in the first match. A total of 22 (62.50%) students that applied for a PGY1 position felt very prepared or extremely prepared in composing CV after the lecture and feedback provided. 83% of students felt the mock interview exercise improved their interviewing skills, and 70% of those felt very confident during the interviewing process. Approximately 67% of all students who applied for a residency would recommend this class to others who are interested in obtaining a residency position. According the National Match website, the match rate from 2012 to 2015 is approximately 64%, while students that complete this course have a match rate of 83%.

Conclusion: Overall, it appears that students feel the PHRD 5065 elective course has positively impacted their experience in the residency application process. Students that applied for a residency felt the course benefited them in preparing their CVs, letters of intent, as well as for the interview process. Although this is a small sample size, alumni that complete this elective feel they have a competitive advantage in the application process and have a higher match rate than the national average. It is possible that other schools of pharmacy could benefit from a similar elective course.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-287

Poster Title: Appropriate use of ondansetron in the emergency department

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Purpose: Several randomized controlled trials show that the incidence of nausea and vomiting (N/V) following opioid administration is very low, however, prophylactic ondansetron administration immediately preceding an opioid continues to be common practice in the emergency department (ED). Indications for the use of ondansetron include prevention of N/V associated with chemotherapy or radiation, and post-operative N/V; however, no indication exists for the prophylaxis of opioid-induced nausea and vomiting (OINV). Due to lack of an approved FDA indication for OINV the appropriate strength is also unclear. The purpose of this study was to evaluate the use of ondansetron in the ED.

Methods: Between December 1st and December 31st of 2015, all patients that received ondansetron were reviewed retrospectively to determine appropriate use. Appropriate use was defined as chart documentation of N/V during ED admission before administration of ondansetron, receipt of ondansetron at least an hour after opioid administration, or ondansetron administration after patient received an opioid and became nauseated. Patient's that had inappropriate use of ondansetron were those with no known documentation of N/V while receiving both an opioid and ondansetron during ED admission. Other outcomes explored included: differences in prescribing habits of ondansetron among four physicians, the strength of ondansetron administered to the improper use group, and the differences in hospital costs among different strengths of ondansetron.

Results: Of the 506 patients reviewed in the study, 261 (52%) received ondansetron appropriately while improper use occurred in the other 245 (48%) patients. There were a total of eight instances where patients did not meet the criteria for either category, five of which were given ondansetron with ketorolac and three of which had no documentation of N/V or narcotic administration. These eight patients were therefore placed in the improper use group.

Upon examination of the strength of ondansetron administered to the improper use group, 44% of patients received a 4 milligram dose whereas 56% received an 8 milligram dose. The difference in hospital cost for both groups was analyzed and found to be greater in the patients that received the larger ondansetron dose, with intravenous administration costing more than oral.

Conclusion: This study found that improper use of ondansetron is common in our department and leads to increased hospital costs. Further education will be done in our ED to ensure that physicians have a higher regard for pharmacovigilance. In addition, the role for ondansetron and the appropriate dose when used in this setting requires further safety and efficacy studies before our department establishes a protocol for its use.

Submission Category: Pediatrics

Submission Type: Case Report

Session-Board Number: 5b-288

Poster Title: Dobutamine-induced rash in a critically ill full-term neonate: A case report

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Purpose: A full-term, male neonate weighing 2970g was admitted to the neonatal intensive care unit (NICU) from the delivery room for respiratory distress, dysmorphic features, and possible cardiac malformation. At delivery, the infant was noticed to have elongated fingers and toes, pigeon chest, and low-set ears. A chest x-ray performed in the NICU revealed cardiomegaly and an echocardiogram revealed ductal-dependent pulmonary blood flow through a small patent ductus arteriosus as well as regurgitation at both the mitral and tricuspid valves. Shortly after birth, the infant was intubated for respiratory support. Around 14 hours of life, a continuous infusion of dobutamine prepared in dextrose was initiated at 3mcg/kg/min for mean arterial pressure (MAP) measurements of 30-36mmHg. Approximately 30 minutes after the start of the infusion, nursing staff reported the emergence of skin irritation starting on the face, which rapidly progressed to a centrally-clearing erythematous rash with serpiginous borders on the infant's neck, head, trunk, and back. Accompanying the rash was an elevation in heart rate from 130-140 bpm to 160-170 bpm. The dobutamine infusion was infused for approximately 2.5 hours and then discontinued. Approximately 45 minutes after discontinuation, the rash cleared. Other medications given around the time of the rash included ampicillin and gentamicin, an alprostadil infusion to maintain the ductus arteriosus, and a fentanyl infusion with intermittent vecuronium doses for sedation and paralysis. One hour after discontinuation, the dobutamine infusion was resumed at 3mcg/kg/min for MAP measurements around 34mmHg. No increase in MAP or was observed after one hour, so the dobutamine infusion was increased to 5mcg/kg/min. At this time the rash returned and the infant's MAP continued to decrease. The dobutamine infusion was stopped and two boluses of normal saline were given, followed by a continuous infusion of dopamine at 5mcg/kg/min. The infant's MAP improved and the rash again resolved upon discontinuation of the dobutamine

infusion. The infant was not re-challenged with dobutamine again and the rash did not return for the remainder of his NICU stay.

This appears to be a case of a medication allergy to an intravenous dobutamine infusion prepared in dextrose in a full-term neonate. Although rare, cases of rash following dobutamine infusions have been reported. These reactions are usually accompanied by eosinophilia and bronchospasm and are thought to be caused by sulfite preservatives contained in the formulation. However, to our knowledge, observation of this type of reaction has been limited to the adult population and has not been reported in neonates. Unlike previous reports, the patient in question did not present with eosinophilia at the time the rash was observed. There were also no signs of bronchospasm reported at the time of the rash, however due to his intubation and mechanical ventilation, this may have been difficult to observe. Other potential causes of the observed rash were considered including other medications, as several medications were given around the time of the initial rash, as well as the possibility that the rash was rather a vasomotor reaction resulting from his critical illness. However, the fact that the rash first appeared and dissipated within one hour of initiation and discontinuation of the first infusion and subsequently re-emerged and dissipated with initiation and discontinuation when the patient was re-challenged with the medication strongly suggests dobutamine to the be cause. This case displays a unique case of what appears to be a drug-induced reaction to a medication in a population where allergic drug reactions are rare events.

Methods:

Results:

Conclusion:

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Evaluative Study

Session-Board Number: 5b-289

Poster Title: Pharmacy students' perception of taking Drug-induced Diseases course before versus after advanced pharmacy practice experience rotations

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Sum Lam

Purpose: Our college has recently revised the Doctor of Pharmacy (Pharm.D.) curriculum which requires pharmacy students to complete all didactic courses before starting Advanced Pharmacy Practice Experience (APPE) rotations. In Spring 2016, 460 students were enrolled in Drug-induced Diseases (DID) course: cohort A (n equals 218) took the course BEFORE starting rotations and cohort B (n equals 242) took the course AFTER completing rotations. Cohort C (n equals 91) were at APPE rotations and took the course in Spring 2015 BEFORE starting rotations. This study evaluated students' perception of taking the course before starting or after completing APPE rotations.

Methods: A standardized survey, with language specific to each cohort, was sent out to 551 students via SurveyMonkey after the final exam for voluntary participation. Students rated course difficulty using a scale of 1 to 10 [1 – Easiest, 10 – Hardest] and their perception based on taking the course the way it was assigned to them, either before starting or after completing rotations using a scale of 1 to 10 [1 – Hated it, 10 – Loved it]. Self-reported course grades and factors contributing to course grades were also collected. Additional comments related to the study objective were recorded. Finalized course grades for cohorts A and B were provided by the course coordinator, and were used as an indicator of actual academic performance. Student's t-test was used for data analysis for rating scores and course grades.

Results: Of 551 students, 12 percent completed the survey (cohort A equals 35, cohort B equals 24, cohort C equals 7). Students preferred to take the course before starting rotations [(9 plus minus 1.3) cohort C versus (7.0 plus minus 2.1) cohort B; P equals 0.007]. Cohort A reported the preference score as (7.9 plus minus 2.0). Students who took the course after completing

rotations rated the course to be easier [(4.4 plus minus 1.9) cohort B versus (5.4 plus minus 1.9) cohort A; P equals 0.03]. Cohort C reported the course difficulty score as (5.4 plus minus 2.6). Based on self-reported course grades, cohort B anticipated higher course grades than cohort A; [(86.5 plus minus 4.1) versus (83.6 plus minus 5.5), respectively; P equals 0.01]. However, there is no significant difference in actual academic performance regardless whether the students took the course before or after the rotations [(82 plus minus 7.0) cohort A versus (83 plus minus 7.3) cohort B; P greater than 0.05]. The most beneficial topics to review were drug-induced cardiovascular disorders (cohorts A and C) and drug-induced fluids and electrolyte disorders (cohort B).

Conclusion: Doctor of pharmacy students prefer taking the DID course before starting APPE rotations; however students found the course easier after completing rotations. There is no significant difference in actual academic performance in the two cohorts that completed Spring 2016 course.

Submission Category: General Clinical Practice

Submission Type: Case Report

Session-Board Number: 5b-290

Poster Title: The Necessity for Pharmacists to Review Patient Cases That Involve Patients on Multiple Medications

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Purpose: This case report demonstrates the need for pharmacists to review patient cases that involve patients on multiple medications. GG is a 71 year old female who presented to the ED with a chief complaint of abdominal pain radiating to her back. She states that she had similar pain eight months ago, for which she was admitted to the hospital with gallstone-induced pancreatitis. During her prior stay, a cholecystectomy was postponed when the patient's stone passed and her symptoms resolved. Her past medical history is significant for: Asthma, rheumatoid arthritis (status-post total right shoulder replacement), breast cancer status-post lumpectomy (1997), gallstone-induced pancreatitis, bilateral cataracts, dilated cardiomyopathy, gastroesophageal reflux disease, cervical herniated disk, hypothyroidism, hyperlipidemia, hypertension, myocarditis, urinary incontinence, and insomnia. Her home medications include: docusate, levothyroxine, fexofenadine, captopril, montelukast, singulair, flovent, verapamil, simvastatin, colchicine, hydroxychloroquine, spironolactone, omeprazole, folic acid, movantik and temazepam. In the hospital, captopril, verapamil, spironolactone, and movantik were held. The patient was placed on a regimen of ursodiol 300 mg twice daily with meals. All other medications or an equivalent that was on the formulary were continued. Her heart rate varied from 74-88 bpm, and blood pressure fluctuates from 106-115/65-68. The patient was normotensive, which is consistent with her captopril, verapamil, and spironolactone being held. In the ED, she was immediately made NPO and labs were taken. Labs were significant for elevated ALT and AST as well as an elevated serum lipase level of 5920 U/L. All other medications or an equivalent that was on the formulary were continued. The patient's abdominal and pelvic CT were consistent in displaying cholelithiasis with mild nonspecific gallbladder distention significant for pancreatitis, while the hepatobiliary scan ruled out acute cholecystitis. During this admission, the general surgeon determined that the patient required a cholecystectomy which the patient refused, claiming she had not yet healed from her shoulder replacement and thus, her body was not ready to handle another procedure. The patient also refused ERCP (endoscopic retrograde cholangiopancreatography). Her serum lipase level

significantly decreased to 131 U/L within two days in the hospital, and she was scheduled for a cholecystectomy for a date she agreed to. The patient was told she could re-start all her medications that she hadn't been taking in the hospital. The patient's medication regimen was reviewed by pharmacy, with a couple of problems being immediately noted. After a series of questions that were presented to the patient, several interventions were made. The patient did not have an outpatient cardiologist; her medication regimen was made primarily by her primary care physician. The patient did not have an indication for the following medications: verapamil, colchicine, and movantik. The patient did not any concomitant atrial fibrillation or angina, and her history of dilated cardiomyopathy and possible left ventricular dysfunction was also contraindicated with the use of verapamil, which was then discontinued. According to the patient, her colchicine was being used for her rheumatoid arthritis. After researching the possible off-label indication, the results were weak supporting its use in rheumatoid arthritis, and was thus discontinued. Also, the patient was not taking any opiates, thus the movantik was deemed unnecessary. Furthermore, the use of ace-inhibitors is implicated in the onset of acute pancreatitis, with the highest incidence being tied to captopril and enalapril. The patient was switched from captopril to an equivalent dose of lisinopril, and carvedilol was initiated for dilated cardiomyopathy. The spironolactone was held due to the patient's blood pressure, and a cardiologist follow-up was made for one week after discharge. Through medication therapy management, pharmacists have the ability to identify potential problems in therapy and intervene to allow for optimal patient outcomes.

Methods:

Results:

Conclusion:

Submission Category: Pediatrics

Submission Type: Descriptive Report

Session-Board Number: 5b-291

Poster Title: Hypertonic saline for the treatment of bronchiolitis in infants and children: The saga continues

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Purpose: Bronchiolitis is the leading cause of hospitalizations in children. The American Academy of Pediatrics (AAP) recommends nebulized hypertonic saline (HS) as the sole therapy in bronchiolitis. In 2016, an extensive review of 22 studies (2682 children) detailed the role of HS. In these trials, HS resulted in improvement in clinical severity score (CSS) and reduced rates of admissions from the emergency department, while data on length of stay (LOS) reduction were equivocal. Since then, new data and analyses have questioned the role of HS in bronchiolitis. This paper will assess whether hypertonic saline's niche in bronchiolitis has changed.

Methods: Extensive literature searches using PubMed were conducted to gather the most recent studies (January 1, 2016 – December 31, 2016) that included the use of hypertonic saline for the treatment of bronchiolitis in children. We excluded studies that were previously analyzed by the review published in 2016. Articles that were determined to be valid and well supported by evidence were chosen for further evaluation. Our aim was to examine whether the benefits of HS, including its impact on LOS, efficacy, and safety continue to be supported by these new data. Two pharmacy students conducted the literature searches and one clinical pharmacist with advanced training in pediatric pharmacotherapy evaluated the literature for validity and content. Nine articles were initially selected to examine the role of HS in children with bronchiolitis. After careful review, five articles were excluded due to doubtful methodology, lack of evidence and limitations. The four remaining articles had proper methodology to evaluate the evidence for efficacy and adverse effects of hypertonic saline in bronchiolitis.

Results: Three of four studies tested the impact of HS on CSS. Study 1, examining Indian children, showed a significant decrease in CSS for patients treated with 3 percent HS vs. normal saline (NS) (p equals 0.001). Study 2 treated young children with 3 percent, 7 percent HS or NS in combination with salbumatol. All saline preparations reduced CSS from baseline to 24 hours (p equals 0.001) with no differences between them (p greater than 0.16). Study 3 found no reduction in CSS at 3 days between 3 percent HS and NS (p equals 0.86) (Baseline data omitted). LOS was examined in all studies. Study 1 showed a 1.5-day reduction in LOS in children less than 25 months of age (p equals 0.001). Study 2 found no reduction in LOS in children less than two years (p equals 0.76). Studies 3 and 4 found no significant reduction in LOS in infants less than one year of age (p equals 0.73 and 0.747, respectively). Study 2 deemed 3 percent HS and NS safe, with the exception of two cases of temporary bronchospasms associated with 7 percent HS. Study 3 found a higher incidence of cough and rhinorrhea with 3 percent HS.

Conclusion: Based on our review, two studies continue to support the efficacy of HS in bronchiolitis, while one that failed to show improvement lacked baseline data. LOS was reduced in one study, but not in two studies that restricted enrollment to children less than one year of age. We question whether a prolonged LOS in this age group relates more to severity of illness rather than ineffectiveness of HS. Overall, HS is safe. Therefore, the role of HS in bronchiolitis remains unchanged. Its use is beneficial in reducing bronchiolitis severity scores; however, its ability to reduce LOS remains unclear.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-292

Poster Title: Protecting the elderly: Assessment of community pharmacists' application of the 2015-updated Beers Criteria in underserved neighborhoods of New York, New York

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Purpose: The American Geriatrics Society (AGS) Beers Criteria for Potentially Inappropriate Medication Use in Older Adults is a list of recommendations intended to guide healthcare practitioners in providing safe medications in the elderly population. The purpose of this study was to assess community pharmacists' application of the 2015 updated Beers Criteria in the underserved minority neighborhoods of Central Harlem and Washington Heights/Inwood in New York, New York. The secondary objective was to compare the application of the 2015 updated Beers List among chain and independent community pharmacies.

Methods: Questionnaires were designed to gather relevant pharmacist and pharmacy characteristics, and to assess the pharmacists' exposure to and application of the 2015-updated Beers Criteria. Background information collected included pharmacy classification (chain or independent), pharmacist title, average prescription volume, and percentage of patients over 65 years of age. Application of the Beers List was assessed by asking whether the pharmacist read the 2015 updates, used an automated computer system to identify drug errors, and/or utilized drug information resources in addition to those provided by the pharmacy. Data on the frequency of contacting prescribers to make age-related interventions, and frequency of referring to Beers Criteria or similar resources were also compiled. Investigators approached pharmacists in Central Harlem and Washington Heights community pharmacies to complete the questionnaire. The questionnaire took each pharmacist approximately two minutes to complete. If multiple pharmacists were on duty at one pharmacy, both pharmacists were asked to complete a separate copy of the questionnaire. Pharmacists were excluded from the study if they exhibited reluctance to participate due to reasons such as time constraints. All statistics

used were for descriptive purposes only. This study was approved by the institutional review board.

Results: Questionnaires were collected from a total of 26 pharmacists working at 22 different pharmacies (12 at chain pharmacies and 14 at independent pharmacies). The majority of participating pharmacists (57 percent) had not read the 2015 updated Beers Criteria, and 50 percent claimed to never refer to the Beers Criteria or similar references in order to make age-related interventions. All pharmacies employed an automated computer system which flagged potential drug-drug or age-drug interactions, and 76.9 percent of pharmacists reported use of an additional drug information resources. There are no recognizable differences of Beers Criteria awareness existing between the chain and independent pharmacies; however, it appears that pharmacists at independent pharmacies contact prescribers more frequently to perform age-related interventions than pharmacists at chain pharmacies (91.6 percent perform 0-5 calls daily, 8.3 percent perform 6 or more calls daily vs 57.1 percent perform 0-5 calls daily, 42.9 percent perform 6 or more calls daily). There were no discernible patterns in Beers Criteria awareness and application based on the factors of pharmacist title, average prescription volume, and percentage of patients over 65 years of age.

Conclusion: The elderly population is at an increased risk of medication-related adverse events. Among community pharmacists, a knowledge gap seems to be present regarding the 2015-updated Beers Criteria. An increased need for pharmacist education is warranted in order to provide optimal medication safety to the elderly population.

Submission Category: Pediatrics

Submission Type: Descriptive Report

Session-Board Number: 5b-293

Poster Title: Pharmacist participation on pediatric emergency response teams

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Purpose: Pharmacists play a crucial role on the pediatric emergency response team by providing medication recommendations, obtaining requested medications, determining proper medication doses, and preparing medications for use. Pharmacist involvement on pediatric emergency response teams may result in fewer adverse drug reactions and medication errors along with increased compliance with advanced cardiac life support guidelines. This study intended to characterize the pediatric pharmacist's role on the pediatric emergency response team at an academic medical center.

Methods: Pediatric pharmacists at Golisano Children's Hospital at Strong Memorial Hospital routinely document their participation in pediatric medical and traumatic emergencies for quality improvement purposes. Data from standardized code documentation sheets for the years 2012-2016 were interpreted to characterize the pharmacist's role in pediatric emergency response teams using descriptive statistics. Information included on code documentation sheets were as follows: date, time, age, sex, location of emergency, number of pharmacists responding, patient diagnosis prompting the code, diagnosis corresponding to medication administration, medication name, total number of medications prepared, and total time spent by the pharmacist.

Results: Pediatric pharmacists at Golisano Children's Hospital at Strong Memorial Hospital documented 390 code responses for the years 2012-2016. The majority occurred during the day shift (54.6 percent) compared to the evening (41.8 percent) and overnight shifts (3.6 percent). The mean age was 120 days in those less than 1 year old and 8 years in those greater than or equal to 1 year old. The most common locations were the pediatric emergency (41.8

percent), trauma (24.8 percent), and intensive care units (12.3 percent). One or two pharmacists responded to a code 88.1 percent of the time. The most frequent diagnoses prompting a code were pain/sedation (29.5 percent), respiratory arrest requiring rapid sequence intubation (28.5 percent), and cardiac arrest (24.5 percent). Medications were administered 77.7 percent of the time, most commonly for pain/sedation (37.6 percent), respiratory arrest requiring rapid sequence intubation (35.0 percent) and cardiac arrest (30.7 percent). Benzodiazepines (34.9 percent), opioids (33.3 percent), and epinephrine (32.2 percent) were administered the most frequently. Four or less medications were given 83.8 percent of the time, with two medications being most common at 29.4 percent of the time. The average time spent by a pharmacist at each code was 40 minutes.

Conclusion: Pediatric pharmacists at Golisano Children's Hospital at Strong Memorial Hospital responded to 390 documented codes during the five year period. Medications were required a majority of the time, which may provide significant opportunities for pediatric pharmacists to have an impact on direct patient care during code situations.

Submission Category: I.V. Therapy/ Infusion Devices/ Home Care

Submission Type: Evaluative Study

Session-Board Number: 5b-294

Poster Title: Y-Site Compatibility of N-acetylcysteine and Amiodarone

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Purpose: The combination N-acetylcysteine and amiodarone was used in an institutional review board (IRB) protocol for the prevention of atrial fibrillation after thoracic surgery. However, studies evaluating stability were not conducted. The purpose of this study was to determine the Y-site compatibility of amiodarone 1.8mg/ml and N-acetylcysteine (NAC) 2.5 mg/ml (NAC 50mg/kg/day up to max dose 5 gm added to 200ml D5W). Both are continuous infusions.

Methods: Prior to assessing particle changes, the apparatus was calibrated using dispersions of spherical particles of known sizes between 10 µm and 25 µm. These standard particles were dispersed in particle-free water. The USP reference standard was a particle count suspension that contains 15 µm polystyrene spheres in aqueous suspension. The acceptable value for counts at 10 µm is between 3330 and 4110 counts/mL. The measured value was 3758 counts/mL. USP < 788> 39NF3 Method 1 was utilized to check that the environment is suitable for test, that the glassware is properly cleaned, and that the water to be used is particle-free. The particulate matter in five samples of particle-free water, each of 5 mL should be less than 25 for the number of particles of 10 mm or greater size for the combined 25 mL. This indicates that the precautions taken for the test were sufficient. Amiodarone Hydrochloride Injection (900mg/ 18 mL) was diluted with 5% dextrose in water (D5W) to a final concentration of 1.8 mg/mL. Acetylcysteine Injection (6g/ 30mL) was diluted with D5W to a final concentration of 2.5 mg/mL. Initial solution appearances such as color, clarity, and particulates were observed and documented. Diluted solutions were mixed together in a PAB Mixing container (B Braun) and evaluated using visual eye and particle-counting assessment upon mixing and again at 2 and 4 hours after mixing.

Results: Initial combination of acetylcysteine and amiodarone resulted in an immediate effervescent and foam adherence to the side of the vessel. The cumulative counts did not exceed 6000 per container equal to or greater than 10 mm and 600 per container equal to or greater than 25 mm for pre-test, amiodarone in D5W, and NAC in D5W. However amiodarone 1.8mg/ml + NAC 2.5 mg/ml (in D5W) exceeded the limits at baseline, 2 hours and 4 hours. An additional sample of Amiodarone 1.8 mg/ml and NAC 25 mg/ml, an increase in 10-fold concentration, was analyzed and exceeded the limits at baseline, 2 hours, and 4 hours. Thus, co-infusion of amiodarone and acetylcysteine via Y-site is considered incompatible.

Conclusion: Acetylcysteine and amiodarone was placed in D5W to determine the size and number of particles at 0, 2 and 4 hours, respectively. The combination of amiodarone 1.8 mg/ml and acetylcysteine (2.5 mg/ml and 25 mg/ml) in D5W exceeded the limits of particles during baseline, 2 hours and 4 hours of the test. Thus, co-infusion of amiodarone and acetylcysteine via Y-site is considered incompatible.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Evaluative Study

Session-Board Number: 5b-295

Poster Title: A single-center retrospective analysis of the effect of emergency department pharmacists on the time to first dose of antibiotics in sepsis.

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Purpose: The primary endpoint was to determine the impact of an emergency department (ED) pharmacist on the time from physician assignment to administration of the first dose of piperacillin-tazobactam in patients admitted through the emergency department with a diagnosis of sepsis or systemic inflammatory response syndrome (SIRS). Secondary endpoints included assessing the impact of adding an emergency department pharmacist on the time between order placement and verification, the impact of adding piperacillin-tazobactam to the emergency department automated medication dispensing system (AMDS) on the time to administration of piperacillin-tazobactam, and the impact of these interventions on the patients' length of stay.

Methods: This quality improvement project was a retrospective chart review examining three distinct time periods: prior to addition of an ED pharmacist and addition of piperacillin-tazobactam to the AMDS (April-June 2014); after the addition of an ED pharmacist, but before addition of piperacillin-tazobactam to the AMDS (October-December 2015); and after the addition of an ED pharmacist and addition of piperacillin-tazobactam to the AMDS (May-July 2016). The following data were collected for patients admitted with a diagnosis of sepsis or SIRS who received a dose of piperacillin-tazobactam in the ED: age, sex, admit date, discharge date, time physician assigned to patient, time of initial piperacillin-tazobactam order placement, time of order verification, time of dispense, time of administration, acuity of admission.

Results: The number of charts meeting inclusion criteria from each of the selected date ranges were 26, 34, and 13 from 2014, 2015, and 2016, respectively. The average age and sex distribution for each group were as follows: 52 and 46.15% male (2014), 49 and 44.12% male (2015), 43 and 46.15% male (2016). The average time in minutes from physician assignment to administration trended up from 236.7 in 2014, to 259.2 in 2015, to 269.7 in 2016. The average time in minutes from order placement to verification trended down from 21.5 to 7.2 to 6.15 minutes from 2014 to 2015 to 2016, respectively. The average time between order verification and administration decreased from 97 to 80 minutes with the addition of piperacillin-tazobactam to the ADMS. The average length of stay trended down from 8.34 days in 2014, to 6.64 days in 2015, to 5.15 days in 2016.

Conclusion: The average time from physician assignment to administration trended up despite a downward trend in the time between order placement and verification, and the time between verification and administration. The pharmacy factors that influence time to first dose of antibiotic administration improved after the addition of a clinical pharmacist in the ED and the addition of piperacillin-tazobactam, a common antibiotic used empirically in sepsis, to the ADMS in the ED.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 5b-296

Poster Title: Pharmacists' attitudes and practices regarding the tetanus, diptheria, and pertussis vaccination in pregnancy and surrounding newborns

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Purpose: The objective of this study was to evaluate pharmacists' understanding, attitudes, and practices surrounding the recommendations of the Advisory Committee on Immunization Practices (ACIP) regarding vaccination of pregnant females or individuals planning to come into close contact with infants with Tetanus, Diphtheria, Acellular Pertussis (Tdap), updated in 2013. In addition, we sought to identify barriers to implementing these recommendations in pregnant females.

Methods: The survey for this study was distributed electronically via Qualtrics® on April 12, 2016 to a random sample of 10,000 pharmacists across the United States and was closed on April 26, 2016.
The survey questions were modeled after a previously published study evaluating pharmacists' knowledge, attitudes, and practices regarding influenza vaccination in pregnant women. The modified survey had 27 questions that assessed three major areas; the role of the pharmacist in Tdap vaccination, perceived barriers to vaccination, and understanding of the Advisory Committee on Immunization Practices (ACIP) recommendation. The original survey was validated by authors of the previous study using convenience sampling. Our survey was similarly piloted among pharmacists in Buffalo, NY selected via convenience sampling, to check for face validity.
Survey participation was voluntary and anonymous and no personal identifiers were collected. As an incentive to complete the survey, participants were given the opportunity to provide their name and email address in order to be entered in a drawing for a 100 dollar VISA gift card. The D'Youville College Institutional Review Board approved the study.

Demographic characteristics were summarized using frequencies and percentages. Chi-square tests were used to test differences in responses by gender, year of graduation, and role in the pharmacy. McNemar's tests were used to measure the level of agreement in responses to outcomes of interest.

Results: A total of 225 pharmacists responded to the survey. Most respondents agreed that pharmacists should have a role vaccinating the public and individuals expecting to come into contact with a newborn against Tetanus, Diptheria, and Pertussis (88.5 percent and 86.9 percent) respectively, but only 77 percent agreed that pharmacists should have a role vaccinating pregnant women against Tdap (p equals less than 0.001). Numerous barriers to vaccinating pregnant women against Tdap were identified, with the highest number of respondents recognizing lack of insurance coverage, lack of interest in vaccination by patients, advice from patient's physicians, and liability concerns as barriers. Only 80.2 percent of respondents agreed that the Tdap vaccination is safe during pregnancy. When asked to respond to two case scenarios of pregnant women eligible for vaccination in their 29th and 31st weeks of pregnancy, only 22.5 percent and 30.6 percent respectively stated they would offer the vaccination. When asked to respond to a case scenario of a woman in her 21st week of pregnancy for whom the vaccination is not recommended, 17.3 percent said they would offer the vaccination.

Conclusion: Our survey suggests that while most pharmacists feel they should have a role in vaccinating pregnant women and those expecting to come into contact with a newborn against tetanus, diptheria, and pertussis, there are barriers to implementing this practice. Future efforts should focus on further evaluating identified gaps and developing programs for pharmacists emphasizing the significance of vaccinating these patients to reduce the burden of pertussis in infants.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 5b-297

Poster Title: Vancomycin vs. vancomycin-rifampin for the treatment of MRSA-associated acute pulmonary exacerbations of cystic fibrosis

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Purpose: Patients with cystic fibrosis (CF) experience recurrent acute pulmonary exacerbations (APEs). Methicillin-resistant Staphylococcus aureus (MRSA) colonization, a common cause of APEs, has increased from 9.2% in 2002 to 25.9% in 2014. Although the CF pulmonary guidelines do not make a recommendation regarding treatment of MRSA, vancomycin with and without rifampin has been used in this population, despite a lack of evidence. The purpose of this study was to compare the change in pulmonary function in patients having CF and MRSA colonization treated with either vancomycin monotherapy or vancomycin plus rifampin for an APE.

Methods: This retrospective cohort study analyzed patients with CF hospitalized for an APE between 5/1/2012 and 4/30/2014. Inclusion criteria were: aged 6-20 years; diagnosis of CF; admission diagnosis of an APE; colonization with MRSA in sputum; at least 3 sequential doses of vancomycin; at least 1 correct vancomycin trough; and, baseline and follow-up pulmonary function tests. Patients with multiple hospital admissions were included as separate patient encounters. Patients were divided into two cohorts: vancomycin monotherapy ("monotherapy group") and vancomycin plus rifampin ("dual therapy group"). The primary endpoint was the change in forced expiratory volume in 1 second (FEV1), and secondary endpoints were the change in forced vital capacity (FVC) and hospital length of stay (LOS). Statistical analysis was completed using SAS version 9.4. Continuous variables were compared using Student's t-test or Wilcoxon rank-sum test as appropriate, and categorical data were compared using the Fisher's exact or Chi-squared tests as appropriate. A p-value less than 0.05 was considered to be

statistically significant for all analyses. Normally distributed data was reported as mean +/- SD, and non-normally distributed data was reported as median (IQR).

Results: A total of 40 patient encounters met inclusion criteria: 25 patients received monotherapy and 15 patients received dual therapy. No statistically significant difference in demographics was found between the groups. Mean vancomycin dose (14.9 +/- 4.8 vs. 13.5 +/- 3 mg/kg; p = 0.3) and mean trough level (12.3 +/- 2.2 vs. 13.6 +/- 5 mg/L; p = 0.8) were similar between the monotherapy and dual therapy groups, respectively. Rifampin was dosed as 600 mg/day in one or two doses with a mean of 13.8 +/- 4.7 mg/kg/day. There was no difference in mean change in FEV1 (32.0 +/- 28.4 vs. 21.0 +/- 12.1%; p = 0.1) nor FVC (21.9 +/- 25.5 vs. 14.0 +/- 9.3%; p = 0.2) between the monotherapy and dual therapy groups, respectively. Median LOS [13 (11 – 14) vs. 13 (9 – 14) days; p = 0.6] and median time to readmission [82 (43 – 129) vs. 147 (78 – 219) day; p = 0.2] were similar between the monotherapy and dual therapy groups, respectively. No difference existed between mean change in minimum inhibitory concentration (MIC) between the monotherapy (0.4 +/- 0.9) and dual therapy (0.2 +/- 0.6) groups (p = 0.9).

Conclusion: The addition of rifampin to vancomycin for the treatment of an APE of CF had no significant impact on improvement in pulmonary function or LOS in this small, single-center study. This study was limited by a small sample size at a single center. Until further data is published regarding the role of combination vancomycin and rifampin for treatment of an APE of CF it's use should be discouraged.

Submission Category: Small and Rural Pharmacy Practice

Submission Type: Descriptive Report

Session-Board Number: 5b-298

Poster Title: Pharmacy interpretation and translation refugee services in the city of Buffalo

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Purpose: Refugees accessing the United States healthcare system have limited English language skills and health literacy. Refugee healthcare needs requires proper navigation and utilization of the healthcare system. Community pharmacies are the most accessible health service available to service them and can serve to treat medical conditions as well as refer to the proper healthcare professional. The purpose of this study is to evaluate the presence and utilization of interpretation and translation services available to refugee populations accessing community pharmacies in the Buffalo area and to assess the appropriateness of these services and identify any deficiencies and areas for improvement.

Methods: Pharmacies serving refugees were identified based on geographic areas (zip codes) where refugees reside. A 30-question survey consisting of both free response and multiple choice questions was developed. Content included pharmacy and refugee service demographics, types of interpreting and translation services, and the interest in and/or availability of other resources. The survey was administered prospectively to a pharmacist or technician via an on-site interview. Any questions about the survey or content being asked were answered and clarified on-site during the survey administration. The survey was administered from March 2, 2016 to March 18, 2016. Frequency data was analyzed with Microsoft Office Excel and SAS. Results were further categorized into the following sections: Demographics, Pharmacists Competency and Interest, Translation Services, and Interpretation Services.

Results: A total of 15 pharmacies were identified and administered surveys. One pharmacy that did not service refugees was excluded. The most common pharmacy was a large community chain (50 percent) or independent (43 percent). The majority of the pharmacies know some of their refugees' country of origin (93 percent). Most pharmacists thought their staff was knowledgeable about their translation/ interpretation services offered (86 percent); however, less than half were knowledgeable on finding outside resources (43 percent versus 57 percent). Pharmacists believe they moderately understand who refugees are and their differences (71 percent), but fewer had a moderate/lesser understanding of a refugee view of United States healthcare (57 percent). The translation services were through computer software, non-pharmacy software, and on-site personnel (79 percent, 71 percent, and 57 percent, respectively). Interpretation services were similar. Translation and interpretation services were described as adequate (71 percent and 82 percent, respectively), however most were 'rarely' used (87 percent and 71 percent, respectively).

Conclusion: While the availability of translation and interpretation services at pharmacies with a high refugee population may be sufficient, the utilization of these services may be lacking. Pharmacists could benefit from additional refugee healthcare training. There are multiple opportunities to improve upon current services to not only provide sufficient and correct medical information, but to aide in improved refugee healthcare.

Submission Category: Critical Care

Submission Type: Case Report

Session-Board Number: 5b-299

Poster Title: Symptomatic intracerebral hemorrhage after thrombolysis with tissue plasminogen activator in minor stroke: A case report

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Purpose: Current data supports the safety of intravenous tissue plasminogen activator (tPA) in patients with minor stroke symptoms, categorized as a National Institutes of Health Stroke Scale (NIHSS) score between 1 to 4 before thrombolytic therapy. In the RESUVAL Stroke Network study in France, a total of 1,043 patients had received tPA, and 170 of those patients had a NIHSS score of less than or equal to 4. Overall, no patient had experienced symptomatic intracerebral hemorrhage (SICH) in this study. Thus, the authors concluded that there is evidence of safety and potential benefit of tPA administration in minor stroke patients. However, we present a case of a 48 year-old male with comorbidities of hypertension, hyperlipidemia, heart failure, type II diabetes mellitus, and stage 3 chronic kidney disease (CKD) who presented to the emergency department for hypertensive emergency with decompensated heart failure with preserved ejection fraction (HFpEF) and was admitted to intensive care for intravenous vasodilator therapy. Late on the first night of his admission, a bedside nurse noticed signs of left facial droop. The patient was still able to follow commands, responded to questions, and demonstrated strong and equal grip in both upper extremities and strong and equal resistance in both lower extremities. A neurology assessment was performed with a CT head scan, found no signs of hemorrhage, and the patient was determined to have an NIHSS score of 2. The neurologist discussed with the patient the benefits and risks of tPA and received patient consent to begin tPA administration. The patient then received a tPA bolus of 9 mg given over one minute, followed by a one-hour tPA 81 mg infusion. Approximately four hours after the start of tPA, a bedside nurse noticed bleeding around his foley catheter. One hour later, the patient appeared to be disoriented and had symptoms of slight weakness in grip of the left upper extremity and a more pronounced left facial droop. The patient later had

intermittent episodes of vomiting and became aphasic, but was still able to follow commands. Follow-up CT scans were performed, which showed intracerebral hemorrhage with midline shift requiring external ventricular drain (EVD) and monitoring of intracerebral pressure. The patient was treated and monitored for approximately 7 weeks throughout his admission before being discharged to a nursing facility due to new disabilities. Assessment just before discharge reported improved alertness with intermittent orientation, dysarthria and dysphagia, minimal spontaneous speech, normal grip strength in upper extremities, and requirement of assistance to move to the edge of his bed. It should be noted that, previously, the patient was living independently without assistance before his hospital admission. Four days after discharge, the patient was readmitted to the hospital with acute kidney injury (AKI) and urosepsis, for which the patient received appropriate antibiotics based on culture results. Two days after his readmission, the patient developed significant decline in mental status, unarousable to voice or pain, with frequent episodes of apnea. His family was notified of his declining condition, and the patient expired the third day following. As this case report suggests, the benefit of tPA in minor stroke patients with an NIHSS score of 4 or less versus the risk for intracerebral hemorrhage (ICH) should be assessed very closely. Considering this patient's comorbidities, his history of hypertension and CKD with elevated serum creatinine were potential risk factors for ICH. Although previous studies support the safety of tPA in minor stroke patients, providers should carefully consider ICH risk factors in minor stroke patients before administering tPA.

Methods:

Results:

Conclusion:

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 5b-300

Poster Title: Evaluation of serum calcium differences between hypertensive crises and control patients: a case-control study

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Purpose: Serum calcium is an important cation involved in cardiovascular and kidney processes, smooth muscle contractions, and other physiologic functions. Parathyroid hormone, vitamin D and calcitonin regulate serum calcium levels. Previous studies analyzing serum calcium and blood pressure are conflicting; some report a positive correlation while others report no association. There are no previous studies assessing the serum calcium levels in patients presenting with hypertensive crisis. The purpose of this study is to evaluate serum calcium levels in hypertensive crisis patients and a control group without hypertensive crises.

Methods: This is a retrospective, case-control, single-center study. This study has been approved by Xavier University of Louisiana College of Pharmacy Institutional Review Board and the University Medical Center New Orleans Research Review Committee. Patients' electronic charts were reviewed from August 2013 through August 2015. Calcium levels in patients presenting with hypertensive crises were compared to all patients admitted to the hospital who met the inclusion criteria during the study duration. Patients were included if they were 18 years old, with either a diagnosis of hypertensive crisis – case group or without diagnosis of hypertensive crisis – control group. Exclusion criteria consisted of a diagnosis of primary or secondary hyperparathyroidism, CKD (stages 3, 4 or 5), calcium or vitamin D supplementation prior to serum calcium level or vasopressor administration prior to documented blood pressure. The primary objective of this study was to determine differences in serum calcium between hypertensive crises patients (cases) and those without hypertensive crises (controls). Secondary objectives included exploring correlation between serum calcium and systolic blood pressure

(SBP) and diastolic blood pressure (DBP) at the time of hypertensive crisis and determining the effects of covariates (age, race, sex, BMI and history of diabetes) on blood pressure in hypertensive crisis patients. Student's t-test and simple linear/multiple linear regression analyses were performed using IBM SPSS Statistics 19.

Results: There were 234 patients in the control group and 212 patients in the control group. Our study population was majority African American (71.4 percent cases; 58 percent controls) and males (65.8 percent cases; 75 percent controls). Patients in the case cohort had a mean BMI of 30.26 kg/m2 compared to 26.81 kg/m2 in the control group ($p < 0.001$). The mean calcium level was not significantly different between the cases and controls (8.9 mg/dL vs. 8.9 mg/dL, respectively; p equals 0.960). Serum calcium and SBP during hypertensive crises were positively correlated (r equals 0.103 and R2 equals 0.011; p equals 0.058). Of all the covariates assessed, none had a significant association with SBP during crises. With regards to DBP during hypertensive crises, age, BMI, and history of diabetes were all negatively correlated.

Conclusion: We did not observe a significant difference in serum calcium levels between patients with hypertensive crisis and compared controls. There was however, a small but significant positive correlation between serum calcium and SBP at the time of crises; with calcium accounting for 1.1 percent of the variability in the systolic blood pressure. Our findings suggest a potential role for serum calcium altering (specifically calcium depleting therapies) in the care of hypertensive crises patients. Further studies should evaluate the possible role of age, BMI, and history of diabetes in hypertensive crises patients.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 5b-301

Poster Title: Utilizing a medication synchronization program in improving adherence and overall health outcomes.

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Purpose: Medication synchronization programs have the ability to align patients' multiple medications to once monthly deliveries. The purpose of this program was to assess patient interest in a medication synchronization program located at a pharmacy within the same health-care system as the PCP/CCP office.

Methods: Patients were identified using Home Health Care Managers at clinics in the same health-care system as the medication synchronization pharmacy. Patients were selected based on the following criteria; contact with PCP/CCP in last 6 months, >/= 4 medications on their active profile, and followed by care manager. Then, patients were screened on willingness to switch pharmacies and enroll in the medication synchronization program.

Results: A total of 213 patients were identified as utilizing a Home Health Care Manager, of these patients 46 were already utilizing the in-system pharmacy services. After screening by the managers and pharmacy interns, 102 patients were further reviewed by the clinic pharmacist for appropriateness. A total of 60 patients fit the criteria for switching to the medication synchronization program. Of these patients meeting criteria, 8 were willing to change pharmacies.

Conclusion: Several barriers were identified during this pilot program. These included patients not actively engaged in health care, as identified by no show to appointments, preference for previous pharmacy services, and proximity to in-system pharmacy. Of the patients that accepted transfer to the program, future efforts will be made to evaluate health outcomes; blood pressure, blood glucose, and hemoglobin A1C. This will help to determine the impact of the medication synchronization program.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 5b-302

Poster Title: Association of serum magnesium on blood pressures in hypertensive crises patients: a case-control study

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Purpose: Magnesium, an essential cofactor, plays a vital role in various physiologic processes including cardiac excitability, neuromuscular transmission, and glycolysis. Observational and clinical trials have shown conflicting evidence on the relationship between blood pressure and serum magnesium levels; some show no association, while others show a negative association. The primary objective of this study is to determine differences in serum magnesium between hypertensive crises patients and a control group. The goal of the study is to determine the relationship between serum magnesium and blood pressure to inform and advise healthcare providers' decision to supplement (or not supplement) magnesium in hypertensive crises.

Methods: The study is a single-center, retrospective, chart review, case-control study conducted at University Medical Center New Orleans (UMCNO) in Louisiana. This study is Institutional Review Board (IRB) approved by Xavier University of Louisiana. Patient cases from August 2013 to August 2015 who were greater than or equal to 18 years old with hypertensive crises and ICD-9 code of 401.9 and patient controls without ICD-9 code of 401.9 were included. Only patients with documented magnesium levels on their electronic medical record were included. Patients with chronic kidney disease stages 3, 4, or 5, end stage renal disease, hepatic cirrhosis, pheochromocytoma, alcoholism, chronic diarrhea, or hyperaldosteronism were excluded. Patients who received magnesium supplementation (oral or IV) at home or during the encounter before magnesium levels were drawn were also excluded. Additionally, patients who received vasopressors or inotropes prior to measurement of blood pressure were excluded. The primary objective of the study is to compare mean serum magnesium levels between

hypertensive crises patients and a control group. Secondary objectives of the study includes assessing the association between serum magnesium on systolic and diastolic blood pressure (SBP and DBP) and the effect of covariates (age, sex, race, Body Mass Index (BMI), and history of diabetes mellitus) on SBP and DBP in hypertensive crises patients. Student's t-Test and simple/multiple linear regression analyses were performed using IBM SPSS Statistics version 19.

Results: A total of 218 hypertensive crises patients and 749 control patients were included in the data collection. Gender distribution was 54 percent males and 46 percent females in the case group and 64 percent males and 36 percent females in the control group. There was no statistical significant difference in the mean serum magnesium levels in patients with hypertensive crises compared to the control group (1.88 mg/dL versus 1.91 mg/dL; p=0.66). Serum magnesium was not a statistically significant factor in determining systolic (r=0.059; p=0.382) or diastolic blood pressure (r=-0.04; p=0.544) in hypertensive crises patients. Of the four electrolytes measured, only calcium was significantly correlated with SBP at time of crises (r=0.181; p=0.007). Also, potassium was the only electrolyte (among four) that significantly correlated with DBP at time of crises (r= 0.133; p=0.049). A statistically significant difference was seen in BMI between cases and controls (30.5 kg/m2 versus 26.4 kg/m2 respectively; $p < 0.001$). Among the covariates assessed, age was a significant predictor variable of DBP at time of crises and BMI was a significant predictor of both SBP and DBP at the time of crises ($p < 0.05$ for all).

Conclusion: We found no significant difference in serum magnesium levels between hypertensive crises patients and our control group. Also, there was no significant association between magnesium and either systolic or diastolic blood pressure the hypertensive crises patients. Unexpectedly, calcium was directly correlated with systolic blood pressure. The relationship between calcium and blood pressures in hypertensive crises patients represents an area of future research exploration.

Submission Category: Oncology

Submission Type: Descriptive Report

Session-Board Number: 5b-303

Poster Title: Breast cancer mobile applications designed for patients: An assessment of quality

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Purpose: Breast cancer diagnosis is of increasing concern among women in the United States. For this reason, proper education about breast cancer prevention and maintenance is important. With the increase of smartphone and smartphone application (app) use, healthcare professionals may be able to recommend apps to patients as a reference for breast cancer education. The purpose of this study is to assess the quality of breast cancer apps for patient use based on app engagement, functionality, aesthetics, and information. A secondary objective is to provide a list of apps that may be recommended by health care professionals, such as clinical pharmacists.

Methods: Two major app stores, Google Play for the Android platform and Apple App Store for the iOS platform, were searched using terms for the most commonly associated breast cancer diseases and symptoms. Apps were included in the study if they were available in United States on Google Play Store or Apple App Store, free of charge, were written in the English language, had a main focus on breast cancer, and were for patient oriented education. Relevant apps were evaluated by two reviewers on April 2016, using the Mobile App Rating Scale (MARS) tool. The MARS tool is a verified mobile app rating tool which collects information about an app to classify and rate it based on four categories: engagement, functionality, aesthetics and information quality. Each category has a subset of Likert scale questions, which were averaged to provide an overall category score. Scores of 1 to 1.99 were rated as inadequate, 2 to 2.99 as poor, 3 to 3.99 as acceptable, and 4 to 5 as good. It was determined by the reviewers that a score of 4-5 (good) across each of the categories would allow for an app recommendation for patient use.

Results: A total of 101 apps were included in the study. Of those apps, 28 (27.7 percent) were available strictly on the Google Play Store, 41 (40.6 percent) on the Apple App Store and 32 (31.7 percent) were available through both stores. Amongst all the apps evaluated, 26 (25.7 percent) in the information category, 14 (13.9 percent) in the engagement category, 42 (41.6 percent) in the functionality category, and 37 (36.6 percent) in the aesthetics category received a score of good (4-5) via the MARS tool. Overall, 9 (8.9 percent) apps received a score of good in each of the app categories. Of the 9 apps, 3 (33.3 percent) were from Android platform, 4 (44.4 percent) were from the iOS platform, and 2 (22.2 percent) were rated individually but were from both platforms.

Conclusion: In conclusion, a minority of the apps within the Google Play Store and Apple App Store received a score of 4-5 (good) across all four categories. Therefore, few apps on either of the markets are suitable to recommend by healthcare professionals, to patients for breast cancer prevention and maintenance.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 5b-304

Poster Title: Evaluation of the need for pharmacologic venous thromboembolism (VTE) prophylaxis in patients with cirrhotic coagulopathy

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Purpose: Due to decreased synthetic capabilities of clotting factors in cirrhotic patients, the International Normalized Ratio (INR) is commonly elevated. Clinicians often translate this as being 'auto-anticoagulated', therefore not requiring inpatient prophylaxis with an anticoagulant. In contrast, a new hemostatic balance is achieved in these patients, similar to the normal patient but more fragile, leaving them concurrently prone to emboli formation and bleeding. The fine line that exists in these patients between risk of bleeding and clotting requires exploration. The objective of this study was to identify the impact of prophylactic VTE anti-coagulation in hospitalized patients with cirrhosis.

Methods: This was an institutional review board approved, single-center, retrospective cohort study evaluating the impact of pharmacologic VTE prophylaxis in patients with cirrhotic coagulopathy. Patients with an ICD-9 code pertaining to chronic liver disease or cirrhosis who were admitted to Buffalo General Medical Center between April 2011 – April 2015 were evaluated for inclusion. Inclusion criteria were age 18 years or greater with an International Normalized Ratio (INR) greater than or equal to 1.5 not due to anticoagulant use. Patients were excluded if they presented with acute VTE or active bleeding. The primary endpoint of this study was to compare the rate of nosocomial acquired venous thromboembolism in cirrhotic hospitalized patients treated with a conventional VTE prophylaxis dose of either subcutaneous unfractionated heparin (UFH) 5000 units every 8 hours, UFH 5000 units every 12 hours, subcutaneous enoxaparin 30 or 40mg every 12 hours, or fondaparinux 2.5mg every 24 hours versus cirrhotic hospitalized patients not treated with any pharmacologic VTE prophylaxis. Nosocomial VTE was defined as a VTE acquired during hospitalization or within 30 days of prior hospitalization. The secondary outcome of this study was to compare bleeding rates between

the pharmacologic and non-pharmacologically treated groups. Bleeding related to heparin use was defined as bleeding which occurred 24 hours after heparin initiation that was not present at the time of admission.

Results: There was no statistically significant difference in regard to both primary and secondary outcomes. The rate of VTE in the non-pharmacologic arm was 2.4% versus 0.6% in the pharmacologic arm ($p = 0.32$). Bleeding was experienced in 4.12% of patients in the pharmacologic treatment arm versus 1.59% in the non-pharmacologic arm ($p = 0.31$).

Conclusion: Although a numerical reduction in nosocomial VTE was achieved with the use of pharmacologic VTE prophylaxis this difference was not statistically significant. With this reduction in nosocomial VTE also came an increased risk of bleeding. The balance between thromboembolism risk and bleeding risk should be weighed when deciding whether or not to use pharmacologic VTE prophylaxis in this population.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-305

Poster Title: Evaluation of the use of phytonadione for the management of an elevated INR in patients who have not received vitamin K antagonists

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Purpose: The administration of vitamin K for the treatment of an elevated International Normalized Ratio (INR) in the presence of a vitamin K antagonist or malnutrition is well established. However, there is a lack of evidence supporting the benefit of vitamin K administered in the attempt to correct the coagulopathy associated with impaired synthetic function typical of liver cirrhosis. The purpose of this study was to evaluate INR changes in cirrhotic patients who received vitamin K to reverse coagulopathy not associated with systemic use of a vitamin K antagonist.

Methods: A retrospective observational study was performed via electronic chart review on adult patients greater than or equal to 18 years of age admitted to Buffalo General Medical Center and Millard Fillmore Suburban Hospital who received vitamin K. Records were reviewed and any patient with a history of vitamin K antagonist use within 7 days were excluded from analysis. The cohort was divided into two groups corresponding to receipt of fresh frozen plasma. The primary objective was to compare the degree of change in patient INR levels before and 48 hours after vitamin K administration. The mean change decrease in INR was determined by comparing the baseline INR pre vitamin K with the INR at 48 hours. Additional endpoints collected include change in prothrombin time and platelet count at 48 hours.

Results: The mean INR was 2.62 in patients prior to receiving vitamin K, with “liver impairment” as the most commonly cited reason for an elevated INR by prescribers. Vitamin K had no significant impact 48 hours after administration, as INR levels dropped to an average of 2.33 in patient who had not received fresh frozen plasma (n=63, P=0.11). An individualized patient

review found an average INR decrease of 0.31, with the largest drop of 2.52 and, in some patients, an increase in INR by 3.79. These results demonstrate the lack of clinical benefit of vitamin K administration in order to correct an elevated INR typical of cirrhotic patients. Prothrombin time was minimally improved, decreasing from 27.14 to 27.03 seconds, but was found to be neither statistically nor clinically relevant (P=0.07). Platelet count was also found to decrease 48 hours after vitamin K administration, from an average of 127 to 100 x 10^9 per liter (P=0.027).

Conclusion: This retrospective chart review demonstrated the lack of benefit in administering vitamin K to correct the coagulopathy typical of liver cirrhosis. These results align with previous studies that discuss the inability of INR to represent the new hemostatic balance achieved in cirrhotic patients. This evaluation will assist in the creation of prescriber education programs and the development of a guideline to establish best practice for the utilization of vitamin K agent in this patient population.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Case Report

Session-Board Number: 5b-306

Poster Title: The Role of C1- Esterase Inhibitors in the Management of Hereditary Angioedema Exacerbation

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Purpose: C1- esterase inhibitor is a blood protein that regulates the body's ability to fight infections, coagulate and complement inflammatory response. Patients with hereditary angioedema (HAE) have a defect in the gene that controls this protein and as a result have either inadequate or non-functioning C1- esterase inhibitor. The biochemical imbalance of C1-esterase inhibitor causes unwanted peptides to induce capillaries to release fluids into surrounding tissues causing edema. There are three types of HAE: type I HAE is caused by inefficient production of the C1- esterase inhibitor while in type II, the production of C1-esterase is sufficient, however the function is inadequate. Type III is an extremely rare form where the C1- esterase protein level and function are normal while the patient still exhibits symptoms. It is most common in women usually exacerbated by hormonal irregularities (i.e. pregnancy, oral contraceptives). Based on pharmacokinetics and pharmacodynamics, the therapeutic profile of C1- esterase inhibitor provides an onset of 15-minutes with a complete resolution of symptoms within 30-minutes. This case report describes the potential use of C1-esterase inhibitor therapy in exacerbations of suspected hereditary angioedema. Our patient is a 26 year old female with multiple presentations to a medical intensive care unit with life-threatening oropharyngeal swelling. The patient's angioedema exacerbations began after pregnancy and were unassociated with ACE Inhibitor use. Multiple blood tests resulted with normal C1- esterase level. The patient's, age, symptoms, normal C1- esterase level, and multiple angioedema exacerbations occurring post-pregnancy give us reason to suspect type III HAE. Current standard therapy for HAE exacerbation consists of corticosteroid and antihistamine administration, despite the lack of obvious pathophysiological benefit. However with the use of C1- esterase inhibitor, HAE patients experience fewer angioedema-associated

complications and improved symptom relief. Furthermore, given the high cost of C1- esterase therapies, an opportunity exists for pharmacists to improve overall health effectiveness and outcomes in patients with this rare condition.

Methods:

Results:

Conclusion:

Submission Category: General Clinical Practice

Submission Type: Case Report

Session-Board Number: 5b-307

Poster Title: Drug interaction between methadone and fluconazole

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Purpose: Purpose: This case report illustrates the increase in serum concentrations of methadone when co-administrated with fluconazole. DO, a 58 year old male, presented to the emergency department (ED) with progressive difficulty and pain in swallowing for 3 weeks. Past medical history includes Human Immunodeficiency Virus (HIV) with a CD4 23, VL 867878, non-compliance to antiretroviral therapy secondary to depression and active poly-substance abuse issues on methadone maintenance, and chronic obstructive pulmonary disease (COPD). Upon admission, according to the gastrointestinal team's recommendation, the patient was treated for presumed esophageal candidiasis with fluconazole 100mg PO daily for 14 days, and was considered for an esophagogastroduodenoscopy if symptoms persisted. The maintenance dose of methadone, 100mg PO daily, according to the patient's treatment program was continued. Infectious Disease team was also consulted and suggested 100mg IV fluconazole daily, which began on hospital day 2. The dysphagia continued to improve, and the patient was switched back after 3 days of IV to fluconazole 400mg oral suspension daily as his swallowing improved and he felt less retrosternal pain.
On hospital day 8, the patient developed an acutely altered mental status, with alternating agitation and somnolence as well as confusion, on a non-focal neurological exam. The patient was disoriented and restless throughout the day. A stat head computerized tomography revealed no acute intracranial pathology. It was reported that the clinical pharmacist noted on rounds that fluconazole, a known cytochrome P450 inhibitor, suppresses the metabolism of methadone in liver. Therefore, fluconazole increases the serum level of methadone and potentiates its effect. The patient was referred to Addiction Psychiatry who subsequently recommended decreasing the methadone dose, to 30mg daily as he was deescalated incorrectly from IV to PO antifungal therapy. On hospital day 9, the patient also presented with seizures requiring a total dose of 4mg lorazepam, with subsequent improvement. A magnetic resonance imaging of the brain later revealed patchy white matter hypo-densities and

periventricular matter, confirming the altered mentation was likely secondary to methadone toxicity in the setting of a drug-drug interaction with concomitant HIV encephalitis.
The patient became asymptomatic for several days, after discontinuing fluconazole and his mental status slowly improved as the drug concentrations were gradually eliminated after a 7-10 day wash out period. No ECG changes were noted throughout the admission. He was eventually discharged on hospital day 20 to a nursing home.

Methods: N/A

Results: N/A

Conclusion: N/A

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-308

Poster Title: Aprepitant use evaluation in the prevention of postoperative nausea and vomiting in bariatric patients at Huntington Hospital

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Additional Author (s):
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Purpose: Nausea and vomiting is a common postoperative complication, with an incidence reaching as high as 70-80% in general surgery. While there are prior studies of aprepitant in preventing postoperative nausea and vomiting (PONV), there is conflicting and inconclusive data over the relationship between body mass index (BMI) and the incidence of PONV in the obese bariatric surgery patient population. Therefore, the purpose of this study was to evaluate the use and efficacy of aprepitant in preventing PONV 24-hours post-surgery, specifically in this population.

Methods: This is an IRB approved retrospective drug use evaluation study of aprepitant conducted at Huntington Hospital (HH). The use of aprepitant 40 mg one-time dose was approved for the prevention of PONV by Northwell Health Pharmacy and Therapeutics Committee on October 5, 2011. A report from an automated dispensing cabinet from HH was generated for patients on aprepitant 40 mg between May through August 2016. Electronic medical records were reviewed and data was collected on the following: patients' demographics (gender, age, BMI), drug allergies, home medications, admitting diagnosis, surgery performed, duration of surgery, preoperative and 24-hours postoperative medication administration records. Primary outcome studied was the incidence of nausea and vomiting, defined as the number of rescue antiemetics doses given 24-hours postoperatively. Secondary outcomes included: concomitant home medications with greater than or equal to 10% risk of nausea and vomiting, confirmed by two drug information resources, and the number of opioid doses given 24-hours postoperatively.

Results: The report generated 90 patients and data was collected on 84 (58 females, 26 males, average age of 45 years). Six patients were excluded either for surgery other than bariatric or aprepitant use outside the recommended 3-hour time frame prior to anesthesia induction. All laparoscopic bariatric surgeries, which lasted approximately 2 hours, were performed by the same surgeon. Twenty eight (33%) patients were obese, 48 (57%) were morbidly obese, and 8 (10%) were severely obese, as per BMI classification. No standardized preoperative medication protocol existed. Thirty three (40%) patients did not receive antiemetics 24-hours postoperatively and 51 (60%) received 1 or more. Of the 33 patients who did not receive antiemetics, 23 (70%) had no concomitant home medications that had greater than 10% risk of nausea and vomiting and 10 (30%) had 1 or more. Of the 51 who received more than 1 antiemetic, 32 (63%) patients had no concomitant home medications and 19 (37%) had 1 or more. Out of 33 patients who had no antiemetics, 28 (85%) were given opioids 24-hours postoperatively and 5 (15%) had none. Out of the 51 who had 1 or more antiemetics, 43 (84%) received opioids 24-hours postoperatively and 8 (16%) received none.

Conclusion: The majority of patients were not taking concomitant medications that had a high-risk for nausea and vomiting prior to surgery, but we observed no reduction in the number of antiemetics given 24-hours postoperatively. The use of opioids 24-hours postoperatively was high (84.5%) and 51 patients needed rescue antiemetics, which shows that postoperative opioids play a role in the incidence of PONV. Literature shows that medications can potentiate the incidence of PONV, but further studies in bariatric surgery patients are needed with a larger sample size to confirm these results.

Submission Category: General Clinical Practice

Submission Type: Case Report

Session-Board Number: 5b-309

Poster Title: Ketorolac-induced acute kidney injury associated with hearing loss

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Purpose: We present a probable case of ketorolac-induced acute kidney injury associated with acute hearing loss. According to the Kidney Disease: Impacting Global Outcomes (KDIGO) guidelines, acute kidney injury (AKI) is defined as an increase in serum creatinine by 0.3 mg/L or greater within 48 hours, an increase in serum creatinine to 1.5 times baseline, which is known or presumed to have occurred within the prior 7 days or urine volume of 0.5 mL/kg/h for 6 hours. Evaluation of hearing loss can be either audiometric which includes standard pure tone thresholds, speech discrimination scores, otoacoustic emission and psychophysical measurements or nonaudiometric data which includes self-reported hearing loss via survey results.

Non-steroidal anti-inflammatories (NSAIDs), specifically ketorolac, are associated with acute kidney injuries. Signs and symptoms of an acute kidney injury include increase serum creatinine, elevated BUN, weight gain and hyperkalemia. The mechanism of NSAID- induced kidney injury is typically caused by hypoperfusion to the kidney cause by inhibition of prostacyclin synthesis. It is has been suggested the mechanism of NSAIDs induced hearing loss is similar to salicylates. Suggested mechanism of ototoxicity is an increase in norepinephrine, a decrease in prostacyclin, and decrease cochlear blood flow.

A 57-year-old male (165.1 cm, 142 kg) with a primary diagnosis of osteoarthritis of bilateral knees and receiving a left total knee revision (TKR) for recurrent prosthetic joint infections and severe progressive pain and instability in the left knee. His past medical history includes anxiety, arthritis, borderline diabetes, gout, herpes simplex virus, hypertension, infection of ankle joint, infection of prosthetic left and right knee joints, morbid obesity, bilateral feet neuropathy, obstructive sleep apnea, renal failure, spinal stenosis, and venous insufficiency of lower extremities. Immediately post-operatively, the patient was started on ketorolac 15 mg IV push every 6 hours. He received 5 doses of ketorolac on post-op day 1 and 1 dose of ketorolac

and 1 dose meloxicam 15 mg on post-op day 2. The patient was also started on aspirin 325 mg by mouth twice daily for deep vein thrombosis (DVT) prophylaxis, hydromorphone PCA, docusate, senna, pantoprazole, and morphine immediate release on post-op day 1. The patient renal function was normal and his serum creatinine was 0.8 mg/dL at baseline and following, the administration of ketorolac his serum creatinine increased to a maximum of 3.5 mg/dL on POD 3. The ketorolac was discontinued and the patient serum creatinine returned to 1.0 mg/dL on POD 5. The patient also became hyperkalemic with potassium of 5.6 mmol/L. Compared to his baseline of 5.0 mmol/L. Upon physical exam, the patient also reported hearing loss in both ears on POD 2, which started to resolve on POD 5 and fully resolved at discharge. It was determined that ketorolac, a nephrotoxic agent, was the probable cause. The Naranjo probability score was five, indicative of probable ketorolac induced acute kidney injury. Interestingly, the patient reported hearing loss at the same time as the acute kidney injury and the hearing loss resolved a few days following the resolution of the acute kidney injury.

Methods:

Results:

Conclusion:

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-310

Poster Title: Assessing the appropriateness of sugammadex use in accordance with pre-established Pharmacy and Therapeutics Committee approved criteria.

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Purpose: Sugammadex is FDA approved for routine reversal of the neuromuscular blocking agents vecuronium and rocuronium. In May of 2016, our institution approved sugammadex for the reversal of vecuronium and rocuronium by anesthesia during surgery when response to neostigmine is not adequate or surgery is unexpectedly aborted. It was additionally approved for use in the emergency department when emergent intubation is aborted. The purpose of this study was to evaluate sugammadex use to determine compliance with pre-specified guidelines set by the Pharmacy and Therapeutics Committee (P&T).

Methods: The institutional review board approved this open-label, observational study. All patients who received sugammadex between June 16, 2016 and September 7, 2016 were included in the study. There were no exclusion criteria. Patients were identified as having received sugammadex via a central search of medical records using a Drug Utilization Review Report through the Pharmacy Information System. Patients receiving sugammadex were assessed by a review of anesthesia records, progress notes, and physician orders. Data collected included the type of neuromuscular blocking agent used, department where sugammadex was administered, whether neostigmine was given prior to sugammadex, documentation of the time of administration of neostigmine and sugammadex, and documented reasons for sugammadex use. Thresholds of 100% were set for use of vecuronium or rocuronium, 90% for prescribing by an anesthesiologist or ED physician, 90% for inadequate response to neostigmine, surgery unexpectedly aborted, or emergent intubation aborted. The primary endpoint of this study was the percentage of time that sugammadex was used in

accordance with the criteria for use set forth by the P&T. Secondary endpoints included documented reasons for sugammadex use, documentation of administration times, and the incidence of use over the three-month period.

Results: In a three-month period, sugammadex was used in 30 patients (mean = 10/month). Expected use was estimated at 4 cases per month. Rocuronium was used prior to administration of sugammadex in 100% patients (30/30). In the 30 cases, 100% (30/30) were ordered by anesthesiologists, and 0% (0/30) were ordered by the emergency department. Sugammadex was not used for emergent abortion of surgery (0/30) or emergent abortion of intubation (0/30). Sugammadex was administered after inadequate response to neostigmine in 76.7% cases (23/30). Reasons for sugammadex use when neostigmine was inadequate were breathing difficulties (7/23) and weakness (4/23). The remaining cases (12/23) did not have a reason documented. Reasons for sugammadex use without prior use of neostigmine included train of four of 0 out of 4 (2/7), for patient assessment in PACU (1/7), and unknown secondary to no documentation (4/7). Documentation of the time administered was reported for neostigmine only in 34.8% (8/23), sugammadex only in 13% (3/23), both medications in 34.8% (8/23), and neither medication in 17.4% (4/23) of cases. P&T criteria for sugammadex use were not met in 23.3% of cases (7/30).

Conclusion: The number of times sugammadex was administered was higher than the expected use of 4 per month. Goals of 100% and 90% were achieved for use of correct neuromuscular blocking agent and prescribing by allowed physicians, respectively. The goal of 90% adherence to P&T protocol was not met due to seven cases where neostigmine was not used prior to sugammadex administration. Education of physicians, anesthesiologists, and nursing staff regarding sugammadex and the guidelines for its use will be implemented in order to ensure appropriate future use of sugammadex.

Submission Category: Pharmacokinetics

Submission Type: Evaluative Study

Session-Board Number: 5b-311

Poster Title: Pharmacodynamic relationship between PCSK9, alirocumab concentration, and LDL-C lowering in four Phase 3 ODYSSEY trials with or without statin background therapy

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Purpose: Proprotein convertase subtilisin/kexin type 9 (PCSK9) protease, a key regulator of cholesterol homeostasis, promotes degradation of low-density lipoprotein (LDL) receptors in the liver, leading to increase of LDL cholesterol (LDL-C). Alirocumab, a human monoclonal antibody, binds and inhibits PCSK9, and decreases LDL-C levels. It is indicated as an adjunct to diet and maximally tolerated statin therapy in heterozygous familial hypercholesterolemia (HeFH) or clinical atherosclerotic cardiovascular disease for patients requiring additional LDL-C lowering. Clinical trials suggest the pharmacokinetic profile (concentration-dependent and non-linear kinetics), PCSK9 production rate, and LDL-C reduction differs amongst alirocumab dosing strategies, with statin therapy, and compared to ezetimibe.

Methods: In this analysis we used data from four ODYSSEY Phase 3 randomized trials, MONO, FH I, COMBO II, and LONG TERM in which pharmacokinetic samples were collected, to identify the relationship between the pharmacokinetic profile of alirocumab and pharmacodynamic profiles of PCSK9 and LDL-C. Patients in the MONO trial were on alirocumab monotherapy, and the other three trials enrolled patients on maximally tolerated statin therapy. MONO and COMBO II compared alirocumab with ezetimibe, and FH I and LONG TERM compared alirocumab with placebo. In MONO, COMBO II, and FH I patients were initiated on alirocumab 75 mg every 2 weeks (Q2W) and dose-escalated to 150 mg Q2W at Week 12 if their LDL-C was still greater than or equal to 70 mg/dL. In the LONG TERM study, patients received 150 mg Q2W for the entire study. The study durations were 24 (MONO), 78 (FH I and LONG TERM), and 104 (COMBO II) weeks. Concentrations of alirocumab, free and total PCSK9 were measured at

Weeks 4, 12, 16 and 24, along with LDL-C levels at Weeks 4, 8, 12, 16 and 24. Alirocumab pharmacokinetic parameters included trough concentration that was assessed 8 to 21 days after previous injection.

Results: In total, 2407 patients were randomized to receive alirocumab. The mean trough concentration (standard deviation) of alirocumab at Week 24 for FH I, MONO and COMBO II was 12,148.1 (8,914.0), 14,772.2 (10,201.7), 8,384.3 (10,942.8) ng/mL in patients who required dose adjustment, versus trough concentration of 4,465.1 (2,467.3), 6,991.4 (4,418.4), 3,945.8 (2,728.1) ng/mL in patients who did not, respectively. LDL-C reduction in the alirocumab arms was apparent by Week 4 and was sustained until the end of treatment. Mean percentage changes in LDL-C concentrations from baseline to Week 24 ranged from minus 47.2 percent to minus 61.0 percent with alirocumab compared to minus 15.6 to minus 20.7 percent with ezetimibe and 0.8 to 9.1 percent increase with placebo (P less than 0.0001). Although mean concentrations of free PCSK9 at Week 12 in MONO, COMBO II and FH I were somewhat higher in patients who required dose adjustment than those who did not (MONO: 59.3 versus 40.4 ng/mL; COMBO II: 211.9 versus 141.5 ng/mL; FH I: 188.9 versus 185.5 ng/mL), an additional decrease in mean free PCSK9 concentrations was observed after alirocumab dose adjustment to 150 mg Q2W (MONO: 14.3 ng/mL; COMBO II: 131.3 ng/mL; FH I: 80.5 ng/mL, at Week 24).

Conclusion: Treatment with alirocumab resulted in an increase in serum alirocumab concentrations, leading to a decrease in free PCSK9 and significant reduction in LDL-C levels in all Phase 3 ODYSSEY trials evaluated. LDL-C followed the same pharmacodynamics pattern as free PCSK9. Free PCSK9 levels were higher in statin-treated patients and remained consistently higher throughout the study, supporting existing evidence that statins increase PCSK9 production. Free and total PCSK9 levels at baseline were higher in patients who received alirocumab dose adjustment, likely due to greater PCSK9 production and therefore need for higher doses to achieve required LDL-C thresholds.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 5b-312

Poster Title: Evaluating the effectiveness of an unfractionated heparin protocol that uses anti-factor Xa monitoring

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Purpose: Intravenous unfractionated heparin offers rapid anticoagulation, but also requires continuous monitoring and frequent administration rate adjustments. Hospitals use heparin protocols to aid in the determination of initial infusion and subsequent adjustment rates. This study evaluated the effectiveness of an existing weight based heparin protocol used at a large community teaching hospital. The existing weight based protocol has established maximum heparin doses to be administered at both initial dosing and subsequent rate adjustments. This study will also evaluate the appropriateness of the maximum doses by comparing time to achieve therapeutic anticoagulation in obese and non-obese patients.

Methods: This single center, observational, retrospective cohort study was conducted using data from patients who were treated with intravenous unfractionated heparin infusions at a large community teaching hospital from May 2015 to April 2016. The heparin protocol utilized antifactor Xa (anti-Xa) monitoring. For the primary endpoint, patients' anit-Xa levels were collected to determine percentage of patients achieving therapeutic anticoagulation at 24, 48, and 72 hours post initial infusion. Additional secondary outcome measures assessed were the average percentage of time spent by patients in the therapeutic window over the course of their treatment, as well as difference in time to achieve therapeutic anticoagulation between obese and non-obese patients. Therapeutic anticoagulation was defined as two consecutive therapeutic levels, with anti-Xa levels defined as 0.3 to 0.5 units/mL for patients placed on low heparin protocol and 0.5 to 0.7 units/mL for patients placed on high heparin protocol. Frequencies and percentages were used to summarize the proportion of patients achieving therapeutic levels at 24, 48, and 72 hours, and to determine the average percentage of time patients maintain therapeutic anti-Xa levels during the course of treatment. Kaplan-meier

estimates and log-rank tests compared the difference in time to achieve therapeutic levels between obese and non-obese patients from initial infusion to 72 hours.

Results: Anti-Xa levels were analyzed from 191 patients meeting inclusion criteria for this study. At 24 hours post initial heparin infusion 32.98% of the 191 patients had achieved therapeutic Anti-Xa levels. Of the 191 patients studied, 110 patients remained on heparin infusions after 48 hours of therapy. At 48 hours post initial infusion 62.73% of the 110 patients had achieved therapeutic Anti-Xa levels. At 72 hours post initial heparin infusion 62 of the original 191 patients remained on heparin therapy. 61.29% of these 62 patients achieved therapeutic Anti-Xa levels at 72 hours post initial infusion. On average patients spent a time of 57 hours on a heparin infusion. 38.94% of the average time spent by patients on heparin infusions was spent in the therapeutic range as defined by the studied protocol. There was no difference in time to achieve therapeutic levels between obese and non-obese patients (log-rank test p-value=0.104).

Conclusion: The results of this study suggest the existing heparin protocol needs to be re-evaluated. A high percentage of patients had not achieved therapeutic anticoagulation at 24, 48, and 72 hours post initial heparin infusion. Furthermore, the results indicate that over the course of heparin treatment, patients spend, on average, a higher percentage of time non-therapeutic than therapeutic. No difference was found in time to achieve therapeutic Anti-Xa levels between obese and non-obese patients. This suggests the current protocol's maximum initial and subsequent adjustment dosing does not contribute to differences between obese and non-obese patients in time to achieve therapeutic anticoagulation.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 5b-313

Poster Title: Preferred First-line Add-on Therapy to Metformin in Non-Insulin Dependent Diabetic Patients in an Outpatient Urban Setting

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Purpose: In 2015, the Comprehensive Type 2 Diabetes Management Algorithm published by the American Association of Clinical Endocrinologists (AACE) and American College of Endocrinology (ACE) updated the Glycemic Control Algorithm to provide a suggested hierarchy of use for the preferred, first-line add-on therapy to metformin. This algorithm now lists glucagon-like peptide-1 receptor agonists (GLP-1RAs) and sodium glucose co-transporter 2 (SGLT2) inhibitors as the top two agents to consider following metformin. The purpose of this study is to determine whether antihyperglycemic medication prescribing in an urban, outpatient setting reflects the changes in the Glycemic Control Algorithm set forth by the AACE/ACE.

Methods: The institutional review board at The Brooklyn Hospital Center in Brooklyn, NY approved this retrospective cohort study, which utilized chart review of patients identified from a password protected site where pharmacist interventions regarding chronic care management are logged. Data from three outpatient clinics was reviewed to identify an eligible patient cohort. The patient population extracted in the present study satisfied the following conditions: (i) diagnosis of Type 2 Diabetes Mellitus; (ii) age ≥18 years old; (iii) seen by a clinical pharmacist between April 2015 to August 2016; (iv) medication therapy of metformin + at least one other antidiabetic agent. Inclusion period was chosen based on the date of publication of the first AACE/ACE algorithm (2015) to make the previously described changes to the suggested hierarchy of antihyperglycemic use. Exclusion criteria was: (i) presence of chronic kidney disease, ≥ stage 4; (ii) Estimated glomerular filtration rate (eGFR) of < 30 mL/min; (iii) treatment with insulin therapy; (iv) A1C of ≥ 9%. Eligible patients' charts were analyzed to determine which diabetes therapy were utilized in addition to metformin for patients who do not require

insulin therapy. Demographics, vitals, laboratory values, and other baseline characteristics were collected for each eligible patient. Descriptive statistics were used to summarize the data.

Results: Out of 319 patients screened, 22 met eligibility criteria. Of the 22 included patients, 32% were African-American, 64% had Medicaid, and the mean age was 59 years old. The preferred add-on therapy to metformin in this patient population and practice setting appears to be dipeptidyl peptidase-4 (DDP4) inhibitors, with 64% of regimens containing one of these medications. Although sulfunylureas (SUs) are now considered to be last-line therapy as per the AACE/ACE Glycemic Control Algorithm, 45% of regimens still contained a SU. Although 64% of patients had a diagnosis of hypertension and 55% had a BMI ≥ 30 kg/m2, only 5% were on SGLT2 inhibitors and 0% were on GLP-1RAs.

Conclusion: Although the AACE/ACE Glycemic Control Algorithm recommends GLP-1RAs, followed by SGLT2 inhibitors, as the preferred, first-line add-on therapies to consider after metformin, these agents are being minimally utilized in our patient population despite the additional benefits these medications may confer. Future studies are needed to determine potential barriers leading to underuse of these agents in practice.

Submission Category: General Clinical Practice

Submission Type: Case Report

Session-Board Number: 5b-314

Poster Title: Anaphylaxis to rocuronium during anesthetic induction

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Purpose: Anaphylaxis during anesthesia is considered a rare phenomenon, but it poses life threatening complications if not managed quickly and appropriately. Neuromuscular blockers (NMBs) are commonly used as paralytic agents during surgical induction and have been associated with anaphylactic reactions. One of the agents highly implicated is rocuronium. This case report illustrates how the use of one NMB may be associated with anaphylaxis while another class of NMBs may be safe. This is a 73-year-old African American man who developed anaphylactic reactions to rocuronium on two separate occasions during induction for a left popliteal aneurysm repair. During the first induction, fentanyl, etomidate, sevoflurane, and rocuronium were administered over a few minutes. Within thirty minutes after administration of these agents, his systolic blood pressure dropped to 35 mmHg from 160 mmHg. The patient averaged systolic pressures in the 50-60 mmHg range for ten minutes. Vitals returned back to baseline with the use of phenylephrine, vasopressin, and epinephrine. Given the patient's acute on chronic kidney disease and hypotensive episode, the surgery was postponed. Approximately two weeks later, the patient returned to the OR for a second attempt for left lower extremity revascularization. This time, induction was completed using sevoflurane, propofol, and rocuronium. Again his systolic blood pressure dropped to 35 mmHg from 170 mmHg, averaging in the 40-50 mmHg range. Resuscitative measures included phenylephrine, norepinephrine, epinephrine, vasopressin, hydrocortisone, and two units of PRBC's. The procedure was once again cancelled. At this time, there was a strong suspicion that the patient may be allergic to rocuronium which was supported by a positive serum tryptase level of 48.8 ng/mL measured approximately 30 minutes after onset of the hypotensive episode. The patient returned to the OR the following day and cisatracurium was used instead of rocuronium. The surgery was successful and the patient was brought to ICU for further observation and was eventually discharged. The quaternary ammonium ion structure of NMBs is the main contributing factor in the development of allergic reactions. Therefore, it is not surprising to see that most cases of anaphylaxis are associated with the use of succinylcholine, due to its molecular flexibility. The

ability to vary the distance between its quaternary ammonium ion structure favors binding to IgE antibodies, and thus cause a subsequent reaction. Rocuronium, belonging to the aminosteroidal drug class, has a slightly less mobile structure, but may bind to IgE in a similar fashion. Benzylisoquinoliniums, such as mivacurium and atracurium, induce histamine release. Cisatracurium, an isomer of atracurium, has a lesser tendency to produce mast cell degranulation, even though it shares the same benzylisoquinolinium structure. Cross reactivity relates with the structure of the molecule, its flexibility, and the way an allergic response is initiated. It is thus essential to understand the cross reactivity between the different NMBs, and their associated risk for having an anaphylactic reaction.

Methods:

Results:

Conclusion:

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5b-316

Poster Title: Assessing knowledge and level of concern regarding Zika virus in Nuevo Cuscatlan, El Salvador

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Purpose: Zika Virus has recently become an area of great concern because of its continuing spread throughout the world. It is especially concerning for pregnant women and people of childbearing age, as it may cause microcephaly and severe fetal brain defects. Although it is not yet common in the United States, education and prevention tips are being discussed all over the news. This project was designed to assess knowledge of Zika virus and transmission in subjects in the endemic country of El Salvador.

Methods: One hundred adults patients (>18 years old) in attendance at a Global Health Outreach clinic located in Nuevo Cuscatlan, El Salvador from July 30, 2016 to August 7,2016 were asked to complete a survey. The survey consisted of basic demographic questions, questions regarding knowledge and transmission of Zika virus, and level of concern regarding the virus. The interviewer presented the survey verbally to the subject with the use of a Spanish interpreter.

Results: Of the 100 patients surveyed in Nuevo Cuscatlan, El Salvador 32 patients were male and 68 patients were female. The majority of the patients were greater than 40 years of age. In total 91% of patients had heard of Zika virus, 60% stated they knew how Zika was transmitted, 39% had received information from a healthcare professional and 85% were concerned about Zika virus in their country. Regarding the risk between Zika and pregnancy 53% were aware such a risk existed stating consequences such as “microcephaly, baby malformations, and babies can die”. Regarding knowledge of transmission 39% of patients did not know or inaccurately defined the mode of Zika transmission.

Conclusion: This study evaluated the knowledge of patients in El Salvador regarding Zika virus and its modes of transmission. Although prevalent in El Salvador, only 1 in 2 people knew the importance of Zika in regards to birth defects and many people did not understand how the virus was spread. Healthcare professionals, including pharmacists, need to further educate patients in developing nations on both long- and short-term mission work in order to prevent the spread of this disease.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Descriptive Report

Session-Board Number: 5b-317

Poster Title: Optimization of Treatment of Acute Urinary Cystitis in Emergency Room Patients Being Discharged Home

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Purpose: The recent surge of antibiotic resistance has resulted in an increased awareness of antibiotic stewardship programs. At Huntington Hospital (HH), we developed a guideline for the treatment of symptomatic uncomplicated urinary tract infections (UTIs). The purpose of this study is to assess if patients in our Emergency Department (ED) are being appropriately treated according to an internally developed guideline for UTI following 2010 IDSA recommendations.

Methods: A retrospective chart review was conducted at HH to assess the treatment of ED patients discharged home who were diagnosed with acute urinary cystitis after implementation of internally developed guidelines for the Treatment of UTI in the ED for patients discharged home. Exclusion criteria included: males, pregnant females, children < 16 years of age, patients diagnosed with complicated UTIs, pyelonephritis, contaminated urine samples or admitted patients. Eligible patients received empiric treatment with antibiotics in our ED in conjunction with a urinalysis and a urine culture. Assessment of antibiotic selection and duration was further evaluated against urine culture results and documented in the HH “ED laboratory call back” by Physician Assistants (PAs). . Through our medical electronic record system, we extracted patients who received a urinalysis in the ED and identified patients diagnosed with UTIs from January 1 - 31, 2016 (Controlled group) and March 1 - 31, 2016 (Intervention group). The primary outcome was to determine if patients who were diagnosed with symptomatic uncomplicated UTIs and who had positive urinalysis and urine culture were treated according to the guidelines. The secondary outcome was to evaluate whether patients who obtained negative cultures were stopped or continued on their antibiotic treatment.

Results: There were 39 patients in the Control group and 40 patients in the Intervention group. Nine (36%) patients in the Control group received appropriate antibiotic therapy vs. 18 (78%) patients in the Intervention group. Out of 9 patients in the Control group, one patient received the appropriate dose of antibiotic and duration of the therapy as compared to 5 out of 18 patients in the Intervention group. There were 11 (100%) patients in the Control group who obtained a negative urine culture and were continued on antibiotic treatment at home vs. 6 (60%) patients in the Intervention group.

Conclusion: The implementation of the uncomplicated UTI guidelines in our ED has led to a positive shift in the selection of empiric treatment of antibiotics for patients being discharged home. Limitations of our study include a small sample size, high ED physician turnover and difficulty in ensuring continued education of the guideline. The next step is the creation of an inter-disciplinary team between pharmacy, physicians and PAs to review susceptibility of urine cultures and to continually assess for appropriate selection and duration of antibiotics. This will optimally lead to the prevention of inappropriate antibiotic treatment in patients diagnosed with uncomplicated UTIs.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 5b-318

Poster Title: Pharmacists' Attitude Towards Pharmacogenomic Testing

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Purpose: Pharmacogenomics is a growing field with great potential that involves utilizing a patient's genetic information to optimize therapeutic outcomes and minimize adverse events. It is important for pharmacist's to be equipped with the knowledge and basic understanding of this field. The new 2016 ACPE standards include pharmacogenomics as one of it's required elements of the pharmacy curricula. The purpose of this study was to assess how knowledgeable pharmacists are with available pharmacogenomic resources. Additionally, pharmacists' level of comfort and potential barriers their participation in pharmacogenomics will be studied.

Methods: This study has been approved by the institutional review board. A survey was created using Survey Monkey and distributed to New York State pharmacists via various social media outlets. Those who are participating provided consent. The anonymous survey asked a series of questions centered on pharmacists' knowledge and utilization of pharmacogenomics to guide patient therapy. The following data was collected: years as a licensed pharmacist, gender, area of practice, specialty, level of education, specialized training, understanding of pharmacogenomics, education received in pharmacogenomics, level of comfort of ordering pharmacogenomic tests, frequency of accessing pharmacogenomics resources, resources used, knowledge of drugs for which pharamcogenomic markers are relevant, frequency of recommending pharmacogenomic testing, liability and responsibility associated with pharmacogenomic tests, importance of pharmacogenomic testing, etc. Data determined the frequency, comfort level, and importance associated with the pharmacist's role in the utilization of pharamcogenomic testing to guide patient therapy. The survey took approximately 5-10 minutes and all questions did not require a response.

Results: Seventy-five pharmacists were surveyed, 64.8 percent being female. The majority of respondents had either less than 5 years (41.4 percent) or greater than 15 years (28.6 percent) of experience. Most practiced in general inpatient care (45.5 percent) followed by general community practice (30.9 percent). A total of 69.7 percent of respondents reported understanding concepts of pharmacogenomic testing but only 15.4 percent said they felt qualified recommending testing. Only 19 percent were able to accurately identify how many drugs had pharmacogenomic statements issued by the FDA. Additionally, 71.4 percent said they did not receive any training at all in pharmacogenomics and 82.3 percent felt it is crucial to introduce pharmacogenomics as a topic taught in pharmacy and continuing education curricula. Only 35.5 percent of surveyed pharmacists provided a response on resources that contain information related to pharmacogenomics. Furthermore, 54.1 percent of respondents have never accessed pharmacogenomic-specific resources. Of note, 58 percent reported feeling responsible to ensure proper pharmacogenomic testing when needed in optimizing drug therapy, while 90 percent of respondents report having not having recommended pharmacogenomic in the past 6 months. Also, 96.6 percent report never having encountered a patient who has brought pharmacogenomic tests for interpretation or guidance.

Conclusion: The use of pharmacogenomics in the profession of pharmacy has grown from a supplemental reference to an integral knowledge set over the past few years. This is shown by mandating the incorporation of pharmacogenomics into the pharmacy curriculum by ACPE. However, practicing pharmacists are reporting feeling unqualified and unprepared to utilize this information on a day to day basis. Pharmacists want and need additional training to feel fully equipped in making pharmacogenomic recommendations.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 5b-319

Poster Title: An interprofessional educational outreach program by pharmacy and public health students in a community based organization servicing patients with sickle cell disease

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Purpose: Team based care is important in providing patient education on chronic disease states in a public setting and empowering patients with knowledge to help manage their health conditions. The aim of this project was to evaluate the impact of pharmacy and public health students' educational outreach initiatives in raising awareness of the importance of immunizations in patients with sickle cell disease. Also to provide public awareness of the condition during Sickle Cell World Day 2016 at a local community based organization in an underserved community.

Methods: Study participants provided informed consent prior to the surveys. A Center for Disease Control and Prevention (CDC) questionnaire was used to assess the respondent's baseline knowledge of sickle cell disease. Additionally, patient baseline demographic data, including health beliefs was collected prior to any educational informational session.
Based on the results of the CDC questionnaire, two pharmacy and two public health students provided educational materials (e.g. brochures, flyers) in support of providing accurate evidence-based information to the respondents individually and provided clarification to any discrepancies as noted in the patient specific responses. Additionally, a 30-minute interprofessional student developed and directed informational interactive session was delivered to the audience to enhance the patient's comprehension of the health related topics. Afterwards, a post survey was administered to the participants for their feedback and to assess their knowledge of material presented.

Results: Study participants provided informed consent prior to the surveys. A Center for Disease Control and Prevention (CDC) questionnaire was used to assess the respondent's baseline knowledge of sickle cell disease. Additionally, patient baseline demographic data, including health beliefs was collected prior to any educational informational session. Based on the results of the CDC questionnaire, two pharmacy and two public health students provided educational materials (e.g. brochures, flyers) in support of providing accurate evidence-based information to the respondents individually and provided clarification to any discrepancies as noted in the patient specific responses. Additionally, a 30-minute interprofessional student developed and directed informational interactive session was delivered to the audience to enhance the patient's comprehension of the health related topics. Afterwards, a post survey was administered to the participants for their feedback and to assess their knowledge of material presented.

Conclusion: Interactive sessions led by pharmacy and public health students had a positive impact on health literacy and providing an educational outreach session on World Sickle Cell Day in the community. Open discussion format with patients was a valuable learning experience as noted by patients on their evaluations. Outreach to community-based organizations should be encouraged among students from various disciplines as part of the interprofessional educational experience in professional health programs.

Submission Category: Leadership

Submission Type: Evaluative Study

Session-Board Number: 5b-320

Poster Title: Pharmacy students' international experience at an urban college of pharmacy

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Purpose: The Brazil Scientific Mobility Program (BSMP) provides one-year scholarships to undergraduate students for studies in the Science, Technology, Engineering and Mathematics fields in United States colleges and universities. The program intends to foster academic and research exchange. In 2013, St. John's University (SJU) College of Pharmacy and Health Sciences started accepting BSMP students. The purpose of this project was to survey past and current students to assess satisfaction with their curriculum and overall experience in this exchange program and to identify areas that need improvement.

Methods: Past and current BSMP students were invited to participate. A list of email addresses of 98 candidates was obtained and a self-administered electronic survey instrument was utilized. The purpose, anonymity, and voluntary nature of the survey was disclosed and return of a completed survey implied consent. Majority of the survey questions assessed satisfaction with the curriculum and participants were also given the opportunity to provide additional comments. Additional survey questions assessed satisfaction with housing and the overall experience. Curriculum questions evaluated pharmacy classes and their application to the practice of pharmacy in Brazil and the advantage, if any, of English language classes. This project was submitted to the SJU Institutional Review Board and received exempt status.

Results: Fifty two candidates responded. Majority (≥90%) took English language classes prior to starting the program and deemed them beneficial. More than 96% of the Brazilian students were housed in one residence hall and more than 92% were satisfied with this residence. They did feel however, they would prefer to be more integrated into other facilities that housed American students. This would allow a more extensive submersion into American student

culture and strengthen their conversational English speaking. Majority of students were satisfied with the courses they completed. The courses with the most satisfaction (>80%) were Pharmaceutical Marketing, Pharmacoeconomics, Public Health, Leadership Development, Pharmacy Practice and the US Healthcare Environment. Courses of least satisfaction were courses with a content focus in clinical pharmacy practice and basic science. This was due to the vast difference in the practice of pharmacy in Brazil vs. the US.

Conclusion: BSMP students were very satisfied with their overall US experience. However, a more focused curriculum would specifically improve their pharmacy learning experience and would be more applicable to their interests and the practice of pharmacy in Brazil. This survey has acknowledged that the practice of pharmacy can be vastly different in other countries and that a curriculum should be customized to have a greater impact and satisfaction on the curriculum experience.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 5b-321

Poster Title: Analogues of resveratrol as novel cis-stilbene antiestrogens

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Purpose: While the synthetic stilbene diethylstilbestrol is well known as an estrogen agonist with toxic effects after developmental exposure, natural trans-stilbenes such as resveratrol, piceatannol and pterostilbene found in grapes, blueberries and other plants have been shown to have antineoplastic and other medicinal properties. In this report, we test the hypothesis that stilbene analogues and isomers of resveratrol have estrogen agonist or antagonist activity.

Methods: Presented is the in vitro estrogen activity of 29 stilbene analogues and isomers obtained from Dr. Agnes Rimando of the USDA Natural Products Utilization Research Unit in Mississippi. The estrogen-dependent breast cancer cell T47DkbLuc reporter gene assay and the MCF-7 proliferation assay were both utilized to determine estrogen agonist and antagonist activity. For those with activity at high dose, data was obtained over the range of 1 nM to 10 uM. In an effort to explain estrogen agonist or antagonist activity observed, computer stimulations were performed using MOE software to dock the 29 stilbenes to the crystal-structure of the Estrogen Receptor alpha Ligand Binding Domain (ERLBD). These crystal-structures contained diethylstilbestrol or tamoxifen bound within representing agonist and antagonist binding modes. Multiple configurations of potential poses for each stilbene were generated using MOE and the poses were ranked in ascending order by delta-G.

Results: No significant estrogen agonist activity of the stilbene analogues was observed using the reporter gene and cell proliferation assays. At the same time, stilbenes 4 and 9 were found to have dose dependent estrogen antagonist activity. Stilbenes 4 and 9 are both cis-isomers with meta-methoxys on one phenyl ring, where resveratrol is a trans-isomer with meta-hydroxyls. The hydroxyl group on the styryl-ring of resveratrol is replaced by a nitro-group in stilbene 4 and an ethoxy-group in stilbene 9. The MOE docking stimulations of the stilbenes

with ERLBD generated ligand binding poses that suggest reasonable antiestrogen binding modes for stilbenes 4 and 9 bound to ER. Thus, the cis-stilbenes 4 and 9 fit well into the tamoxifen binding pocket of the antagonist form of the ERLBD. These cis-stilbenes can mimic tamoxifen binding that occupies a channel to the outside of the ER, mechanically blocks helix-12 and receptor mediated transcription is inhibited. This antagonist stilbene binding mode is only possible for cis stilbenes.

Conclusion: Data obtained from this study can be used to suggest the potential of stilbene analogues as antihormones that could be used in estrogen dependent breast cancer. Previous studies involving these stilbene analogues reported that the methoxyl compounds had the most antitumor activity in hormone independent cells. These earlier studies determined that increasing the number of methoxy groups will result in greater antiproliferative effects and that the cis-isomers exhibited greater antagonist activity than the trans-isomers. Our study of the estrogen activity of the stilbenes analogues describes a similar structure activity relationship for the antiestrogen activity in breast cancer cells.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-322

Poster Title: Evaluation of Clinical vs. Administrative Barriers in Prior Authorization Requests for Hepatitis C Therapy in the HIV/AIDS Medicaid Population

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Purpose: To evaluate the (clinical vs. administrative) factors in the decision-making process related to the Prior Authorization requests by providers for HCV medications in a HIV/AIDS Medicaid Managed Care Organization (MCO) for patients presenting with HIV/HCV co-morbidities.

Methods: A retrospective, cross-sectional analysis was performed using both administrative and clinical data for Hepatitis C Prior Authorization (PA) requests in a Medicaid HIV/AIDs Special Needs Health Plan with over 6,000 Medicaid HIV/AIDS positive members in New York for the year of 2015. The reasons for HCV PA denials and approvals were then categorized as either clinical or administrative factors.

Results: The initial Hepatitis C drug PA denial rate was 8.9% or 40 denials out of 450. After an appeal (second request attempt), 22 were later approved resulting in 432 overall approvals or 96% overall approvals for 2015. The denial reasons in descending order of frequency for the initial requests (n=40) included alternative regimen recommended by health plan's clinical pharmacist to provider (42.5%), member has unsuppressed HIV Viral Load per the health plan's prior authorization policy (37.5%), insufficient evidence per AASLD to support drug effectiveness in certain patients (12.5%), and incomplete lab data from providers (7.5%) (Table 1). 92.5% of the denials were based on clinical factors compared to 7.5% of denials based on administrative reasons. Of the 40 denied cases, 22 were later approved after an appeal. Of the denials that were eventually approved, 90.9% were based on clinical factors compared to 9.1% which were based on administrative factors. Further analysis was done related to the outcomes for the remaining 5% of members who requested for Hepatitis C during the 2015 calendar year for which their requests were denied completely. 66.7% of the denials were based on clinical factors compared to 33.2% of denials based on administrative reasons.

Conclusion: Clinical factors played a major contributing factor for patients being denied or approved Hepatitis C therapy in the health plan compared to administrative factors. Based on this evaluation, evaluating the clinical factors may prove to be in the best interest of the patient population by the health plan to address if certain barriers should be modified or improved upon to ensure best clinical practices are followed. Further analysis should also be done in accessing the health outcomes of patients that have completed their respective HCV therapy.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 5b-323

Poster Title: Effect of proton pump inhibitor use on infection rates in kidney transplant recipients

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Purpose: Following transplantation, patients receive maintenance immunosuppressant medications, such as mycophenolate mofetil and steroids, which can cause gastrointestinal upset upon initiation. Thus, medications such as proton pump inhibitors (PPIs) are often prescribed for the first month. The inherent acidity of the stomach prevents bacterial growth, however, PPIs inhibit gastric acid secretion, creating an environment susceptible to bacterial colonization. Infections can be fatal for these patients due to immune system limitations as a result of immunosuppressants. The risk-benefit balance of utilizing PPIs post-transplant remains controversial. This study aims to evaluate the relationship between PPI use and infection incidence in kidney transplant recipients.

Methods: This single center, retrospective chart review included all adult patients who received a kidney transplant between January 2014 and December 2015. Data was collected on patient demographics, details of PPI use, and the incidence and type of any infections experienced. The time the patient developed these infections in relation to the time of transplant was also taken into consideration. The data collected was analyzed utilizing descriptive statistics.

Results: Fifty percent of the patients that were prescribed a PPI post-transplant developed infections within the first three months of the procedure. During this time frame, the number of infections that each patient developed varied, with 73 percent of patients developing multiple infections. Out of the 26 patients who had at least one infection, 96 percent were on a PPI for at least two months post-transplant and the remaining patient was on this therapy for less than one month. Eighty percent of the infections were urinary tract infections and only one patient developed Clostridium difficile diarrhea.

Conclusion: Although half of the patients developed at least one infection within three months of transplant, with majority on daily PPI therapy for more than two months, the infections experienced by patients mainly included urinary tract infections. Patients treated with PPIs have traditionally been thought to be at an increased risk for enteric infections such as Clostridium difficile, Campylobacter and Salmonella, but only one patient had an infection of this nature. Thus, it does not appear that PPI use has increased the risk for infections in kidney transplant recipients. However, randomized placebo-controlled studies are needed to further clarify this relationship.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-324

Poster Title: Evaluating patient knowledge of outpatient proton-pump inhibitor use in a transitional care setting

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Purpose: Proton-Pump inhibitors (PPIs) are among the most frequently prescribed classes of medications. Many patients take PPIs longer than recommended in the package insert. Since studies have shown an association between PPIs and an increased risk of bone fracture, pneumonia and Clostridium difficile infection, long-term use has consequences associated with cost and safety. We sought to evaluate patient knowledge of their outpatient PPI use in a transitional care setting.

Methods: Adult patients admitted to the internal medicine service with a PPI listed as an outpatient medication were prospectively interviewed by a pharmacy student using a PPI questionnaire. The questionnaire assessed PPI indication, duration and administration as well as patients' knowledge of PPI side effects and alternative medications prescribed. Patients unable to answer questions and who did not have a caregiver present were excluded. Interviews were conducted over a 4-week period in August and September 2016 with responses recorded in a central database. This project was approved by the Institutional Review Board.

Results: A total of 30 patients consented to participate in the study. The average age of the patients interviewed was 71.3 years. The PPIs consisted of either pantoprazole (15, 50%) or omeprazole (15, 50%). Acid reflux (15, 50%) was the most frequent indication patients gave for taking a PPI followed by a response of "I don't know" (11, 36.7%). An antacid was the most commonly reported alternative therapy (12, 40%). The most common response patients gave for their duration of therapy was "longer than 1 year" (15, 50%). Patients most often replied

"none" (13, 43.3%) or "I don't know" (14, 46.7%) when asked about their awareness of PPI side effects.

Conclusion: Our survey is an effective tool to assess patient knowledge about outpatient PPI use in a transitional care setting. Acid reflux was the most common outpatient indication; however, more than 36% of patients did not know why they were taking the medication. Half of the patients described a duration of therapy greater than one year, whereas the majority of patients were either unable to name side effects or felt there were none. Larger studies are needed to further validate our results.

Submission Category: Pharmacokinetics

Submission Type: Evaluative Study

Session-Board Number: 5b-325

Poster Title: Content, curriculum, and design of clinical pharmacokinetics courses in Accreditation Council for Pharmacy Education (ACPE)-accredited colleges of pharmacy

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Purpose: Clinical pharmacokinetics is a necessary and vital part of every pharmacist's education to ensure the proper use of medication. At this time, the methods of structuring and delivering this material across pharmacy schools is unknown. To determine the current content, curriculum, and design of clinical pharmacokinetics courses in all Accreditation Council for Pharmacy Education (ACPE)-accredited schools, a survey was distributed to each school. This enables us to assess the current focus and trend in clinical pharmacokinetic education.

Methods: Each ACPE-accredited college of pharmacy was individually contacted to determine the individual that could best answer questions regarding their respective school's pharmacokinetics curriculum. That individual then received an online survey and all the answers were compiled and analyzed. The respective colleges of pharmacy and respondents' names were anonymous through the survey. The survey was organized into four categories; (1) the curriculum portion included how the material is distributed throughout the degree; (2) the design portion included teaching and assessment methods; (3) the course content portion identified specific medications, classes, and mathematical models used; and (4) the last section identified other teaching methods that were not previously mentioned. Responses were analyzed using descriptive statistics.

Results: A voluntary survey recipient was acquired from 108 colleges of pharmacy. Of these, 76% (82/108) completed the full survey. Biopharmaceutics and basic pharmacokinetics preceded the clinical pharmacokinetics course in 54% and 66%, respectively. Fifty-nine percent delivered clinical pharmacokinetics as a stand-alone course, and 41% integrated the topics

within other courses. Classroom instruction averaged 15 hours when integrated within other courses. Clinical/applied pharmacokinetics is mostly taught within the P2 and P3 years (70% and 53%, respectively). The top three classes of medications, aminoglycosides, vancomycin, and phenytoin are taught in 96%, 94%, and 91% of schools, respectively. Although most students were provided the pharmacokinetic equations to use on exams (84%), they were mostly restricted to only use a scientific calculator (88%). The most utilized teaching methods included lecturing, using actual pharmacokinetic cases, and practice quizzes/exams (for no credit), 95%, 85% and 58%, respectively.

Conclusion: This survey returned a large response rate of ACPE-accredited pharmacy schools. Results indicated a variation of teaching methods, content, and curriculum throughout the schools as expected. Seeing these results in aggregate may be useful as a reference for schools that are redesigning their curriculum or are considering doing so.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 5b-326

Poster Title: Assessment of obesity trends and nutrition knowledge in first through third year pharmacy students

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Purpose: Obesity can be directly linked to many chronic health problems. Therapeutic lifestyle changes based on diet and exercise have proven to be preventative in many disease states. Although some information about nutritional tools and guidelines is available for pharmacy students, there could be additional student training in this area. The purpose of this study was to identify the need for additional education in regards to obesity and nutrition for pharmacy students in order to promote preventative patient care.

Methods: The institutional review board approved our study. A comprehensive survey was issued to first through third year pharmacy students at the local college of pharmacy. The survey consisted of ten multiple-choice questions regarding obesity trends in the United States, nutrition, and lifestyle modifications. Pre-tests and post-tests were administered to students on a voluntary basis. In between the surveys, students were encouraged, but not required to attend educational presentations regarding the subject. Surveys with 100 percent of questions correct were considered adequate prerequisite knowledge.

Results: Thirty-three pharmacy students completed the pre-test. One student answered nine survey questions correctly. Eight students answered seven to eight questions correctly. Seventeen students answered four to six questions correctly. Seven students answered one to three questions correctly. Based on these results the average score was calculated to be 5.12 out of 10 correct answers on the pre-survey. Twenty-three pharmacy students completed the post-test. One student answered all ten survey questions correctly. Eight students answered eight to nine questions correctly. Twelve students answered six to seven questions correctly.

Only two students answered four to five questions correctly. Based on these results the average score was calculated to be 7.21 out of 10 correct answers on the post-survey.

Conclusion: The results showed that pharmacy students benefit from educational sessions regarding obesity and nutrition. Pharmacy students lacked sufficient knowledge about the topics in the pre-survey. There was approximately a two-question increase in scores from the pre-survey to the post-survey. We can conclude that there was a positive shift in student knowledge provided by the educational presentations. This tool may be useful in the future for assessing deficiencies in other fields of pharmacy to identify areas of educational opportunity in preventative patient care.

Submission Category: Clinical Services Management

Submission Type: Descriptive Report

Session-Board Number: 5b-327

Poster Title: Impact of pharmacy-driven medication counseling and discharge service

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Purpose: As part of the Affordable Care Act, Centers of Medicare and Medicaid Services (CMS) began financially penalizing hospitals with higher than average 30-day readmission rates starting in October 2012. Currently, CMS looks specifically at readmission data for core measures, which include acute myocardial infarction, heart failure, pneumonia, chronic obstructive pulmonary disease exacerbation, and total hip/knee arthroplasty. In the Medicare population, adverse drug events make up 20 percent of readmissions within the first three weeks after discharge. The transition of care between inpatient and outpatient services is vital for positive patient outcomes and prevention of readmissions.

Methods: To improve the transition of care, disease state education, medication reviews and discharge counselings were completed from June 7, 2016 until September 27, 2016 by the transition of care pharmacist and fourth year pharmacy interns at a 383 bed community/teaching hospital. Customized patient lists were generated through the electronic health record, Epic, to identify patients who had a targeted disease state in their problem list and those who had discharge orders submitted by their physician. Targeted disease states included acute coronary syndrome (ACS), congestive heart failure (CHF), chronic obstructive pulmonary disease (COPD), cerebrovascular accident (CVA), atrial fibrillation (AF), deep venous thrombosis (DVT) prophylaxis, and thromboembolism (PE). In June and July, the process was to identify the selected patients and coordinate with their nurse to complete discharge counseling together. As difficulties in coordination arose, the process was changed in August and September to obtain the discharge summaries from the nurse and complete the counseling independently. Patients were counseled prior to discharge according to their reason for

admission and discharge medication list. There was also a focus on patients being discharged on an anticoagulant. If there was a need for intervention, the pharmacist/pharmacy intern provided corrected medication administration instructions or collaboratively worked with the provider to make the necessary changes. Education documentation was kept within the patient chart and in a spreadsheet.

Results: In total, 176 patients were encountered. Disease state counseling and medication education was provided to all patients. A full medication review was completed with 147 patients and 81 patients received discharge counseling. There were 180 disease state educations delivered/provided to patients with the following diagnoses: CHF, COPD, ACS, AF, PE, DVT, CVA, hip and knee replacements and unspecified conditions. Medication education for anticoagulation was provided to 97 patients; 33 on Coumadin, 32 on Xarelto, 19 on Eliquis, 11 on Lovenox, 1 on Pradaxa, and 1 on both Coumadin and Lovenox. There were a total of 20 interventions made and documented in 63 patients. Interventions included correction of prescribing errors, optimization of pharmacotherapy, correction of drug administration, and implementation of adherence methods.

Conclusion: Pharmacy involvement in the discharge process greatly improves patient care. Patients who are knowledgeable about their medications are more likely to be adherent and take their doses correctly and appropriately. We positively impacted each patient encountered by making necessary interventions prior to discharge and providing disease state medication counseling. We believe continuation and expansion of this pharmacy-driven service will result in decreased readmissions, improved patient outcomes, and reduce overall healthcare costs.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Descriptive Report

Session-Board Number: 5b-328

Poster Title: Quality assessment of post-graduate readiness workshop series during the fourth year of pharmacy school

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Purpose: The purpose of this workshop series is to expand the content of a postgraduate preparation workshop series for fourth year pharmacy students (P4). Previously, this series solely addressed residency preparation, including the application process, interviewing skills, and integration of an evaluated mock interview/case presentation scenario. It did not address other concerning areas for P4 students, such as answering insurance questions, managing student loans, and ideas for attaining professional practice at the top of a pharmacist's license. Therefore, student leaders of the P4 class collaborated with the Wegmans School of Pharmacy (WSoP) faculty to further develop the workshop series.

Methods: P4 student leaders pre-screened the P4 class for interest in a postgraduate student developmental workshop series. As there was positive interest in the series, P4 student leaders collaborated with pharmacy faculty to build upon an established series that focused on residency preparation. Inclusive of topics more relevant to community practice, financial health and overall job satisfaction, the new workshop series included: The Good, The Bad and The Ugly: Interview Gaffes and Strokes of Genius; How to Navigate ASHP Midyear and the Residency Application Process; 2 in 10 If Your Prior Auth is Approved, Net 30: All You Could Ever Know About Insurance; Shut Up and Take My Money: How to Achieve Your Financial Goals; and Life After Pharmacy School and Residency: Survival Tips and Tricks. Coinciding with various community- and residency-associated deadlines, these workshops were set to launch in September 2016. To better gauge the relevance of this series, P4 student leaders developed an 11 question Likert Scale survey with 10 questions directed at assessing readiness for life after

pharmacy school. One open-ended question was also included, allowing for expression of further areas of concern. The survey was distributed via email as a Google form to 82 students comprising the WSoP Class of 2017. Students were allotted one week to respond.

Results: A total of 36 out of 82 P4 pharmacy students responded to the survey. Students reported feeling unprepared to manage post-graduate finances (50%), write a letter of intent and curriculum vitae (47% and 49% respectively), apply for post-graduate careers (36%), answer questions regarding insurance (37%), and transition to an entry-level pharmacy position (42%). Students also expressed a general lack of familiarity with the residency application process and its major deadlines (64%). Although an optional educational session focusing on creating portfolios was offered during the 2015-2016 academic year, most students felt that they were not knowledgeable about portfolio components (72%). Lastly, 39% of students felt unprepared to attend the American Society of Health-System Pharmacists Midyear clinical meeting and exhibition in 2016. Concerns regarding post-graduate pharmacy professions were also expressed in the results of the open-ended question.

Conclusion: Pharmacy students indicated that there are many facets of post-graduate preparation that they are ill-equipped to manage and, thus, are areas for concern. These include various aspects surrounding the community practice and residency application process; the explanation of common, often complex, adjudication problems; and the achievement of personal and professional goals following graduation. These results have shown that providing educational workshops geared towards these topics may be beneficial in enabling and empowering our P4 students to be more successful and prepared upon graduation. These results will be used to emphasize those aspects during the future workshop series.

Submission Category: General Clinical Practice

Submission Type: Case Report

Session-Board Number: 5b-329

Poster Title: Hypertriglyceridemic pancreatitis: a case report

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Purpose: It is well documented that the risk of hypertriglyceridemic pancreatitis (HTGP) is markedly increased when serum triglyceride levels exceed 1000 mg/dL. This case report describes R.M, a 26 year old male with a past medical history of pancreatitis, obesity, asthma, hyperlipidemia, hypertriglyceridemia, hypertension, uncontrolled Type 2 diabetes (HbA1c 13.1%) secondary to medication non-compliance (off insulin for 3 weeks) and diabetic ketoacidosis (DKA), who presented to the emergency department (ED) with acute onset abdominal pain, elevated lipase (432 U/L), amylase (159 U/L), triglyceride levels of 3449 mg/dL and a pseudohyponatremia (Na = 133 mEq/L) secondary to excess triglycerides which displace water-containing sodium. The pain was described as a constant "stabbing" event that began around his epigastric area and was reported a 2/10 at onset but quickly progressed to a 10/10 with radiation to the back and was later associated with nausea and emesis. A computerized tomography (CT) was performed and revealed findings consistent with acute pancreatitis. In the setting of R.M.'s elevated triglycerides with no past medical history of gallstones, abdominal trauma, newly prescribed medication or non-prescription herbal supplementation nor unusual food intake or alcohol consumption, hypertriglyceridemia was the most likely etiology. No other systemic findings or organ failure complications were noted. On admission, the patient was given several doses of hydromorphone 1 mg for pain and ondansetron 4 mg for nausea as well as a continuous intravenous D5W maintenance infusion at 200 ml/hour. On hospital day 2, R.M was initiated on an insulin drip at 8 units per hour after an endocrine consult. Given that the patient's fasting blood glucose (FSBG) level was reported around 200 mg/dL, he also required a D5W intravenous infusion at 300 ml/hour simultaneously with the insulin drip to avoid a hypoglycemic episode. Titration of the D5W to maintain a FSBG between 150-200 mg/dL was also documented while maintaining the insulin drip between 8-6 units per hour. Potassium chloride (KCl) 20 meq/L in D5W at 300 ml/hr was substituted if potassium levels fell below 3.5

mEq/L. By hospital day 3, the triglyceride levels decreased to 1383 mg/dL and the patient's overall pain began to resolve. On hospital day 4, the triglycerides decreased even further to 831 mg/dL by that morning. Discontinuation of the insulin drip was recommended by the endocrine team after the triglyceride levels dropped below 500 mg/dL which was achieved by day 5 of the hospital stay. Upon resolution of the acute pancreatitis, the patient was started on clear liquids and was advanced as tolerated after clinical improvement by day 6. The patient was eventually transitioned to an adjusted detemir and lispro insulin regimen along with low dose metformin. A low fat diet was encouraged upon discharge in addition to a combination gemfibrozil 600 mg twice daily and omega-3 fatty acids 4 grams daily regimen with close follow up of lipid and glucose monitoring in the outpatient diabetic clinic.

Methods:

Results:

Conclusion:

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5b-330

Poster Title: Retrospective analysis on the incidence of falls in patients taking medications associated with fall risk

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Purpose: Falls are a significant public health problem, especially among the elderly. Falls are not only associated with morbidity and mortality in patients but can lead to a decrease in independence and early admission to long-term care facilities. There are numerous risk factors associated with falls, including age, comorbidities and medications. Medications are a modifiable risk factor that pharmacists can play a role in addressing, both in inpatient and community settings. The purpose of this study was to determine whether there is an association between the medication(s) a patient is taking and the occurrence of falls in that patient.

Methods: The institutional review board approved this retrospective chart review. Adult patients were included if they were admitted to Long Island Jewish Medical Center from January to December 2015, experienced one or more reported falls during admission, and were given a medication known to be associated with falls. A list of medications associated with falls was compiled after consulting the 2015 Beer's Criteria and a literature search. Patients who were under the age of 18, experienced a fall in the emergency department or outpatient clinic, or were not given a medication from the compiled list were excluded from the chart review. Information such as patient age, comorbidities, medication therapy regimens, documentation of fall assessment and reported falls were analyzed from patient electronic medical records. Assessment of therapy based on patient comorbidities and age was performed to determine whether medications administered during their inpatient stay contributed to their risk of falls. During review of patient charts, medications that were given within 48 hours of the reported

fall event were stratified, and the duration between medication administration and fall events were recorded. The primary outcome was to identify specific drug classes from the compiled list that resulted in the highest rate of falls in admitted patients. In addition, the timing of medication administration to fall was explored.

Results: Two hundred and thirty-six patient charts were reviewed, and 150 patients met the inclusion criteria. The average age was 66 years (19 to 95). Most patients were female (51 percent). The majority of patients only had one fall during their admission (99 percent), with two patients (1 percent) had two falls. A fall risk assessment was performed on 99 percent of patients, and from those patients 96 percent were at risk for a fall. We focused on nine different drug classes, with anti-hypertensives, anticoagulants and narcotics being the most used. Out of 150 patients, 33 percent were on one anti-hypertensive drug, and 25 percent were on two or more. Thirty-seven percent of patients were on one anticoagulant. Lastly, 32 percent of patients were on one narcotic, and 3 percent were on two or more. Mean time to fall, in hours, for the top 3 drug classes are as follows: anti-hypertensives 3.7, anticoagulants 4.2 and narcotics 4.1.

Conclusion: Following analysis of the reported falls in one year of admissions, anti-hypertensives, anticoagulants, and narcotics caused the most number of falls. Although administration route and patient comorbidities influence onset of action, certain drug classes are attributed to increased fall-risk shortly after administration of a class medication. This study reflects the increasing need for inpatient fall assessment and careful consideration of patients taking medications known to cause falls. Long-term studies analyzing drug interactions and patient adherence will provide further insight into fall prevention during admissions.

Submission Category: Pain Management

Submission Type: Descriptive Report

Session-Board Number: 5b-331

Poster Title: Community pharmacy survey regarding naloxone education, access, and distribution

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Purpose: In 2013 New York State (NYS) logged 1,589 opioid related deaths. Naloxone is a non-scheduled opioid antagonist that has been proven to rapidly reverse life-threatening opioid induced respiratory depression (OIRD). Pharmacist initiated naloxone prescriptive authority varies by state. NYS requires either a provider-initiated prescription or a collaborative practice agreement, and registration "as an opioid overdose prevention program to furnish naloxone under a non-patient specific prescription (standing order)". The objective of this study was to ascertain the availability of naloxone from community pharmacies and identify barriers, if any, for accessing naloxone within the Albany, NY capital district.

Methods: Study personnel approached pharmacies in Albany County and three surrounding Counties (Rensselaer, Saratoga, and Schenectady) to ascertain availability of naloxone and potential pharmacist distribution barriers. Contact was made by Student Pharmacists and Pharmacy Residents by phone or in person. Predetermined questions were posed to pharmacists and were documented on a de-identified spreadsheet. Participants were asked if the pharmacy currently had any form of naloxone on the shelf, if they had a collaborative practice agreement to prescribe naloxone, how many prescriptions they filled weekly for naloxone, who the pharmacist believed would be an appropriate person for in-home naloxone, and if they would be willing to use an available risk-assessment tool that accurately quantified percent risk for opioid-induced respiratory depression in order to qualify patients for a naloxone prescription. Participation was voluntary and responses were kept anonymous.

Results: One-hundred and forty-six (146) pharmacies were contacted in total, of which 93 agreed to participate. Out of 93 participants, 58 reported having a collaborative practice agreement to prescribe naloxone. Nevertheless, 71 percent of pharmacies (66 out of 93) had no naloxone in stock. Reported reasons for not stocking naloxone included high cost (22 percent), low demand (24 percent), tight inventory (32 percent), and unknown reason (13 percent). Out of all the participants, 96 percent reported receiving an average of zero prescriptions per week for any form of naloxone. When asked if it would be appropriate for patients with an opioid abuse disorder or patients on chronic opioid therapy to have naloxone, 88 percent and 80 percent respectively responded yes. When participants were asked if having a quick tool for assessing OIRD would be beneficial, 86 percent responded yes, 10 percent responded no, and 4 percent were unsure.

Conclusion: Naloxone procurement and distribution by pharmacists is fragmented. This survey demonstrates that almost every pharmacy is not receiving naloxone prescriptions and therefore not stocking naloxone due to inventory and cost restrictions, regardless of regulation that allows pharmacist distribution of naloxone without an external prescription. Pharmacists could play a key role in reducing these barriers by increasing prescriber and patient knowledge about OIRD, assessing risk, educating patients and caregivers on available products, and distributing naloxone. To assist pharmacists in identifying and qualifying patients, a tool for determining OIRD could be beneficial.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-332

Poster Title: Retrospective evaluation of post market data regarding GLP-1 agonists and DPP-4 inhibitors incidence rates of pancreatitis

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Purpose: Dipeptidyl peptidase 4 inhibitors (DPP-4) and glucagon-like peptide 1 (GLP-1) agonists are anti-diabetic medications that target incretin, a hormone that stimulates the pancreas to create more insulin and lower blood glucose levels. The benefit of choosing these therapies over insulin and insulin secretagogues is due to a lower risk of hypoglycemia. However, an FDA safety communication was issued in order to raise awareness that incretin based therapies have an increased risk of pancreatitis. The purpose of this study is to compare the risk profiles of pancreatitis between the GLP-1 agonist and DPP-4 inhibitors.

Methods: The institutional review board has approved this retrospective study. The FDA Adverse Event Reporting System (FAERS) consists of thousands of de-identified anonymous reports that is publicly available and extracted into excel files from 2004-2015. A subset of data from the database consisted of patients either on a GLP-1 agonist (exenatide and liraglutide) or a DPP-4 inhibitor (sitagliptin, saxagliptin, linagliptin, and alogliptin) from 2011 to 2015. Subsequently, incidence of pancreatitis within each medication was recorded. Patients were excluded if they were on a combination therapy involving one of these agents. Two proportions was calculated for each class of medication and compared against the other using a proportional t-test. A 95 percent confidence interval was used to establish differences. The first proportion is the ratio of patients who were on a GLP-1 agonist and had pancreatitis over every patient on a GLP-1 agonist. The second proportion is the ratio of patients on a DPP-4 inhibitor that had pancreatitis over all patients on a DPP-4 inhibitor.

Results: A total of 75,679 patients who were on a GLP-1 and DPP-4 inhibitor were extracted from the database from 2011 to 2015. Extracted data from the FAERS database consisted of 34,507 reports of patients taking a DPP-4 inhibitor. Of those, 5,020 reports had an episode of pancreatitis that warranted documentation in the database. On the other hand, 41,172 reports were withdrawn from the database who was taking a GLP-1 agonist. Of those, 7,206 patients who were on a GLP-1 agonist experienced pancreatitis. Patients that received a GLP-1 agonist had a higher incidence of pancreatitis when compared to DPP-4 inhibitors, however this was nonsignificant (17.5 percent versus 14.5 percent; p greater than 0.05).

Conclusion: Looking at the reports of GLP-1 agonists and DPP-4 inhibitors spanning from 2011-2015 shows that the incidence rates of pancreatitis is similar between the two classes of medications and therefore a significant difference in the risk profiles does not exist. The FAERS database consists of mandatory reports from drug manufacturers or voluntary reports that are serious enough to document, therefore, all the adverse events may not reflect the entirety of the population. As a result all conclusions with significance from the study must be evaluated in the context of these reports.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-333

Poster Title: Anti-Tumor Necrosis Factor alpha safety in inflammatory-mediated diseases using FAERS

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Purpose: Biologic therapy, notably the anti-tumor necrosis factor alpha agents, are known for their efficacy against inflammatory and immune mediated diseases such a psoriasis and rheumatoid arthritis. Injection site reactions (ISR), upper respiratory infections (URI), and death are three relevant adverse events of anti-tumor necrosis factor alpha agents such as etanercept (Enbrel) and adalimumab (Humira). This retrospective study will determine whether a significant difference exists between the incidence of adverse events such as ISR, URI, and death for the above mentioned indications.

Methods: This retrospective study was approved by the institutional review board. The FDA Adverse Event Reporting System (FAERS), a publicly available database containing thousands of de-identified anonymous adverse event reports was analyzed from 2004-2015. All FAERS reports on etanercept and adalimumab indicated for psoriasis and rheumatoid arthritis were extracted. The database was mined for the adverse effects, ISR, URI, and death and were recorded within each indication. A comparison of adverse events was performed by drug and indication. The proportion of each adverse event over the total number of adverse events for each indication was calculated and compared. A proportional t-test was used to compare the ratios of the adverse events of the medications within the indications. A 95 percent confidence interval was calculated.

Results: A total of 197,208 etanercept and 110,948 adalimumab reports were generated from adverse events common to both drugs severe enough to warrant reporting to the FAERS database from 2004-2015. There were 67,162 etanercept reports were indicated for psoriasis and 130,046 were for rheumatoid arthritis. In the adalimumab population, 53,106 were indicated for psoriasis and 57,842 for rheumatoid arthritis. In psoriasis-indicated etanercept versus adalimumab, etanercept demonstrated a higher rate of ISR (29.8 percent versus 14.1 percent; p less than 0.05). Similarly, the ISR rates for the rheumatoid arthritis-indicated reports, etanercept had a significantly higher incidence (27.5 percent versus 11.1 percent; p less than 0.05). However etanercept showed a non-significant lower rate of URI incidence in the psoriasis-indicated reports (13.5 percent vs 20.1 percent; p greater than 0.05). Lastly, the URI incidence for rheumatoid arthritis patients showed a significantly higher rate in the etanercept versus adalimumab reports (41.8 percent versus 15.1 percent; p less than 0.05).

Conclusion: There was not a significant difference between etanercept and adalimumab in the incidence rate of URI in psoriasis patients. However, there was a significant difference in the incidence of ISR and URI in patients with rheumatoid arthritis as well as ISI in the psoriasis population. All of the adverse events reported to FAERS may not reflect the entire population since all reports are voluntarily reported. As a result all conclusions drawn must be evaluated in the context of these reports.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 5b-334

Poster Title: Incidence and risk factors of acute kidney injury (AKI) in hospitalized children receiving combination vancomycin and piperacillin/tazobactam

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Purpose: Vancomycin is commonly used for treatment of Methicillin-resistant Staphylococcus aureus (MRSA) infection in children. Several studies have identified that adult patients treated with combination vancomycin plus piperacillin/tazobactam experienced more episodes of acute kidney injury (AKI). A recent study identified that significantly more children with late AKI received combination vancomycin plus piperacillin/tazobactam (61.9% vs 38.4%; p = 0.04). The primary objective of this study was to determine the rate of AKI in critically ill children treated with vancomycin and piperacillin/tazobactam. Secondary objectives were to describe and compare the characteristics of patients that developed AKI versus those that did not.

Methods: This retrospective cohort study analyzed children admitted to the pediatric intensive care unit (PICU) at Women and Children's Hospital of Buffalo between 01/01/14 and 12/31/15. Inclusion criteria were: admission to the PICU; age great than 2 months; treatment with concurrent vancomycin and piperacillin/tazobactam for at least 48 hours; serum creatinine (SCr) level within 24 hours of antibiotic initiation and throughout therapy; and at least one appropriately drawn vancomycin trough value. Subjects with underlying renal dysfunction, defined as glomerular filtration rate (GFR) less than 90 mL/min/1.72 m2 as calculated by the Schwartz equation, were excluded. AKI was defined as an increase in SCr by greater than or equal to 0.3 mg/dL within 48 hours, and increase in SCr to 1.5x baseline within the prior seven days or urine volume less than or equal to 0.5 mL/kg/hour for six hours, according to the Kidney Disease Improving Global Outcomes AKI Consensus Conference. The primary endpoint was the rate of AKI. Statistical analysis was completed using SAS version 9.4. Continuous variables were compared using Student's t-test or Wilcoxon rank-sum test as appropriate, and categorical data

were compared using the Fisher's exact or Chi-squared tests as appropriate. A p-value < 0.05 was considered to be statistically significant for all analyses. Normally distributed data was reported as mean and SD, and non-normally distributed data was reported as median (IQR).

Results: A total of 63 patients met the inclusion criteria. AKI occurred in 18 (28.1%) of patients. Demographic data were similar between AKI and non-AKI groups, including median Pediatric Index of Mortality II (PIM II) score [4.4 (3.2 – 4.7) vs. 4.2 (3.1 – 4.6); p =0.77] respectively. Median vancomycin dose [15 (7.6 – 16.3) mg/kg/dose vs. 14.9 (10 – 15) mg/kg/dose; p = 0.44] and duration of vancomycin treatment [3.5 (2.3 – 6) days vs. 3 (2 – 4) days; p =0.36] were similar between the AKI and the non-AKI group, respectively. Initial vancomycin trough levels were similar between the AKI group [10 (7.6 – 16.3 mg/dL) and the non-AKI groups [9.5 (7.6 – 14.2) mg/dL; p = 0.59]. Piperacillin/tazobactam doses were similar for the AKI group [95.6 (76.08 – 95.61) mg/kg/day] compared to the non-AKI group [90.51 (66.1 – 100) mg/kg/day; p = 0.58]. Duration of piperacillin/tazobactam was similar [3 (2.3 – 3.8) days vs. 3 (2 – 4) days; p = 0.87] between the AKI and non-AKI groups, respectively. Thirty-three percent (n = 6) of patients in the AKI group were on a concurrent nephrotoxin compared to 21.3% (n = 10) in the non-AKI group (p = 0.93).

Conclusion: Over one-quarter of critically ill pediatric patients treated with combination vancomycin and piperacillin/tazobactam developed AKI. No difference existed between vancomycin dose, initial trough level, and duration; nor in piperacillin/tazobactam dose and duration in the AKI and non-AKI groups. As AKI occurred in at a high rate in this heterogeneous and complex population, further research should seek to identify risk factors for developing AKI when combination vancomycin and piperacillin/tazobactam is used.

Submission Category: Automation/ Informatics

Submission Type: Descriptive Report

Session-Board Number: 5b-335

Poster Title: Measuring the impact of pharmacist interventions to smart infusion pump drug library parameters for the high alert medication dexmedetomidine

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Purpose: Dexmedetomidine, a high alert medication, is prone to decimal point errors when being programmed in a smart infusion pump for administration. Smart infusion technology provides the ability to either deliver medication as a Basic Infusion without benefit of dosage/rate protection, or through a drug library, which acts as a second-check. Alerts are generated when an infusion's entered parameters fall outside of the hospital's pre-determined limits. In this study, we analyzed alerts generated by the Guardrails, Alaris System to evaluate interventions made, identify potential areas for improvement, and increase medication safety.

Methods: After reviewing drug information resources and looking at data derived from the smart infusion technology, it was decided to change the drug library parameters for dexmedetomidine. The changes were: (1) lower soft maximum continuous dose (CD) from 1 to 0.7 mcg/kg/hour; (2) add a hard maximum CD of 1 mcg/kg/hour; (3) lower soft minimum bolus dose (BD) from 0.9 to 0.5 mcg/kg; (4) lower our soft maximum BD from 1.1 to 1 mcg/kg; (5) lower our hard maximum BD from 1.2 to 1.05 mcg/kg; (6) lower our soft minimum bolus dose administration rate (BDAR) from 0.09 to 0.05 mcg/kg/min; (7) lower soft maximum BDAR from 0.11 to 0.1 mcg/kg/min; (8) add a hard maximum BDAR of 0.11 mcg/kg/min. These changes were implemented on July 21st 2014. We collected 1 year of alert data prior to the changes and 1 year of alert data post-changes to measure the impact of the library changes. Infusion alerts can be overridden, reprogrammed, or cancelled. Overrides or reprograms can occur when a soft alert is generated. Hard alerts require either a reprogram or cancellation.

Results: As a result of library update on July 21st 2014, the number of CD alerts for overrides above the drug's soft maximum decreased from 460 to 207 (55 percent). The number of all CD reprograms above the maximum increased by more than four-fold from 63 to 271 (430 percent). The number of CD cancellations decreased from 45 to 2. The number of overrides below the newly instituted soft minimum for BD and BDAR were 131 and 7, respectively. The total number of reprograms increased significantly after instituting new CD parameters, indicating that users agreed with and complied with the alerts generated; doses were reprogrammed within the allowed limits. The number of CD alert overrides decreased significantly, as expected with the addition of a hard maximum CD. The number of cancellations did not increase, as one would expect when instituting a hard maximum CD. This suggests that the users did not cancel out the infusion to go to Basic Infusion and thus the drug remained protected by Guardrails. The data suggests that a reevaluation and possible further decrease of our soft minimum BD and BDAR limits may be necessary to minimize alert fatigue in smart infusion pump users.

Conclusion: Safety software is important for minimizing intravenous medication errors, improving patient care, and measuring system performances; it is essential for patient safety and preventing adverse outcomes resulting from programming errors. Due to the addition of a hard maximum CD, we were able to see an increase in reprograms, decrease in cancellations, and decrease in overrides. Providing the infusion user with an alert can prevent the administration of a potentially dangerous medication dose to a patient.

Submission Category: Small and Rural Pharmacy Practice

Submission Type: Descriptive Report

Session-Board Number: 5b-336

Poster Title: Prevalence and knowledge of hypertension in a selected cohort in rural Haiti

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Purpose: The global burden of hypertension is increasing, with a projected increase in prevalence to 29.2%, or 1.56 billion, by the year 2025. Uncontrolled hypertension can cause serious morbidity. Haitians consume excessive amount of salt. It is estimated that they consume 30 to 35 grams of sodium daily whereas the WHO recommends 4 grams of salt intake daily. There is little information about the enormity of the problem of hypertension in Haiti. This project was designed to determine the prevalence of hypertension, assess the basic knowledge of Haitians regarding high blood pressure and heighten awareness in the seriousness of this condition.

Methods: A survey was designed to collect information about hypertension. Verbal consent from the patient was obtained prior to administering the questionnaire. The survey was translated from English to Haitian Creole and patients over the age of 18 with hypertension were included. Data on age, gender, height, weight, blood pressure measurement at the time of clinic visit was collected. Assessment on the basic knowledge of hypertension, diet, perception of seriousness of the disease and barriers to seeking health care in rural Haiti was also documented. Creole translators helped with data collection. Patients were prescribed antihypertensive medications and were given at least a 30-day supply. They were also counseled on the disease state and the medication that were prescribed.

Results: One hundred and thirty four patients completed the survey. All patients surveyed were adults. The blood pressure ranged from 129/80 mmHg to 225/140 mmHg. Only 42% of patients reported they knew they had high blood pressure for more than 3 years. Over 12% of patients had no knowledge of having hypertension. Of the patients that knew that they had hypertension 89% of patients reported they have been treated with antihypertensive medications in the past, but most do not have continuing treatment. Approximately, 66% of

patients reported that they considered hypertension to be a serious condition. Majority of the patients' diet consisted of vegetables, rice, beans, meat and fish. Assessment of salt-intake was difficult to measure. Sixty four percent of patients reported that their main barrier to health care and treatment of hypertension was mainly due to limited income and health care resources.

Conclusion: Many participants who were surveyed didn't know they had hypertension and were unaware of the seriousness of the disease. There are many barriers in preventing patients from having access to health care, including medications especially when living in rural areas of Haiti. It is unclear whether the patients with high blood pressure will be able to purchase antihypertensive medications to control their hypertension once they have exhausted their medication supply. Uncontrolled hypertension can lead to serious adverse outcomes and major interventions in rural Haiti are needed to address adequate management of hypertensive patients through chronic use of medications and follow-ups.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 5b-337

Poster Title: Comparison of dofetilide and sotalol in reducing atrial fibrillation related hospital re-admissions

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Purpose: Dofetilide (Tikosyn®) and sotalol (Betapace AF®) are Class III antiarrhythmics indicated for the treatment of highly symptomatic atrial fibrillation or atrial flutter. Due to their QTc prolonging effects and risk for development of the life-threatening arrhythmia torsades de pointes (TdP), treatment must be initiated in the hospital so patients can have their heart rhythm, kidney function, and electrolytes monitored for a minimum of three days. Pharmacists play a crucial role in monitoring for renal dose adjustments and screening for dangerous drug-drug interactions during initiation of dofetilide or sotalol therapy.

Methods: A retrospective chart review will be conducted in patients who received dofetilide or sotalol therapy as a new start or continuation from home during any admission at our institution from September 2014 through August 2016, and included in the primary efficacy analysis if there is a 6-month period after discharge to evaluate. All data will be recorded without patient identifiers and to maintain confidentiality. The data collected from the electronic medical record (EMR) will include the patient age, comorbidities, baseline creatinine clearance (CrCl), electrolytes, and QTc values, medication doses, drug-drug interactions, and adverse reactions/events. The primary outcome will be rate of hospital re-admissions secondary to uncontrolled atrial fibrillation/flutter while on dofetilide or sotalol therapy. Secondary outcomes will be any adverse drug events due to dofetilide or sotalol requiring discontinuation, number of interventions documented by pharmacist as per our drug protocol, and number of drug-drug interactions prevented or that occurred.

Results: A total of 36 and 47 patients were prescribed dofetilide and sotalol therapy during the last 2 years, respectively. Of dofetilide patients, 32 (88.9%) were new starts, and for sotalol, 21 patients (44.7%) were new starts. The median age was 69 years old (IQR 64-78) and 72 years old (IQR 61-84) for patients on dofetilide and sotalol, respectively, with median CrCl of 74 mL/min (IQR 53-97) and 69 mL/min (IQR 39-81). For the primary outcome, 1/17 patients (5.9%) discharged on dofetilide therapy had a hospital readmission for uncontrolled atrial arrhythmia within the next 6 months, compared to 4/33 (12.1%) discharged on sotalol therapy. Of all patients on dofetilide, 7/36 (19%) required drug discontinuation during their admission; 4 due to QTc prolongation, 1 for patient complaint of headache and nausea, 1 for a severe drug-drug interaction, and 1 for risk avoidance of thrombosis if cardioverted to normal sinus rhythm. Of sotalol patients, 9/47 (19%) also required drug discontinuation; 4 for lack of efficacy in patients remaining in rapid AF, 2 for renal impairment, 2 for QTc prolongation/bradycardia, and 1 for a newly diagnosed ejection fraction < 40%.

Conclusion: Dofetilide and sotalol are efficacious when used as antiarrhythmic therapy to prevent recurrence and re-hospitalization for atrial fibrillation or flutter. However both have a high risk of QTc prolongation and significant drug-drug interactions, requiring careful monitoring and intervention. Pharmacists play an important role in monitoring dosing based on creatinine clearance, other labs values, and screening for potential drug interactions.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-338

Poster Title: Fructose alters cell survival and gene expression in microglia and neuronal cell lines

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Purpose: Microglia are macrophages that are found primarily in the CNS and play a crucial role in maintaining a healthy brain by engulfing invading microorganisms, releasing inflammatory mediators, and pruning dead cells. Microglia can become activated in response to certain stimuli which causes them to transition into a pro-inflammatory state, and can sometimes become chronically activated which can result in neuronal damage. Studies have shown a causal relationship between this activation and sugars such as fructose and glucose. We sought to understand the role of sugars in microglial activation and the subsequent effects on neuron health.

Methods: Rat microglia (HAPI) and neuronal (B35) cell lines were treated with varying concentrations of fructose (25 mM, 12.5 mM, and 6.25 mM) or glucose (25 mM and 12.5 mM) as a positive control to determine their effects on the cells. Following treatment and incubation for 3 or 24 hours, the cells were analyzed using an MTT assay to measure cell survival or real-time polymerase chain reaction (RT-PCR) to measure gene expression levels. Effects of fructose were measured in HAPI microglia after direct treatment with the sugar. The genes investigated by the RT-PCR in the HAPI cells included: glucose transporter 5 (GLUT5), and the inflammatory markers high mobility group box 1 (HMGB1), and prostaglandin E receptor 2 (Ptger2). To evaluate the effects of microglial activation on neuronal function, the B35 neurons were treated either directly with sugars or with the supernatant collected from fructose-treated HAPI microglia. This allows examination of the effects of soluble neuron-injury factors released by microglia. The genes investigated by RT-PCR in B35 neurons included nuclear factor kappa B (NFkB) and enolase 2 (Eno2).

Results: Cell survival assays showed that 24-hour direct fructose treatment increased B35 cell survival by up to 13%, while groups treated with microglia supernatant increased cell survival by up to 33%. In HAPI microglia, 3 hours of treatment with fructose caused GLUT5 expression to be suppressed by up to 32% in all treatment groups except for 6.25 mM fructose, while Ptger2 and HMGB1 expression was increased by as much as 65% and 15%, respectively. After 24-hours of treatment with fructose, the HAPI microglia showed a maximum of 80% increased expression of HMGB1, while Ptger2 expression was mostly unchanged. In B35 neurons, 3 hours of treatment with fructose caused a decrease of up to 26% in NFkB and an increase of up to 46% in Eno2 expression.

Conclusion: Cell survival results indicate that the microglia may provide a short term protective effect on the B35 neurons. However, data from the gene expression assays show evidence of cellular dysfunction in neurons and pro-inflammatory activity in microglia which may lead to neuronal death on a longer timeline. As seen in the gene expression results, microglia had increased expression of pro-inflammatory genes and B35 neuronal cells had increased expression of markers of cellular damage. Future studies will further explore the effects of fructose on expression of other genes and examine the effects on neuron survival at later time points.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 5b-339

Poster Title: Role of nurr1 in mediating the antineoplastic effect of fenretinide in breast cancer

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Purpose: NURR1, a member of the constitutively active NR4A nuclear receptor family, exhibits context dependent tumor suppressor or promoter effects in cancer. Our previous studies reveal that NURR1 is silenced upon neoplastic transformation of breast epithelium, and higher expression is associated with greater breast cancer patient survival. Although the receptor is not known to bind endogenous ligands, pharmacological induction of NURR1 expression has shown mediation of growth arrest and apoptosis. Fenretinide, an atypical retinoic acid derivative, has been shown to induce expression of other NR4A family receptors. Here, we investigated if fenretinide is a NURR1 regulator in breast carcinoma cells (BCCs).

Methods: Cell lines were treated with fenretinide and its ability to induce expression of NURR1 micro ribonucleic acid (miRNA) and protein in BCCs was ascertained using quantitative reverse transcriptase polymerase chain reaction (qRT-PCR) and flow cytometry, respectively. We developed stable BCC lines by stably transfecting MDA-MB-231 breast carcinoma cells with NURR1 specific CRISPR/CAS9 expression plasmid, thereby eliminating endogenous NURR1 expression (BCC-N1KO cells). Since previous studies have suggested that fenretinide induces apoptosis independently of RXR and RAR, we ascertained the capacity of fenretinide to induce transcriptional activity from retinoic acid response element (RARE) and NGF1-beta response element (NBRE) driven luciferase reporters. In order to determine if NURR1 transcriptional activity was sufficient to induce apoptosis, we transiently transfected HEK293 cells to express wild-type NURR1, a naturally-occurring dominant negative NURR1 variant (NURR1a) or the DNA binding mutant (NURR1-DBDmu), and used annexin V staining as a determinant of apoptosis.

Results: Our studies show that loss of NURR1 resulted in an increased basal proliferation, but increased sensitivity to fenretinide-mediated cell death. Our findings also show that fenretinide induces apoptosis in a dose dependent fashion with approximately 32 percent and 42 percent of the cell population staining positive for annexin V at 1 and 10 micrograms per milliliter respectively. We also saw an over 2-fold increase in the induction of NURR1 gene expression when cells were treated with 10 micromolar concentration of fenretinide. Fenretinide failed to induce RARE activity, confirming previous reports that fenretinide does not function as a potent RAR/RXR agonist. However, the NR4A-responsive (NBRE)-luciferase activity was significantly induced by fenretinide. Interestingly, all three NURR1 variants were able to induce apoptosis as determined by annexin V staining.

Conclusion: Together, these studies confirm that NURR1 has a gene-dose dependent function in cancer. At basal levels, NURR1 transcriptional function opposes proliferation and may function to help the cell survive in high stress environments such as drug therapy. Alternatively, high levels of expression result in non-transcriptional functions which induce apoptosis in breast cancer. Pharmacological targeting of NURR1 with fenretinide may be a feasible method for both chemoprevention and treatment of breast carcinoma.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-340

Poster Title: Comparing the pro-resolving effects of fish and krill oils

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Purpose: The omega-3 fatty acids eicosapentaenoic acid and docosahexaenoic acid are often used to treat hypertriglyceridemia, but recent studies have suggested that these molecules may also be useful for the treatment of inflammatory conditions. Omega-3 fatty acids are used as building blocks in the biosynthesis of a class of molecules called specialized pro-resolving mediators (SPRMs). SPRMs execute various inflammation resolving functions throughout the body. Two common dietary supplements, which contain omega-3 fatty acids, are fish oil and krill oil capsules. The purpose of this study was to evaluate and compare the in-vitro pro-resolving effects of fish oil and krill oil.

Methods: This study was designed to test, in various ways, the inflammation resolving effects of Omega-3 fatty acids using a cell line of cultured rat microglia called highly aggressively proliferating immortalized (HAPI) cells. These cells were chosen as a model for inflammation because microglia form the basis of the active immune response in the brain and omega-3 fatty acids have shown promising activity in the central nervous system. HAPI cells were plated and treated in triplicate. One set of three wells was left untreated. Another group of wells was treated with lipopolysaccharide (LPS) in order to stimulate inflammation. A third set of wells was treated with either fish oil or krill oil to ensure that no part of the formulation resulted in an elevation of inflammatory markers. The fourth group was treated with either krill oil or fish oil and LPS. Several assays were then used to assess the level of inflammation in each group. Experimental sample supernatants were used to assess nitrite concentrations using a Griess assay. The inflammatory markers tumor necrosis factor-alpha and interleukin-6 were measured via ELISA.

Results: The cells that were activated with LPS all displayed significantly higher levels of nitrite, tumor necrosis factor-alpha and interleukin-6 than those that were not treated with LPS. The treatment groups that were activated with LPS and treated with omega-3 fatty acids showed statistically significant reductions in nitrite, interleukin-6 and tumor necrosis-alpha levels compared to the LPS only treatment group. The cells that were activated with LPS and treated with krill oil had significantly lower nitrite, tumor necrosis factor-alpha and interleukin-6 concentrations than the LPS activated cells that were treated with fish oil.

Conclusion: Treatment with both forms of omega-3 fatty acids resulted in reduced levels of nitrite, tumor necrosis factor-alpha and interleukin-6 in LPS stimulated cells. Treatment with krill oil exhibited greater pro-resolving effects than treatment with fish oil. These results suggest that further evidence should be obtained to determine whether pharmacists should preferentially recommend krill oil over fish oil.

Submission Category: Leadership

Submission Type: Descriptive Report

Session-Board Number: 5b-341

Poster Title: Challenges and opportunities: Establishing an interprofessional education (IPE) experience in a college of pharmacy with an unaffiliated academic health center (AHC)

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Purpose: This communication describes the process of establishing an inter-professional education (IPE) experience between Arnold and Marie Schwartz College of Pharmacy (AMSCOP), a school unaffiliated with an academic health center (AHC), and Weill Cornell Community Clinic (WCCC), an underinsured, primary care clinic. In 2010, the World Health Organization published an IPE and collaborative practice framework to stimulate innovation in healthcare education. Accreditation standards, including those for pharmacy education, have been instituted to incorporate IPE. This newly established collaboration between two previously unaffiliated institutions aims to further the mission of IPE in pharmacy and other healthcare fields at the experiential level.

Methods: A search for an AHC to establish a collaborative practice with AMSCOP was conducted in the metropolitan New York City area. Affiliation opportunities were restricted to the ambulatory care setting in order to facilitate inter-professional interaction between multiple health disciplines and the patient. A total of seven institutions were contacted, with responses from five. Four institutions cited malpractice concerns and spatial restrictions as the primary reasons for lack of pursuing collaboration. Weill Cornell Community Clinic was open to establishing an IPE opportunity with pharmacy involvement, and worked with AMSCOP over the course of 18 months to establish a formal memorandum of understanding between the college and the clinic. Two pharmacy students took on roles as pharmacy co-directors of this project, and met with the clinic medical student co-directors and faculty clinical director to establish goals of the collaboration, as well as a framework by which to integrate pharmacy involvement into an established clinic. Pharmacy involvement in clinic operations were aimed

to address the need for medication review for patients with high disease burden, patient education to increase adherence and safe medication use, and pharmacoeconomic considerations as related to medication reimbursement costs. In order to mirror medical student involvement at the clinic, pharmacy student co-directors established a student recruitment timeline and interview process.

Results: After an initial pilot period of 6 months with two pharmacy student co-directors, a selection process, involving a letter of intent and interview, was conducted to select students for the following academic year. Prior to establishment of this contract, medical students assisted patients with procuring high cost medications, and managing reimbursement for eligible prescriptions; however, there was no pharmacy involvement, as all matters were managed by medical students. With the establishment of this collaboration, pharmacy students have been involved more directly with patient care through collection of medication histories, formulation of a patient plan in conjunction with an interdisciplinary team, and patient education. Thus far, pharmacy students have been involved in six clinic visits resulting in 19 hours of direct patient care, addressing interventions such as omission of therapy, selection of appropriate agents, management of polypharmacy, patient education on OTC product selection, and evaluation of therapeutic equivalence for patients on foreign medications. Six volunteer pharmacy students for the 2016-17 year were selected to be involved with continuing this initiative, providing direct patient care as part of an interdisciplinary team at the clinic, student to student mentorship, pharmacotherapy presentations for medical students, and longitudinal, scholarship projects.

Conclusion: The primary purpose of this collaboration was to establish an inter-professional educational experience for pharmacy students that would improve patient care and outcomes in a student-coordinated, primary care clinic in the New York City metropolitan area. Over the course of two years, a working contract was established; pharmacy students have participated in direct patient care encounters on a regular basis while providing educational presentations to medical students, and a unique perspective on medication management. All of these activities encompass an IPE framework which guides future expansion and scope of involvement in this collaboration.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-342

Poster Title: Acute effects of chocolate, coffee and tea constituents theobromine, caffeine, and l-theanine on cognitive function and mood: a meta-analysis

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Purpose: Chocolate, tea and coffee are popular foods with naturally occurring stimulants consumed to enhance mood and cognitive function. Caffeine is a xanthine and the most widely consumed stimulant found in coffee and tea. l-theanine is an amino acid found in tea along with caffeine. Theobromine is a caffeine metabolite and mild stimulant found in chocolate. The purpose of this meta-analysis is to assess the individual acute effects of compounds caffeine, l-theanine and theobromine on cognitive function and mood within one and two hour post treatment time periods.

Methods: We searched PubMed, SCOPUS, and Cochrane Central from their inception to October 2016. Included randomized controlled trials (RCTs) had to be fully published. RCTs with the following criteria were included: 1) healthy adult sample, 2) oral administration of coffee, tea and chocolate with one or more of the following constituents : Caffeine, l-theanine, theobromine and 3) must measure cognitive function and mood. Mood was assessed through alertness, and calmness derived from Bond-Lader scales. Cognitive Function was assessed through rapid visual information processing and attention switching tasks. All measures of mood and cognitive function had to be used across three or more individual studies. Mean changes from baseline and post treatment outcomes were calculated using the “metafor” (version 1.9-8) package in “R”. Meta-analysis for comparable outcome measures was conducted using a random-effects model in MATLAB-r2016b, with average effect size presented as average standardized mean differences (SMDs) for the first and second hours post treatment dose. SMDs between treatment and placebo were calculated by dividing the mean difference by the

pooled standard deviation. Restricted maximum-likelihood estimation was used to estimate the between-study variance (t) in a random-effects meta-analysis. A moderator analysis for dosage and effects correlation was conducted in a mixed-effect model. In cases where data necessary for calculations were not available, the original authors were contacted to obtain raw data.

Results: We screened 4352 studies and evaluated 109 full-text articles. A total of 19 RCTs (n=433 participants) met our eligibility criteria. Eleven RCTs (n=332) evaluated caffeine and l-theanine. Eight RCTs (n=101 participants) evaluated theobromine and caffeine. For the mood evaluation, first hour Bond-Lader "alert" ratings for caffeine, l-theanine and theobromine were inputted into a random effects model to obtain the average SMD of 0.653 (SE = 0.05) in favor of caffeine ($t=7.87$, $p < 0.01$). Second hour random effects model with an average SMD estimated to .435 (SE=0.10) favored theobromine ($t=3.15$, $p< 0.01$). Bond-Lader "calm" ratings after one hour using a REM with an average SMD of 0.435 (SE = 0.05) favored l-theanine ($t=5.45$, $p < 0.01$). Second hour calm analysis was nonsignificant ($P>0.05$). Cognitive function accessed through accuracy in attention switching data favored caffeine ($t=7.34$, $p < 0.05$) for the first hour using a REM with an average SMDs estimated at .289 (SE = 0.05). Second hour accuracy data favored theobromine ($t=5.34$, $p < 0.01$) using a REM with an average SMDs estimated at .289 (SE = 0.03). Insufficient data was available to conduct a meta-analysis for rapid visual information processing. Moderator analysis on dosage and effect was nonsignificant ($p>0.05$).

Conclusion: Caffeine and theobromine alone increased Bond-Lader alertness in the first hour while l-theanine did not. Caffeine achieved the highest first hour alertness SMD of .653 vs .342 (theobromine). Second hour Bond-Lader alertness favored theobromine over caffeine with an average SMD of .435 and .234 respectively. Cognitive function data defined though accuracy in attention switching tasks followed similar trends and favored caffeine in the first hour and theobromine in the second hour. Caffeine's higher alertness and accuracy in the first hour are likely attributed to its shorter half-life and higher blood brain barrier penetration compared to theobromine.

Submission Category: General Clinical Practice

Submission Type: Case Report

Session-Board Number: 5b-343

Poster Title: Personalized pharmacotherapy in a patient with cytochrome P450 2D6 polymorphism

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Purpose: All individuals vary in their genetic makeup, and therefore standard prescribing guidelines cannot be used consistently for all patients. This case illustrates the need for personalized pharmacotherapy in a patient with a history of serotonin syndrome complicated by cytochrome P450 2D6 polymorphism. JK is a 47-year-old female with a history of depression, migraine headaches, anxiety, urticaria and eating disorders. During a follow-up visit with her primary care physician, patient reported symptoms of palpitations, night sweats, and hot flashes as well as occasional tremors. At the time of the visit, patient was taking vortioxetine 5 milligrams three times daily, duloxetine 30 milligrams three times daily, and sertraline 125 milligrams daily, which are substrates of the cytochrome P450 2D6 enzyme. An electrocardiogram showed sinus tachycardia at 101 beats per minute, which had increased from 3 months prior. Laboratory testing including blood count, thyroid function, and metabolic panel all came back normal. The patient also denied use of any stimulants or over the counter medications. Results of her genetic testing returned and indicated that patient is a poor metabolizer of cytochrome P450 2D6, increasing her risk of serotonin syndrome on these medications. Due to the concern of her emerging serotonin syndrome, tapering of vortioxetine and duloxetine were recommended after discussion between her primary care physician, pharmacist, and psychiatrist. A few days after the visit, patient reported a resting heart rate of 195 beats per minute. Her psychiatrist also noted psychomotor agitation. The patient was admitted to the hospital for worsening symptoms of serotonin syndrome. During her hospitalization, all antidepressants were discontinued and symptoms abated. The new discovery of the patient's genetic makeup and history of serotonin syndrome posed a great challenge in providing appropriate medications to treat her multiple disease states such as migraines. Beta-blockers and tricyclic antidepressants, first-line or second-line medications

recommended by guidelines for migraine prophylaxis, are affected by cytochrome P450 2D6 metabolism. Therefore, the patient can no longer receive standard therapy and must receive individualized treatment. Rather than treating her migraines prophylactically, she is now being treated symptomatically with medications to help with her nausea and pain. Also her depressive symptoms are controlled with lamotrigine which has an off label indication for depression. Studies outlining the complexities of individual genetics set the ground for the concept of personalized medicine. Due to the great deal of psychiatric medications affected by cytochrome P450 2D6, genetic testing should be considered in patients taking multiple medications that are substrates of the enzyme. The development of pharmacogenetics can help guide safe prescribing methods for individualized treatment. Increasing awareness of the importance of pharmacogenetics in personalized pharmacotherapy can improve the safe treatment of behavioral health problems and decrease potential for adverse reactions.

Methods:

Results:

Conclusion:

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 5b-344

Poster Title: Back to the future: Systematic review of current dosing algorithms for erythropoiesis-stimulating agents in hemodialysis patients to better inform a novel, universal, and precise approach

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Purpose: Erythropoiesis-stimulating agents (ESA) are the primary treatment of anemia in patients with end-stage renal disease on hemodialysis. Use of ESAs is problematic due to complex pharmacokinetics and a narrow pharmacodynamic target of hemoglobin 10 to 12g/dL. Overshoot of this target hemoglobin is associated with an increased risk of thromboembolic events. Lower hemoglobin increases the risk for blood transfusions, cardiac dysfunction, and decreased quality of life. There is no universal ESA dosing algorithm with strong accuracy and precision to maintain hemoglobin at the target range. The purpose of this study is to define characteristics and performance of current ESA dosing algorithms.

Methods: A systematic literature review was conducted. The following search terms were used in Pubmed and EMBASE databases from inception of the database until 08/24/2016: (epo OR erythropoietin OR erythropoiesis stimulating agent OR ESA) AND (computerized OR physician OR individualized OR decision OR monitoring OR algorithm OR protocol) AND (ESRD OR end stage renal disease OR hemodialysis). Inclusion criteria were algorithms applied to human subjects, published in English, and evaluated the use of epoetin alfa or darbepoetin alfa in patients with end-stage renal disease on hemodialysis. Literature search results were filtered based on study title and abstract with application of inclusion criteria. Full-text articles were then evaluated for inclusion. If included, a standard database was utilized to organize and characterize findings from each study. Data extraction included: study design, setting, size, inclusion/exclusion criteria, dosing software and/or algorithm, parameters included in the

dosing algorithm, laboratory values, demographic information, hemoglobin target range, hemoglobin values, type of ESA utilized, and ESA dosing. The primary endpoint was the percentage of patients at the target hemoglobin (defined by each individual study) over the study period.

Results: The literature search yielded 2,048 results. Thus far, 6 studies have met inclusion criteria. Study 1 utilized a pharmacokinetic model that targeted a hemoglobin range of 10 to 13g/dL in 1,558 patients. The median hemoglobin was 11.9 g/dL, however only 42 percent were constantly in range. Study 2 utilized a pharmacodynamic model that increased the time within target hemoglobin range (10.5 to 12.5g/dL) from 56 to 66 percent in 214 patients. Study 3 utilized a decision table to target hemoglobin 10 to 12g/dL in 49 patients. Percent within target range increased from 77.6 to 85.7 percent. Study 4 utilized Smart Anemia Manager software in 52 patients targeting hemoglobin 10 to 12g/dL. Percent within target range increased from 61.9 to 72.5 percent. Study 5 utilized Crit-Line software with AMIE computer algorithm in 44 patients to target hemoglobin 11 to12 g/dL. Results demonstrated an increase in target attainment from 28 to 39 percent. Study 6 utilized DARWIN computer decision support system in 8,941 patients to target hemoglobin 10 to 12g/dL. DARWIN was not associated with an improved on-target hemoglobin (odds ratio 1.12, 95 percent confidence interval 0.97 to 1.28) but did reduce the likelihood of hemoglobin greater than 12g/dL.

Conclusion: There are currently a variety of ESA dosing algorithms in the literature. These tools have a mild degree of success, with an improvement of on target hemoglobin ranging from 0 to 11 percent. However, there is no universally applicable algorithm with excellent accuracy and precision. Characteristics of algorithms with high success rates include monitoring hemoglobin monthly, assessing ferritin and TSAT for adequate iron dosing, and individualization through computer software. Future studies should include a large number of subjects, compare a robust dosing approach to the current standard of care, and include outcomes of hemoglobin, quality of life, and costs.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 5b-345

Poster Title: Duration of antibiotic therapy in septic shock patients with intra-abdominal infections

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Purpose: The recent study by Sawyer et al. found no difference in outcomes among patients with complicated intra-abdominal infections who received short-course antibiotic therapy (4 plus or minus 1 days), as opposed to traditional 7-14 day antibiotic therapy, given adequate anatomical source control. The objective of our study was to determine whether a shorter course of antibiotic therapy, with adequate source control, applied to septic shock patients with intra-abdominal infections.

Methods: This retrospective chart review, at a tertiary care center of adult surgical intensive care unit patients, was approved by the Institutional Review Board. Our study evaluated septic shock patients with intra-abdominal infections who were treated by adequate surgical source control and antibiotics between April 20, 2012 and May 23, 2016. Data was collected from electronic medical records, with all information documented without patient identifiers to maintain confidentiality. Severity of patients' illness was stratified using Acute Physiology and Chronic Health Evaluation II (APACHE II) and Sepsis-related Organ Failure Assessment (SOFA) scores. Patients were evaluated on the following criteria: median days to resolution of fever (less than 38 degrees Celsius for 24 hours), normalization of white blood cell count (less than or equal to 11,000 per cmm), vasopressor requirements, resolution of Systemic Inflammatory Response Syndrome (SIRS) related physiological abnormalities, 28- day mortality, recurrence of intra-abdominal infection, and development of subsequent infections. The primary outcome was duration of antibiotic therapy to achieve resolution of septic shock. The secondary

outcome was 28-day mortality. Student's t-test and Chi-square test were used to evaluate demographic data and severity of illness. Fisher's exact test was used to evaluate mortality.

Results: One hundred and two patient records were evaluated; 52 patients met criteria of septic shock with an intra-abdominal infection and adequate surgical source control. The median duration of antibiotic therapy for all patients was 7 days, whereas the median time to resolution of septic shock was 6 days. Patients were then divided into two groups based on the median time to resolution of septic shock symptoms. Twenty patients had resolution of septic shock within less than or equal to 6 days of antibiotic therapy (Group 1), while 32 patients (Group 2) had resolution of these symptoms after more than 6 days of antibiotics. Mean APACHE II scores for Group 1 and Group 2 were 22.35 plus or minus 6.2 and 7.80 plus or minus 3.3, respectively (p equals 0.07). The mean SOFA scores were 19.34 plus or minus 5.4 for Group 1 and 8.34 plus or minus 2.7 for Group 2 (p equals 0.52). Twenty-eight day mortality occurred in 6 patients (11.5 percent); 5 patients in Group 1 (25 percent) and 1 patient in Group 2 (3.13 percent) (p equals 0.026).

Conclusion: Short-course antibiotic therapy may not be sufficient in the treatment of septic shock patients with intra-abdominal infections, who had undergone an adequate source control procedure, and may lead to increased risk of 28-day mortality.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-346

Poster Title: Evaluation of prescribing patterns of Quetiapine fumarate extended-release (XR) at an inpatient psychiatric facility

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Purpose: Quetiapine is a widely prescribed atypical antipsychotic that is commonly used for multiple indications including bipolar disorder, schizophrenia, and augmentation in major depressive disorder. It is currently available as an immediate-release (IR) and an extended-release (XR) tablet and both have demonstrated similar efficacy, tolerability, and pharmacokinetic profiles. Additionally, both may be dosed once daily. The extended-release formulation is significantly more expensive than the immediate-release formulation. The purpose of this retrospective drug-utilization review is to evaluate the prescribing patterns of quetiapine XR and assess potential hospital cost savings if all orders for the XR formulation were switched to quetiapine IR.

Methods: This is an institutional review board (IRB) approved, retrospective chart review. This review will include 100 patients, over the age of 18 years, who have been prescribed and were taking quetiapine XR as inpatients between January 1, 2015 and August 30, 2016. Patients who were refusing their medication were excluded from the study population. Data collected includes: patient demographics (age, sex, race, weight, height), psychiatric diagnosis, medication use information (e.g., medication name, dosage, frequency). All study data was obtained and evaluated from the confidential medical record.

Results: Out of 100 randomized patients, 16 were diagnosed with schizophrenia, 31 were diagnosed with major depressive disorder, and 39 were diagnosed with bipolar disorder. Mean doses were: 293 mg, 235 mg, and 303 mg in patients with schizophrenia, major depressive disorder, and bipolar disorder, respectively. Eighteen patients received quetiapine XR for other indications. The total amount spent on quetiapine XR on these patients was $30,285 based on

the average wholesale price. Substituting each of the orders with quetiapine IR would result in a cost of $18,044 to the hospital, and savings of $12,241.

Conclusion: Quetiapine XR is a more expensive formulation that increases hospital costs without adding any therapeutic benefit. Converting patients from quetiapine XR to quetiapine IR through use of a therapeutic interchange policy would result in cost savings for the hospital with no expected effect on patient outcomes.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Descriptive Report

Session-Board Number: 5b-347

Poster Title: Analysis of student research programs across pharmacy schools and hospitals

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Purpose: Clinical research is a cornerstone of a pharmacy practice, yet pharmacy students are not routinely exposed to it in their curriculums. Engaging in student research is associated with development of valuable skills and higher levels of critical thinking. Residency programs and employers increasingly seek graduates with research experience. However, there is no standardized program recommended by the ACPE. Schools that extend research opportunities often do so as an elective, while others do not offer any at all. The purpose of this analysis is to characterize various clinical research programs specifically geared towards PharmD students offered by pharmacy schools and hospitals.

Methods: An online search was initiated to identify hospitals and schools of pharmacy in the United States that offer a structured clinical research program for students. Program information was either obtained from journal articles yielded by a PubMed and Google Scholar search or published webpages on hospital/pharmacy school websites found from a general Google search. These programs were analyzed for specific predetermined variables including: duration of program, student eligibility requirements, participant selection process (i.e. open, proposal, GPA), whether it was an elective course or extracurricular, whether a mentor was assigned, if funding was provided, and if a presentation or publication was required. Programs were excluded if their descriptions did not address all of the above features on their program webpages. Programs that met inclusion criteria were further compared to identify unique features.

Results: Twenty student-focused research programs were identified from the literature search. Two were developed by hospitals and the remaining 18 by schools of pharmacy. The length of the programs varied greatly, ranging from 9 weeks to two years. The eligibility of students spanned across nearly all years of pharmacy school - from second year of pre-pharmacy to the

last professional year. Four programs targeted P1/P2 students, four targeted P3/P4 students, with the remaining being open to all students. As for the selection process, most programs required an application (n=14). The composition of the applications differed greatly however, with some requiring a minimum GPA (n=7) and letters of recommendation (n=5) and others requesting a topic proposal (n=5). One program held up to 2 rounds of interviews. In terms of program outcomes, the majority required their students to present at the respective sites' research symposiums (n=10). While most programs encompassed similar components, some implemented innovative features. One program awarded NIH grants to its participants and funded the cost of poster materials and travel to conferences. Another program had its participants present and defend their research protocols, similar to a PhD thesis presentation. One program held IRB training sessions.

Conclusion: There is a wide spectrum of student clinical research programs with differing requirements and goal outcomes amongst programs. Most programs shared similar core components, however some included innovative features such as IRB training and defending research protocols. Hospitals and schools of pharmacy looking to develop a research program can use these practices as foundation for building their program. Programs that have developed a successful research program should consider publishing their results or including them as part of their program website.

Submission Category: Pain Management

Submission Type: Descriptive Report

Session-Board Number: 5b-348

Poster Title: Improving pain management knowledge in palliative care through global education

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Purpose: Data indicates that tens of millions of people worldwide lack access to essential pain medications causing unnecessary suffering from severe pain. There are many reasons behind this, which can include undue restrictive regulations regarding opioid prescription medications, distribution barriers, stigma, and the high cost of some medications. Many patients, including cancer and palliative care patients in Guatemala are not receiving adequate pain management due to the growing concern of abuse for these medications. The main purpose of this project was to increase awareness and improve pain management by providing much needed education on prescription opioids in the relief of pain.

Methods: A global academic service-learning component was incorporated into an Advanced Pharmacy Practice Experience (APPE) rotation in May 2016 in Guatemala City, Guatemala. During this time, a survey questionnaire and presentation for medical students and physicians at the national cancer hospital was conducted. The presentation covered topics such as the World Health Organization analgesic ladder, calculations using the equianalgesic opioid dosing chart, conversions involving methadone, and discussions on the use of adjuvant analgesic options for pain management. The survey questionnaire, which was given pre and post the in-service, focused on methods used to manage pain and was given to the students and residents before and after the presentation to assess their knowledge on pain management.

Results: Sixteen individuals including medical students and physicians from the national cancer hospital attended the educational in-service regarding opioid prescriptions medications and their use in pain management. Prior to the in-service, the overall passing rate was 63%. A score of 3 out of 5 (60%) was considered passing. The overall passing rate post in-service was 92%.

Conclusion: An educational in-service, such as ours has demonstrated benefits in improving knowledge among healthcare professionals in Guatemala regarding the use of opioid prescription medications for pain management in palliative care patients. Collaborative efforts should be made by governments, health care administrators, pharmacists and prescribers to ensure that opioids are available for the treatment of pain management.

Submission Category: General Clinical Practice

Submission Type: Case Report

Session-Board Number: 5b-349

Poster Title: Risperidone-induced hepatotoxicity in a schizophrenic patient unresolved after switching to paliperidone

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Purpose: This case report describes possible risperidone- and paliperidone-induced hepatotoxicity. A 23-year-old hispanic male with a past medical history of schizophrenia was admitted to an inpatient psychiatric unit after psychiatric decompensation in the community secondary to medication non-adherence. Prior to admission, the patient's family reports he was isolated, restless, malnourished, and paranoid that his food was being poisoned. On admission, his baseline liver function tests (LFTs) were within normal limits. The patient was started on risperidone 1mg, and was titrated in 1mg increments over five days until he reached a 4mg dosage. Approximately one week after initiating risperidone 4mg, the patient experienced a significant rise in LFTs. Aspartate aminotransferase (AST) and alanine aminotransferase (ALT) peaked at 125u/L and 469u/L on the eighth consecutive day of receiving risperidone 4mg, respectively. Medical causes such as refeeding syndrome were ruled out, and it was deemed that the risperidone was the possible cause for the hepatotoxicity. One day after discontinuing risperidone, the patient's LFTs began trending down. His regimen was switched to oral paliperidone 6mg due to minimal hepatic metabolism and a lower hepatotoxicity incidence reported. The patient's LFTs consistently trended downward after three days of oral paliperidone 6mg, and he was thus bridged to the paliperidone palmitate 234mg, the long-acting injectable formulation of paliperidone, four days after initiation of oral paliperidone. The patient's labs fluctuated for six days, however his LFTs began trending upward again (AST: 80u/L and ALT: 217u/L). The second dose of paliperidone palmitate was held to assess if LFTs would continue to rise. Four days later, liver enzymes were still persistently elevated. The patient was switched to oral haloperidol. By the next day, the patient's LFTs were reduced by almost half, and reached normal range approximately three weeks after the discontinuation of paliperidone palmitate. After four weeks of receiving haloperidol, the patient's LFTs remained stable. The patient was discharged on haloperidol decanoate and normal LFTs. This case

highlights possible hepatotoxicity associated with risperidone that remained unresolved after switching to paliperidone, but resolved after switching to haloperidol. Findings of this case suggest that haloperidol may be an appropriate antipsychotic to switch to if a patient develops hepatotoxicity during risperidone or paliperidone therapy. Additionally, baseline and routine screening of liver function tests in patients initiated on risperidone may be warranted.

Methods:

Results:

Conclusion:

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5b-350

Poster Title: Effects of delayed rifampin administration in combination with polymyxin B against KPC-producing Klebsiella pneumoniae

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Purpose: Infections caused by KPC-producing Klebsiella pneumoniae (KPC-Kp) are associated with unacceptably high mortality rates in the clinical setting. As a result, the need for novel combinations and dosing strategies has arisen in order to effectively combat KPC-Kp. The objective of this study was to compare the combinatorial pharmacodynamics of polymyxin B (PMB) and rifampin (RIF) administered simultaneously, versus polymyxin B with delayed rifampin administration.

Methods: Five clinical KPC-Kp strains (3 KPC-2 and 2 KPC-3) obtained from patients with bacteremia were investigated (Strain, PMB/RIF MICs: 9A, 0.5/64; 26A, 0.5/64; 27A, 1/>64; 8A, 0.5/32; 25A, 0.5/32). Combination therapies of PMB (1.5 and 3mg/L) + RIF (3.5mg/L) were evaluated versus a starting inoculum of 10^7 CFU/ml in 24h static time-kill experiments. The total bacterial population was quantified by plating serial dilutions of bacterial samples on cation adjusted Mueller-Hinton agar plates and then quantified following incubation for 24h at 37 Celsius. Bacterial log(CFU/ml) reductions from baseline were calculated at individual time points to compare the pharmacodynamic effects of RIF added 0, 2, 4, 6, or 8h after the addition of PMB.

Results: Against 9A, simultaneous administration of PMB 3mg/L and RIF displayed the greatest bactericidal activity indicated by a -7.4 log(CFU/ml) reduction in the time-kill experiment from 4-8h. Addition of RIF at 2h to PMB 1.5mg/L was superior to simultaneous administration for 9A, displaying a -7.3 log(CFU/ml) reduction from 4-6h. RIF administration at 2h was the most

effective regimen against 26A, irrespective of PMB concentration. PMB 1.5 mg/L and 3mg/L with RIF added at 2h achieved undetectable counts from 4-8h and 2-6h, respectively. Against 27A, simultaneous administration of PMB 3mg/L and RIF produced the greatest bactericidal activity with a -7.2 log(CFU/ml) reduction from 6-8h. All regimens of PMB 1.5mg/L displayed similar activity regardless of time of RIF administration. Interestingly, against 8A, PMB 3mg/L+RIF dosed at 6h displayed enhanced killing compared to other regimens, generating a -7.2 log(CFU/ml) reduction from 6-8h. PMB 1.5mg/L regimens all displayed similar activity regardless of time of RIF administration. Against 25A, eradication was detected at 24h for PMB 3mg/L+RIF administered at 2, 4, and 6h, while simultaneous and 8h delayed administration of RIF resulted in regrowth. Against PMB 1.5mg/L, complete killing of 25A throughout the experiment was seen only with administration of RIF after 6 and 8h.

Conclusion: KPC-infections have become increasingly problematic to treat in the clinical setting and as a result require innovative treatment approaches. Delaying the addition of rifampin relative to polymyxin B may be advantageous when compared to simultaneous administration by potentiating bactericidal activity of polymyxin combinations against KPC-producing K. pneumoniae. Further studies are warranted to determine if this phenomenon is dependent on the infecting strain.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 5b-351

Poster Title: Management of latent tuberculosis in directly observed therapy programs coordinated by clinical pharmacists

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Purpose: Directly Observed Therapy (DOT) is a widely recommended and promoted strategy used to manage latent tuberculosis (TB). DOT among individuals at the highest risk for progression to active disease is an important strategy used to reduce drug-resistance, relapse, and further transmission. Control and elimination can be achieved with a concerted effort between healthcare practitioners and their inclusion of clinical pharmacists. A pharmacist can offer benefits including expert medicinal care and support, walk-in center convenience, and medication therapy management. This project was designed to highlight the ever-expanding role and capacity of pharmacists in the management of DOT for latent TB.

Methods: A clinical pharmacist at an infectious disease clinic was given the opportunity to manage DOT patients. Prior to the start of therapy, the pharmacy staff at the infectious disease clinic coordinates with the patient's outpatient pharmacy to determine if the medications require a prior authorization. If so, the manual process was initiated and completed by the pharmacist. The initial visit comprised of an interview which served as a priority assessment tool to address barriers to adherence and any patient concerns. A cornerstone of the initial visit was the identification, resolution and prevention of potential drug-related problems completed by the clinical pharmacist. The DOT regimen lasted 12 weeks and consisted of weekly doses of 900 milligrams of Priftin, 900 milligrams of Isoniazid, and 50 milligrams of vitamin B6. Each patient was provided daily doses of vitamin B6 (50 milligrams) in pill trays for the remainder of the week. Additional monitoring parameters included a complete metabolic panel, and a

complete blood count every 4 weeks throughout the course of DOT. The pharmacist participated in the evaluation and distribution of all DOT incentives.

Results: The DOT program has been supervised by the clinical pharmacist since 2013. Since it's inception, the program has enlisted a total of 50 patients. 42 patients have successfully completed DOT, whereas 8 patients failed to complete therapy. 4 of the 8 patients withdrew from therapy prior to completion because of severe adverse drug reactions. 2 of the 8 patients were dismissed because of poor compliance. 2 patients discontinued therapy because of miscellaneous reasons. The clinical pharmacist used a proactive approach in reducing the frequency of drug related problems, thus influencing better pharmacotherapy outcomes for the patient. For some drug interactions, the pharmacist was able to independently identify whether or not the risk outweighed the benefit. The pharmacist served as an asset for patients by obtaining and evaluating pertinent laboratory results. The pharmacist documented and discussed clinically relevant findings with the patient's physician and nurse. The pharmacist assessed any adverse effects, reinforced counseling, and reviewed education points during all encounters.

Conclusion: The critical role that medication management plays in treating latent TB suggests that the integration of clinical pharmacists into DOT teams has the potential to improve health outcomes. Our project elucidates an innovative opportunity for pharmacists to participate in all stages of DOT, including drug ordering, dispensing, administering, and monitoring.

Submission Category: I.V. Therapy/ Infusion Devices/ Home Care

Submission Type: Evaluative Study

Session-Board Number: 5b-352

Poster Title: Acetaminophen Stability in Polyolefin and Polyvinyl Chloride

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Purpose: Acetaminophen's stability according to the manufacturer is listed as six hours, although
current literature implicates that it may be stable for longer. This literature, a specific study conducted by Kwiatkowski et al in the American Journal of Health System Pharmacists, evaluated the drug in syringes or glass containers and not in the intravenous bags routinely used in
pharmacy practice. Our experiment repeated this study utilizing B Braun Polyolefin and Hospira Polyvinyl chloride intravenous-use containers.

Methods: Our stability-indicating study, was based on the current literature and modeled after the
stability study aforementioned. We created an high performance liquid chromatography analysis and modeled it to optimize
wavelength and retention time. Our preparations bore 10 miligram per mililiter concentrations and all tests
were performed in triplicates. Our models to date indicate a linear function with respect to our data and our results are reproducible. Analysis was conducted with the drug mixed with HCl 1 N, NaOH 1 N, H2O2 3 percent and heat (125 degrees centigrade for 15 minutes). The breakdown products generated
peaks distinct from the targeted medication. The containers were kept at controlled room temperature to maximally stress the solutions. Samples were removed from all containers at time 0, 6 and 24 hours and at days 4, 7 and 14.

Results: Throughout the study only one peak was seen on the chromatograph. There was no decrease in concentration. The concentration was slightly elevated in the polyvinyl chloride containers. No sign of drug degradation was noted throughout the study.

Conclusion: The increase in concentration seen with long term storage in polyvinyl chloride is expected as water will evaporate through polyvinyl chloride. Therefore polyvinyl chloride is not a good option for long-term storage of any aqueous component. Acetaminophen has been found to be stable for 14 days and can be stored at room temperature. In accordance with USP 797, the optimal storage would be refrigeration,prepared in batched lots inside a 797 clean room.

Submission Category: Pain Management

Submission Type: Evaluative Study

Session-Board Number: 5b-353

Poster Title: Pigtail catheters versus traditional chest tubes and the need of pain medications in trauma patients

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Purpose: Thoracic injury resulting in pneumothorax or hemothorax is quite common. Traditionally, large bore chest tubes (32-40F) are inserted to treat both pneumothorax and hemothorax. Recent literature has suggested that using smaller pigtail catheters (14F) is equally efficacious, with similar complication rates and fifty percent less insertion site pain when compared to larger tubes. We hypothesize that the placement of a smaller bore pigtail catheter will result in a decreased need of pain medications post pull insertions when compared to traditional chest tubes.

Methods: The institutional review board has approved this retrospective chart review with patients identified through the trauma registry as meeting the following criteria: patients admitted for trauma with a diagnosis of pneumothorax or hemothorax for which a tube thoracostomy was performed. The charts were reviewed and pertinent demographic and clinical data retrieved. Inclusion criteria were all adult trauma patients with tube thoracostomy at any time during admission. Exclusion criteria were those who died prior to tube removal, those with a pneumothorax on pre-pull chest x-ray and patients less than eighteen years of age. Pain medication need was assessed 72-hours post-tube placement. All opiate medications were converted to their morphine equivalences. Data was assessed to determine if patients receiving pigtail catheters required less pain medication when compared to patients who received larger chest tubes.

Results: Among 105 charts reviewed, 35 patients received a pigtail catheter (33 percent). The total 72-hour post-tube placement pain medication need for patients who received a smaller pigtail catheter was compared to patients who received a larger bore chest tube. The mean difference (plus or minus standard deviation) between the larger chest tube and pigtail catheter was found to be 354.36 plus or minus 227.78 milligram and 553.72 plus or minus 422.42 milligram respectively. A significant difference was not found when comparing both groups (P equals 0.66) total opioid use without fentanyl. All data was analyzed using ANOVA for mean comparison of total morphine equivalence.

Conclusion: When comparing patients who received a smaller bore pigtail catheter versus a larger bore chest tube after being diagnosed with a pneumothorax or hemothorax, there was not a significant reduction in the need for pain medication 72-hour post-tube placement. Data collected directly challenges the results of recent studies which have suggested smaller bore catheters resulting in the need of a reduction in pain medication administration. Further analysis is needed in a larger populations and further assessment of confounding constraints and procedure adverse effects are warranted.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-354

Poster Title: Assessing real world evidence of edema in Philadelphia positive chronic myeloid leukemia patients receiving imatinib and nilotinib

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Purpose: Imatinib mesylate (Gleevec) and nilotinib (Tasigna) are medications in the class of BCR-ABL tyrosine kinase inhibitors and are used to treat patients with Philadelphia positive chronic myeloid leukemia (Ph+ CML). The purpose of this retrospective study is to compare the risk profile of edema between imatinib and nilotinib in patients with Ph+ CML, using the FDA Adverse Event Reporting System (FAERS) database in an attempt to illuminate a reflective method on how to help ascertain the risks and benefits of administering these particular medications in patients who are prone to developing edema.

Methods: The institutional review board has approved this retrospective study. The FAERS database comprises anonymous adverse drug events that are publicly accessible comma separated value files from 2004 to 2015. A subdivision of data from the database involves patients who were taking either imatinib or nilotinib with the indication of Ph+ CML listed during the period stretching from 2011 to 2015. These patients were split into two proportions and the rate of edema within each medication for this indication was then recorded. The most suitable statistical tool for this scenario is a two-proportion t-test, given that the researchers are comparing two probabilities of independent events happening. In order to detect a difference, a 95 percent confidence interval was used. The first proportion is the number of total edema events that occurred within the subpopulation of Ph+ CML patients who were on imatinib. The second proportion is the number of total edema events that occurred within the subpopulation of Ph+ CML patients who were on nilotinib.

Results: A total of 4,998 adverse drug reaction records with a Ph+ CML indication that met the standards for Medwatch reporting were cultivated from the FAERS database from 2011 to 2015. The data consisted of 2,330 nilotinib-associated reports. 97 of this dataset showed the occurrence of edema. On the other hand, there were 2,668 imatinib-associated reports, 84 of which exhibited edema. Using a proportional t-test, the research demonstrated a statistically significant difference in edema incidence rates between imatinib and nilotinib (3.15 percent versus 4.16 percent, respectively; p less than 0.05).

Conclusion: In the context of this type of reporting, patients receiving nilotinib were shown to have a higher incidence of edema than patients receiving imatinib. While this data may serve as a pharmacovigilance tool, future post-marketing studies involving these two medications should consider as many individualistic patient variables as possible. Assumptions made about the results of this study must be interpreted considering the manner in which these reports were voluntarily submitted by qualified personnel.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 5b-355

Poster Title: Assessing the relationship between patient perceptions regarding hypertension medications, medication adherence, and blood pressure goal attainment

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Purpose: Monitoring patient adherence to hypertension medication remains challenging. Patient perception regarding the efficacy and importance of a medication regimen may play a large role in the degree of adherence and ultimately blood pressure goal attainment. This project was designed to target patients on antihypertensive regimens, and gain understanding regarding their needs and concerns about their antihypertensive medications in order to increase understanding the relationship between perceptions and maintaining adherent to prescribed medications.

Methods: Patients diagnosed with hypertension being treated with at least one hypertensive medication were selected for inclusion if they met the following criteria: 1 or more blood pressure medications, at least 18 years of age, and presenting to their primary care provider for a follow-up visit for hypertension. Patients were excluded if they had a psychiatric condition that impaired their ability to control their own medication adherence. Utilizing a convenience sample process, patients identified were administered an eight item questionnaire to determine their needs and concerns surrounding the use of blood pressure medications. Additionally, patients were asked requested to self-identify their level of adherence and their blood pressure value for that visit was recorded. Outcomes measured will include: Level of agreement for statements regarding needs and concerns about antihypertensive medications, self-reported rate of adherence, and number of patients at goal blood pressure.

Results: A total of 22 patients were identified that met inclusion criteria and completed the questionnaire. Twenty-seven percent of patients self-identified as being adherent to medication therapy, medication adherence was not assessed in 18 percent of patients. Goal blood pressure was achieved by all patients that self-reported as being adherent and only 40 percent of patients that self-report non-adherence. Regardless of level of medication adherence, 100 percent of patients strongly agreed with statements that assessed their need for their blood pressure medication to maintain their health. All patients that self-identified as non-adherent strongly disagreed with statements that indicated they have concerns regarding their medications, where as 80 percent of patients that self-identified as adherent to therapies, indicated a level of agreement with statements that indicated they have concerns regarding their medications.

Conclusion: The ability to achieve goal blood pressure is impacted by adherence to antihypertensive therapies. Regardless of level of adherence patients on antihypertensive medications strongly agree the medication is needed to maintain their health. Patients concerns regarding their antihypertensive therapies differs with level of adherence, those that are adherent are more concerned with the effects of their medications and medication dependency in comparison to non-adherent patients.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Descriptive Report

Session-Board Number: 5b-356

Poster Title: Update: description and analysis of a clinical emergency pharmacist program in a rural hospital

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Purpose: The acute and fast pace of the emergency department (ED) creates an environment vulnerable to preventable medication errors. The ED has one of the highest preventable medication error rates, hospital wide. The role of the ED pharmacist as a readily visible and available position has drastically evolved. ED pharmacists can improve patient outcomes through interventions including dose adjustments, drug information, patient education and reducing medication errors. In 2010, a small rural hospital in Gallup, New Mexico established a successful ED Clinical Pharmacist Program. This is an update to program establishment, and assessment of evolving responsibilities of the current program.

Methods: The data collection to justify the progression of ED pharmacist integration within the interprofessional team and exemplify intervention evolvement began on September 26th, 2016 and will conclude November 15th, 2016 by the lead ED clinical pharmacist. The study was conducted at Gallup Indian Medical Center (GIMC), a 66 bed Indian Health Service (IHS) rural hospital with a 14 bed ED. Daily pharmacist interventions performed in the ED by the pharmacist were documented on a daily log sheet. Targeted interventions included therapeutic consultation, drug research and information, antimicrobial selection or dosing, dosage calculations or adjustments, response to new lab results, renal dosing advice, promotion of evidenced based guidelines, etcetera. Furthermore, a 10-question survey was developed and deployed from ED staff including physicians, nurses and technicians to capture perspective on ED pharmacist interventions and this position's utility to ED patients, staff and hospital work flow.

Results: A daily log sheet was created to document pharmacist intervention records during weekly shifts of the ED pharmacist. During the first example week, a total of 124 interventions have been made. 21 Intervention categories were observed after the first week of the study. The top three interventions included antimicrobial selection, therapeutic consultation and provision of drug research and information. The preliminary results correspond to the first week of the project; further results are pending. The results of this study will be compared to the interventions made during the inception of the program.

Conclusion: Based off the preliminary results, pharmacist involvement in the ED has expanded significantly in comparison to such implementation in 2010. The ED pharmacist continues to be an integral and appreciated part of the interdisciplinary team caring for ED patients. Continuation and expansion of the pharmacist position in this rural hospital may be warranted, based upon possible future higher patient volumes as this program will continue to aid in decreasing medication errors, improved patient and ED staff satisfaction and continued efficiency associated with real-time interventions.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-357

Poster Title: Compounded apixaban suspensions for enteral feeding tubes

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Purpose: Medication administration via enteral feeding tube is on the rise for critically ill patients. Apixaban is a relatively new oral factor Xa inhibitor which is available only as 2.5 and 5 mg film coated tablets. There are limited compatibility and stability data on compounded apixaban preparations for enteral feeding tubes. This study is intended to identify a suitable apixaban suspension formulation which is easy to prepare by pharmacists, is compatible with commonly used enteral feeding tubes, and has a beyond-use date of at least 48 hours.

Methods: Two types of nasogastric tubes, polyurethane (10 french, 36 inches) and polyvinyl chloride (18 french, 48 inches), were used in this study to represent the commonly used tube materials and to bracket the typical tube diameter range for adults. The tubes were mounted on a pegboard to simulate the patient position. Suspension vehicles of ORA-Plus and water mixtures were first screened for flowability through the tubes. Twenty milliliters of each vehicle were poured in a syringe and allowed to flow through the tube via gravity. All evaluations were done in triplicates, and the tube was flushed with 60 mL water and 60 mL air between runs. Once a suitable vehicle was identified, 0.25 mg/mL apixaban suspensions, were prepared from 5 mg strength tablets using mortar/pestle, Silent Knight Pill Crusher, or crushing syringe. Selected apixaban preparations were administered through each type of tubes for flowability evaluation (n equals 3 with fresh tubes). The drug concentration before and after tube administration was also analyzed by reversed phase high performance liquid chromatography (RP-HPLC). Finally, a stability study of the chosen apixaban suspension formulation was conducted. The suspension was stored in an amber polypropylene bottle at room temperature and analyzed on day-0, 1, 3, and 7 by a stability-indicating RP-HPLC method.

Results: It was observed that ORA-Plus and water mixtures, at 40:60, 50:50, and 60:40 ratios, flowed through both types of tubes at slightly varying speeds with little to no residual volume. Due to its simplicity and ease of preparation, the 50:50 ORA-Plus:water mixture was selected as the vehicle to prepare apixaban suspensions. Among the three compounding methods evaluated, the mortar/pestle approach gave the most accurate potency result of 0.247 mg/mL (99.0 percent label claim) with a relative standard deviation of 2.2 percent. Significant drug loss and variability were observed for Silent Knight Pill Crusher and crushing syringes, respectively. The apixaban suspension prepared by mortar/pestle flowed through both types of tubes with no significant residual volume. The RP-HPLC results also confirmed that more than 98 percent drug remained in the suspension after tube administration. The stability study results indicated that the chosen suspension formulation retained more than 95 percent of initial drug concentration over seven days of storage. No significant degradation products were observed.

Conclusion: A suitable apixaban suspension for enteral feeding tube administration was identified as 0.25 mg/mL drug in 50:50 ORA-Plus:water. This suspension was prepared from 5 mg strength oral tablets, and the traditional mortar/pestle compounding method was found to achieve more accurate and consistent potency results than the Silent Knight Pill Crusher or crushing syringe methods. The chosen apixaban suspension formulation exhibited satisfactory flowability via 10 to 18 french enteral feeding tubes and minimal sorption to polyurethane and polyvinyl chloride tube materials. The beyond-use date of this apixaban suspension, stored at room temperature, was established for up to seven days.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Evaluative Study

Session-Board Number: 5b-358

Poster Title: Management of hyperglycemic emergencies in an academic medical center: assessment of current practicies

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Purpose: Diabetic ketoacidosis (DKA) and hyperosmolar hyperglycemic state (HHS) are complications of diabetes that can result in prolonged hospital admissions and mortality if they occur in the setting of multiple comorbidities, advanced age or are inappropriately managed. In this study we performed a retrospective chart review to evaluate the correlation between the treatment received in the hospital and length of stay, and to identify areas for improvement with a subsequent goal of updating the current institution protocol to improve patient outcomes.

Methods: Patients admitted with a hyperglycemic emergency event from January 1, 2016 to August 30, 2016 who received a continuous insulin infusion were identified. Exclusion criteria were age younger than 18 years old, concurrent diagnosis of cardiac arrest, myocardial infarction, stroke, rhabdomyolysis, leave against medical advice or a presentation inconsistent with either DKA or HHS.
De-identified data of 34 patients was assessed.
The primary endpoint was the effect of the initial emergency department (ED) management, defined as the time to IV fluid and insulin drip initiation, on patient disposition to medicine service versus intensive care units (ICUs). Laboratory parameters related to the hyperglycemic emergency management were collected at the baseline and at the time of patient transfer from the ED. A regression analysis was used to assess correlation between the time of IV fluid and insulin drip initiation and percent reduction in anion gap at the time of transfer.
Secondary endpoints included appropriateness of fluid management, transition to long-acting insulin, resolution of the hyperglycemic event before insulin drip discontinuation, and regular

laboratory assessment. These parameters were analyzed in the subgroups of ICU and medicine patients for correlation with the length of stay.

Results: There were 9 admissions to the medicine service and 25 admissions to the ICUs with the median length of stay of 3 and 5 days, respectively. The average decrease in anion gap from the presentation to the transfer from the ED was 49 percent for the medicine group and 35 percent for the ICU group. There was no significant correlation between the time to initiation of IV fluids and insulin drip with the percent change in anion gap (adjusted R-squared equals 0.04). In the subgroup analysis there was a trend towards a negative correlation between proper fluid management, transition to long-acting insulin, resolution of the hyperglycemic event and regular laboratory assessment with the length of stay (adjusted R-squared equals negative 0.2 in the medicine group, adjusted R-squared equals negative 0.1 in the ICU group).

Conclusion: While our analysis did not show a statistically significant correlation of appropriate management of hyperglycemic emergencies with the decision on transfer to the ICUs versus medicine service and length of stay, this can be partially attributable to study limitations such as its retrospective design and a modest sample size.
The results derived from the analysis have identified areas for improvement and will be included in the new institution protocol on the management of DKA and HHS.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Descriptive Report

Session-Board Number: 5b-359

Poster Title: Implementation and impact of pharmacist-led transitions of care pilot program in the emergency department

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Purpose: Approximately 3.3 million emergency department (ED) visits every year are due to patients presented with asthma and chronic obstructive pulmonary disease (COPD). These respiratory diseases can be managed with proper use of inhalers. However, lack of consultation and inappropriate use of inhalers and lack of follow-up care has led to overcrowding in the ED. The purpose of this study is to determine if a pharmacist-led transition of care pilot program will reduce ED visit rates for patients presenting with acute asthma or COPD exacerbations.

Methods: The pilot program was implemented between November 1, 2015 and May 31, 2016 in the ED. The intervention group included patients who presented to the adult ED with a chief complaint of asthma or COPD exacerbation, subsequently discharged from the ED after treatment and willing to provide consent to be seen by a primary medical doctor (PMD) affiliated with the institution. The control group included patients with an existing private PMD. The intervention group received medication reconciliation, discharge counseling, education about their respective disease states, and follow-up with the pharmacist-led transitions of care clinics. The primary endpoint was 30-day ED revisit rates for a similar chief complaint. The secondary endpoint included ability to recall correct inhaler techniques after first counseling attempt, adherence to transition of care clinic visits, and patient satisfaction which was assessed via a Likert scale.

Results: Forty patients were enrolled in the study. All patients presented with a chief complaint of acute asthma exacerbation. The patients enrolled were divided in two groups. There was no statistically significant difference in the baseline characteristics of the patients in both groups. Control group included twenty-four patients who had a private primary medical doctor. The intervention group included sixteen patients who received discharge counseling in the ED and received appointments for follow-up with pharmacist-led transitions of care clinic. The 30-day ED revisit rates for a similar chief complaint was 37.5 percent in the control and 18.8 percent in the intervention group. This result, however, was not found to be statistically significant (p equals 0.297). A subgroup analysis of control versus patients who adhered to the scheduled clinic appointment revealed that six out of the sixteen patients counseled adhered to their clinic appointment. No statistical significant difference was observed in the subgroup analysis (control 37.5 percent versus intervention 16.7 percent; p equals 0.633). In regards to secondary endpoints, fifteen out of sixteen patients were able to correctly recall 87.6 percent of correct inhaler techniques. The mean patient satisfaction score was 4.60 out of 5. Patients expressed gratitude and enjoyed the program.

Conclusion: Discharge counseling in addition to referral appointments for follow-up with pharmacist-led transitions of care clinic reduced 30-day ED revisit rates among patients with acute asthma exacerbation. However, the result was not statistically significant. Patients who participated in the study were able to demonstrate appropriate use of inhalers and provided positive patient satisfaction scores.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-360

Poster Title: Antihypertensive drug utilization patterns and blood pressure control in Hispanic Americans: The National Health and Nutrition Examination Survey, 2003 to 2012

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Purpose: Antihypertensive pharmacotherapy effectively reduces hypertension-related morbidity and mortality. Several studies have raised the concern of suboptimal pharmacological antihypertensive treatment among Hispanic populations. While insufficient insurance coverage and poor access to healthcare are most widely accepted determinants of health disparities, the causes of racial inequalities are complex and require systematic studies in order to bridge the gap in achieving universal high-quality clinical outcomes. We aimed at evaluating antihypertensive drug utilization patterns and hypertension control among Hispanic hypertensive individuals by insurance status, age, and presence of comorbidities, especially in comparison to Caucasians and African Americans.

Methods: A serial cross-sectional study was conducted based on the latest available nationally representative data, the National Health and Nutrition Examination Survey (NHANES, 2003 to 2012). Conducted by the US National Center for Health Statistics (NCHS), the NHANES has been implemented as a continuous, cross-sectional annual survey, and data are publicly released in 2-year cycles since 1999. The surveys were reviewed and approved by the NCHS Institutional Review Board (IRB) and documented consent was obtained from participants. To be included in the study, participants must be ≥18 years old, and not pregnant at the time of survey. Hypertension was defined as systolic blood pressure (SBP) ≥140 and/or diastolic blood pressure (DBP) ≥90 mmHg and/or affirmative response to “Are you currently taking medication to lower your blood pressure?” Linear trends in the utilization patterns and control of hypertension were assessed with regression models with a 2-year period treated as a continuous variable. Logistic regressions were applied to model probability of antihypertensive treatment and hypertension control among treated and reported odds ratios (ORs) and 95% confidence intervals (CIs) of

Hispanics relative to Caucasians and African Americans. The analyses were conducted in overall sample and subgroups by insurance, age, and comorbidity, with appropriate sample weights accounting for differential probabilities of selection and the complex multistage survey design. All analyses were conducted using SAS 9.4 (SAS Institute, Inc., Cary, NC).

Results: A total of 8796 hypertensive people ≥18 years were identified. During the study period, all three racial groups (Hispanics, Caucasians and African Americans) experienced substantial increase in antihypertensive treatment and hypertension control, with the lowest rates persistently observed in Hispanics. The overall treatment rates were 60.7% (95% CI 57.0%-64.3%), 73.9% (95% CI 71.6%-76.2%), and 70.8% (95% CI 68.6%-73.0%) and hypertension control rates were 31.2% (95% CI 28.6%-33.9%), 42.9% (95% CI 40.5%-45.2%), and 36.9% (95% CI 34.7%-39.2%) for Hispanics, Whites, and African Americans, respectively. The lower treatment rates among Hispanics were particularly pronounced with regard to polytherapies: Hispanic hypertensive individuals were 23% less likely (OR, 0.77 [95% CI, 0.65-0.92]) than Caucasians and 40% less likely (OR, 0.60 [95% CI, 0.42, 0.86]) than African Americans to receive antihypertensive polytherapies, when controlling for potential confounders. When stratified by insurance status, Hispanics (odds ratios, 0.74 [95% CI, 0.60-0.91] for insured and 0.58 [95% CI, 0.36-0.94] for uninsured) persistently had lower rates of hypertension control compared with Caucasians. These disparities also persisted in subgroups stratified by age (≥60 and < 60 years) and presence of comorbidities but worsened among patients < 60 years.

Conclusion: Our study confirms positive trends in both antihypertensive therapy utilization and hypertension control in all racial groups over the 10 year study period. At the same time, we observed marked racial differences in these measures. Hispanic patients appeared to have poorer hypertension control compared to Caucasians and these differences were more pronounced in younger and uninsured patients. While African Americans received more intensive antihypertensive therapy Hispanics were undertreated. Therefore, further efforts should focus on understanding the reasons for racial inequalities in hypertension control and mounting a broader effort in addressing these reasons.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5b-361

Poster Title: Quality assessment before and after implementation of a revised warfarin management program in a small community hospital

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Purpose: The objective of this evaluation is to assess the effectiveness of warfarin management before and after new warfarin dosing guidelines and education were implemented with medical providers and pharmacists.

Methods: The warfarin policy and dosing guidelines were expanded and updated to include suggested dosing strategies in patients with low risk, average risk, and high risk for warfarin sensitivity and bleeding. Education for warfarin pharmacodynamics and pharmacokinetics, dosing, and monitoring was provided to medical providers and pharmacists.
A Medication Use Evaluation was conducted for the month of March in 2015 and 2016, which represented conditions before and after the implementation of the warfarin new management program. Patients admitted during the time period and receiving warfarin were randomly selected and included for evaluation.
Targeted parameters of the evaluation included incidence of an International Normalized Ratio (INR) assay greater than 4.0 that occurred during the admission period. INR values greater than 4 on admission were excluded from this measurement. Also measured were increase of INR greater than 1.5 points per day of therapy, presence of INR measurement at baseline, initial doses greater than 5 mg in patients not receiving warfarin prior to admission, and patients that were in therapeutic INR range at discharge.

Results: A total of 22 patients were evaluated from both time periods. Supratherapeutic INRs greater than 4.0 upon admission were greater in 2015 (14%) than in 2016 (5%) after implementation of the updated warfarin management protocol. The percentage of patients who experienced INR increases over 1.5 points at any day was greater in 2015 than in 2016 (14% vs. 5%). There were no significant differences before and after implementation of the

warfarin management guidelines in the incidence of therapeutic INRs upon discharge, with 36% therapeutic INRs in 2015 and 41% in 2016.

Conclusion: After the implementation of an updated warfarin management program there was a decrease in the incidence of INR values over 4.0 and INR value increases greater than 1.5 points on any day of therapy, however the results did not meet statistical significance. Additionally, there was no significant difference in the percentage of therapeutic INRs upon discharge.

Submission Category: Geriatrics

Submission Type: Descriptive Report

Session-Board Number: 5b-362

Poster Title: Concurrent Cholinesterase Inhibitor and Anticholinergic Therapies in Patients with Dementia

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Purpose: Acetylcholine (ACh) plays a significant role in cognition and memory formation, and the current mainstay of therapy for dementia are cholinesterase inhibitors (ChIs). The 2015 American Geriatrics Society (AGS) Beers Criteria recommends against the use anticholinergic medications in older adults with dementia, due to unintended memory impairment, attention deficits, and confusion. Concurrent use of these medications may outweigh the marginal benefits provided by ChIs. This evaluation sought to identify the incidence of concurrent use of anticholinergic and ChIs, assess for anticholinergic burden, and identify the discontinuation frequency of anticholinergics at the initiation of ChI therapy within the Boise Veterans Affairs.

Methods: Based on initial review of 202 patient profiles, this retrospective, descriptive, medication evaluation included 131 patients who met criteria for inclusion. Patients were included based on the following: (1) received prescribed either donepezil, rivastigmine, or galantamine for a minimum of 90-days; (2) received concurrent ChI therapy in addition to anticholinergic therapy; (3) concurrent therapy continued for a minimum of 90 days; and (4) documentation of dementia that is either Dementia, Alzheimer's, Lewy Body, or Vascular dementia.
The Computerized Patient Record System (CPRS) was used to obtain individual patient information. De-identifiable demographic data included: age, gender, race, and Boise VAMC location. Relevant medication information collected consisted of the date of initiation, and when available, the date and rationale for discontinuation of anticholinergic therapy.

Reviewal of medication histories began from one year following the original issue date of ChI treatment. If concurrent anticholinergic therapy occurred, then the primary author evaluated for the accumulative Anticholinergic Drug Scale (ADS) activity. Individual medications were scored based on their serum anticholinergic activity (SAA): Level 3 (markedly anticholinergic), Level 2 (ACh adverse events usually at excessive doses), and Level 1 (potentially anticholinergic).
Each patient evaluated for their accumulative ADS "risk burden" by summating the SAA level for each documented ACh agents and sorted into two risk groups: high/medium and low anticholinergic burden.

Results: Seventy percent (92) of Boise VAMC patients utilized concurrent therapy compared to 30% (39) with only ChIs. Of those 92 patients, 26 (28%) had an accumulative ADS level of ≥3, whereas the majority of patients (72%) had an ADS level ≤2. Concurrent therapy was common (56; 61%) with one ACh medication, with only three patients (5%) who fell into the high/medium risk group with an ADS level of ≥3. Thirty-six patients (39%) used two or more ACh agents of which 23 (64%) had an ADS level ≥3.
Fifty-one patients (55%) had at least one ACh medication discontinued at a particular point in time. Reasons included: expired prescription or rationale not found (32), reported adverse side effects (10), lack of benefit (3), or switched to another medication (3). Five patients (9%) reported adverse side effects related to cognitive function. Three patients (6%) had an ACh medication discontinued following ChI initiation. In two of these patients, the ACh medication was replaced by another ACh agent.
Patients were predominately male (93%) and white (96%) and 79 (±10) years old. Documentation of "dementia" was the most common (79%) diagnosis and donepezil (68; 74%), and galantamine (24; 26%) were the most commonly used agents.

Conclusion: Twenty-six patients (28%) had an increased risk of adverse cognitive effects and decreased the efficacy of ChI. Diagnosis documentation in the patient's problem list was inconsistent and potentially created false exclusions for patients who otherwise may have met criteria. There is not a standardized list of ACh medications known to cause adverse cognitive side effects. A list of agents found to cause adverse cognitive effects, based on evidence-based research, was generated and compared to the VA Drug Formulary. In the future, an evaluation that incorporates changes or decline in cognitive function would strengthen the value of this theoretical drug-drug interaction.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5b-363

Poster Title: Evaluation of Opioid Reversal with Naloxone: a Single-Center Retrospective Study

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Purpose: Opioid medications consistently rank among the drugs most frequently associated with adverse events. We reviewed cases of naloxone administration at our institution to assess our opioid prescribing and administration practices. Our primary measure was the rate of opioid reversal with naloxone. Secondary endpoints included demographic information, proportion of patients with at least 2 known risk factors for over-sedation, proportion of patients with opioids on their admit medication history, cumulative 24-hour opioid amount given prior to reversal, rate at which nurses followed our institution's Range Orders Procedure, and number of submissions to our institution's internal event reporting system describing opioid reversal.

Methods: We systematically reviewed all cases of naloxone administration at our institution from March 2016 through May 2016. Cases stemming from outpatient opioid use were excluded. Patients who did not receive opioids outside of the operating room were also excluded. Risk factors for over-sedation were defined as those included in the Joint Commission Sentinel Event Alert on the safe use of opioids in hospitals. Twenty-four hour cumulative morphine equivalents were determined using the Hopkins Opioid Conversion Program online calculator in order to provide consistency and prevent calculation errors.

Results: In the defined time frame, 6673 inpatients received an opioid analgesic. Naloxone for opioid reversal was administered to 39 patients (0.58%) who met inclusion criteria. Of these patients requiring opioid reversal, we found the following demographic data: mean age was 63 years, 59% were female, 59% were post-operative, median serum creatinine was 1.0 mg/dL, and the mean BMI was 29.4, though 46% of patients were obese (BMI ≥ 30). In this cohort, 79.5% had at least 2 risk factors for over-sedation. Nearly 85% did not have an opioid

documented on their admission medication history, suggesting they were potentially opioid-naïve. The mean morphine milligram equivalents given in the 24 hours preceding naloxone administration was 19.6 mg. Per our institution's policy on range orders, nurses are instructed to begin with the lowest prescribed dose of opioid; this policy was followed in 53.8% of cases. Naloxone administration has historically been used as a surrogate marker for overall event reporting. We reviewed all event reports submitted during the study period and found that only one corresponded to opioid reversal, so it may be that our event reporting rate is as low as 2%.

Conclusion: Our overall rate of opioid reversal with naloxone was 0.58%, which is comparable to similar studies. However, our secondary endpoints indicate that opioid prescribing and administration habits may not take into account patient-specific risk factors for over-sedation. These results may serve as an impetus for improvements in quality and patient safety.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-364

Poster Title: Inpatient anticoagulant usage trends in a healthcare system from 2010-2016

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Purpose: The purpose of this investigation was to determine the usage patterns of warfarin and the direct acting oral anticoagulants (DOACs) within the Intermountain healthcare system over a six year period.

Methods: Data was extracted from the Enterprise Data Warehouse (EDW) from January 2010 to March 2016. Comparisons were made between warfarin and the different direct oral anticoagulants over time and across the Intermountain Healthcare hospitals to see the usage patterns of anticoagulants. Intermountain Healthcare switched electronic medical record systems at different hospitals starting in October 2014, the data from those hospitals were not available during this analysis.

Results: Anticoagulant usage patterns varied over the last six years. Warfarin prescribing has decreased system-wide after the introduction of DOACs to the market. Dabigatran use slightly increased when first approved but its use has decreased since the approval of rivaroxaban and apixaban. Rivaroxaban use increased over the last 5 years but has remained level since the approval of apixaban. Apixaban use has been increasing over the last year. Edoxaban was not used across the system during the time period investigated. Anticoagulant use varied by hospital and type of unit or floor.

Conclusion: Warfarin use has seen a steady decline while rivaroxaban and apixaban use have seen an increase over the last two years. Dabigatran use has been low and edoxaban has not been used over the last six years. Anticoagulant usage patterns have changed across hospitals with the introduction of DOACs and may continue to change over time. As reversal agents for DOACs are approved, usage patterns may change further.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 5b-365

Poster Title: Acceptance of medication therapy management (MTM) recommendations: A retrospective comparison of face-to-face and telephonic delivery models

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Purpose: The purpose of this study is to determine and compare the recommendation acceptance rates of two MTM delivery models.

Methods: An employee with PacificSource performed a search to identify patients that received MTM services from March 2015 to December 2015 and created a spreadsheet containing the de-identified data. The de-identified data was then sent to Bengal Pharmacy and securely stored on an encrypted flash drive. This was then accessed through an encrypted computer within the Bengal Pharmacy MTM offices. The data was then separated into two groups. Namely, those who participated in face-to-face (F2F) and telephonic MTM services. The number of recommendations made within each group was added up. Then the number of accepted recommendations was determined using claims data. These numbers were then used to perform statistical analysis, using 2 proportions z-test.

Results: A total of 418 F2F comprehensive medication reviews (F-CMR) and 2,846 telephonic CMRs (T-CMR) were collected. Out of those CMRs, 1,716 recommendations were made during the F2F encounters and 5,887 recommendations during the telephonic encounters. Only 32 of the F2F recommendations were accepted and resulted in a claim that made a change in accordance with the recommendation (1.8%). A sum of 1138 accepted recommendations resulted from the telephonic services (19.3%). This resulted in a Z-score of 17.6 ($p < 0.01$), thus indicating a significant difference between the two proportions and disproving my original hypothesis.

Conclusion: Telephonic CMRs produced abnormally higher acceptance rates when compared to CMRs performed face-to-face with patients. Due to the volume of CMRs completed telephonically versus face-to-face, this also suggests that T-CMRs may be more attainable. This leads us to conclude and recommend that pharmacist, insurance companies, and MTM vendors should not be required to meet with their patients face-to-face. The average number of recommendations made per CMR and the rate of acceptance are inversely related – this may indicate that providers are less likely to review more lengthy CMR results as well.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 5b-366

Poster Title: Analysis of perceived barriers to pharmacy-based human papillomavirus vaccination provision among practicing and student pharmacists: opportunities for education

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Purpose: The National Immunization Survey (NIS) of 2015 found that only 35% of adolescents in the U.S. had completed the 3-dose series of HPV vaccine. Pharmacists can be a valuable resource in improving HVP vaccination rates through offering the convenience of patients not having to return to their physician's office for their 2nd or 3rd dose. However, the HPV and other adolescent vaccines are not as widely offered by community pharmacies as other vaccines. The purpose of this study was to determine areas in which foundation and continuing education can be improved to expand pharmacist provision of the HPV vaccine.

Methods: A survey was adapted from Teeter and colleagues that assesses pharmacists' beliefs and perceptions about providing the HPV vaccine in a pharmacy setting. The online questionnaire was administered via email to ISU College of Pharmacy alumni and current PharmD students using REDCap (Research Electronic Data Capture). The questionnaire included basic demographic information such as level of experience, gender and practice setting and 33 5-point Likert-type questions (1-strongly disagree to 5-strongly agree, or 1- not at all to 5-extremely). The primary endpoint was to identify correlations between the beliefs and perceived barriers and the respondents' level of experience. Secondary endpoint identified questionnaire's correlations with gender and pharmacy practice setting. Two subgroup analyses were also preformed comparing independent pharmacists against chain pharmacists as well as 1st and 2nd year students against 3rd and 4th year students. Data was and stored on REDCap and analyzed using Microsoft Excel and MIniTab Express. The Chi squared test of independence and adjusted residuals were used to analyze differences between pharmacist demographics and each question. Idaho State University's IRB deemed this study exempt from the approval process.

Results: Ninety-seven questionnaires were completed, resulting in a response rate of 7.4%. The survey groups had significantly differing opinions on 4 of the 33 questions. For the primary endpoint, students were more likely agree that the failure of some insurance companies to cover the vaccination costs was a barrier to providing the HPV vaccine(P=0.006). For the secondary endpoints, participants that worked in the community setting were more likely to strongly agree with this (P=0.005) although those in a health-system setting were more likely to only slightly agree (P=0.04). Health-system and female participants disagreed that children should be vaccinated against HPV once they are sexually active (P=0.003, 0.005), whereas community and male participants were unsure (P=0.001, 0.02). Community participants were more likely to strongly agree that there are too few patients who want the HPV vaccine compared to health-system participants (P=0.005), and health-system participants felt less strongly (P=0.004). Females were more likely to disagree to having moral or religious apprehensions about HPV vaccine (P=0.003), and men were more unsure (P=0.007). There were no statistically significant differences across the questionnaire for either of the subgroup analyses.

Conclusion: This study suggests that offering education to students in school as well as continuing education for community pharmacists on insurance reimbursement models for vaccinations may help to increase pharmacists' provision of the HPV vaccine. Barriers were more often reported by community participants compared to health-system, which shows that the barriers exist more strongly against community pharmacists. The HPV vaccine seems to still be stigmatized as a female vaccine rather than a gender-non-specific vaccine. Thus, there exist opportunity for education among all levels of experience for regarding current recommendations that HPV vaccine applies equally to both males and females.

Submission Category: Oncology

Submission Type: Descriptive Report

Session-Board Number: 5b-367

Poster Title: Assessment of minority inclusion by sponsor in select FDA oncology approvals: 2010-2015

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Purpose: Minority inclusion in clinical trials is important for drug development because rates of morbidity/mortality are higher in minorities in the United States (U.S.). Despite FDA and NIH guidance to sponsors for inclusion of these populations in clinical research to observe differences in safety and efficacy, overwhelmingly low minority inclusion persists, far below U.S. demographic and disease prevalence. Reliance on industry-funded trials and use of foreign trial participants guiding drug approvals may be exacerbating these patterns. This project assessed inclusion of diverse populations in clinical trials, and evaluated for inclusion trends among sponsors in recent FDA approvals of select oncology products.

Methods: Oncology products included in the assessment were identified through the Hematology/Oncology (Cancer) Approvals & Safety Notifications page of the FDA website (www.fda.gov). U.S. prevalence data were gathered from the Surveillance, Epidemiology, and End Results (SEER) program database for multiple myeloma, breast, colon, lung, and prostate cancers; cancers that are noted for disparities among African Americans. The demographics of trial participants for each new drug approved for these select cancers from the years 2010 to 2015 were obtained from the Medical Reviews through the Drugs@FDA database. The demographics of trial participants were compared by cancer type to SEER prevalence data. In addition, sponsors with two or more drug approvals during the specified time period were assessed for trends in demographic inclusion.

Results: Throughout the years 2010-2015 sponsors did not include a diverse population in their oncology clinical trials. Trial participants did not mirror disease prevalence or U.S. demographics. In addition, there was a marked trend toward greater inclusion of White/Caucasians in oncology clinical trials, and a resulting decrease in all other racial and

ethnic groups except Asians. Increased inclusion of Asian populations was noted among a select number of sponsors, likely due to their clinical trial site(s) in Asia.

Conclusion: Products approved by the FDA from 2010-2015 to treat select cancers failed to include diverse populations in their supporting clinical trials. Additionally, declining minority inclusion was seen in trials of evaluated sponsors, with the exception of Asians. This movement toward greater reliance on White/Caucasians and non-U.S. Asians to support drug approvals means knowledge gaps in safety and efficacy for minorities will persist. These ongoing gaps will fail to shed light on the role drugs play, if any, in health disparities. This project's results cast doubt on ability of providers to generalize these drugs' efficacy and safety to the U.S. population.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5b-368

Poster Title: Pharmacy Department Standardization of Intravenous Medications

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Purpose: Due to variability in IV room experience, a wide range of methods have been employed in regards to intravenous medication preparation, leading to the development of this quality improvement study. Uniformity and simplicity are two key characteristics that are necessary during the process of preparing intravenous medication drips. The Institute for Safe Medication Practices (ISMP) encourages healthcare facilities and systems to select a standard way to dose medications. This process is also likely to decrease medication errors. The purpose of this study is to establish uniformity by implementing a standardized method for preparing common intravenous medication drips.

Methods: Ten intravenous medication drips were included in the study: 1) Norepinephrine, 2) insulin, 3) nicardipine, 4) dexmedetomidine, 5) fentanyl double strength, 6) midazolam, 7) morphine, 8) furosemide, 9) vasopressin, and 10) amiodarone. Pharmacy staff members were asked to complete pre and post surveys in order to observe varying preparation methods and to then determine a standardized method before administration of the post survey. For each of the ten drips, the following were preparation options which participants could select on the survey:
A) Add volume of ordered drug.
B) Remove volume equal to amount of drug to be added, then add drug.
C) Remove overfill, then add drug.
D) Remove overfill plus volume equal to amount of drug to be added, then add drug.
E) Add amount of drug calculated to account for base fluid overfill.
F) Other, please describe_____.

After completion of the pre-survey, the method selected to be the new standard was option E) Add amount of drug calculated to account for base fluid overfill. The rationale behind this method was to decrease number of port entries.

Results: The pre-survey was completed by 32 pharmacy staff members. Using a retrospective approach, the standardized method was selected as the correct preparation method 62 times out of 320 total responses. The other 258 responses, although highly variable, were incorrect. As can be observed, less than 20 percent of survey responses reflected adherence to the standard although it was not yet implemented. The post survey was completed by 16 pharmacy staff members. Out of 160 total responses, 117 responses were correct. This reflects an adherence measure, to the newly implemented standardized method of preparation, of 73%. After performing a chi-square test, the findings are noted to be statistically significant ($P < 0.001$).

Conclusion: Although there was a decrease in number of respondents from pre-survey to post survey, findings manifest that there is a difference in method of preparation before and after implementation of the standardized method of intravenous medication admixtures. A higher degree of variability, in respect to preparation method, existed before the standard was in place. A significantly higher number of admixtures are being prepared in a uniform manner, thereby providing more precise drug concentrations from preparation to preparation. Minor alterations to the standard method of preparation will help simplify the process and lead to higher levels of standardized method compliance.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 5b-369

Poster Title: Off-label use of PD-1 inhibitors nivolumab and pembrolizumab at Huntsman Cancer Institute

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Purpose: PD-1 inhibitors improve overall survival and progression free survival in many patients with metastatic melanoma, non-small cell lung cancer (NSCLC), renal cell carcinoma (RCC) and Hodgkin's Lymphoma. Their increased use is promising for patients with metastatic disease. However, their use has been seen in non-approved metastatic disease as well. The purpose of this study was to determine the demographics and if the use of PD-1 inhibitors at Huntsman Cancer Institute was similar according to FDA labeling.

Methods: Pending approval, the institutional review board will assess this medication use evaluation. Men and women greater than 18 years old were enrolled if they had received either nivolumab or pembrolizumab at Huntsman Cancer Institute, electronically prescribed from EPIC database, from July 1, 2014 through July 31, 2016. Patients on study nivolumab or pembrolizumab were excluded. The primary outcome measure was total administrations according to FDA approval versus off-label use.

Results: Of the 255 patients enrolled; there were a total of 1,754 administrations (1,043 of pembrolizumab and 711 of nivolumab) between July 1, 2014 and July 31, 2016. The average age at diagnosis was 61, and average weight was 79 kg. 95% of all infusions were given in the outpatient setting in the infusion room. Average dose was 195 mg. 58% (1,016) of all administrations were for malignant melanoma, 15% (259) for NSCLC, 0.3% (5) for Hodgkin's Lymphoma, and 27% (474) for miscellaneous malignant neoplasms.

Conclusion: There were a total of 1,724 administrations. Of those, 27% (474) did not have a diagnosis code that correlated to an FDA approved indication. The patients without a FDA approval should have been on study medication.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 5b-370

Poster Title: Identifying opportunities to improve patient care by assessing knowledge of hemoglobin A1c and vaccine status in patients with type 2 diabetes

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Purpose: Patients with diabetes are at risk for multiple complications, including immunodeficiency. Patients diagnosed with diabetes are typically educated about goal plasma glucose levels according to the American Diabetes Association Standards of Care. However, there seems to be a disconnect between the patient's understanding of the interpretation of glucose levels and the translation to their hemoglobin A1c. Additionally, the Advisory Committee on Immunization Practices (ACIP) recommends patients with diabetes receive additional vaccines due to increased risk for pneumonia and hepatitis. This project was designed to identify knowledge gaps among patients, and evaluate where a pharmacist could become involved by providing education.

Methods: This project was conducted in two separate retail pharmacies, one within a grocery store (Site A) and one embedded in a community clinic (Site B). Both pharmacies have established programs aimed at helping patients manage their diabetes in a one-on-one setting. Protocols were already in place at both pharmacies to administer vaccines in accordance with ACIP recommendations. Patients qualified for inclusion if they were picking up a medication used to treat diabetes. A short survey was conducted at the time of dispensing by either a pharmacist, pharmacy intern, or pharmacy technician. The survey consisted of three yes or no questions with a possible two additional follow-up questions to ascertain whether the patient knew their most recent A1c result, when it was checked, and an assessment of their vaccine status. Pharmacy employees were trained on the best practices to conduct this survey during workflow so as to minimize the additional time required during the check-out process. The survey included guidance for the pharmacist or intern to provide education if the patient was

interested, such as A1c goals, appropriate timing of A1c tests, and cost of point-of-care testing. The patients' protected health information was not recorded for the survey purposes.

Results: Fifty-nine patients participated in the survey. The American Diabetes Association Standards of Care were used to determine recommended time frames for A1c tests. Overall, 71% of patients knew their A1c and had gotten it tested within the appropriate time frames (73% at Site A, 69% at Site B). Per patient report, approximately 53% of patients had received all recommended vaccines (42% at Site A, 65% at Site B) and 20% of patients had received some of the recommended vaccines (15% at Site A, 27% at Site B).

Conclusion: Most of the interviewed patients knew their A1c result, but there were 29% of patients who did not or had not had it tested within the appropriate interval. While several patients had received a portion of their recommended vaccines, there were still 47% of patients that were not fully immunized. By asking patients these simple questions during the check-out process, pharmacists and other staff can identify which patients may require more education, provide point-of-care testing, and administer needed vaccines in order to cover this gap in patient care.

Submission Category: I.V. Therapy/ Infusion Devices/ Home Care

Submission Type: Evaluative Study

Session-Board Number: 5b-371

Poster Title: Improving patient satisfaction and safety by compounding fluorouracil continuous infusions

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Purpose: Two important components of fluorouracil home infusions are patient safety and satisfaction. Huntsman physicians ordered patient's home infusions by sending them to an outside pharmacy to be compounded and delivered. Deliveries were made at the Huntsman Infusion room on the day of the patient's infusion and were hooked up by nurses. Delays in delivery caused patients to wait for up to hours in the infusion chair. This resulted in a significant decrease in patient satisfaction. The purpose of this project was to improve patient satisfaction and safety by compounding home infusion fluorouracil at Huntsman with standardized supplies and infusion education.

Methods: Huntsman Cancer Hospital management verified with regulatory compliance the feasibility of transitioning compounding from Home infusion to Huntsman Cancer Hospital. Bundling payments for the elastomeric pumps with 5-FU drug and supplies allowed hospital compounding to be a reasonable option. Nurses were already hooking up patients to be sent home on their pumps in the infusion room. The switch entailed compounding the drug at Huntsman, providing line care supplies, and coordinating of orders with home health companies. The switch improved patient care by minimizing potential errors with care coordination, reducing delays in infusion delivery, providing more patient friendly devices (elastomeric instead of electronic pumps), and reducing potential for chemotherapy spills. Pharmacy IT helped facilitated the change through Epic. To assess the impact of the switch, we surveyed infusion room nurses. They were asked to respond to the following statements using a Likert scale of strongly agree, agree, neither agree or disagree, disagree, and strongly disagree: 1. There are fewer delays in 5FU continuous infusion starts since implementation, 2. Patients receive adequate supplies to manage 5FU continuous infusions, 3. Patient satisfaction

has increased since Huntsman implementation, 4. Nursing satisfaction was increased since Huntsman implementation, 5. Patients have had less issues with their elastomeric pump, 6. Patients prefer the elastomeric pump.

Results: Of the 13 Huntsman infusion nurses surveyed, none strongly disagreed with any of the statements and only one nurse disagreed with one statement. The most positive responses were to the statement “There are fewer delays in 5FU continuous infusion starts since implementation”, with 77% of nurses strongly agreeing and 23% agreeing. There was an overall positive response to the statement “Patients prefer the elastomeric pump”, with 76% of nurses either agreeing or strongly agreeing, and 23% neither agreeing/disagreeing. Overall, nurses felt patients were more satisfied with the switch. The least positive response was to the statement “Patients have had less issues with their elastomeric pumps.”, with 8% disagreeing, 46% neither agreeing or disagreeing, and 46% either agreeing or strongly agreeing. Comments the nurses left explained the elastomeric pumps would sometimes not fully infuse. The lower positive results could be due to a higher number of patients receiving elastomeric balls and the increased role infusion room nurses have in managing fluorouracil home infusions.

Conclusion: The nurse survey showed that the wait times for patients have decreased, a main goal in improving patient satisfaction. The nurses were more satisfied with the switch and felt patients preferred Huntsman to compound their fluorouracil home infusions. Issues with the switch were the failure of elastomeric pumps to fully infuse. The next step for this project will be to survey the patients themselves on the impact the switch had on satisfaction, safety and cost.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5b-372

Poster Title: Reducing 30-day readmission rates: what is the impact of decentralized bedside delivery?

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Purpose: The rate of hospital readmissions within 30 days is an indicator for quality of care. In addition to having a direct effect on patients, hospital readmissions represent a financial burden on the healthcare system. Not all reasons for readmission are preventable, but some medication-related ones may be. Medication non-adherence is responsible for up to two-thirds of hospital admissions. Reasons for non-adherence are multifactorial including poor communication about medications and financial burden for patients. As healthcare moves in the direction of population health and shared accountability, reducing 30-day readmission rates becomes increasingly important for patient care.

Methods: The Medication Reconciliation, Education, Adherence, and Delivery Initiative (Med READI) is the decentralized bedside delivery service offered by Intermountain Medical Center Community Pharmacy. The program aims to decrease medication non-adherence and consequently 30-day readmission rates by ensuring patients leave with their discharge medications in hand, understand their medications, and know how to contact a pharmacist with any questions. To determine the effect of the decentralized Med READI model, 30-day readmission rates from February 1, 2014 through February 1, 2015 were compared to 30-day readmission rates from October 1, 2015 through September 1, 2016. These periods correlate with the centralized Med READI model and the decentralized Med READI model implementation dates, respectively. A readmission was defined as any encounter within 30 days of discharge, including inpatient, outpatient, and emergency department visits. Readmission rates were evaluated for the following units: the cardiothoracic unit (S3 and S4), surgical unit (T10 and T11), and medicine unit (T8 and T9). These units and dates were included

based on the risk of 30-day readmission being related to medication use, and on the implementation of the decentralized Med READI model being on all units. Not all floors serviced by Med READI were represented in this study. The maternity unit, same day surgery unit, and Intermountain Surgical Center unit were excluded due to the lower probability that 30-day readmissions are medication-related.

Results: Under the centralized Med READI model (February 1, 2014 through February 1, 2015), an average of 813 patients per month received discharge medications before leaving the hospital. After implementing the decentralized Med READI model (October 1, 2015 through September 1, 2016), an average of 851 patients per month received discharge medications through the service. Transitioning to the decentralized Med READI model increased the number of patients served by 4.7 percent. Readmission rates were determined for both models. With the centralized Med READI model, a total of 33.8% of patients were readmitted during the study period. Following the implementation of the decentralized Med READI model, the 30-day readmission rate decreased to 29.5% of patients. The readmission rates from these two periods were compared using the z-test for proportions, and the difference was found to be statistically significant. Subgroup analysis for each floor found statistically significant differences on all floors, with the exception of S4 which showed no difference.

Conclusion: The rate of 30-day readmissions reduced with the implementation of a decentralized Med READI model. The results are likely due to a mixture of reasons including increasing the number of patients served and performing medication education by pharmacy. One limitation of the study is attributing the reduction in readmission rates to decentralizing Med READI as opposed to other hospital initiatives occurring simultaneously. Although the reduction in readmission rate is likely due to many efforts, we feel the impact from decentralizing Med READI is still significant based on the timing of other initiatives, target audiences, and subgroup analyses.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 5b-373

Poster Title: Dexmedetomidine use for extubation in mechanically ventilated patients

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Purpose: Dexmedetomidine is a selective alpha-2-adrenergic agonist which possesses sedative, analgesic, and anesthetic properties. Although many studies have investigated dexmedetomidine for ICU sedation, limited trials have been conducted to evaluate dexmedetomidine during extubation in agitated patients. This is of particular interest as agitation increases the risk of self-extubation and leads to prolonged intubation time. Dexmedetomidine may have an advantage in extubation of agitated patients as the clinical practice guidelines state that non-benzodiazepine regimens prevent delirium more than benzodiazepine regimens. This study examines the use of dexmedetomidine in the specific patient population of agitated patients when extubation is expected within 24 hours.

Methods: This is a single center, retrospective cohort study where chart records of patients at Greenville Memorial hospital will be reviewed for inclusion criteria and eligibility for this study. Once patients are identified as meeting inclusion criteria data will be obtained from their medical chart by study investigators. Inclusion criteria include all patients receiving dexmedetomidine to assist with extubation at Greenville Memorial Hospital from July 2016 through June 2017. Exclusion criteria include: patients requiring mechanical ventilation less than 24 hours, patients less than 18 years of age, and pregnancy. The primary outcome is the percentage of successful extubations within a 24 hour period per total number of patients receiving dexmedetomidine. Secondary outcomes include: Intensive Care Unit length of stay, hospital length of stay, and cost of therapy. Safety endpoints include: Hemodynamic instability defined as hypotension (reduction in MAP less than 60 mmHg for 2 consecutive readings throughout duration of infusion or greater than 20 percent drop in systolic blood pressure for 2 consecutive readings) or bradycardia (heart rate less than 60 beats per minute for 2 consecutive readings) or incidence of respiratory depression (O2 Sat less than 88 percent,

respiratory rate less than 10, need for CPAP/BIPAP or reintubation within 24 hours of extubation).

Results: Results pending.

Conclusion: Research in progress.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 5b-374

Poster Title: MTM Hybrid Course Improves Student Self-efficacy in Performing Medication Therapy Management Services (MTMS)

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Purpose: To determine if an integrated approach between a Medication Therapy Management elective course and an Introductory Pharmacy Practice Experience (IPPE) would improve a student's self-efficacy in providing MTM services (MTMS).

Methods: An elective course was structured so that students were initially trained through the APhA certificate program Delivering Medication Therapy Management Services. These students were then enrolled in an MTMS focused, 6-week IPPE under the supervision of a preceptor who had also completed the same certificate training program. A self-efficacy survey adapted by Dahl and Hall (University of Florida College of Pharmacy) was administered to pharmacy students in their third professional year to determine their confidence levels before and after the hybrid course. A control group of third-year pharmacy students, who participated in the same certificate program but did not have an IPPE specifically focused on MTMS, also completed the survey.

Results: Of the 26 students targeted to complete the post-survey, 21 responded (80% response). For analytical purposes, the self efficacy survey was divided into five specific categories: billing, communication, documentation, barriers, and clinical knowledge and skills. The hybrid course improved the self-efficacy of our students in the areas of communication ($p < 0.05$), and documentation ($p < 0.05$).

Conclusion: A hybrid course blending together the didactic experience with hands-on application of skills may improve a student's learning experience and skill set. Furthermore, improving a student's self-efficacy in the area of MTMS may promote the involvement and competence of future pharmacists in performing MTMS.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 5b-375

Poster Title: Acute kidney injury in patients treated with rasburicase for tumor lysis syndrome

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Purpose: Tumor lysis syndrome (TLS) is an oncologic emergency that can cause multiple metabolic complications in patients undergoing chemotherapy. The occurrence of acute kidney injury (AKI) in these patients increases their risk of death and development of further complications as well as additional use of healthcare resources. The mainstays of therapy for preventing and treating this type of AKI include aggressive hydration, allopurinol, and rasburicase. Due to uncertainty of rasburicase's clinical efficacy with respect to resolution of AKI, further investigation is warranted. The purpose of this study is to assess severity of AKI after rasburicase use in patients with TLS.

Methods: Adult and pediatric patients were included in the study if they were admitted to the study site between January 1, 2010 and June 1, 2016, diagnosed with clinical or laboratory tumor lysis syndrome, and received at least one dose of rasburicase during hospitalization. Patients were excluded if they had a history of chronic kidney disease, diagnosis of sepsis, history of renal transplant, received high-dose methotrexate regimen during admission, or were pregnant. Demographic information was collected including patient age, gender, weight, height, race/ethnicity, tumor type, hospital unit, total length of stay in hospital, baseline serum creatinine, uric acid level, and baseline stage of AKI. AKI staging and severity was determined using RIFLE and P-RIFLE criteria.

Results: A total of 81 patients received rasburicase during the study period. To date, 4 patients have been evaluated. Three patients have been identified as meeting study inclusion, and one patient was excluded due to history of CKD. Two out of three patients were female and Caucasian and one out of three was male and African American. All patients presented in

clinical tumor lysis syndrome and AKI, had an average Cairo Bishop grade of 3.3, and an average age of 65 years (no pediatric patients have been evaluated at this time). The average length of hospital stay was 38 days and the average baseline SCr was 0.99 mg/dl. Malignancies represented include multiple myeloma, endometrial cancer with myelodysplasia, and B-cell lymphoma. On average, patients were admitted for 8 days before receiving rasburicase, had a pre-rasburicase SCr of 4.8 mg/dl, a uric acid level of 17.3 mg/dl, a RIFLE stage of 3 (failure), and received a 13 mg dose of rasburicase (some weight based, some standard). One patient received dialysis and saw resolution of AKI 34 days after receiving rasburicase. Two patients expired before resolution of AKI within an average rasburicase treatment duration of 11.5 days.

Conclusion: Preliminary data suggest that patients receiving rasburicase in response to TLS may not have resolution of AKI or may endure a long hospital stay to achieve resolution of AKI. As data collection is ongoing, it is difficult to draw conclusions based on a small sample of preliminary data. Additional research is needed to further evaluate the efficacy of rasburicase in resolving AKI for these patients.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-376

Poster Title: Assessment of adherence to formulary drug restrictions after modification of criteria display

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Purpose: Using a formulary is important for all institutions because they optimize patient care, increase safety, and decrease costs. A mechanism for formulary management is to restrict medications to certain prescribing criteria, like service, indication, or location. Despite the establishment of restriction criteria, maintaining adherence to evidence-based restrictions can be difficult. The purpose of this project was to assess if there was an improvement of adherence to formulary restriction criteria at an academic medical center after changing the presentation of formulary-restriction information. Pharmacist opinion on formulary website modification was also captured.

Methods: Modifications to formulary-restriction criteria on a formulary website improved the style and readability of the content text in July 2015. Restriction criteria were formatted with italics, bolded words, and underlined words to make the style more appealing to the reader. In order to assess improvement, adherence to formulary restrictions was collected in 2 cohorts from before (December 2014 to February 2015) and after (December 2015 to February 2016) website modification. Profiles of patients receiving formulary-restricted drugs, based on top 5% most commonly charged formulary-restricted medications during the month, were reviewed. From these medications, 20% of orders were evaluated for adherence to restriction criteria. The percentage of adherent orders from the before cohort was compared with the after cohort using descriptive statistics. A survey was sent to pharmacists to assess their opinion of the changes to formulary-restriction criteria display on the formulary website.

Results: A total of 288 and 570 samples were randomly selected and assessed in the before and after cohort, respectively. While all samples in the before cohort (n = 288/288) were able to be assessed for compliance, 38 orders in the after cohort (n = 532/570) could not be evaluated due to limitations associated with patient records. It was found that 90.28% (n = 260/288) of orders in the before cohort were compliant with restriction criteria compared with 87.03% (n = 463/532) in the after cohort, resulting in a decrease in adherence of 3.25%. This difference is approximately equivalent to 7869 orders for restricted medications not meeting appropriate criteria being approved out of an average of 242,115 total restricted medication orders that are made monthly. The drugs that increased the most in compliance were ertapenem (Invanz®), ciprofloxacin (Cipro®), and intravenous acetaminophen (Tylenol®). Medications with the largest reduction in adherence to restriction criteria were intravenous immune globulin (Privigen®), meperidine (Demerol®), and linezolid (Zyvox®).

Conclusion: The overall change in adherence to formulary restriction was not enhanced by an improved display via a formulary website, based on an observed decrease in compliance to restriction criteria when comparing time periods before and after the modification of restriction criteria display. This suggests that further enhancements to improve formulary restriction adherence are necessary beyond changes to display criteria on formulary websites. Future potential initiatives include a formulary website change, appropriateness stewardship programs, clinician education, and employee incentives for formulary restriction adherence.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Evaluative Study

Session-Board Number: 5b-377

Poster Title: Analyzing the Impact of Elective SCCP 757 on Students' Preparedness for Advanced Pharmacy Practice Experience (APPE)

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Purpose: APPE rotations are designed to improve and test a pharmacy student's ability to provide pharmaceutical care, while ultimately determining if the student has achieved the competencies required to practice pharmacy. Various opportunities are available throughout the pharmacy curriculum to practice clinical skills in preparation for APPE rotations. During the spring semester of the P3 year a new course (SCCP 757) was made available to students that allowed them to interact with real patients on an inter-professional team. Our objective was to determine if completing course SCCP 757 prior to APPE rotations affected students' perception on their preparedness for APPE rotations.

Methods: An anonymous survey was sent via email to the third year class and promptly closed the evening before the initiation of APPE rotations. The survey included 11 questions; Question #1 determined participation in the course and the remaining assessed the student's confidence in various competencies. For questions #2-8, a Mann-Whitney U test was performed as the students were asked to assess their confidence using a 1-5 Likert scale. Answers to questions #9-11 were examined using the Fisher's Exact test.

Results: Survey response rate was 70%. The mean responses of the student's that participated in the SCCP 757 (group 1) tended to be higher than those of the students that did not (group2). The difference between the both groups was statistically significant for questions #2(How prepared do you feel for APPE (4th) year rotation?) and #5 (I am confident in my ability to perform a medication reconciliation for a patient), $p=0.015$ and $p=0.036$ respectively. Only one question that had a lower average response in group 1, but this difference was not significant.

Conclusion: Students that participated in this elective course seemed to feel better prepared in the competencies investigated by this survey. This course may benefit students by exposing them to direct patient care and interdisciplinary teams, ultimately better preparing students for APPE rotations.

Submission Category: Pediatrics

Submission Type: Descriptive Report

Session-Board Number: 5b-378

Poster Title: Evaluating the effect of two weight-based parenteral nutrition formulations on the incidence of hyperglycemia and hypernatremia in low birth weight neonates

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Purpose: At the Medical University of South Carolina (MUSC), neonates with a birth weight less than 1800 grams receive standardized parenteral nutrition (PN) formulations on their first day of life until a custom PN can be started. Initially, a single PN formulation was used; however, we noted hypernatremia requiring increased fluid rates and subsequent hyperglycemia. As a quality improvement measure, our neonatal intensive care unit (NICU) implemented a change in policy to two weight-based standard PN formulations for the first day of life PN. The purpose of this study was to evaluate the potential benefits of this policy change.

Methods: This was an observational study of the electronic medical records of low birth weight (less than 1800 grams), preterm neonates at MUSC Children's Hospital. Inclusion criteria were patients admitted to the NICU between August 2014 and May 2015 (single PN group) and May 2015 to July 2016 (weight-based PN group) who received standardized PN at less than 48 hours of life. Patients transferred from outside hospitals, born with suspected or known major congenital or chromosomal anomalies, or who did not survive to 24 hours were excluded. The single PN group received 10 percent dextrose and 4 percent amino acids initiated at 80 mL/kg/day, while the weight-based PN group received a standard formulation based on weight (greater than or equal to 1000 grams: same formulation as single PN group, or less than 1000 grams: 7.5 percent dextrose and 3 percent amino acids initiated at 100 mL/kg/day). Data collected included birth weight, gestational age, Apgar scores, appropriateness of size for gestational age, concurrent medications, serum glucoses while receiving standardized PN, and serum sodium concentrations obtained in the first 24 hours of life. Primary endpoints were

proportions of patients with hyperglycemia (glucose above 150 mg/dL) and hypernatremia (sodium concentration above 145 mmol/L). Secondary endpoints were proportions of hyperglycemia and hypernatremia in neonates less than 1000 grams. Differences between groups were analyzed by Chi-Square and t-test.

Results: During the enrollment period, 407 patients received standard PN with 170 included in the study, 92 in the single PN group and 78 in the weight-based PN group with a median birth weight of 1270 grams (range 456-1795 grams) and median gestational age of 29.7 weeks (range 23-36.7 weeks). Patient demographics were similar between the two groups. Although not statistically significant, there was a higher proportion of small for gestational age (SGA) neonates in the weight-based PN group (39 percent versus 28 percent, p equals 0.16). There was no significant difference in rates of hypernatremia between the two groups (17 percent in the single PN group versus 12 percent in the weight-based PN group, p equals 0.28). This finding was consistent in neonates less than 1000 grams (single PN: 9 of 25, 36 percent versus weight-based PN: 6 of 28, 21 percent, p equals 0.24). However, there was a significantly higher rate of hyperglycemia in the weight-based PN group (27 percent versus 11 percent, p equals 0.007) which was also seen in the subgroup analysis of neonates less than 1000 grams (weight-based PN: 16 of 28, 57 percent versus single PN: 5 of 25, 20 percent, p equals 0.006).

Conclusion: The purpose of this single-center observational study was to determine if rates of hyperglycemia and hypernatremia were decreased with weight-based PN instead of a single standard PN formulation. Surprisingly we found no difference in hypernatremia and an increased risk of hyperglycemia in the weight-based PN group. Although not significant, there were more SGA neonates in the weight-based PN group, which could have influenced the rate of hyperglycemia. Further research is necessary to determine the optimal standardized PN formulation for low birth weight neonates.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 5b-379

Poster Title: Evaluation of vancomycin dosing regimens and resulting trough concentrations in pediatric bone marrow transplants patients

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Purpose: Achieving a target vancomycin trough concentration is often difficult in pediatrics due to variable pharmacokinetic profiles. There is limited data on appropriate dosing of vancomycin in pediatric bone marrow transplant patients, but proper antibiotic dosing and empiric coverage in febrile neutropenia is of vital importance in this highly immunosuppressed population. The purpose of this study was to evaluate the effectiveness of an empiric dosing regimen of vancomycin 15 mg/kg every eight hours in achieving target vancomycin trough concentrations of 10-15 mcg/ml in pediatric bone marrow transplant patients to determine if a change in the febrile neutropenia protocol was warranted.

Methods: This was a retrospective chart review that evaluated vancomycin dosing for febrile neutropenia in pediatric bone marrow transplant patients at the Medical University of South Carolina Children's Hospital from July 2014-July 2016. Both the empiric vancomycin dosing regimen with resulting trough concentration and the vancomycin dosing regimen that ultimately resulted in the target trough concentration of 10-15 mcg/ml were assessed in 25 pediatric patients that received bone marrow transplants. Subsequent dose modifications as well as trends in serum creatinine were also evaluated throughout the entire course of vancomycin.

Results: The protocol regimen of vancomycin 15 mg/kg every eight hours achieved a target vancomycin trough concentration of 10-15 mcg/ml in 12 percent of patients and resulted in a vancomycin trough concentration less than 5 mcg/ml in 65 percent of patients. One patient had a trough concentration greater than 15 mcg/ml. Eight patients that were evaluated were not included in the empiric dosing analysis due to differing regimens or not receiving vancomycin. Of the 23 patients that received vancomycin, 9 percent of patients required dosing regimens

less than 15 mg/kg every eight hours to achieve target trough concentrations and 83 percent of patients required dosing regimens greater than 15 mg/kg every eight hours. The dosing regimen that achieved a target trough concentration in the largest percentage of patients was 20 mg/kg every six hours. After achieving a target trough concentration, 48 percent of patients required subsequent dose reductions due to supratherapeutic trough concentrations.

Conclusion: The protocol dosing of vancomycin 15 mg/kg every eight hours resulted in subtherapeutic vancomycin trough concentrations in more than 82 percent of patients and more than half of the patients required a dosing regimen of at least 20 mg/kg every six hours to achieve the target vancomycin trough concentration. The outcomes of this study resulted in a change in the empiric dosing regimen of vancomycin to 15 mg/kg every six hours for febrile neutropenia in pediatric bone marrow transplant patients.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 5b-380

Poster Title: Evaluating the frequency of appropriate metabolic monitoring in hospital inpatients on second generation antipsychotics

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Purpose: In 2004 a consensus statement was published regarding metabolic monitoring for patients taking second generation antipsychotics (SGA) because of their ability to cause metabolic syndrome to include hypertension, hyperlipidemia, hyperglycemia, and obesity. These guidelines were the collaborative work of several research groups including the American Diabetes and Psychiatric Associations and suggested a schedule for appropriate monitoring. Adherence to monitoring has become relevant in clinical practice because of the increasing number of patients on SGA rather than first generation antipsychotics (FGA) due to the potential for extrapyramidal side effects (EPS) and the risk of developing cardiovascular disease from metabolic syndrome.

Methods: Following Institutional Review Board (IRB) submission and approval, a patient list from an institutional setting was generated for all medical inpatients currently on or initiating SGA therapy. Patients were randomly selected via a random number generator to compile an adequate sample size of 500 patients. Exclusion criteria included surgical admissions. Inclusion criteria included patients over 18 years old admitted to the hospital over the last 5 years on SGA therapy including clozapine (Clozaril), olanzapine (Zyprexa), risperidone (Risperdal), quetiapine (Seroquel), aripiprazole (Abilify), and ziprasidone (Geodon). Retrospective analysis over a 5 year period was conducted to gather demographics and evaluate whether appropriate monitoring was completed per guidelines during hospital stay.

Results: Adherence to metabolic monitoring was defined as completion of suggested monitoring parameters to include blood pressure, blood glucose, lipid panel, waist circumference and body mass index (BMI). Non-adherence was determined by the absence of any one parameter. In years 2010, 2011, and 2014 adherence to metabolic monitoring was 0 percent in patients on SGA prior to hospital admission and patients initiated on SGA during their hospital stay. Analysis of each parameter revealed that waist circumference was the number one parameter not measured by providers with 100 percent non-adherence. The most frequently measured parameters were blood pressure followed by blood glucose then lipid panels. Blood pressure measurements were taken in 100 percent of patients, blood glucose measurements ranged from 93 to 97 percent, and lipid panels ranged from 6 percent to 11 percent over the analyzed time period. Weights were documented for all patients allowing our research team to calculate BMI using a standard BMI calculator. Because of this we considered adherence to measuring BMI 100 percent. Data collection was prematurely ceased after analysis of only 3 years instead of 5 years since no significant difference in overall adherence rates to metabolic monitoring were observed.

Conclusion: Given the low adherence rates and negative findings, we conclude that the impact of the consensus statement was poor. This study included patients from a hospital inpatient setting which we feel was a limitation. Reasons for hospital admissions ranged from managing comorbidities to acute illnesses which likely took precedence over completing metabolic monitoring in certain cases. Further interventions are needed for improvement which should be driven by pharmacists in the form of continuing education and involvement in multi-disciplinary rounds. Also, advances in medical charting could allow for automatic prompts to remind providers of the monitoring parameters for patients on SGA.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 5b-381

Poster Title: Clinical Impact of Prescription Medication Quantity on Grip Strength

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Purpose: Hand grip strength has been widely used as a practical and reliable measurement for evaluating age-related changes and alterations in biological functions. The use of specific medications, including cardiovascular agents, have been associated with reduced grip strength. Studies have also found that grip strength is inversely related to polypharmacy, the concurrent use of five or more medications. Additional research is necessary to determine whether the association between grip strength and other medication classes is generalizable.

Methods: This study examined associations between prescription medication count and grip strength among 5,197 patients, aged 18 years and older who participated in the 2011–2012 National Health and Nutrition Examination Survey (NHANES). Prescription medication use was self reported and collected by a trained interviewer. Baseline demographic information was collected and evaluated including age, gender, medications history, and prescription count. Muscle strength was assessed using the Takei digital grip strength dynamometer. Combined grip strength was calculated by totaling the best reading from each hand. Multiple linear regression models were used to examine the association between combined grip strength and the number of medications used, with and without an adjustment for gender, age, height, and arm circumference.

Results: The average age of the NHANES patients was 45.9 years. The mean height was 175.8 cm for men and 162.1 cm for women. Mean combined grip strength, measured in kilograms, was higher among men than women (89.8 kg vs. 56.4 kg; $p < 0.001$). Men and women reported an average of 1.57 and 2.06 prescriptions, respectively ($p < 0.001$). In both unadjusted and

adjusted models, there was a linear decline in combined grip strength associated with increasing number of medications ($p < 0.001$).

Conclusion: Increasing quantity of prescription medications is associated with reduced grip strength independent of age, gender, height, and arm circumference. Additional studies are needed to clarify if reduced grip strength is directly due to medication use or another underlying process.

Submission Category: Small and Rural Pharmacy Practice

Submission Type: Evaluative Study

Session-Board Number: 5b-382

Poster Title: Trends in formal diagnosis and self-acknowledgement of depression and depressive symptoms of patients with diabetes in a rural healthcare setting

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Purpose: Approximately 14.8 million American adults suffer from depression, and two out of three people do not seek or receive proper treatment for depression. Depression is linked to poor health behaviors such as under or overeating, physical inactivity, and lack of motivation for self-care which may negatively affect comorbid diabetes management. A diagnosis of diabetes may also negatively impact depression management. This project was designed to assess and compare trends related to depression diagnosis, self-acknowledgement, and management between privately-insured and uninsured patients with diabetes in a rural setting for the purpose of advising on screening and management behaviors in these settings.

Methods: A retrospective medical chart review of patients referred to a rural diabetes education program by local free clinics and private medical practice offices was performed. Participants with a diagnosis of diabetes or prediabetes and at least 18 years of age completed a diabetes assessment between September 2014 and December 2016. The assessment gathered information regarding whether the participant suffered from anxiety or depression and reviewed current medications; a Patient Health Questionnaire-9 (PHQ-9) was also completed to screen for depression. Referring provider notes were reviewed for a diagnosis of depression. Providers were also contacted to verify the presence or lack of a depression diagnosis. Patients were excluded if any described assessment information was missing or if the provider did not respond regarding diagnosis of depression. PHQ-9 categories consisted of those who were likely experiencing minimal or no depressive symptoms, mild, moderate, or severe depression. If a diagnosis was not specified in the available medical records, those taking selective serotonin reuptake inhibitors were considered to be treated for depression while

those on bupropion, selective norepinephrine reuptake inhibitors, tricyclic antidepressants, and trazodone had an “unknown” treatment status. Statistical and descriptive analyses were performed as appropriate to evaluate the prevalence of self-acknowledged or provider diagnosed depression, PHQ-9 scores, and presence or absence of treatment with antidepressants in the two clinic populations and describe differences in these variables between groups.

Results: Ninety-six patient charts, 58 free clinic and 38 private practice, were analyzed. No statistically significant differences existed between the groups in baseline demographics, proportion of patients self-reporting or being formally diagnosed with depression, or presence of treatment. PHQ-9 scores differed significantly between the groups at baseline with free clinic patients experiencing higher PHQ-9 scores consistent with more severe depressive symptoms. Of the free clinic patients (n equals 28) and private practice patients (n equals 18) who self-reported having depression, 61 percent of free clinic patients had a formal diagnosis of depression compared to 91.7 percent of private practice patients. Sixteen free clinic patients had symptoms of moderate or severe depression. Seven of these patients (43.7 percent) had no diagnosis of depression and seven patients (43.7 percent) were not receiving treatment for depression despite presence of moderate or severe symptoms. No private practice patients with moderate or severe depressive symptoms were undiagnosed or untreated. Six participants in the total free clinic population (approximately 10 percent) had symptoms of moderate or severe depression and lacked both a physician diagnosis of depression and treatment.

Conclusion: Compared to patients referred from primary practice offices, free clinic patients experienced higher rates of depressive symptoms but were more likely to lack formal diagnosis of depression and lack treatment for symptoms. It is possible free clinic patients are not reporting depressive symptoms to free clinic providers or providers are overlooking the diagnosis and treatment of depression due to lack of screening or resources to manage the condition. This study highlights how routine screening for depression along with timely diagnosis and treatment could benefit diabetes patients in a rural, free clinic setting. Larger studies are needed to confirm these results.

Submission Category: Small and Rural Pharmacy Practice

Submission Type: Evaluative Study

Session-Board Number: 5b-383

Poster Title: Identification, Prevalence, and Treatment of Painful Diabetic Neuropathy in Patients from a Free Clinic in a Rural Area in South Carolina

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Purpose: Diabetic patients in rural areas have significant disadvantages, which places this population at higher risks of developing complications and having less access to proper treatment. We studied a rural population of diabetic patients that attended a pharmacist-lead free clinic for a diabetic education program. Our objectives were: 1) Determine the prevalence of diabetic peripheral neuropathy (DPN) and painful diabetic neuropathy (p-DN) in type 2 diabetic patients. 2) Assess the proportion of patients with DPN and p-DN left undocumented upon physician referral to a pharmacist-led free clinic, and 3) Determine the appropriateness of pain medication regimen.

Methods: We performed a retrospective analysis of clinical records of patients from the Presbyterian College School of Pharmacy (PCSP) Wellness Center located in Clinton, SC. Diagnosis of DPN and/or p-DN were obtained from referral notes in the clinical records and compared with results from foot exams performed by the pharmacists in the free clinic using Weinstein-Semmes monofilament exam and clinical features. Medication regimens were obtained from these clinical records and compared using AAN treatment guidelines.

Results: Within our study population, the prevalence of DPN was 62.2%, compared to published national average of 37.2%, p-DN was 23.4% compared to published national average of 17.5%. In p-DN patients, 53.8% (n=14) had a documented diagnosis of p-DN by the referring physician, and 46.2% (n=12) were identified by the pharmacists. We uncovered that 95% (19 of 20) of the

patients treated for p-DN received sub-optimal treatment. Gabapentin was the most frequently used medication in our population with 65.4%.

Conclusion: Patients in rural South Carolina had a higher prevalence of DPN and p-DN with over 60% undocumented cases of p-DN. Greater than 95% of patients receiving pain treatment did not receive optimum therapy according to AAN guidelines. Our study also confirms the positive role of pharmacists in diabetic complication management in rural areas. Pharmacist-led diabetes education programs are in a position to reduce the percentage of uninsured diabetic patients untreated and undiagnosed with painful diabetic neuropathy in similar rural communities and demographics.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 5b-384

Poster Title: Induction of P-glycoprotein in Caco-2 cells and chemotherapy resistance

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Purpose: Multidrug resistance (MDR) is a huge barrier to cancer treatment with chemotherapy agents. Increased drug efflux due to the overexpression of the protein transporter P-glycoprotein (P-gp), encoded by ABCB1/MDR1 gene, has been shown to be a major contributor to MDR. Certain P-gp substrates, such as anticancer agents, have been shown to induce MDR in cancer cells. The purpose of this study was to evaluate if the P-gp substrates losartan and fexofenadine would induce P-gp overexpression in Caco-2 cells, a colorectal cancer cell line. In addition, assess whether these chemotherapy naïve Caco-2 cells show resistance to P-gp substrate chemotherapy agents.

Methods: Caco-2 cells were cultured in EMEM supplemented with 20 percent FBS and penicillin-streptomycin solution. Cultures were incubated at 37 degrees Celsius and 5 percent carbon dioxide in 100 millimeter dishes. The cells were grown until they were 80-90 percent confluent then subcultured following ATCC protocol. Cells were removed using trypsin-EDTA solution. New plates were inoculated with 400,000 cells. Cells were given either losartan (5, 50, 100 micromolar) or fexofenadine (25, 75 micromolar). Negative control cells were not given a drug, and positive control cells were given 10 nanomolar vinblastine. RNA was harvested once per month. Expression of ABCB1 was analyzed using the quantitative-PCR BioRad CFX96 thermocycler and normalized to eEF1 expression. A cell proliferation assay was performed according to manufacturer protocol, with the PrestoBlue Cell Proliferation Assay kit. Losartan and fexofenadine treated Caco-2 cells were seeded in a 96 well plate. Same seeding was done for the positive and negative controls. The wells were then incubated at 37 degrees Celsius for 4 days, after which a chemotherapy agent was added to each well. PrestoBlue reagent was added to the wells and then incubated for 2 hours. Absorbance was read at 595 nanometers.

Results: Real-time PCR analysis showed overexpression of P-gp in the Caco-2 cells treated with losartan and fexofenadine. Positive control cells, cells treated with losartan and cells treated with fexofenadine had an increase in the ratio of ABCB1 expression to eEF1 expression compared to the negative control. Cells treated with 100 micromolar losartan, and cells treated with 25 micromolar fexofenadine showed the most increase in the ratio of ABCB1 expression. When the chemotherapy naïve, losartan and fexofenadine treated cells were treated with a chemotherapy agent during the cell proliferation assay, the losartan and fexofenadine treated cells had higher absorbance values than the negative control cells, indicating resistance to the chemotherapy agent.

Conclusion: Chemotherapy naive Caco-2 cells increased in expression of P-gp while under continuous exposure to the P-gp substrates losartan and fexofenadine. After the increased P-gp expression was observed, the cells showed resistance to chemotherapy. Prolonged use of P-gp substrate drugs, such as losartan and fexofenadine, for the treatment of common conditions such as allergic rhinitis and hypertension could lead to increased expression of P-gp in cancer cells. Increased P-gp expression in these individuals could cause chemotherapy resistance to P-gp substrate chemotherapy. Knowledge of the potential for P-gp overexpression by common P-gp substrate drugs could lead to further personalized cancer treatment.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 5b-385

Poster Title: Induction of P-gp Expression in Colorectal Cancer Cells Following Exposure to P-gp Substrates

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Purpose: The aim of the study is to determine if colorectal cells will develop resistance to non-chemotherapy agents through induction of P-glycoprotein (P-gp) expression following chronic exposure to P-gp substrates, specifically losartan and fexofenadine.

Methods: Cell lines and culturing: The cell line used was Caco2, purchased from ATCC (Manassas, VA). Caco2 cells were cultured in EMEM with 20 percent FBS and penicillin-streptomycin solution. Cultures were incubated at 37 degrees Celsius and 5 percent CO2 in 100mm dishes. The cells were treated with three concentrations of losartan (5, 50, and 100 micro-molar), two concentrations of fexofenadine (25 and 75 micro-molar), and 10 nano-molar vinblastine. They were grown until 80-90% confluency, then subcultured for viability analysis using American Type Culture Collection protocol. Subculture procedures were performed at approximately an 80 percent confluency observed microscopically.
RNA isolation & PCR: mRNA from the Caco-2 cells was isolated using the RNA Isolation Kit: RNasy Mini Kit (Qiagen), and concentrations measured using the NanoDrop Lite spectrophotometer. Following isolation of the mRNA, reverse transcriptase with iScript cDNA Synthesis Kit (Bio-Rad Laboratories, Hercules, CA) was used per reaction protocol to prepare samples for RT-PCR. The ABCB1 transporter expression was measured using quantitative-PCR (qPCR) BioRad CFX96 thermocycler per protocol. Expression data was normalized to the housekeeping gene EEF1A.
Accumulation: Intracellular levels of losartan and fexofenadine in the treated cells were measured using high-performance liquid chromatography (HPLC).
Resistance: Cells with increased expression of P-gp from losartan exposure were treated with higher doses of the losartan to analyze the induction of resistance. Concentrations ranged from 100-500 mM for high-dose losartan.

Results: PCR analysis demonstrated increased expression of the ABCB1 gene in comparison to the EEF1A gene for the cells treated with 100 micro-molar losartan and 25 micro-molar fexofenadine. Of the three treated samples used, two of them demonstrated increased expression of ABCB1. HPLC showed the intracellular levels to be less in the cells that had higher expression of P-gp. Intracellular levels of the drug were higher when the samples were measured with mass spectrometer. The increased activity was able to be induced by treatment with the substrates, resulting in decreased accumulation of drug in the cells. Viability testing showed that the cells previously treated with losartan were able to survive when treated with the high doses of losartan. Since the concentrations of losartan were considered toxic to the cells, this finding confirms an induced drug resistance in the cells.

Conclusion: Cells treated with losartan and fexofenadine were able to induce an overexpression on the P-gp transporter. This finding confirmed that exposure to non-chemotherapy substrates was able to cause resistance to other P-gp substrates in the cells. With this, there is reason to believe that long term use of losartan or fexofenadine may alter expression of the efflux transporter. Advances such as this could provide answers for patient care in areas that are affected by resistance to therapy. Future studies should be done to further understand the potential causes for inducible resistance.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 5b-386

Poster Title: Evaluation of combination treatment with a cyclin dependant kinase (CDK) 8/19 inhibitor with epidermal growth factor (EGFR) inhibitors to prevent resistance in breast cancer cells

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Purpose: Our previous data suggest that inhibition of cyclin dependent kinase 8 (CDK8) can prevent acquired resistance to lapatinib, a dual epidermal growth factor receptor/ human epidermal growth factor receptor 2 (EGFR/HER2). It is, however, unknown if this mechanism of preventing resistance is dependent on HER2 or EGFR activity, or both. The purpose of this study is to evaluate the effectiveness of Senexin B (SNXB), a CDK8/19 inhibitor in HER2 positive cancer cells to prevent resistance to epidermal growth factor receptor inhibitors.

Methods: SKBR3 cells were seeded at 125,000 cells/well and treated with pre-selected concentrations of each EGFR inhibitor monotherapy or in combination with SNXB. Controls of SKBR3 cells with medium only and SNXB monotherapy were grown and split throughout the entire experiment. Drug-containing media was replenished every 3 to 4 days and phase contrast images were used to monitor any changes and developments in cell morphology, death, and cell senescence. One duplicate flask for each treatment was stained with crystal violet and imaged to show the estimated point of maximum inhibition for each treatment (midpoint), while the other duplicate continued treatment with various end points. Once resistant cells began to show in the presence of sole EGFR inhibitor treatment, the cells were stained and a visual comparison of monotherapy and combination treated cells was conducted to determine if an EGFR and CDK8 inhibition can prevent the emergence of resistance to EGFR targeted therapy. Furthermore, these potentially resistant cells were allowed to grow to explore the mechanism of resistance. MTT assays were performed to determine the 50%

inhibitory concentration (IC50s) and a western blot was performed to qualitatively assess a difference in the amount of CDK8 and EGFR protein expression between normal and resistant SKBR3 cells.

Results: SKBR3 cells that had undergone the gefitinib monotherapy treatments at concentrations 0.25uM, 0.5uM, and 1uM exhibited minimal growth inhibition after 6 treatments. In comparison, the erlotinib monotherapy treatment group at concentrations of 3uM, 4uM, and 5uM showed promising growth inhibition with the greatest seen at 5uM. Combination treatment with gefitinib and SNXB exhibited more growth inhibition versus gefitinib monotherapy, however, there was no visual change in inhibition from midpoint to endpoint. An obvious visual rise in resistance could be seen in the combination treatment with 1uM gefitinib. Combination treatment with erlotinib and SNXB exhibited a greater amount of inhibition versus monotherapy erlotinib and combination gefitinib treatment with no visible cells in the 5uM erlotinib and SNXB combination therapy. 5uM SNXB monotherapy showed partial inhibition (50%) in monotherapy treatment. Results of the MTT assays did not show significant differences in IC50 concentrations. Western blot of non-resistant versus possibly resistant SKBR3 cells showed an increase of EGFR expression in the resistant cells by twice the amount in non-resistant. The resistant cells also showed an increase 1.5 times the non-resistant cells in phosphorylated EGFR protein expression. No difference was observed in CDK8 expression.

Conclusion: Combination therapy of SNXB and EGFR inhibitors showed promising effect in preventing resistance to EGFR monotherapy; especially at higher doses with the erlotinib combination. Calculated IC50s as well as western blotting results give quantitative data that further verifies that there is indeed a trend towards resistance that occurs in monotherapy treatment with EGFR inhibitors. These promising results demonstrate the need to further explore the use of SNXB in combination with EGFR inhibitors and possibly other chemotherapeutic drugs to prevent ongoing development of resistance in cancer cells. Ongoing research with SKBR3 and BT474 cells with SNXB are currently in progress.

Submission Category: Pediatrics

Submission Type: Case Report

Session-Board Number: 5b-387

Poster Title: Daptomycin in combination with ceftaroline for hematogenous osteomyelitis in an 11 month old

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Purpose: A previously healthy 11 month old caucasian male with a recent history of varicella zoster presented with two weeks of fever, decreased activity, and decreased oral intake. A few days prior to admission, the patient would not ambulate on his own. On the day of admission, his abdomen was distended. Parents denied any emesis, cough, congestion, rhinorrhea, swollen joints, or cellulitis.

Baseline labs revealed a WBC 21.5, Bands 25, Polys 38, CRP 240, and a fever of 101.2˚F. Blood, urine, and CSF cultures were positive for MRSA. Vancomycin 15 mg/kg every 6 hours was initiated. The patient had a therapeutic trough drawn appropriately. On hospital day 3, the patient remained febrile, cultures were still positive, CRP was decreasing. On hospital day 4, a decision was made to change vancomycin to daptomycin 10 mg/kg IV every 24 hours + ceftaroline 15 mg/kg IV every 8 hours. A whole body MRI revealed a right proximal leg abscess, septic right hip joint, peritonitis, epidural abscess, and osteomyelitis of the right ilium, ischium, and proximal femur. A diagnosis of acute, multifocal osteomyelitis was given. The patient underwent multiple I&D throughout the next several days. Blood cultures remained positive until hospital day 9.

On hospital day 16, ceftaroline was discontinued due to the patients improving status (CRP down to 21.3 and patient afebrile for >48 hours). During the following days, CRP began to increase, so ceftaroline was restarted on day 22. On day 23, the patient was re-imaged. No new fluid collections were found and the epidural abscess had resolved.

The patient was monitored in clinic with weekly labs. On day 47, labs were within normal limits, the patient had been treated 4.5 weeks from the last afebrile day, therefore antibiotics were discontinued.

This patient presented a unique case of acute multifocal osteomyelitis that was difficult to clear. The infection resulted in septic joints, numerous deep seeded abscesses, including the peritoneal and epidural space. First line treatment for children with acute hematogenous MRSA osteomyelitis and septic arthritis is IV vancomycin while bacteremia persists. Although daptomycin is not indicated by the FDA for pediatric osteomyelitis, it is an alternate treatment option.1

Treatment failure with vancomycin is to be considered when blood cultures remain positive while a vancomycin trough is within therapeutic range (15-20 mcg/mL). In the adult literature, in the event of a vancomycin failure, daptomycin may be used in combination with a beta-lactam.1

A combination of ceftaroline plus daptomycin may speed up clearance of a staphylococcal bacteremia that has been refractory to other antibiotics due to their synergistic effects.2

A daptomycin dose of 6-10 mg/kg is recommended for pediatric patients with bacteremia.1

Ceftaroline dosing in pediatrics has not been formally established, therefore our dosing recommendations were based upon on an ongoing clinical trial evaluating ceftaroline use in children with osteomyelitis infections (NCT02335905). The dose chosen for our patient was 15 mg/kg every 8 hours infused over 120 minutes, based on safety parameters of this study.

To our knowledge, this is the first pediatric patient to be treated with this combination therapy. Our hope is that this case will demonstrate the clinical benefit of this antimicrobial combination in the pediatric population and encourage further studies to assess the success rate and safety of this combination in the treatment difficult MRSA infections in children.

1. Liu C et al. Clinical Practice Guidelines by the Infectious Diseases Society of America for the Treatment of Methicillin-Resistant Staphylococcus Aureus Infections in Adults and Children. Clinical Infectious Disease. 2011; 52:1-38.

2. .Sakoulas G, et al. Antimicrobial salvage therapy for persistent staphylococcal bacteremia using daptomycin plus ceftaroline. Clinical Therapeutics. 2014; 36(10): 1317-33.

Methods:

Results:

Conclusion:

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 5b-388

Poster Title: Assessment of adherence to formulary restrictions for intravenous immunoglobulin (IVIG) in an academic medical center

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Purpose: Intravenous immunoglobulin (IVIG) is approved by the U.S. Food and Drug Administration for the treatment of immune disorders, such as low IgG. As IVIG is a high-cost medication, it has been restricted at MUSC Health. Current formulary restrictions note that ordering must occur via an order set and reordered daily by attending physicians. The restriction also requires that the indication must be included in the diagnoses covered under the Medicare Local Coverage Determination (LCD). The goal of this medication use evaluation was to assess the compliance of prescribed orders to the MUSC formulary restriction in the inpatient setting.

Methods: Orders for IVIG for admitted patients in May, June, and August 2016 were identified via the electronic medical record, Epic. Restriction adherence was assessed for both the indication for IVIG use as well as attending physician authorization. The indication entered by the ordering provider was compared with the indications on the Medicare LCD list to determine adherence to the indication portion of the formulary restriction. Attending physician authorization was assessed via whether the attending was the ordering provider or whether the attending endorsed the use of IVIG in a progress note. The primary endpoint was the percentage of IVIG orders prescribed for indications included in the formulary restriction. The secondary endpoints included the percentage of IVIG orders placed by an attending, the percentage of IVIG orders acknowledged by the attending, and the overall restriction compliance.

Results: During the months of May, June, and August 2016, 180 orders of IVIG were administered to 121 inpatients. Overall, 63.9 percent of orders (115 orders) were placed for an indication included on the Medicare LCD list. The most common unapproved indications were encephalopathy, seizures, and hyperbilirubinemia. The percentage of orders placed by an attending was 8.3 percent (15 orders). The attending physician acknowledged the use of IVIG in the progress note in the majority of cases.

Conclusion: There is significant room for improvement in prescribing intravenous immunoglobulin (IVIG) for an appropriate indication based on formulary restrictions at MUSC Health. Following an assessment of allowed indications at other academic medical centers, proposed changes will be vetted through the Pharmacy and Therapeutics committee and implemented in the coming months.

Submission Category: Oncology

Submission Type: Descriptive Report

Session-Board Number: 5b-389

Poster Title: Community education of personalized breast cancer therapy utilizing students of healthcare professions

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Purpose: Health literacy is a growing problem that can further lead to altered decision making, an amplified variety of health conditions, and decreased survival rates. This study demonstrates that by providing brief, educational seminars to medically under-served members of local communities, we could improve patients' basic knowledge of breast cancer and explain specific treatment options that are available. Through this expanded knowledge, it is expected that patients will take a more active role in their own healthcare.

Methods: The study began by developing a PowerPoint; based on a fifth grade reading level so all levels of education could be involved and understand how to respond. Topics such as breast cancer statistics, incidence rates, screening, risk factors, signs and symptoms, genetic testing and markers, and treatment were combined in order to give a diversity of subjects patients would benefit from in regards to breast cancer. Once created, pharmacy students reached out to local under-served communities to raise awareness about breast cancer and the many options patients have. Patients were given a pre-presentation survey in order to assess their basic knowledge of breast cancer. The survey consisted of a one (strongly disagree) to five (strongly agree) key to measure the patients understanding of various topics related to breast cancer. After the pre-presentation survey was completed, an educational breast cancer PowerPoint was presented. Questions were then asked and a post-survey (with the same questions as the pre-survey) was given in order to determine whether the presentation met its primary goal of elevating patient's awareness of breast cancer.

Results: Whether breast cancer naive or a survivor, the majority of the patients present reported expanded knowledge of breast cancer and felt that they were more confident in taking initiative in their healthcare. With an alpha level set at 0.05, all of the questions showed statistical significance. Three key elements that showed the greatest improvement of gained knowledge involved the causes of breast cancer (pre-score 2.9- post-score 4.6 (standard deviation 1.69)), signs and symptoms of breast cancer (pre-score 3.5-post-score 4.5 (standard deviation 0.96)), and treatment options available to the public (pre-score 3.3-post-score 4.6 (standard deviation 1.31)). This suggests that at baseline, the patients were comparatively less aware and educated on breast cancer then after the presentation, when the post-survey was given. By presenting the material with a pre- and post-presentation survey, this enables the amount of knowledge gained by participants to be measured, and helps shape future presentations to guarantee maximum awareness to the patients attending.

Conclusion: By this study, it can be concluded that pharmacists play a vital role in increasing health literacy and perhaps a subsequent improvement in survival rates by promoting breast cancer education and community outreach. By utilizing pharmacy students as presenters, this enables patients to have their medication questions answered, but also provides a platform for furthering pharmacy student's education and skills as they develop into healthcare providers. The students also serve as a reminder that pharmacists are the most accessible healthcare provider, and a valuable resource for medical information and referrals.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5b-390

Poster Title: Evaluation of contracted sexually transmitted infections by state sex education mandate status

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Purpose: The purpose of this study was to determine if a difference existed between the mandated and non-mandated sex education states as it relates to the associated number of cases of chlamydia, gonorrhea, and syphilis.

Methods: This was a retrospective study evaluating data from the 2015 State Sex and Human Immunodeficiency Virus (HIV) Education Policy presented by the Henry J. Kaiser Family Foundation and the 2013 Rates of Reportable Sexually Transmitted Infections (STIs) among Young People 15 – 24 Years of Age furnished by the Centers for Disease Control and Prevention (CDC). With respect to the 2015 State Sex and HIV Education Policy, the section of interest to the investigation was the "Mandates Sex Education" category which yielded "Yes" or "No" designations. Each listing per state, and the District of Columbia (DC), was included in the analyses. As it pertains to data from the 2013 Rates of Reportable STIs among Young People 15 – 24 Years of Age, estimates pertinent to the investigation were the number of cases of chlamydia, gonorrhea, and syphilis reported. These findings, per state and the DC, were included in the analyses. The Mann - Whitney U test was utilized to detect potential differences observed between the mandated and non-mandated sex education states, corresponding to the number of cases of chlamydia, gonorrhea, and syphilis. With regards to the statistical testing performed, P less than 0.05 was deemed to be statistically significant.

Results: States that mandated sex education (Group A) and those that lacked this mandate (Group B) were twenty four states, including the DC, and twenty six states, respectively. The median number of cases of chlamydia for Group A and Group B were 7,765 and 16,013, respectively. No statistical difference was observed between these two groups as it pertains to

the number of cases of chlamydia reported (95 percent CI, -12,555 to 869 percent, P equals 0.09). The median number of cases of gonorrhea for Group A and Group B were 1,309 and 2,857, respectively. No statistical difference was observed between these two groups as it relates to the number of cases of gonorrhea reported (95 percent CI, -2,580 to 298 percent, P equals 0.19). The median number of cases of syphilis for Group A and Group B were 30 and 59, respectively. No statistical difference was observed between these two groups with respect to the number of cases of syphilis reported (95 percent CI, -52 to 11 percent, P equals 0.22).

Conclusion: Acquisition of STIs, namely chlamydia, gonorrhea, and syphilis, was not shown to be statistically different among states with a sex education mandate versus those without this decree. The difference in the number of chlamydia cases reported between the two study groups was found to be approaching statistical significance. The utility of these findings should be viewed in the larger context of expected variance in the delivery of sex education offered among states that possess the mandate. Furthermore, it's important to account for the undisclosed sex education offerings provided by states that lack an official directive.

Submission Category: Small and Rural Pharmacy Practice

Submission Type: Evaluative Study

Session-Board Number: 5b-391

Poster Title: Treatment patterns of patients 80 years of age and older with diabetes in a rural primary care setting

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Purpose: There is limited data on the adequate control of diabetes in patients older than 80 years of age. The aim was to evaluate the treatment patterns of patients older than 80 with diabetes, in a rural health, family medicine setting to determine if the American Diabetes Association (ADA) and American Geriatrics Society (AGS) guideline goals are being met.

Methods: The Greenville Health System Institutional Review Board approved this retrospective chart review conducted in a rural health, family medicine clinic. Charts were screened and included if the following inclusion criteria were met: a diagnosis of diabetes (type 1 or 2), age 80 years or older, and prescribed at least one blood glucose lowering agent. Data was collected from July 1, 2015 to June 30, 2016, using computerized patient records. This data includes: age, smoking status, current diabetes medications, lipid lowering medications, blood pressure medications, A1c values, blood pressure measurements, low density lipoprotein concentration, macrovascular and microvascular complications. The primary outcome was percentage of patients with controlled or uncontrolled diabetes in a rural health, family medicine clinic. Fisher's exact test was used for the statistical analysis by an independent statistician.

Results: One-hundred seventeen patient charts were analyzed. Of all patients analyzed, 49.1 percent were on metformin therapy, 31.9 percent were on basal insulin therapy, 47.1 percent were on an ACE inhibitor, 96 percent were on statin therapy, as these medications are recommended by the American Diabetes Association and American Geriatrics Society to adequately treat diabetes mellitus and other interrelated chronic conditions. Of the patients analyzed, 84.8 percent of patients (73.7 percent with A1c less than 7.5 percent and 11.1 percent with A1c between 7.5 to 8 percent) met A1c goals of less than 8 percent per AGS

guidelines. Of those not taking metformin, only 82 percent were at A1c goal of less than 8 percent. There was a statistically significance association between meeting A1c goal and number of antidiabetic medications for the management of diabetes (p equals 0.031). For other endpoints, statistical significance was found between number of medications and attained blood pressure goals, per national hypertension guidelines (p equals 0.038).

Conclusion: In a rural health, family medicine setting, patients were more likely to meet A1c goal if currently prescribed metformin, compared to using other antidiabetic therapies. In addition, patients with more antihypertensive medications were less likely to have controlled blood pressure. This study compares the framework of the American Diabetes Association and the American Geriatric Society guidelines, but more explicit studies need to be done to support these results.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 5b-392

Poster Title: Low molecular weight heparin dosing and monitoring in venous thromboembolism treatment in obese patients

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Purpose: Limited information is available regarding the dosing and clinical outcomes of low molecular weight heparin (LMWH) therapy for venous thromboembolism (VTE) in patients weighing over 150 kg. The purpose of this case series is to describe the clinical outcomes of such treatment and the observed monitoring practices using LMWH anti-Xa levels.

Methods: A retrospective chart review was performed on adult patients admitted from November 2, 2012 to July 31, 2015 who received at least one regularly scheduled dose of enoxaparin for VTE treatment. Patients with a body mass index greater than 40 kg/meter squared and weight greater than 150 kg were included. Patients were excluded if creatinine clearance could not be calculated using the Cockcroft-Gault equation due to missing values, the patient had a diagnosis of atrial fibrillation, the patient was admitted to an oncology service, or the dose was prescribed as a one-time order. Data elements to characterize the enoxaparin regimen, creatinine clearance, bleeding, and recurrent VTE events were collected for each patient. Major bleeding was defined as bleeding leading to death, requiring greater than 2 units of packed red blood cells, occurring at a critical site, or a decrease in hemoglobin by at least 2 g/dL. Descriptive statistics were applied.

Results: Thirteen patients had a BMI greater than 40 kg/meter squared and weighed greater than 150 kg (range 152-258 kg). Four patients weighed greater than 200 kg. All patients had a creatinine clearance greater than 50 mL/min calculated with the Cockcroft-Gault equation using ideal body weight. No major bleeding events or recurrent VTEs were noted during enoxaparin treatment. Enoxaparin dosing ranged from 0.7 to 1 mg/kg twice daily for a median of 5.5 doses

(range 1-17). The duration of enoxaparin treatment ranged from 1 to 10 days (median 3 days). Eight patients could have received a dose closer to 1 mg/kg without added inconvenience or exceeding 1 mg/kg of total body weight. Anti-Xa levels were checked in 7 patients, typically after 2 to 3 doses. Five levels were between 0.5 to 1.2 IU/mL (doses 0.7-1 mg/kg), 1 was subtherapeutic at 0.38 IU/mL (dose 0.8 mg/kg), and 1 supratherapeutic at 1.22 IU/mL (dose 0.7 mg/kg). Six dose adjustments in 4 patients were made in response to LMWH anti-Xa level monitoring. A transition to warfarin occurred in 10 patients and to rivaroxaban in 3 patients.

Conclusion: The role of LMWH anti-Xa monitoring to guide dose adjustments has not yet been clearly elucidated. While additional data regarding clinical outcomes is warranted to confirm these findings, it appears that dosing at or close to 1 mg/kg of total body weight is reasonable.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Evaluative Study

Session-Board Number: 5b-393

Poster Title: Sleep habits and quality among pharmacy faculty members

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Purpose: A recent study evaluated career satisfaction, lifestyle, and stress level among pharmacy faculty members, but did not collect data or assess sleep habits and sleep quality among this population. There is a lack of published evidence regarding sleep habits and quality among pharmacy faculty members. This study was designed to determine an association between sleep habits with sleep quality among pharmacy faculty members from current schools or colleges of pharmacy in the United States.

Methods: A survey was administered to pharmacy faculty members who were current members of the American Association of College of Pharmacy. Participation in the study was voluntary. The survey contained 20 questions regarding demographics, including academia status, and the Pittsburgh Sleep Quality Index (PSQI). A link to the survey was sent on August 1, 2016 with a remainder email on August 16, 2016; the survey closed on August 31, 2016. After data collection, Wilcoxon sum rank test and Kruskal Wallis test were used, respectively, for two groups or more for global scores among patients, Chi-square analyzed proportional differences of good verses poor sleep by characteristics, and a multivariate logistic regression model calculated factors associated with poor sleepers.

Results: Of the 7043 pharmacist faculty members invited to participate, 1213 (17.82%) completed the survey. The mean component scores for the PSQI were: sleep quality 1.01, sleep latency 0.89, sleep duration 1.08, sleep efficiency 0.58, sleep disturbance 1.11, use of sleep medications 0.34, and daytime dysfunction 1.07. Of these results, a global score, a combined measurement of all components, was determined to be 6.08, indicating that 66.7% of faculty members were categorized as poor sleepers. There was a significant different in the global score between married and unmarried group ($p < 0.001$). There was an association between job title and global scores, ($p < 0.001$). The proportion of poor sleepers in unmarried group is

significantly higher than in married group (76.7% vs. 63.5%, $p < 0.001$). Full-time professors were noted to have a 50% reduction in being a poor sleeper as the proportions of poor sleepers are significantly difference among the respondents with different job titles ($p = 0.009$).

Conclusion: This survey was concluded among pharmacy faculty members in the United States, indicating a majority of this population can be categorized as poor sleepers, particularly among those who are unmarried. In addition, job title of full-time professor may be associated with a reduction in the classification of poor sleeper. Additional studies should be conducted to assess sleep habits and quality during an academic year. Strategies to improve sleep habits and quality among pharmacy faculty members should be considered.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Descriptive Report

Session-Board Number: 5b-394

Poster Title: Evaluating the financial burden of pre-residency preparation and assessing student financial preparedness

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Purpose: Student pharmacists embark on a time intense and rigorous process should they choose to pursue residency training. This process is frequently costly and students are often unaware of the full financial commitment. The purpose of this study is to assess applicant expenses who applied for and interviewed during the 2016 residency cycle and evaluate their financial preparedness.

Methods: Data were collected by an electronic survey (Survey Monkey) sent to 2016 residency applicants from six United States colleges of pharmacy representing various regions of the country. The survey requested information related to how much the student spent traveling to conferences, the application process itself, traveling to interviews, and how much the student spent if they participated in phase 2 or the scramble phase. Information was also collected on the number of programs applied to, both in and out of state, as well as the number of interview invitations received. The primary outcome was to determine the median amount spent by the students who responded to the survey, and identify any trends that may prove useful to future applicants. A secondary endpoint was to evaluate financial preparedness for residency expenses.

Results: The survey was completed by 159 applicants who applied to residency programs in 2016. Overall, the students applied to a median of 8 programs (IQR 5-10) and received a median of 4 interviews (IQR 2-6.5). The median amount spent for the entire process was 1,840 dollars (IQR 1,090 to 2,955 dollars), applicants participating in the phase 2 match reported

median expenditures directly related to phase 2 of 280 dollars (IQR 180 to 360 dollars). Median pre-application costs such as conferences, professional wear and printing totaled 1,000 dollars (IQR 600 to 1,500 dollars). PhORCAS expenses were 410 dollars (IQR 290 to 530 dollars), and the median spent to attend on-site interviews was 440 dollars (IQR 20 to 1,140 dollars). Median expenditures for residency bound students who attended mid-year were 2,260 dollars (IQR 1,660 to 3,365 dollars) compared to 910 dollars (IQR 621 to 1,493 dollars) for those who did not attend. Approximately 72 percent of respondents reported they either did not prepare a budget, or did not budget enough for the residency application process. Fifty respondents (31 percent) reported taking out loans to help cover the cost of the residency application process.

Conclusion: The results of the survey reveal residency candidates will likely spend approximately 1,800 dollars during the match process, and should anticipate up to 3,000 dollars. Mentors and students can utilize these data for early recognition of the importance of financial planning for the residency process.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5b-395

Poster Title: Predictors of antiretroviral errors among patients in the intensive care unit

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Purpose: South Carolina consistently ranks among the top ten nationally for newly diagnosed HIV/AIDS cases. The complexity of antiretroviral therapy (ART) puts this population at a greater risk for medication errors, which can be compounded when they are hospitalized. The complexity of ART places HIV-infected patients at a high risk for medication errors, which may be increased in the intensive care unit (ICU). The primary objective of this study is to quantify antiretroviral (ARV) medication error rates in HIV -infected patients admitted to the intensive care unit and to identify risk factor associated with these errors.

Methods: This study is an Institutional Review Board approved, single center, observational, retrospective cohort study. Eligible patients were adult HIV-infected patients admitted to the ICU for 24 hours or more between January 1, 2009 and December 31, 2014 at Palmetto Health Richland Memorial Hospital. Electronic medical records were reviewed for host and medication related data. Antiretroviral-related errors were identified and classified as follows: incomplete regimen, incorrect dosage, incorrect ARV ordered, drug-drug interactions, and dose omission. Appropriateness of crushable administration was also calculated. Descriptive statistics were used to calculate the ARV error rate and duration of errors. Patients were grouped by presence or absence of medication error for comparison using Student t-test or Chi-square as appropriate ($p < 0.05$).

Results: Of the 2828 patients reviewed, 225 met inclusion criteria. Patients were 50.3 years old, predominantly male (67%) and spent an average of 7.3 days in the ICU. Most patients' primary diagnosis was non-HIV related. Fifty patients (22%) did not continue ARVs during their ICU stay.

Approximately 66% of patients experienced an ARV medication error. About 52% of these patients experienced more than one medication error. The most common error was dose omission (64%), followed by incomplete regimen (34%) and dosing errors (31%). Approximately 41% of the ICU stay resulted in a dose omission. Mean creatinine clearance was significantly lower for patients who experienced a medication error (60.39mL/min vs 76.81mL/min,p=0.0062), shown in the 75% of dosing errors due to renal dysfunction.

Conclusion: A significant number of HIV-infected patients in the intensive care unit experienced an ART error. Pharmacists have the ability to make a significant impact by assessing ART for appropriate drug selection, dosing, and administration.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-396

Poster Title: Quantitation of cytokines in human cervical mucus using proximity ligation assay

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Purpose: Persistent human papillomavirus (HPV) infection is the primary risk factor for cervical cancer development. In order to understand clearance versus persistence of HPV infection, it is necessary to understand the immune response to the infection. Cytokines IL-12 and IL-6 contribute to the proinflammatory process responsible for mounting an effective immune response. Cytokine profile analysis offers potential as an early diagnostic tool and biomarker for personalized treatment of persistent HPV infections and directed drug therapy in the treatment of advanced disease. This project focuses on using proximity ligation assay to quantify IL-6 and IL-12 in human cervical mucus samples.

Methods: The proximity ligation assay (PLA) was completed using the Taqman Protein Assay Open Kit from Applied Biosystems. Assay probes were prepared using biotinylated affinity-purified polyclonal antibodies against human IL-6 and IL-12 purchased from R and D Systems. Each antibody was separated into two aliquots and the 3' and 5' oligonucleotides provided in the Taqman Protein Assay Open Kit were added to each aliquot separately. A standard curve was prepared for each antibody using a recombinant protein corresponding to either IL-6 or IL-12 and the PLA was performed using the protocol from Applied Biosystems. The data was analyzed on the BIORAD CFX 96 Real-time PCR system. The assay was validated using cervical mucus samples obtained from Women's Care Clinic at the University of South Carolina. Clinical data and laboratory data regarding presence and type of HPV present in the sample were also available for each cervical mucus sample. The quantity of the cytokines in the cervical mucus samples was determined by comparing the Cq values determined by the PLA to the standard curves. For the purpose of validating the PLA, these relative cytokine quantities could then be compared to cytokine quantitation data determined previously using an ELISA technique.

Results: The Taqman Protein Assay Open Kit from Applied Biosystems was used to effectively design assays for both IL-6 and IL-12. Standard curves were generated for both IL-6 and IL-12 with the minimum detection limit of both cytokines being approximately 30 picograms per microliter. A limited number of cervical mucus samples (20) were used to effectively validate the use of the PLA for the quantitation of both IL-6 and IL-12 in clinical cervical samples.

Conclusion: The PLA proved to be an effective tool in the quantitation of IL-6 and IL-12 in clinical cervical samples. Further analysis on a larger sample set is warranted and currently being pursued in order to compare the quantitation results with known immune status regarding HPV clearance. We are hopeful that the PLA will prove to be a valid technique not only in biomarker discovery but in the future in its practical application as a clinical diagnostic tool which will help direct drug therapy.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 5b-397

Poster Title: A Nicotine Replacement Therapy Medication Use Evaluation (MUE) in an Inpatient Psychiatric Hospital

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Purpose: Cigarette smoking is a major public health issue and risk factor for many leading causes of death including heart disease, stroke, and lung cancer. Individuals with mental illness may utilize smoking to self-medicate in order to relieve psychiatric symptoms. Smoking cessation is the key to decrease the number of diseases and deaths related to smoking. Nicotine replacement therapy (NRT) is available to help individuals who are attempting to quit. The purpose of this study is to assess the appropriate use of NRT in patients with a history of tobacco use disorder in an inpatient psychiatric facility

Methods: A medication use evaluation (MUE) form was created to determine the appropriate use of nicotine replacement therapy in adult patients with psychiatric disorders. Forms were designed to determine justification of use, appropriate dosing, and adequate length of therapy. Chart reviews were conducted from October – December 2015 with goals corresponding to The Joint Commission (JTC) standards. Average compliance was calculated and results presented at the Medication Management Committee in January 2016.

Results: Justification for use, dosing, and length of treatment were recorded and analyzed for the Division of Inpatient Services. The compliance rate for justification of use was 78%, appropriate dosing was 33%, and adequate length of treatment was 25% with 0% documenting continued-NRT use beyond recommended therapy.

Conclusion: The NRT MUE of patients with a history of smoking cessation in an inpatient psychiatric hospital identified key areas of improvement. While compliance rates for justification of use could improve, compliance rates for dosing and length of therapy were dismal. Future educational interventions should target common prescribing patterns, identify best practices associated with NRT prescribing, and include pharmacists educating patients and prescribers. Evidence has shown that behavioral support and pharmacist counseling alongside NRT has a positive impact on patients' ability to quit, but it is unknown how to maintain and improve smoking cessation post discharge in inpatient psychiatric settings.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 5b-398

Poster Title: Feasibility of implementing NCCN clinical practice guidelines in a pharmacy based tobacco treatment program

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Purpose: The Clinical Practice Guidelines in Oncology for Smoking Cessation, developed by the National Comprehensive Cancer Network (NCCN) in 2015, state that smoking cessation should be an integral part of oncology treatment. The guidelines require all cancer patients to be screened for tobacco, advised to quit and provided evidence-based assistance and follow-up to promote abstinence from tobacco during and after cancer treatment. This report describes the implementation of an automated system to identify and refer current cigarette smokers to a pharmacy led tobacco treatment program in a NCI designated cancer center designed to be consistent with the NCCN Clinical Practice Guidelines.

Methods: Data was collected from 15,868 patient visit records for outpatients seen at the Hollings Cancer Center from November 1, 2015 to July 31, 2016. During this 9-month period, 1,022 current smoking oncology patients were eligible to be enrolled into our tobacco treatment program. An automated system attempted to reach eligible patients by phone within a week after their last oncology clinic visit to invite them to schedule a future appointment with a clinical pharmacist for behavioral counseling and pharmacotherapy consistent with the NCCN guidelines. Pharmacists were authorized to initiate, modify, discontinue and determine duration and dose for smoking cessation medications for enrolled patients under a collaborative drug therapy management protocol. With some exceptions (e.g., distance of the patient's residence from the cancer center), clinical pharmacists delivered 4 or more behavioral counseling sessions consistent with NCCN guidelines. The goal of the tobacco treatment program is for all patients to have both pharmacotherapy and behavioral counseling. All

patients, regardless of whether they received care from the pharmacist or not, were called back at one, three and six months to assess their tobacco use and offer follow-up assistance if needed.

Results: Of the 1,022 eligible smokers, 499 were reached by phone (49 percent). Of those patients reached by phone, 226 accepted an appointment with a pharmacist (45 percent). Patients not reached by phone or who were not ready for assistance were sent information about the tobacco treatment program. Data available on patients reached at the one-month revealed that 20% were not smoking with quit rates approximately 2 times higher in those who had seen a pharmacist.

Conclusion: It is feasible to implement a pharmacy based tobacco treatment program using the NCCN Clinical Practice Guidelines for Smoking Cessation in a large cancer center, although further refinement of these methods are needed to engage more patients in the process of quitting.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 5b-399

Poster Title: Impact of an annual medication use evaluation on formulary adherence of antiretroviral agents used to treat human immunodeficiency virus (HIV)

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Purpose: Some drug classes present formulary management challenges based on the large number of therapeutic options and lack of active-control studies. One such class is antiretrovirals used to treat human immunodeficiency virus (HIV). In order to better manage antiretroviral medications available on the formulary of an academic medical center, an annual medication use evaluation of the class was initiated. The primary objective of this study was to analyze if an annual MUE of antiretroviral medications used to treat HIV improved overall formulary adherence with these medications.

Methods: In May 2012, an annual medication use evaluation of antiretrovirals used to treat HIV was initiated at an academic medical center. Every spring since, the Infectious Diseases specialty pharmacy resident works with a drug information specialist to review antiretroviral utilization, HIV guidelines, and drug costs to recommend formulary changes to the Anti-infective subcommittee. A retrospective review was conducted to examine baseline antiretroviral medication use from August 2008 to April 2012 prior to the implementation of this project. All inpatient orders for both formulary and nonformulary antiretroviral medications were collected from the institution's order entry systems; formulary adherence was determined based on the formulary status of the medication at the time of the order. "Annualized" evaluation periods in the before time frame were broken into three time periods of varying length based on availability of previously collected data. The primary outcome of this study was overall formulary adherence, calculated by divided nonformulary antiretroviral use by total antiretroviral use, before and after the implementation of the annual MUE. Secondary outcomes were annualized adherence of antiretroviral medications and total and annualized formulary changes, cost savings, and utilization of these medications. Institutional Review Board (IRB) approval was not necessary as this was a quality improvement project.

Results: Total formulary adherence was 10.57% (n = 1977/18697.5) in the evaluation period before the implementation of the annual MUE and 3.53% (n = 949/26913) time period after the implementation. Before examining an annual MUE of antiretroviral medications for the treatment of HIV non-formulary use was 9.88% between May 2011 to April 2012. After initating an annual MUE to evaluate antiretroviral medications used to treat HIV non-formulary use decreased to 3.14% in 2012, 2.58% in 2013, 4.07% in 2014 and 4.12% in 2015. All inpatient HIV medications were reviewed based on if at the time the patient received the medication it was formulary or non-formulary. In total, 30 formulary changes were made between August 2008 and February 2016; 17 and 13 formulary changes were performed before and after the annual MUE implementation, respectively.

Conclusion: Based on results of the study, an annual MUE increased formulary adherence of antiretroviral medications used to treat HIV. Antiretroviral medication formulary changes have decreased in recent years at this academic center since the initiation of this annual MUE. The MUE will continue to be an annual project that the Infectious Diseases specialty pharmacy resident will complete on their medication use policy rotation.

Submission Category: Pharmacy Law/ Regulatory/ Accreditation

Submission Type: Descriptive Report

Session-Board Number: 5b-400

Poster Title: Medicinal marijuana legislation: Evidence based or not?

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Purpose: The legalization of marijuana has been a highly debated topic both on a federal and state level. Even as more states move to approve legislation to legalize the use of marijuana for medical purposes, it continues to be classified as a class 1 federally controlled substance, and is therefore, considered to be illegal with no federally recognized medicinal purpose. The purpose of this project is to determine if the rationale or justification utilized by state legislatures, which have legalized marijuana use for medicinal purposes, was based on scientific evidence.

Methods: Twenty-five states, the District of Columbia, and the U.S territories of Guam and Puerto Rico were identified as having legalized marijuana use for medicinal purposes. Students in their third and final year of pharmacy school paired with a pharmacist faculty member, reviewed the state laws associated with the aforementioned legislatures for verbiage indicating that scientific evidence was a contributing factor for the pursuit of the legalization of medical marijuana use, as well as any articles or research named specifically in the legislation as evidence toward this goal.

Results: Fourteen of the twenty-eight legislatures evaluated specifically list scientific evidence as a reason for seeking legalization of medicinal marijuana. Of those fourteen, seven states list medical journals or scientific research as evidence for legalizing medical marijuana. Of note, all twenty- eight legislatures outline medical conditions, labeled as “debilitating medical conditions,” within the laws for which medicinal marijuana may legally be used. Additionally, all twenty-eight legislatures outline provisions for a committee which would guide change to their individual medicinal marijuana programs as needed (e.g., changes or additions to approved medical condition lists, or legal possession limits), and most of these states required committee

membership to include medical professionals. Those states not requiring healthcare professionals on the committees require their committee membership to seek outside counsel with appropriate healthcare professionals before acting.

Conclusion: Fifty percent of the enacted medical marijuana laws in the United States are based on scientific evidence as cited in their respective legislative action, and twenty-five percent of these laws are for specific patient populations and/or indications. Therefore, an opportunity exists to educate legislatures on evaluating medical literature and potentially grading the evidence to help guide decisions related to controversial agents such as marijuana in possible legalization,monitoring of effects, as well as further research on those agents. A scientific methodical approach would help ensure appropriate use and target populations.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 5b-401

Poster Title: Incidence of Hypophosphatemia in Very Low Birth Weight Infants Receiving Parenteral Nutrition

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Purpose: Very low birth weight (VLBW) infants are at a higher risk for nutritional and electrolyte deficits compared to infants born at normal birth weights. Administering optimal concentrations of calcium and phosphate presents a challenge due to solubility limitations in parenteral nutrition (PN). Despite an emphasis on calcium, both elements have a significant impact on bone development and mineralization. The recommended calcium to phosphate ratio during the first week of life is 1.3 to 1.7. The purpose of this study is to report the incidence of hypophosphatemia within days 4-14 of life in VLBW infants receiving PN and other nutrition sources.

Methods: This retrospective, observational study reports the incidence of hypophosphatemia, defined as a serum phosphate level less than 4.0 mg/dL, within days four to fourteen of life in VLBW infants receiving PN. Initial inclusion criteria were VLBW infants weighing less than 1500 grams who were admitted into the NICU between August 1, 2015 and March 31, 2016. Additionally, subjects must have received parenteral nutrition and had at least one renal laboratory panel between days four and fourteen of life. Eligible patients were also evaluated for impact of birth weight classification on development of hypophosphatemia. Time to resolution was measured by number of days from diagnosis of hypophosphatemia until a serum phosphate level of ≥ 4.0 mg/dL was achieved. The median time to resolution was determined by Kaplan-Meier analysis. A Cox regression analysis assessed time to resolution based on calcium to phosphate ratio as a covariant.. For each resolution time, the total phosphate and calcium intake (mmol/kg/day and mEq/kg/day, respectively) , as well as the calcium to to phosphate ratio, were measured the day prior to resolution. These values were then averaged for each respective resolution time in order to determine what amount of phosphate intake

and what calcium to phosphate ratio resulted in resolution. Also, the impact of hypophosphatemia on clinical outcomes, such as ventilator and/or CPAP use, was evaluated.

Results: Of the 136 patients admitted during the study period, 122 met inclusion criteria. Eighty-seven percent of patients (n=106) were hypophosphatemic between days four and fourteen of life (C.I. 0.80-0.92). Of the four birth weight categories, subjects with a birth weight less than 750 grams had the highest incidence of hypophosphatemia (37.7%) compared to subjects with a birth weight of 750-999 grams (27.4%), 1000-1249 grams (15.1%), and 1250-1500 grams (19.8%). The median time to resolution in subjects who were hypophosphatemic was 4 days from day of diagnosis (95% CI 0.35-0.54). The mean calcium intake the day prior to resolution for subjects who resolved after the median time to resolution of four days was 1.15 mEq/kg/day and the mean phosphate intake was 1.10 mmol/kg/day. The mean calcium to phosphate ratio the day before resolution for all patients who resolved after 4 days was 1.14:1. Additionally, one of the clinical outcomes that was measured was the odds of a hypophosphatemic VLBW infant being intubated, which was 4.36 times the same odds in a baby without hypophosphatemia ($p>0.0085$, C.I. 1.30-16.02).

Conclusion: The incidence of hypophosphatemia is significant in VLBW infants, especially those with a birth weight less than 750 grams, suggesting lower birth weights may be associated with increased risk of hypophosphatemia. The lower calcium to phosphate ratio intake the day before hypophosphatemia resolution, as compared to the current recommendations of 1.3 to 1.7, suggests inadequate phosphate supplementation relative to calcium intake in these infants. While attention to phosphate supplementation is recommended, additional research is warranted to establish clinical outcome correlations and to recommend a change in current electrolyte requirement practices.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 5b-402

Poster Title: Y-site physical compatibility of hydrocortisone infusions with intensive care unit admixtures

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Purpose: Despite controversial evidence of survival benefits, intravenous low dose hydrocortisone is recommended by current sepsis guidelines to treat adults with septic shock who remain hemodynamically unstable after adequate fluid resuscitation and vasopressor therapies. Septic shock patients may require multiple intravenous medications and hydrocortisone to aid in restoration of hemodynamic stability. Compatibility data is imperative to safely co-infuse these medications through a y-site connector of patients with limited IV access. The purpose of this study was to examine the physical compatibility of hydrocortisone with select intravenous drugs used for critically ill patients in intensive care units through a simulated y-site infusion.

Methods: The tested drugs were metoprolol, esmolol, labetalol, albumin, levothyroxine, acetaminophen, ibuprofen, meropenem, doripenem, ciprofloxacin, levofloxacin, cefepime, epinephrine, norepinephrine, and cisatracurium. Equal volumes of either normal saline or hydrocortisone were combined with each test drug at the maximum concentrations safe for patient infusion or the commercially available concentration, as appropriate. The samples were examined visually against white and black backgrounds and also using turbidimetric analysis to determine physical compatibility. Observations and analyses were take over a one hour-period at 15-minute intervals beginning after mixing to account for contact time in a y-site connector. Each test was performed in triplicate. A difference in nephelometric turbidity units (NTU) of > 0.5 units between control and test solutions is commonly accepted as incompatible. Further statistical analysis was completed using One Way Analysis of Variance with Tukey Multiple Comparison Procedure on all groups pairwise for normally distributed data and Kruskal-Wallis

Analysis of Variance on ranks with Tukey Multiple Comparison Procedure on all groups pairwise for data that was not normally distributed.

Results: None of the admixtures demonstrated visual changes against white and black backgrounds when combined with hydrocortisone. Although less than 0.5 NTU differences were obtained when examined via nephelometer, combinations of hydrocortisone with levofloxacin, cefepime, and ciprofloxacin demonstrated statistical differences in turbidity from controls (p-value >0.05) Labetolol demonstrated physical incompatibility with a change in turbidity > 0.5 NTU compared to controls.

Conclusion: Metoprolol, esmolol, labetalol, albumin, levothyroxine, acetaminophen, ibuprofen, meropenem, doripenem, epinephrine, norepinephrine, and cisatracurium exhibited no evidence of visual or turbidimetric incompatibility, showing physical compatibility when co-infused with hydrocortisone. Chemical compatibility data should also be evaluated prior to co-infusing these medications. Labetolol displayed physical incompatibility with hydrocortisone, and the two agents should not be co-infused. Levofloxacin, cefepime, and ciprofloxacin displayed statistical differences from control solutions when combined with hydrocortisone and further testing is warranted before these agents can be safely administered through a y-site connector.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5b-403

Poster Title: Host Factors Associated with Elevated Minimum Inhibitory Concentrations to Fosfomycin and Doxycycline among Vancomycin-Resistant Enterococcal Urine Isolates at a Tertiary Care Medical Center

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Purpose: Antibiotic susceptibility patterns of vancomycin-resistant Enterococcal (VRE) urine isolates to fosfomycin and doxycycline are generally lacking. The purpose of this study is to identify factors which are predictors of fosfomycin or doxycycline non-susceptibility among VRE urine isolates. This was an observational, retrospective study completed at a tertiary care medical center in Columbia, South Carolina.

Methods: A susceptibility profile was created from non-repeat VRE urine isolates that underwent Epsilometer testing over a 14-month period to evaluate daptomycin, doxycycline and fosfomycin in vitro activity. Routine susceptibilities from automated testing (Vitek II) were collected. FDA-approved Enterococcal breakpoints were used. Isolates were divided into the following groups for evaluation: fosfomycin MIC 64mcg/mL and doxycycline 4mcg/mL. Fisher's exact and Student's t-tests were performed to compare host factors and laboratory parameters between groups ($p < 0.05$ for significance). Multivariate regression was performed to determine predictors of elevated MICs.

Results: Sixty-seven isolates were included in the analysis. The patients were primarily women (66%) and 61 years old. Forty-one isolates (61%) were hospital-acquired. Twenty-six (39%) isolates had an MIC 4mcg/mL). The fosfomycin MIC50 was 96mcg/mL and MIC90 128mcg/mL; doxycycline MIC50 was 12mcg/mL and MIC90 24mcg/mL. Patients with fosfomycin-susceptible isolates had poorer renal function (CrCl ≤30 ml/min) (50% vs 34%, p=0.214), and isolates were

more often hospital-acquired (69% vs 56%, p=0.315), although neither were statistically different. There were no statistical differences in host or laboratory variables detected between the fosfomycin or doxycycline susceptible vs non-susceptible isolates, respectively.

Conclusion: Available susceptibility data may substantiate expanded treatment options for multi-drug resistant urinary tract infections. Additional data are needed to conclude definitive risk factors for fosfomycin or doxycycline-resistance among VRE urine isolates.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 5b-404

Poster Title: Survey review of a patient-centered approach to diabetes management

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Purpose: Diabetes mellitus is a demanding disease that requires patient adherence to complicated medication therapy. These requirements can negatively impact patients' quality of life. Furthermore, poor glycemic control may cause macro and micro vascular complications including neuropathy, retinopathy, nephropathy, cardiovascular, and cerebrovascular disease. Prior research shows that interventions aimed at improving adherence to antidiabetic medications have not always produced significantly positive impacts on patient outcomes. There is a growing philosophy that patient-centered care may be more effective at enhancing patient outcomes. This study evaluated a patient-centered approach to treatment and its impact on life quality, glycemic control, and perceived disease progression.

Methods: This study is a retrospective chart review of 119 veteran patients over the age of 18, diagnosed with either type 1 or 2 diabetes mellitus. Patients were enrolled in the outpatient endocrine clinics located at the James A. Lovell Federal Health Care Center. Patients were offered an opportunity to participle in a survey assessing their current treatment for diabetes. Informed consent was obtained from every participant. All participants received and completed a one-sided page patient-centered questionnaire regarding their diabetes treatment in their room before seeing the physician. The survey assessed patient characteristics such as diet, frequency of exercise, number of missed doses, reasons for noncompliance, knowledge of current therapy, and whether said knowledge assisted with compliance. The survey asked patient to list any diabetes medication they were currently taking. If patient was using insulin, the question was asked if there were any extra vials of insulin around the house. Patient perceived progression was also assessed through a question that asked whether the patient felt better, the same, or worse since, and by what percentage, since their last visit. The survey inquired how the patient's blood sugars have been since their last visit, what times the patient

checks blood sugar levels, and if podiatrist and optometrist appointments were annually done. The reason for the survey was conveyed to patients before check-out.

Results: A total of 119 patients received a survey, but not every patient completed it. Unanswered or incorrectly answered questions were counted as non-applicable and unreadable responses as inconclusive. Of patients answering, about 88 percent followed a special diet and 75 percent endorsed some form of exercise. Since their last visit, 42 percent of patients reported their health remaining the same, 22 percent reported improvement, 11 percent reported worsening, and 25 percent of answered were inconclusive or non-applicable. About 55 percent of patients reported forgetting to take their medication while 44 percent denied ever missing a dose. Most patients, 90 percent, endorsed knowledge of their medication for diabetes but only about half of the patient population considered this knowledge helpful with compliance. Only about 35 percent of patients carried an updated medication list. Patients reported blood sugar control as bad 17 percent of the time and adequate 65 percent of the time. For blood sugar monitoring, 35 percent of patients endorsed checking 3 to 4 times a day, while 9 percent checked once or none times a day. Up to 16 percent of patients endorsed checking 5 or more times a day.

Conclusion: Diabetes management involves a lot of patient involvement. Patient education is an important role for a pharmacist and the study shows that most patients understand how their medication works, but there is still room for compliance improvement through different vehicles. Many survey responses were non-applicable which may have skewed results. This may necessitate a revision of the survey's language. This patient population appears active in their diabetes care. Moving forward, the next step is assessing clinical outcomes to find correlations to survey responses. These future data may lead to a focus shift for diabetes management from the patient's perspective.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 5b-405

Poster Title: Medication use evaluation of corticosteroids in the neonatal intensive care unit

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Purpose: Corticosteroids are given to infants in neonatal intensive care units (NICU) to treat and prevent bronchopulmonary dysplasia, as well as other conditions. However, data for the bronchopulmonary dysplasia dosing of corticosteroids in neonates is limited and controversial. Recent studies have suggested that lower doses may be as effective and have fewer side effects than what has been previously recommended. The purpose of this project was to evaluate the corticosteroid dosing strategies used by our neonatologists, and identify differences between our practice and current recommendations to determine if changes needed to be made to improve patient safety and quality of care.

Methods: This medication use evaluation (MUE) was approved by the institutional review board. Medication administration records were reviewed for patients admitted to our NICU between 2013 and 2015. Patients who received hydrocortisone, dexamethasone, or budesonide for the treatment and prevention of bronchopulmonary dysplasia or to facilitate extubation were included in the evaluation. Patients who received corticosteroids for other indications, such as hypotension or adrenal insufficiency, were not included. The indication for use, initial weight-based dose, day of life therapy was started, length of therapy, and number of courses given were evaluated for each corticosteroid qualified patients received. This data was analyzed and compared to current dosing recommendations from drug information databases. Differences in dosing regimens were measured. A difference was defined as any weight-based dose or dosing interval of a prescribed dosing regimen that did not match what was recommended per the most recent literature at the time the corticosteroid was received. All-cause mortality and transfer to a children's hospital for more critical care were also measured in this evaluation to determine if there was a link between corticosteroid doses that deviated from recommendations and poor outcomes.

Results: A total of 35 patients were included in this evaluation. A wide variety of dosing regimens were seen for hydrocortisone and dexamethasone, but budesonide dosing was consistent across all patients. A total of 22 patients from the evaluation received dexamethasone. Of these patients, 63 percent were dosed within the range suggested by recent literature. Thirty-two percent of the patients who received dexamethasone were dosed above the suggested range, with 5 percent dosed below. Thirty of the evaluated patients received hydrocortisone, however only 3.3 percent of those patients were dosed according to current recommendations. The other 96.7 percent of hydrocortisone patients received doses that were significantly higher than recommended. One hundred percent of patients who received budesonide were dosed per recommendations. It was also noted that 33.3 percent of the entire patient population that received any corticosteroid either died or became so critically ill they had to be transferred to a children's hospital for further care. Ninety-one percent of these patients received corticosteroid doses that were higher than what was recommended by literature. However, due to gathering information from handwritten charts, it is unknown if the over-dosing of corticosteroids had any direct impact on these adverse outcomes.

Conclusion: There is room for improvement when it comes to the dosing of corticosteroids in our NICU. This MUE showed that a majority of corticosteroids, especially hydrocortisone and dexamethasone, were given to patients at doses other than what is recommended by current literature. In most cases, these corticosteroids were given at higher than recommended doses, which could potentially lead to adverse events and poor long-term outcomes. Future improvement strategies include physician education and updated dosing protocols.

Submission Category: Clinical Services Management

Submission Type: Evaluative Study

Session-Board Number: 5b-406

Poster Title: Improvement in medication adherence after engagement in medication synchronization in an ambulatory care pharmacy

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Purpose: Hypertension affects 1 in 3 Americans. Adherence to one's antihypertensive regimen is associated with overall reduced morbidity and mortality related to end-organ damage. UI TEAM RX is a patient care model offered through the University of Illinois at Chicago outpatient pharmacies. The goals of UI TEAM RX are to have a positive impact on safety, adherence and costs related to pharmacy care. The purpose of this study is to explore if engagement in the UI TEAM RX care model impacts adherence to prescribed antihypertensive therapy.

Methods: The project was a retrospective refill record review conducted at University Village Pharmacy (UVP) in Chicago, IL, an ambulatory care pharmacy associated with the University of Illinois Hospital and Health Sciences System. UI TEAM RX patients with hypertension and association with the pharmacy for at least three fills prior to, and three consecutive refills after engagement in UI TEAM RX were included. Patient names were collected using the UI TEAM RX calendar. Enrollment dates of each patient were obtained and documented. Using the pharmacy's prescription management software, the number of antihypertensive medications were recorded. Adherence was measured by calculating patient proportion of days covered (PDC) in the time period between three refills prior to and after engagement in UI TEAM RX. PDC was calculated as the number of days in period covered divided by the number of days in period, then multiplied by 100 to provide a percentage. The PDC of each patient before and after engagement in UI TEAM RX was compared. Upon review, the patients were then categorized into four groups: 1)non-adherent to adherent; 2) maintained adherence; 3) adherent to non-adherent; 4) maintained non-adherence. In following with current literature, 80 percent was used to categorize a patient as adherent or non-adherent.

Results: Among 42 patients enrolled in UI TEAM RX at UVP, 33 patients met the defined inclusion criteria. Overall, 8/33 (24 percent) patients improved from clinically defined non-adherent to adherent, 20/33 (60 percent) patients maintained adherence, 2/33 (6 percent) patients declined from adherent to non-adherent, and 3/33 (9 percent) patients maintained non-adherence.

Conclusion: Among patients with hypertension who are managed with the UI TEAM RX model, participation in the program appears to impact adherence to prescribed antihypertensive therapy. Overall, there was an increase in patients considered clinically adherent when compared to adherence rates prior to implementation of the care model. Further exploration of the model is needed in order to establish a potential correlation between adherence and program engagement. Pharmacists should continue to identify patients that can benefit from this program and maintain patients currently enrolled in order to maximize the benefits of their antihypertensive regimens.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 5b-407

Poster Title: The Impact of Genotype Testing On Clinical Outcomes in Warfarin Treated Patients Undergoing Major Orthopedic Surgery and Managed by a Pharmacist-Guided Personalized Consult Service

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Purpose: The objective of this study was to evaluate whether genotype testing improves clinical outcomes in warfarin treated patients undergoing major orthopedic surgery and managed by a pharmacist-guided personalized consult service.

Methods: This was a prospective observational cohort study at UI-Health from April 2014 to April 2015. The intervention group included patients managed by the pharmacist-guided personalized consult service and who also had genotype testing ordered (genotype-guided group), while the control group included patients managed by the pharmacist-guided personalized consult service but did not have genotype testing ordered. The primary efficacy outcome was time to reach first therapeutic International Normalized Ratio (INR) and the primary safety outcome was the proportion of INRs at extreme values (INR < 1.5 or >4). Bivariate analysis was employed to identify significant factors ($p < 0.05$) associated with each outcome. Multivariate linear and survival models were used to assess the association between the genotype-guided group and each primary outcome.

Results: A total of 52 consecutive patients were enrolled. The mean age for patients receiving genotype-guided dosing was 63.1 years vs. 61.6 years for controls (p=0.47). Thirty-two percent of patients were African-American in the genotype-guided group vs 56% in controls (p=0.33). The proportion of women was 52% and 44% (p=0.59), respectively. There was no statistically significant between-group difference in the time to reach the first therapeutic INR and the proportion of INRs at extremes between the genotype-guided group and controls (mean±SD: 4.1±3.0 vs. 4.0±2.8 days, p=0.89; and 34.8%±25.0 vs. 38.7±29.4, p=0.63, respectively). The

treatment effect was not statistically significant for time to reach the first therapeutic INR or proportion of INRs at extremes (HR: 0.54, 95%CI: 0.26 -1.12; β: -0.66, 95%CI: -14.72-13.40, respectively).

Conclusion: The addition of genotype testing in orthopedic surgery patients newly initiated on warfarin when already managed by a pharmacist-guided personalized consult service did not result in significant changes in clinical outcomes.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5b-408

Poster Title: Effects of Providing Medication Reconciliation Services on Pharmacy Student Knowledge and Attitudes at a Large Academic Medical Center

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Purpose: According to Objective 1.1 of the 2015 American Society of Health-Systems Pharmacy (ASHP) initiatives to improve pharmacy practice in health systems, pharmacists are encouraged to help hospitalized patients achieve the best use of their medications. When overseen by a pharmacist, student pharmacists participating in Advanced Pharmacy Practice Experiences (APPEs) can help achieve a positive impact on the appropriate use of medicines while improving their own learning. The purpose of this study is to assess if students have an increase in knowledge about the medication reconciliation process and changes in perceived value, skills, and attitudes after providing these services.

Methods: Subjects included 4th year student pharmacists from four colleges of pharmacy enrolled in a five to six week long APPE at a large academic medical center from June 2015 to April 2016. Students were introduced to the medication reconciliation process and were expected to complete the admission medication reconciliation within 24 hours of patient hospitalization under the supervision of a pharmacist. A 26-item electronic survey voluntary was administered at the beginning and end of the APPE. The survey gathered demographics, previous medication reconciliation experience and pharmacy work experience. Student's baseline knowledge was assessed using 10 multiple-choice questions about the medication reconciliation process. Student attitudes, perceptions, skills, and confidence related to communication, problem solving, critical thinking, patient-centered care, and ability to apply medication reconciliation concepts in a hospital setting were assessed on a Likert scale, where one indicates strongly disagree and five indicates strongly agree). The number of medications the patient is taking, medication discrepancies identified, high-risk drug discrepancies

identified, and time spent conducting the medication reconciliation were also assessed. Pre- and post-survey results were compared to determine whether student knowledge, attitudes, perceptions, and skills had increased after conducting med rec. Wilcoxon signed- rank test and paired t-test was used to compare pre-and post-medication reconciliation attitudes, perceptions, and knowledge with p-values less than 0.05 considered statistically significant.

Results: Amongst the 49 student respondents with little to no prior experience with conducting medication reconciliations, there was a statistically significant increase in mean knowledge-based scores (before APPE was seventy-seven percent, after APPE was eighty-three percent; p-value equals 0.036). Performing medication reconciliations did not show a change in students' attitudes and perceptions of cultural competency and confidence in interactions with patients. Overall, students perceived less of an improvement in their skills after completion of the APPE (mean before APPE was 4.7 [SD equals 0.4], Mean after APPE was 4.4 [SD equals 0.4]; p-value equals 0.003). Students' perceived ability to identify and assess discrepancies also decreased overall. There were 1,394 medication reconciliations and 4,473 discrepancies were identified (average 3.2 discrepancies per patient profile), of which 19 percent required a pharmacist intervention. The average time completing a medication reconciliation was 23 minutes (SD equals 10.5) which varied across significantly across hospital locations (p-value equals 0.001).

Conclusion: Pharmacy students were able to correctly identify important discrepancies within patient medication profiles and spend a significant amount of time conducting medication reconciliations during their APPEs. While students demonstrated an increase in their knowledge about the medication reconciliation process, they had an overall decrease in their perception, attitudes, and skills regarding what could be learned from the medication reconciliation process. The study results suggest more time should be spent educating students about the value of the medication reconciliation process during APPEs.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5b-409

Poster Title: Four brains are better than one: Can cognitive training in an IPE clinical setting reduce processing biases in health professionals and improve patient outcomes?

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Purpose: Understanding how information processing biases heuristics, such as, decision making, cognitive shortcuts and functional fixedness interact is crucial in the education of health professionals, as it could have a differential impact on diagnostic error. The purpose of this study is to provide insight into the cognitive and affective influences occurring in both type 1 and type 2 thinkers, related to judgment, diagnostic decision-making, diagnostic success and cognitive heuristics involved in relationship with brain activity during the diagnostic process.

Methods: A protocol was specifically developed to explore whether the Emotiv could be utilized to understand and change decision making strategies in students. Research assistants first calibrated the wireless eeg and were given instructions on how to participate in a verbal protocol (talk aloud protocol).. The subjects were asked to stare at a small point on the screen for two minutes in order to capture baseline brain activity on the eeg and beta, theta, alpha and delta brain waves on the 3D model. They were given six classic problem solving tasks (The Chicken and the Fox, etc). Verbal protocol (talk aloud protocol) was used to observe cognitive process, in-line recorded brain wave activity. Recordings from the sessions were captured four times; at baseline, after each problem was given, when incorrect heuristics were used and when correct solutions were given. The verbal protocols were also transcribed.

Results: Initial results tentatively suggest that experience moderates relationship between wave form and accuracy. As resting state Alpha dissipates, the beginning of conscious processing begins as Beta becomes active. The areas cover AF3 (logical attention), Fz (working

memory) and F7 (verbal expression). Logical attention and working memory areas light up in Delta, which indicates deep, intuitive processing. This pattern was not observed when problems could not be resolved, with Alpha and Delta waves engaged in resting state, and no activity recorded in Beta.

Conclusion: Diagnostic reasoning is a crucial skill. Understanding what cognitive processes underlies decision making and problem solving can aid in the design of specific diagnostic reasoning pedagogies, that target those particular conscious processes. Data from this study will aid as indices for future diagnostic decision-making studies, measurement of diagnostic skills, and how students can be trained to develop accuracy in diagnosing.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-410

Poster Title: Development of new reactions for use in medicinal chemistry: Novel method for one-pot two-step synthesis of acylated ureas and carbamates

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Purpose: Development of new reactions allowing carbon-carbon and carbon-heteroatom bond formation is the essence of organic chemistry. New reactions are very often applied in synthetic medicinal chemistry to access new scaffolds possessing unique bioactivity. The purpose of this project was to investigate new reaction protocols to efficiently synthesize acylated carbamates and ureas as potential bioisosteres of a peptide bond. The use of carbamates in the development of prodrugs cannot be overemphasized. Prodrugs are frequently used to increase the bioavailability of drugs and thus improve their absorption, distribution, metabolism, and excretion (ADME) profile.

Methods: New and efficient synthetic organic chemistry methods were sought for the synthesis of acylated carbamates and ureas with the aim to apply the invented protocol to medicinal chemistry projects. The developed synthetic method includes isocyanites generated in situ from benzamide or alkyl amides by using oxalyl chloride, followed by an addition of a nucleophile such as amine, alcohol, thiol, amide, and sulfonate to give the corresponding acylated ureas or acylated carbamates. This project produced a small library of compounds that were purified via crystallization or automated flash chromatography purification system and further analyzed using proton and carbon nuclear magnetic resonance (1H, 13C NMR) spectroscopy and high-resolution mass spectrometry (HRMS) techniques. The purity of the final compounds was assessed by analytical high performance liquid chromatography (HPLC).

Results: During this project, a series of acylated ureas and acylated carbamates was synthesized by using novel synthetic methodology. The final compounds were prepared in a convenient one-pot two-step reaction sequence under relatively mild conditions and reaction time of

approximately 6 hours. The purification of final compounds required either convenient crystallization process or a little bit more laborious flash chromatography. Overall, 13 compounds were prepared which will be further evaluated in biological testing.

Conclusion: In conclusion, scoping studies were performed on a novel one-pot two-step reaction sequence to obtain acylated carbamates, ureas, and related compounds. The products were synthesized in good yield after final purification. The developed synthetic protocol is currently utilized in the synthesis of compounds suitable for further biological investigation.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 5b-411

Poster Title: Pharmacist implementation in independent physician offices to perform clinical pharmacy services to help Medicare patients

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Purpose: The Centers for Medicare and Medicaid Services (CMS) is shifting reimbursement of physician offices from a fee for service model to more outcomes oriented payments. Medicare has recently provided financial incentives for physicians to apply clinical pharmacy services within their own practice. This business plan was initiated in order to explore the opportunities of establishing clinical pharmacy services to complement patient care provided by independent physician offices. This would initiate multidisciplinary team-based patient-centered care to a more local level in order to optimize health outcomes of Medicare patients.

Methods: Research was performed on multiple aspects of the market with a focus on Medicare patients. We specifically initiated our research with Chronic Care Management (CCM) and then expanded to Transitions of Care Management (TCM) and Annual Wellness Visits (AWV) in order to get a sense of how physicians were conducting these services. In order to do this we performed market research on patient-centered medical homes, physician groups and clinics, health information software, and ambulatory care clinics. We assessed how many physicians are taking advantage of these new comprehensive services, any obstacles that they are experiencing, and how CMS has responded to the data that they have received thus far. Research was also performed on the local (Chicago, Illinois) market in order to gather information and assess the possible impact of implementing pharmacists to assist in performing these services. In addition, the logistics of operations of a possible independent company to provide pharmacy clinical services were researched in order to find the optimal location of establishment.

Results: It was determined that physician offices were not implementing these comprehensive services because of the intensity of labor involved without an equal financial reimbursement. CMS has responded to the minimal implementation of the services with an expansion to CCM reimbursement to stratify the reimbursement and requirements to fulfill a larger range of Medicare patient population. The Medicare Access and Children's Health Insurance Program Reauthorization Act (MACRA) is a measure to incentivize physicians with Merit-based Incentive Payment System (MIPS) as one of the alternatives for reimbursement. This has alleviated some of the difficulties in making implementation of these services practical. Many of the services that are required in order to receive full reimbursement can be performed by a pharmacist that is partnered with a physician. We have found that other essential personnel would be a social worker, nurse, and pharmacy technician in order to optimize operations to ensure efficiency and outcomes. Another crucial component that would help to solidify these clinical services into a comprehensive and collaborative health care would be clinical software that is adaptive and flexible to make the patient experience and health care seamless.

Conclusion: There is a significant need for the improvement of health quality outcomes and Medicare has provided an opportunity for pharmacists to fulfill this need. Clinical pharmacy services can complement physician practices while taking advantage of the opportunities that CMS provides. Pharmacists have an array of clinical skills associated with medications and disease states that are underutilized and can be employed to complement physicians who are trying to adapt to the new rules and regulations. Ongoing research and implementation of pharmacists to perform these clinical services will help advance the health profession to new heights and better outcomes.

Submission Category: Pain Management

Submission Type: Case Report

Session-Board Number: 5b-412

Poster Title: Patient response to intravenous valproate sodium for the treatment of status migrainosus with aura: a case report

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Purpose: There is some literature suggesting the efficacy and tolerability of intravenous (IV) valproate sodium in the treatment of status migrainosus with or without aura. Existing data suggest that doses ranging from 300 milligrams to 1 gram are associated with migraine headache relief within several hours. This case report describes a patient response to IV valproate sodium used in the treatment of status migrainosus. The patient is a 23-year-old female with a past medical history of status migrainosus with aura, who was admitted to an inpatient headache clinic with refractory headache pain. Upon admission, the patient's pain score was 8 on a scale of 1 to 10. She was initiated on treatment with 9 scheduled doses of IV dihydroergotamine over 6 days and gradually improved over this time. However, on admission day 7 the patient felt subjectively worse despite the initiation of a second course of IV dihydroergotamine, reporting a pain score of 9. Other IV abortive medications were ordered for the patient as needed, including diphenhydramine, ketorolac, methylprednisolone, and orphenadrine, but these did not provide substantial pain relief. On day 11, the patient received 500 milligrams of IV valproate sodium. Within one hour of administration, the patient's pain score decreased from a score of 8 to a score of 2. The patient tolerated the medication well, and experienced a 75% decrease in her pain level over the course of four hours. This decrease in pain score demonstrates a positive response to therapy with IV valproate sodium. Due to the efficacy of this treatment for the patient, therapy with IV valproate sodium was continued; the dosage was increased to 750 milligrams every eight hours on day 12. By day 13, the patient rated the severity of headache as 1 to 2 out of 10. The following day, the patient rated the severity of headache as 0 out of 10, and was discharged on day 14. Her discharge medications included oral valproic acid as an abortive medication, among others, in the case of future attacks. This case report provides one example of a favorable patient response to IV valproate sodium. Because individual responses to valproate sodium and other abortive medications are

highly patient-specific, further study into possible predictors for positive responses would be valuable for the management of acute migraine attacks.

Methods:

Results:

Conclusion:

Submission Category: Pharmacy Law/ Regulatory/ Accreditation

Submission Type: Descriptive Report

Session-Board Number: 5b-413

Poster Title: Identification of unapproved prescription drug products and the impact of the FDA's Unapproved Drugs Initiative on approval status

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Purpose: Healthcare providers should be aware that not all medications currently on the US market have been approved by the FDA. Certain drugs entered the market prior to the Federal Food, Drug, and Cosmetic Act of 1938 and the 1962 amendment that together established safety and efficacy standards. In 2006, the FDA implemented the Unapproved Drugs Initiative to take action against these drugs. The purpose of this study was to identify these products and assess the impact of the Initiative on approval status.

Methods: To identify marketed unapproved drugs, a list from the FDA Prescription Drug Wrap-Up program of 1984, known as DESI-II, was acquired using the Freedom of Information Act. A systematic search of the DESI-II list by two independent reviewers was conducted to identify single-entity prescription drug products. Over the counter medications, combination products, and discontinued products were excluded from our search. Online FDA resources were used to determine the approval status of each drug. Resources included the FDA Orange Book, National Drug Code Directory, Drugs@FDA, and the Enforcement Activities section of the FDA website. In addition to approval status, we collected information on proprietary names, formulation, approval date (if applicable), and any FDA enforcement warnings that prompted approval. Descriptive statistics were used to characterize the approval status and other attributes of these products.

Results: Sixty-six drug products were identified from the DESI-II list. Of these, 29 drugs (44%) were marketed and remained unapproved, 16 (24%) were approved, and 21 (32%) had both approved and unapproved formulations. Of the 37 products that received approval, 16 were

sent a FDA enforcement warning as a result of the Unapproved Drugs Initiative. Examples of drug products that gained approval following FDA warnings included colchicine and pain medications such as codeine, hydrocodone, and oxycodone. Drugs that had not received a FDA enforcement warning went through the approval process voluntarily. The majority of drugs were characterized as injectable (43%) or oral (33%) formulations. Other identified formulations included ophthalmic, topical, suppository, sublingual, and inhalant products. Hospital drugs such as injectable phenobarbital and calcium gluconate continued to be marketed as unapproved products. Other common hospital drugs with both approved and unapproved formulations included oral barium sulfate and injectable epinephrine, hydromorphone, morphine, magnesium sulfate, sodium bicarbonate, phenylephrine, and vasopressin.

Conclusion: Despite efforts by the FDA to remove unapproved drugs from the market, many still remain. It is important for healthcare providers to be aware that unapproved drugs still exist and their safety and efficacy cannot be assured. The Unapproved Drugs Initiative's aim is to ensure quality standards, however, unapproved drugs that undergo the approval process regain de facto patent exclusivity which could potentially result in increased prices. Further research should be conducted to determine the impact of the FDA Unapproved Drugs Initiative on drug expenditures.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Evaluative Study

Session-Board Number: 5b-414

Poster Title: Impact of discharge anticoagulation education by pharmacists in the emergency department

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Purpose: Significant risks are associated with new prescriptions for anticoagulation medications. While the impact of a pharmacist's role within an ambulatory care setting has been demonstrated in regard to anticoagulants, the evidence for these interventions in the emergency department (ED) are less established. Since 2013, pharmacists have been involved in discharge counseling and phone follow-up for anticoagulant medication prescriptions in the ED at Northwestern Memorial Hospital (NMH). The purpose of this study is to identify the impact of pharmacist counseling, defined by intervention on callback, versus standard of care discharge measures on patient understanding and appropriate use of anticoagulant medication

Methods: In May 2013, an initiative was set forth in the NMH ED whereby patients discharged from the ED with a new prescription for an anticoagulant (low molecular weight heparin, warfarin, or direct oral anticoagulants) received counseling by the ED pharmacist. During hours when the pharmacist was not present, patients received standard discharge counseling from physicians and/or nurses. All patients receiving anticoagulation, regardless of the counseling intervention provided, received a follow-up phone call by an ED pharmacist within 24-72 hours of discharge. This study was a retrospective chart review of all patients discharged from the ED at NMH from May 2013 to May 2016 with a new prescription for an anticoagulant. Patients were included who had documentation of an "ED Anticoagulant Counseling" note in the electronic medical record during this time frame. For those patients that received pharmacist counseling prior to discharge the following information was collected: demographics, medication, indication, prior history of anticoagulation use, noted drug-drug interactions, appropriateness of medication dosing, if the patient was able to fill the prescription, if they

were taking the medication appropriately, and any side effects experienced. Patient charts were also reviewed for documented readmission to a hospital within 90 days following their initial ED visit for worsening condition or an issue related to their anticoagulation medication.

Results: 174 patients were analyzed in a per protocol analysis. Patients who did not receive pharmacist counseling prior to discharge required an increased need for intervention during callback versus patients who received pharmacist discharge counseling (36.4% vs. 12.9%, p equals 0.0005). A few example interventions on callback included: patient administering medication inappropriately or taking concomitant medications that interact with their prescribed anticoagulant. In addition, patients who had not received counseling were more likely to return to NMH within 90 days for an anticoagulant related problem versus patients who had received counseling (12.12% versus 1.85%, p equals 0.0069). Although not statistically significant, patients who received counseling by a pharmacist were more likely to seek appropriate follow-up with their primary care provider (77.8% versus 66.7%, p equals 0.1145). There were no statistically significant differences between the two groups in gender, age, type of anticoagulant selected, nor indication for anticoagulation.

Conclusion: Discharge counseling by pharmacists in the ED leads to improved patient understanding and appropriate usage of anticoagulant medications.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Evaluative Study

Session-Board Number: 5b-415

Poster Title: The evaluation of opioid prescribing practices in the emergency department

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Purpose: Over the past several years, opioid prescription abuse has increased significantly, resulting in serious sequelae such as overdose and death. The Center for Disease Control (CDC) released a Morbidity and Mortality Weekly Report (MMWR) detailing this epidemic in January 2016 and clinical guidelines for prescribing opioids in March 2016. The goal of this study was to characterize opioid prescribing practices at a large, academic medical center Emergency Department (ED) before and after these recommendations in order to determine if the number of opioid prescriptions or quantity of opioids has declined.

Methods: This was a retrospective cohort of patients at least 18 years of age who received at least one prescription upon discharge from the Loyola University Medical Center ED between March – June 2015 (pre-MMWR group) and March – June 2016 (post-MMWR group). Patients were not included in the study if there was incomplete medication documentation. The primary objective was determining the percentage of opioids prescriptions prescribed between the two time periods. Secondary endpoints included opioid dose, strength, relative potency, duration, and number of doses. This study also characterized the change in non-opioid analgesic medications prescribing practices.

Results: Preliminary results of this study include 303 patients (pre-MMWR group n = 178; post-MMWR group n = 125). Notable differences in baseline demographics include higher incidence of cancer (3.9 % vs. 12.0%, $p < 0.01$) and osteoporosis (1.1% vs. 16.0%, $p < 0.01$) in the post-MMWR group and higher incidence of arthritis in the pre-MMWR group (6.2% vs. 0.8%, $p = 0.02$). Overall, 111 (36.6%) received a prescription for an opioid upon discharge. For the pre-MMWR group of 2015 data, 71 received an opioid upon discharge (39.89%) compared to 40

(32.0%) patients in the post-MMWR group (p = 0.16). The most prescribed opioid upon discharge for both groups was hydrocodone with acetaminophen (33.7% vs 28.8% p= 0.469).

Conclusion: These preliminary results demonstrate a non-significant trend towards decreased opioid prescriptions since awareness has been directed towards the ongoing crisis of opioid abuse in the US. We plan to continue to add to this data in order to characterize the patterns of opioid prescribing methods over a longer period of time. This can help to determine if the CDC MMWR and new clinical guidelines has made a significant impact regarding opioid prescribing practices.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Evaluative Study

Session-Board Number: 5b-416

Poster Title: Effect and incidence of treatment with hydroxocobalamin or sodium nitrite/sodium thiosulfate in patients with inhalation injuries

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Purpose: Smoke inhalation injuries can result in cyanide toxicity that can significantly increase the morbidity and mortality in burn patients. Cyanide prevents oxygen utilization during cellular aerobic respirations. This rapidly leads to functional tissue hypoxia if left untreated. The purpose of this study is to evaluate the incidence and effects of cyanide treatments on patients with smoke inhalation injury with possible cyanide toxicity.

Methods: The institutional review board approved this single center, retrospective cohort study. All patients age 18 years and older were enrolled if they were admitted to Loyola University Medical Center between January 1, 2008 through March 1, 2015 with possible cyanide toxicity due to smoke inhalation injury. The primary endpoint was to describe the incidence of cyanide exposure treatment and determine if receiving treatment is associated with decreased 30-day mortality in burn patients with smoke inhalation injury. Secondary endpoints included mechanical ventilation, duration of mechanical ventilation, intensive care unit and hospital length of stay, and hospital mortality.

Results: Overall 148 patients were admitted for inhalation injury, of which 134 (90.5%) were included. Twelve patients (9%) received cyanide treatment. Baseline demographics were well-matched between groups. The inhalation injury score was significantly higher in the between patients who received cyanide treatment and those who did not (median; 3 [interquartile range (IQR) 3 – 4] and 2 [IQR 1 – 2] respectively; $p \leq 0.01$). There was no difference in mortality between groups (16.7% cyanide treatment vs. 25.41% no treatment; p=0.51). Patients treated for cyanide exposure had longer median days of mechanical ventilation (24 days [IQR 18-28] vs. 11.5 days [IQR 3-28]; p= 0.03), were more likely to be continuously paralyzed in the first 24

hours after injury (75% vs. 39.3%; p=0.02), and had longer median ICU (39 days [IQR 20-65] vs. 16.5 days [IQR 7-33]; p=0.02) and hospital length of stay (40 days [IQR 19-66] vs. 19.5 days [IQR 7-35]; p=0.04).

Conclusion: The incidence of cyanide treatment for inhalation injury was low. There was a non-significant decrease in mortality in patients that were treated with cyanide antidotes, despite higher baseline severity of illness. This finding warrants further exploration in a larger trial.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 5b-418

Poster Title: Evaluation of effect of programmed death-1 inhibitors on coagulation markers

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Purpose: The programmed death-1 (PD1) inhibitors, nivolumab and pembrolizumab, represent a new therapeutic target in the treatment of cancer. They are approved for various cancers including melanoma, non-small cell lung cancer, renal cell carcinoma, head and neck cancers, and Hodgkin's lymphoma. These drugs have no known effect on coagulation. At our institution, it was observed that one patient who was receiving warfarin therapy required multiple dose modifications of warfarin upon initiation of nivolumab. The purpose of this evaluation was to determine if administration of programmed death ligand inhibitors affected coagulation markers in patients with or without concomitant administration of anticoagulants.

Methods: The institution's investigational review board approved this retrospective chart review. A database query was conducted to identify all patients who received either nivolumab or pembrolizumab from September 2014 to September 2016. Electronic medical records were utilized to determine information regarding PD1 inhibitor use including dose, indication, and administration dates. When available, coagulation markers including partial thromboplastin time (PTT), prothrombin time (PT), and international normalized ratio (INR) values were collected at baseline and throughout PD1 inhibitor therapy. The use of anticoagulants was recorded including any dose modifications of anticoagulants during PD1 inhibitor therapy. The presence of any documented bleeding events was also noted. Due to the anticipated small sample size, descriptive statistics only were used to evaluate the results.

Results: During the study period a total of 114 patient's received treatment with a programmed death-1 inhibitor, 91 patients received nivolumab and 23 patients received pembrolizumab. Only 26 of 91 of nivolumab patients (29%) and 8 of 23 pembrolizumab patients (35%) had coagulation markers reported at baseline or during PD1 inhibitor therapy. 13 of 34 (38%) total patients with coagulation markers were receiving concomitant anticoagulant therapy (7

warfarin, 2 enoxaparin, 2 rivaroxaban, 2 apixiban). Only patients receiving concomitant warfarin experienced substantial changes in coagulation markers during PD1 inhibitor therapy. Of the 7 patients receiving warfarin and PD1-inhibitor therapy, 5 required warfarin dose adjustments. Causality of need for dose adjustments could not be definitively determined. No bleeding events were reported in any of the patients evaluated.

Conclusion: This data demonstrates that in the absence of warfarin, programmed death-1 inhibitors do not affect coagulation markers. The concomitant use of nivolumab or pembrolizumab with warfarin may affect coagulation markers and require warfarin dose modification. Warfarin should be used with caution in patients receiving PD1 inhibitors and INR should be monitored carefully

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5b-419

Poster Title: Characterization of MRSA versus MSSA prevalence based on risk factors and infection source to identify opportunities to minimize vancomycin utilization

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Purpose: Vancomycin is routinely used for empiric broad-spectrum Gram-positive coverage despite lack of patient risk factors. Antimicrobial overuse can lead to unintended consequences (e.g., bacterial resistance, increased costs, and adverse effects). Conversely, inadequate antimicrobial coverage of pathogenic organisms can have detrimental effects. There are evidence-based risk factors helpful when determining need for empiric MRSA coverage. The CDC Core Elements of Hospital Antimicrobial Stewardship Programs lists de-escalation of empiric MRSA coverage as a syndrome-specific intervention. The purpose of this study was to characterize patient and culture-specific factors associated with MRSA versus MSSA infection to identify strategies to optimize vancomycin use.

Methods: This was a single-center, retrospective, observational study. All positive S. aureus cultures from January 2015-December 2015 were included. Cultures with incomplete susceptibility data were excluded. Culture-specific data collected included culture site, S. aureus susceptibility, and vancomycin MIC. Patient-specific data included infection source, presence of purulence if skin and soft tissue infection, vancomycin exposure, nasal MRSA PCR results, and history of S. aureus infection in the past 90 days. Descriptive statistics were performed for all continuous (mean ± SD) and categorical [N (%)] data. All normally distributed categorical variables were compared using X2. A two-tailed p-value of 0.05 was considered statistically significant.

Results: Total of 819 cultures from 643 subjects. MRSA prevalence was 34.7% (n = 285). Of subjects < 65 years (n = 432), cultures positive for S. aureus were more prevalent than the ≥65 years (551 versus 268, respectively) however, MRSA prevalence was lower in subjects < 65

years (27.2% versus 50.3%, respectively, $p < 0.0001$). MRSA more frequent in subjects admitted to the general floor (n = 212) versus ICU (n = 44) with MRSA prevalence of 37.8% and 26.3%, respectively ($p < 0.0083$). Most common sources of S. aureus included SSTI (n = 281, 34.3%), pulmonary (n = 103, 12.6%), bacteremia (n = 101, 12.3%), and unknown/multiple source (n = 87, 10.6%). MRSA was most prevalent in the genitourinary source (51%) compared to other sources, and 70% of these subjects were ≥ 65 years old. Majority of subjects with pulmonary MRSA were ≥65 years (n = 22, 61.1%). MRSA nasal PCR negative predictive value in the ICU from all sources was 98%. For 79 cultures, subjects had history of MRSA infection within < 90 days but only 37.9% had current positive MRSA culture (n = 30) versus MSSA (n = 49). 58.6% of MSSA infections were treated with ≥1 dose of vancomycin.

Conclusion: Overall low MRSA prevalence. MRSA infection within < 90 days was not predictive of current MRSA infection, contrary to existing evidence. MRSA nasal PCR has reliable negative predictive value in the ICU making this a valuable tool for early vancomycin discontinuation. Lack of MRSA nasal PCR assessment outside the ICU is a limitation. Although not a frequent genitourinary pathogen, if present, increased MRSA likelihood supports empiric vancomycin until susceptibilities finalized. These data support opportunities for reduced vancomycin use in patients < 65 and in the ICU if nasal MRSA PCR negative.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5b-420

Poster Title: Overview of allergy consults at a large academic center

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Purpose: The presence of allergies in the medical record may result in less efficient and more costly antibiotic use. Allergy services are often consulted to determine a true antibiotic allergy history when the optimal antibiotic is limited by a history of antibiotic allergy. The objective of this study was to evaluate the recommendations resulting from allergy consults and the frequency of antibiotic allergies being correctly updated in the medical record after the allergy service consult.

Methods: Consideration for study inclusion were patients 18 years or older, received an inpatient or outpatient allergy service consult, were hospitalized at Northwestern Memorial Hospital between January 2009 and July 2012, and had one or more beta-lactam allergy listed in the medical record. Additionally, the allergy reaction (if available), information regarding graded challenge or desensitization, and infectious diseases consult information was collected.

Results: A total of 156 patients were included in the study. Patients were predominantly female (n equals 84, 53.8 percent), Caucasian (n equals 104, 66.7 percent), with mean age 58.9 years (SD 17), median length of hospital stay 12 days (IQR 7-24.5), and median days to allergy service consult 5 (IQR 2-10). There were 90.4 percent of patients (n equals 141) with reported penicillin allergy, n equals 37, 23.7 percent with cephalosporin allergy, and n equals 9, 5.8 percent with reported allergy to carbapenems. A reaction was only documented in 75.6 percent of reported allergies with the most common reaction being rash/itching (n equals 57, 46.7 percent). The allergy service recommended changes in 71.6 percent (n equals 111) of cases. The allergy list

was updated post allergy service consult for 73.9 percent (n equals 82) of patients. A graded challenge was recommended in 88 (56.8 percent) of patients and a desensitization was recommended in 11 (7.1 percent) of patients. All graded challenges and desensitizations were successful. An infectious diseases service was consulted in approximately 80 percent of patients and recommendations from this service were followed in 100 percent of consults.

Conclusion: Only three quarters of medical records were appropriately updated after an allergy consult. Approximately half of patients with an allergy consult had a graded challenge in which they tolerated a beta-lactam, potentially resulting in the administration of a more appropriate antibiotic. Future studies should stress on the reinforcement of an allergy “de-labeling” intervention post allergy consult.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 5b-421

Poster Title: Discontinuation of antipsychotics initiated for hospital delirium

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Purpose: Hospital delirium is a common issue in acutely ill patients. Although there are many strategies for the prevention of hospital delirium, many patients require pharmacologic treatment with haloperidol or atypical antipsychotics such as quetiapine and olanzapine. Similar to proton-pump inhibitors in ventilated patients, antipsychotics used for hospital delirium may be overlooked during patient discharge. The unnecessary continuation of these medications increases the risk of harmful adverse effects such as QTc prolongation and pseudoparkinsonian effects. The purpose of this study is to determine the rate at which antipsychotics initiated for hospital delirium were continued after hospital discharge.

Methods: The institutional review board approved this single-center retrospective chart review. Informed consent was not necessary. Patients aged 18-89 years old who received at least one dose of haloperidol, olanzapine, quetiapine, or ziprasidone while admitted to the medical floor or intensive care unit between May 2015 and July 2015 were included in the review. Patients were excluded if they were younger than 18 years old, pregnant, had a medical history of psychotic disorder (such as schizophrenia, bipolar disorder, and major depression with psychotic features), received a new diagnosis of psychotic disorder, received alcohol withdrawal therapy, included an antipsychotic medication on their home medication list, were treated for drug or alcohol intoxication, and/or expired during hospitalization. Data collection included demographic information including age and sex, floor status at the time of antipsychotic initiation, whether the patient was sedated, intubated, immobilized, or admitted to an intensive care unit, and if so, for what length of time, whether the patient received physical or occupational therapy, and overall hospital length of stay. Descriptive statistics were utilized.

Results: Of the 290 patients who received an antipsychotic between May and July of 2015, 239 were excluded, leaving 51 patients for analysis. Of the 51 patients who met criteria, 10 (19.6 percent) patients were inappropriately discharged on an antipsychotic. Of these patients, 80 percent were male and the mean age was 60.1 years. 80 percent of patients initially received haloperidol IV for delirium and 70 percent were discharged on quetiapine oral tablets. 70 percent of patients were sedated for an average of 4.3 days, 50 percent of patients were ventilated with an average of 6.4 days and 80 percent of patients were immobilized for an average of 3.9 days. 90 percent of patients received some form of physical or occupational therapy. Only 40 percent of patients were admitted to an intensive care unit at any point during their stay. Of those patients, the average time spent in the intensive care unit was 9.25 days. Overall, the average hospital length of stay was 11.6 days.

Conclusion: Continuation of antipsychotics initiated for hospital delirium was frequent. In this short three month study, approximately 20 percent of patients were inappropriately discharged on an antipsychotic. Of those patients, 80 percent initially received haloperidol and 70 percent were discharged from the hospital with a new prescription for quetiapine. A larger study spanning over a longer period of time may better determine which patients are at a higher risk of this oversight and which medications are most commonly overlooked.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-422

Poster Title: Assessing student pharmacist confidence in communication skills

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Purpose: Courses emphasizing communications skills (CS) have been included in many pharmacy curricula. Confidence in CS can influence communication-related behaviors. Student pharmacists may have good knowledge yet lack confidence in their CS resulting in reluctance to interact with patients or providers. Conversely, student pharmacists with high levels of confidence may downplay their actual knowledge and demonstrate less than optimal interactions with patients or providers. The primary objective of this study was to examine students' self-reported confidence in specific CS areas. A secondary objective was to examine differences by program year, general communication abilities, and academic performance.

Methods: A questionnaire was constructed where students reported their perceived confidence (from 1: No confidence to 5: Very confident) in selected CS areas: counseling geriatric patients, counseling pediatric patients, counseling patients with limited health literacy, counseling patients with unique cultural/religious beliefs, counseling patients about sensitive prescriptions, and the use of motivational interviewing during patient counseling. In addition to demographics, students provided an assessment of their overall academic performance (How would you rate yourself as a student?) and general written and verbal communication abilities. The questionnaire was administered online via REDCap to all first-, second-, and third-year students at Midwestern University's Chicago College of Pharmacy. Student confidence in the selected CS areas and demographics were described for the overall sample. Differences across program year were examined with ANOVA. Self-reported academic performance and communication abilities were collapsed into "Good" vs. "Other" groups and compared using unpaired t-tests. An overall alpha level of 0.05 was used for all analyses.

Results: Of the 611 students that the survey was distributed to, a total of 379 students completed the survey (62.0 percent response rate). The majority of respondents were either first- (51.9 percent) or third-year (36.7 percent) students. More than half of the participants were female (69.3 percent) and self-identified as Caucasian (46.2 percent) or Asian (32.7 percent). The mean (standard deviation (SD)) age of participants was 24.7 (4.4). The mean (SD) confidence for the targeted CS areas were as follows: geriatric counseling: 3.2 (1.1), pediatric counseling: 3.1 (1.1), patients with limited health literacy: 3.3 (1.0), patients with unique cultural/religious beliefs: 3.2 (1.1), sensitive prescriptions: 3.3 (1.1), and use of motivational interviewing: 3.3 (1.1). Confidence in these areas decreased across program year (p less than 0.01) with third-year students being significantly lower than first-year students. Students rating themselves good students or with good written/verbal communications had significantly higher scores in geriatric counseling and use of motivational interviewing. Students with higher self-reported verbal communication ability had significantly higher confidence in counseling about sensitive prescriptions or for cultural/religious beliefs. Confidence in counseling patients with limited health literacy was significantly higher for students with self-reported good verbal or written communication abilities.

Conclusion: In this group of student pharmacists, self-reported confidence in selected CS areas actually decreased as they progressed through the pharmacy program. It is possible that students over-estimated their confidence earlier in the program with their self-ratings becoming more realistic as they gained more experience with patient counseling. Students who rated themselves as good students or having good written or verbal communication abilities generally had higher confidence levels in the various CS areas. Future research could examine the relationship between CS confidence and CS attitudes, as well as the relationship between self-reported confidence and external observation of CS skills.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Case Report

Session-Board Number: 5b-423

Poster Title: Hazards of computerized default medication administration times

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Purpose: Electronic medical records in hospitals, e.g. Epic Systems, have become widespread and offer many benefits.1 However, the introduction of new software can create previously unrecognized risks. Faulty software issues, particularly those related to medications, are so pervasive that the Institute of Safe Medical Practices recently drafted a set of guidelines for the Safe Electronic Communication of Medication Information.2

Medication order processing remains a key, common activity of electronic medical records. Drug databases are utilized to facilitate this processing. However, if the database contains faulty information, an error may result. Herein we describe several examples.

While processing a drug order, a pharmacist discerned a discrepancy between the Epic Systems' drug database default medication administration times (0900 and 1700) and the drug's intended administration times (every 12 hours). The database's description of the drug was "diltiazem 12-hour capsule 60 mg", yet this medication defaulted to be administered every eight hours. Further investigations by the pharmacist and a Doctor of Pharmacy candidate found additional examples of "12 hour" drugs defaulting to eight hour administration times: "bupropion 12-hour tablet 100 mg", "carbamazepine 12-hour tablet 100 mg", and "pseudoephedrine 12-hour tablet 120 mg". These medications' clinical effects occur optimally with these formulations if given every twelve hours. Moreover, the carbamazepine issue was particularly concerning due to the medication's narrow therapeutic window when prescribed to treat seizures; incorrect administration intervals could affect serum drug levels and result in patient harm.

The pharmacist and candidate alerted the hospital's Informatics Support (IS) staff about these discrepancies. The IS staff then performed a comprehensive review of the "12-hour" medications in the database, updating any identified drugs' information to default from every eight hours to every twelve hours.

A PubMed literature search did not yield any articles discussing the default time medication hazards. Thus, to our knowledge this is the first report regarding this problem.

Methods:

Results:

Conclusion:

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 5b-424

Poster Title: Impact of clinical decision support on proton pump inhibitor utilization in an acute care hospital

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Purpose: Proton pump inhibitors (PPIs) are one of the leading treatments for various gastrointestinal (GI) disorders. However, it is estimated that only one-third of PPI use is clinically appropriate. Prolonged use of PPIs has been associated with increased fracture risk, hypomagnesemia, Clostridium difficile diarrhea, and pneumonia. Although it is commonly agreed there is a need to decrease PPI prescribing, there is sparse literature discussing methods to accomplish this in the inpatient setting. This project was designed to evaluate the effect of requiring PPI indications into an existing computerized order entry (CPOE) system in a hospital setting.

Methods: This was a retrospective, chart review study. A preliminary analysis was completed over one month for inpatient orders with intravenous (IV, including IV push and infusion) and oral (PO) pantoprazole and famotidine to assess baseline usage. Additionally, all orders were assessed on the last day of the month-long time period for an indication based on prescriber documentation.
Based on the results, the CPOE screen for pantoprazole orders was modified in an effort to curb inappropriate prescribing. The indication for pantoprazole orders had to be specified by the provider from a pre-populated list: treatment of erosive esophagitis, gastroesophageal reflux disease, hypersecretory conditions, duodenal ulcers, active GI bleeds, or GI prophylaxis in ICU patients (with one or more of the following: coagulopathy, mechanical ventilation for greater than 48 hours, spinal injury or traumatic brain injury, history of GI ulcers), or in high-risk patients (with two or more of the following risk factors: sepsis, ICU stay exceeding 7 days, occult bleeding for 6 days or more, or treatment with high dose corticosteroids). There was no

famotidine indication requirement added to CPOE. The medical staff was educated on the intervention prior to implementation.
After six weeks following implementation of clinical decision support, another one-month period of pantoprazole and famotidine usage was obtained with a single day snapshot assessing appropriateness of pantoprazole and famotidine indication for comparison to pre-implementation data.

Results: Following implementation of the new pantoprazole order screen, IV and PO pantoprazole orders decreased by 38 percent and 32 percent, respectively. However, post-implementation orders for IV and PO famotidine orders increased by 5 percent and 47 percent, respectively. Overall, pantoprazole use decreased by 34 percent compared to a famotidine increase of 25 percent. When assessing the appropriateness of orders post-implementation, there was a large decrease in pantoprazole or famotidine orders with either an unknown or inappropriate indication (28 percent) compared to baseline (58 percent). Medical staff entering orders selected the appropriate pantoprazole indication in 97 percent of orders.

Conclusion: Implementing PPI clinical decision support led to an overall decrease in pantoprazole utilization plus fewer pantoprazole and famotidine orders with unknown or inappropriate indications. Famotidine utilization increased after implementation of the clinical decision support, although the percentage increase in famotidine use was not equal to the magnitude of the percentage decrease observed with pantoprazole orders. Famotidine does not currently have clinical decision support for ordering, but this may be considered if inappropriate utilization continues to increase. This study provides support for the implementation of similar clinical decision support at other institutions to promote more appropriate use of PPIs.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 5b-425

Poster Title: Impact of epidural standardization on the safety and efficacy of epidural management

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Purpose: In December 2015, the University of Chicago Medical Center reviewed all epidural solutions and developed a standardized process for selecting epidural solutions. New preferred solutions contained lower concentrations of both bupivacaine and opioid than what was standardly used. The purpose of this study is to evaluate if the new process for solution selection results in changes in drug concentration utilized and if so were analgesia or adverse events altered.

Methods: This single-center retrospective study evaluated the charts of adults aged 18 and over receiving thoracic epidural analgesia from December 2014 to June 2015 (pre-implementation) and from December 2015 to June 2016 (post-implementation). This project was formally determined to be quality improvement, not human subjects research, and was therefore not overseen by the Institutional Review Board, per institutional policy. The primary endpoint of this study was to determine if lower concentration of epidural medication results in a lower incidence of critical hypotension (mean arterial pressure less than 65 mmHg) 72 hours after initiation of thoracic epidural analgesia. Secondary endpoints include intensive care unit length of stay, strength of epidural solution used, efficacy of analgesia, and number of solution changes required.

Results: The rate of vasopressor utilization 72 hours after initiation of thoracic epidural analgesia was significantly less in the post-implementation group compared to the pre-implementation group (8.45 percent vs. 32.79 percent, p-value less than 0.001). There was a

significant difference in the types of epidural solutions used between the two study groups. Approximately 66 percent of patients in the pre-implementation group received one of the two lower concentrated solutions compared to 86 percent of the patients in the post-implementation group (p-value less than 0.001). Subgroup analyses, efficacy data, and rate of hypotension will be reported at the ASHP Midyear Clinical Meeting.

Conclusion: There is a significant difference in the types of epidural solutions prescribed pre- and post-implementation that resulted in a significantly lower rate of vasopressor utilization within 72 hours after initiation of thoracic epidural analgesia.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 5b-426

Poster Title: Implementation of a sepsis alert system and the impact on bundle compliance and clinical outcomes in the medical intensive care unit

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Purpose: Sepsis accounts for approximately 10 percent of all admissions to the intensive care unit (ICU) and the reported incidence of sepsis continues to increase. The 2012 Surviving Sepsis Campaign guidelines promote the use of time-dependent care-bundle targets. The purpose of the study was to assess bundle compliance and clinical outcomes of patients in the medical intensive care unit (MICU), before and after implementing a sepsis alert system.

Methods: This was a retrospective, institutional review board approved, analysis of de-identified adult sepsis database examining the presence, absence, and timing of the surviving sepsis campaign care-bundle targets before and after the implementation of a sepsis alert system. Consecutive patients with severe sepsis or septic shock admitted to the University of Illinois (UI) Health MICU from 3/1/2015 to 10/27/2015 were included as the before-sepsis-alert group. Patients with severe sepsis or septic shock admitted to the UI Health MICU from 3/21/2016 to 9/26/2016 were included as the after-sepsis-alert group. Inclusion criteria were patients greater than 17 years of age diagnosed with severe sepsis or septic shock requiring MICU admission; the exclusion criteria included prisoners and pregnant females. Data collection consisted of baseline characteristics including demographics, comorbidities, and infection-related variables. Care-bundle characteristics included time to first antibiotic administration, time to drawing first lactate after hypotension (mean arterial pressure less than 65 mmHg), initial fluid amount, and time to vasopressor initiation. Treatment characteristics collected included appropriateness of antibiotic selection, need for vasopressors or inotropes, and total amount of fluid administered. The clinical outcomes assessed included response to fluids, response to vasopressors, length of stay (ICU and hospital), mortality (ICU and hospital), and discharge disposition.

Results: Fifty-two patients were identified who met inclusion criteria with 27 patients included in the before-sepsis-alert group and 25 patients included as the after-sepsis-alert group. Average time to first lactate was improved after the implementation of the alert system from 3.3 hours plus or minus 4.5 hours to 1 hour plus or minus 1.8 hours (P equals 0.018). The percentage of patients who achieved time to first lactate within 3 hours of first hypotension was 92 percent after the alert system compared to 63 percent before (P equals 0.013). The percentage of patients who received antibiotics within 3 hours improved from 74.1 percent to 84 percent though this did not reach statistical significance (P equals 0.381). There were no statistically significant changes in time to first antibiotic or time to initiation of vasopressors. Clinical outcomes did not change with the implementation of this alert.

Conclusion: Implementation of a sepsis alert system in the electronic medical record improved the percentage of patients who achieved sepsis bundle goals for time to first lactate as well as the average time to drawing the initial lactate. Additionally, there was improvement in the percentage of patients receiving antibiotics within the target time. This improvement was not statistically significant but carries meaningful clinical significance. The sepsis alert system has utility in the electronic medical record in achieving care-bundle compliance but the impact on clinical outcomes yet to be determined.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5b-427

Poster Title: Outcomes associated with time-to-antibiotic administration among patients with febrile neutropenia in the emergency department

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Purpose: Febrile neutropenia is an oncologic emergency, associated with mortality rates as high as 58 percent in patients with multiple comorbidities. Prompt administration of empiric broad-spectrum antibiotics is essential in preventing complications and death. The purpose of this study is to determine the outcomes associated with time-to-antibiotic administration among patients with febrile neutropenia presenting to the emergency department (ED).

Methods: This was a single center, retrospective chart review including patients that presented to the ED with febrile neutropenia between January 1, 2009 and April 24, 2013. Time to broad-spectrum antibiotics was determined by comparing ED presentation time to medication administration times as documented in the medication administration record. Patients in the study were divided into those that received antibiotics within 3 hours and greater than 3 hours from time of presentation. The primary objective of the study was to compare all-cause inpatient mortality between those that received antibiotics within 3 hours versus greater than 3 hours. The secondary objective of the study was to assess length of stay (LOS). Type of malignancy, absolute neutrophil count (ANC, cells/mm3) at time of admission, and vasopressor requirement were also assessed.

Results: A total of 57 patients were included in this study. Of the included patients there were 21 patients with solid tumors, 33 patients with leukemia, and 3 patients with no known malignancy. Twenty-six patients received antibiotics within 3 hours of presentation and 31 patients received antibiotics greater than 3 hours from presentation. The overall mortality rate

was 7 percent (4 patients); 3 of the patients that expired had received antibiotics greater than 3 hours (between 6-30 hours) from presentation (P=0.376). In the four deaths reported, three of the patients received a vasopressor. There was no statistically significant difference between vasopressor use in the two groups (P=0.567).
The median LOS was 4 days. The median LOS among those patients receiving antibiotics within 3 hours was 5.62 days, while those that received antibiotics greater than 3 hours had a LOS of 7.58 days (P=0.5559). The median ANC was 130 (cells/mm3). The greater than 3-hour group had a greater ANC than the within-3 hour group (199.6 cells/mm3 vs.118.1 cells/mm3; P=0.0164).

Conclusion: Based on the analyses, the rate of mortality in patients that received antibiotics within 3 hours was lower (3.8 percent) compared to those who received antibiotics greater than 3 hours from ED presentation (9.7 percent). Additionally, patients that received antibiotics within 3 hours had a median LOS that was approximately 2 days shorter than those receiving antibiotics greater than 3 hours after presentation. The differences between groups in terms of mortality and length was not statistically significant, however potentially clinically relevant. These results suggest a benefit to receipt of antibiotics within 3 hours for patients with febrile neutropenia.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5b-428

Poster Title: Outcomes of multiple site Methicillin Susceptible Staphylococcus aureus infections: Getting to the source

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Purpose: Methicillin sensitive Staphylococcus aureus (MSSA) blood stream infections (BSIs) are often treated with oxacillin or cefazolin as first-line options (standard therapy). However, other agents with reported susceptibility may also be considered for use based on convenience of dosing, concomitant infecting organisms, or patient allergies.
Patients with MSSA BSIs often have other concomitant site infections that may change or extend treatment. The purpose of this study was to evaluate outcomes in patients with MSSA infections originating from multiple sites treated with standard therapy (ST) versus other beta-lactam therapy (OBT).

Methods: This was a retrospective, cohort study of patients with MSSA BSIs plus another positive infection site treated with beta-lactam antibiotics as definitive therapy at an academic medical center between January 2012 and December 2014. Patients 18 years of age or older at time of culture and treated with definitive beta-lactam therapy for at least 48 hours were included in two groups: ST or OBT. The primary outcome was time to microbiological cure, measured as time to negative blood cultures. Secondary outcomes included infection recurrence, hospital length of stay, intensive care unit (ICU) length of stay, and inpatient mortality. This study was approved by the Institutional Review board at Northwestern University.

Results: There were 110 patients included in this study (n equals 23 OBT, n equals 87 ST). Baseline demographic

data was similar between groups. There was no difference in modified APACHE II score (p equals 0.65). A larger percentage of patients in the ST group had a wound as a second infection source (35.6 percent vs. 17.4 percent) and urine was the most common second infection source in the OBT group (n equals 7; p equals 0.12 overall). The primary outcome of time to negative blood cultures was not statistically significantly different between groups (p equals 0.75) and all patients in both groups cleared blood cultures. Patients in the ST group had a statistically significantly shorter median hospital length of stay than patients in the OBT group (12 days vs. 23 days, p equals 0.04); however, there was no difference in the ICU length of stay between groups (4 days vs. 11 days, p equals 0.13) or infections recurrence (n equals 3 vs. n equals 0, p eqauls 0.99). There was significantly lower in-hospital mortality in the ST group with 3 deaths (3.5 percent) compared to 6 deaths (26.1 percent) in the other OBT group (p less than 0.01).

Conclusion: For patients with MSSA BSIs and another concomitant site of infection, ST and OBT had similar time to negative blood cultures. Standard therapy was associated with significantly shorter hospital length of stay and lower in-hospital mortality. Future studies should focus on the impact of specific non-ST beta-lactam agent use in multi-focal MSSA infection.

Submission Category: Pain Management

Submission Type: Evaluative Study

Session-Board Number: 5b-429

Poster Title: Prevalence of obstructive sleep apnea and related risk factors in opioid prescribed patients

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Purpose: Opioid-induced respiratory depression and opioid related deaths have been on the rise. Obstructive sleep apnea and concomitant benzodiazepine use are well-known risk factors for opioid induced respiratory depression. The purpose of this study was to provide an estimate of the prevalence of diagnosed obstructive sleep apnea, risk factors for obstructive sleep apnea and other related risk factors for opioid-induced respiratory depression in a cohort of subjects prescribed opioid analgesic medications. Data regarding the prevalence of these risk factors could help support implementation of interventions to decrease the harm from opioid analgesic medications.

Methods: The institutional review board approved this retrospective, medical chart review assessing the presence of obstructive sleep apnea and related risk factors for opioid induced respiratory depression at the University of Illinois Hospital and Health Sciences System. Via a computer-generated prescribing report, investigators identified 250 subjects prescribed targeted opioid analgesic medications within the past year. Male and female subjects age 18 years or older who received their care at the University of Illinois Hospital and Health Sciences System were included. Investigators collected information on obstructive sleep apnea risk factors and diagnosis, and other risks related to sleep disordered breathing and opioid use that were present at the time of the opioid analgesic prescription. Many of the risk factors collected included those described in the STOP-BANG and Berlin Questionnaire obstructive sleep apnea screening tools. Data regarding the presence of additional opioid risk factors unrelated to obstructive sleep apnea were also collected. These risk factors include a history of cardiovascular and pulmonary disease and concomitant use of benzodiazepines and other non-benzodiazepine sedative medications. Data collected was analyzed to determine the prevalence

of obstructive sleep apnea risk factors, concurrent benzodiazepine use and additional cardiovascular or pulmonary risk factors.

Results: Fifty subjects were randomly identified within each stratification of the following targeted opioid analgesic medications: fentanyl transdermal patch, hydrocodone bitartrate-acetaminophen, hydromorphone hydrochloride, morphine sulfate, and oxycodone hydrochloride. Of the 250 subjects prescribed an opioid analgesic medication, 144 subjects were women and 106 subjects were men. A diagnosis of obstructive sleep apnea was found in 14.8 percent (n=37). Just under half of the cohort, 49.2 percent (n=123), had two or more risk factors for obstructive sleep apnea without a diagnosis and 22 percent (n=55) had three or more risk factors, suggesting significant risk of obstructive sleep apnea. Among the 250 subjects reviewed, 21.6 percent (n=54) of subjects had concurrently been prescribed a benzodiazepine within the last six months from the time of prescribing an opioid analgesic medication.

Conclusion: The high prevalence of risk factors for obstructive sleep apnea suggests opioid prescribing commonly occurs in patients who are at heightened risk of adverse effects. Interventions to formally assess obstructive sleep apnea in opioid prescribed patients with considerable risk factors are warranted. These interventions may include educational initiatives, prescribing alerts, pharmacist screening, and other measures. Overall, the prevalence shown may provide insight to healthcare professionals and affect the way they evaluate opioid prescribed patients.

Submission Category: Oncology

Submission Type: Case Report

Session-Board Number: 5b-430

Poster Title: Novel combination therapy with cisplatin, paclitaxel, and cetuximab in advanced head and neck cancer

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Purpose: We reviewed the cases of two patients treated with a novel chemotherapy regimen for advanced head and neck cancer: paclitaxel 80 mg/m2 IV and cisplatin 30 mg/m2 IV on days 1 and 8 with cetuximab 250 mg/m2 IV on days 1, 8 and 15 every 21 days. EW, an 80 year old male who presented with advanced metastatic squamous cell carcinoma of the parotid gland treated with parotidectomy and radiation therapy. EW received three cycles of paclitaxel, cisplatin and cetuximab. On follow-up PET/CT scan he was noted to have no new lymph node involvement and metastatic tumor burden had decreased. Patient is currently being treated with weekly cetuximab maintenance therapy. DB, a 54 year old female who presented with metastatic laryngeal cancer with extension to the base of the tongue and had a tracheotomy. She completed three cycles of standard induction chemotherapy with docetaxel, carboplatin, and 5-fluorouracil (TPF) followed by chemoradiation with cisplatin. One year after completing adjuvant therapy, DB had recurrence of her disease, for which she underwent a laryngopharyngectomy and initiated combination chemotherapy with paclitaxel, cisplatin, and cetuximab. She received three cycles, then was found to have disease progression. Per NCCN guidelines, advanced head and neck cancer is treated with surgery +/- radiation, followed by combination chemotherapy with the preferred regimen being cisplatin/carboplatin + 5-FU + cetuximab. As demonstrated by these cases, the combination of cisplatin, paclitaxel and cetuximab may have potential for treatment in advanced metastatic squamous cell carcinoma of the head and neck. This new regimen was designed in order to optimize both efficacy, by replacing carboplatin with cisplatin, and patient satisfaction, by replacing 5-fluorouracil with paclitaxel. There is limited data to support this regimen in the head and neck cancer setting, but

with this case report, it is our intention to provide evidence upon which clinicians will be able to provide an alternate treatment option for patients who have progressed on previous therapies, or as induction therapy for patients with metastatic disease.

Methods:

Results:

Conclusion:

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 5b-431

Poster Title: Evaluation of prescribing patterns and long-term safety of rivaroxaban and apixaban in a large, academic medical center

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Purpose: Direct oral anticoagulants have become attractive alternatives to warfarin for anticoagulation with non-valvular atrial fibrillation (NVAF) and venous thromboembolism (VTE). These agents have simpler pharmacokinetics, fewer drug-drug interactions and require less monitoring. Previous studies have assessed the prescribing patterns of dabigatran and rivaroxaban due to variations in dosing for different indications, but there is a lack of literature assessing prescribing patterns of the other formulary agent at our institution, apixaban. The primary objective of this study was to determine the appropriateness of prescribing patterns for rivaroxaban and apixaban. Secondary objectives included long-term safety outcomes.

Methods: A retrospective data analysis of electronic medical records was conducted for adults who received at least one dose of rivaroxaban or apixaban during hospitalization with an indication for NVAF or VTE from July 1st through December 31st, 2015. Patients were excluded if there was missing data on height, weight or serum creatinine. The following data was collected: age, weight, height, renal function, anticoagulant indication, CHA2DS2VASc score, prior to admission use, concomitant medications that may increase bleeding risk or cause potential drug-drug interactions, inpatient dosage strength, number of administered doses, laboratory parameters (hemoglobin, hematocrit, platelets, liver function tests, and international normalized ratio [INR]), documented systemic embolism (stroke or VTE), bleeding, and education provided by nursing or pharmacy. Appropriateness of prescribing was based on FDA-approved indications, dose and renal function. If initial prescribing was inappropriate, whether it was changed during hospitalization or at discharge was also collected. Bleeding was defined as major bleeding or bleeding that required discontinuation. Descriptive statistics were

employed to characterize prescribing patterns and a Chi-square test was used for categorical data. This study was approved by the Institutional Review Board.

Results: A total of 150 patients receiving rivaroxaban (n=75) and apixaban (n=75) were analyzed. Indications for NVAF in the rivaroxaban and apixaban groups were 49 (65.3%) and 54 (72%), respectively. There was no difference between rivaroxaban and apixaban on appropriate prescribing patterns (86.7% vs. 86%, p=1.00). Although not significant, apixaban had more inappropriate regimens changed on admission or discharge compared to rivaroxaban (admission: 40% vs. 10%, respectively, p=0.18; discharge: 30% vs. 10%, p=0.32). Incorrect dose was the reason for inappropriate prescribing in all patients, with one rivaroxaban patient having both incorrect dose and frequency. Three patients experienced a new VTE (rivaroxaban=1, apixaban=2) and two patients had major bleeding in the rivaroxaban group. Therapy was discontinued in all cases. Other reasons for discontinuation included low platelets (n=1) and high INR (n=2) among rivaroxaban recipients; worsening renal function (n=3), high INR (n=1), no insurance coverage (n=1) and transition to hospice (n=1) among apixaban recipients. Neither agent was given concomitantly with a strong CYP3A4 inducer or inhibitor. Documented patient education occurred in 72% of rivaroxaban patients and 61.3% of apixaban patients, with nurses documenting 98.1% and 93.6% of provided education, respectively. Pharmacy only documented education for 8.1% of patients receiving apixaban.

Conclusion: This study revealed no difference between the prescribing patterns of rivaroxaban and apixaban. The most common reason for inappropriate dose was due to an incorrect dose, and further studies are needed to assess inappropriate regimens on long-term safety outcomes. Efforts to improve safe and appropriate prescribing may include more structuring for computerized order entry. The low percentages of documented education is alarming, and warrants increased awareness on the importance of providing education prior to discharge.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 5b-432

Poster Title: Medication adherence assessed by community health workers compared with patient self-report

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Purpose: Accurate adherence assessment is challenging, yet important. Clinicians often rely on patient self-report to assess medication adherence. Community health workers (CHW) who conduct home visits with patients offer a different perspective, and may be able to identify non-adherent patients and provide support for clinicians to address barriers to medication adherence. However, the agreement between self-reported adherence and CHW assessed medication adherence has not been previously established. The purpose of this study was to assess the agreement between patient self-report and CHW assessment of medication adherence in African-American and Hispanic patients with uncontrolled type 2 diabetes.

Methods: Data was collected as part of a larger NIH funded study assessing pharmacist-CHW team-based care model. Two hundred forty-four African-American and Hispanic patients with uncontrolled type 2 diabetes (HbA1c ≥8%) were recruited from within the University of Illinois Health ambulatory clinics in Chicago. Patients received support from a CHW through home visits, clinic encounters and phone calls for 12 months. This analysis focused on the 137 patients whose adherence was assessed by a CHW.
Patient self-reported adherence to oral diabetes and hypertension medications was measured using the 8-item Morisky Medication Adherence Scale (MMAS-8). The MMAS-8 was categorized as “high” (score of 8), “medium” (6-7), or “low” (< 6). CHW’s assessment of patient adherence was measured on a five-point Likert scale ranging from “very adherent” to “not adherent.” Ratings from both adherence assessments were obtained after the CHW worked with the patient for one year.

Agreement between the MMAS-8 and CHW's assessment was calculated using the total percent agreement (i.e. adherent and non-adherent on both assessments) and Cohen's kappa. MMAS-8 scores of 6 to 8 were considered "adherent." Patients were considered adherent on the CHW assessment with "very" and "moderately" adherent ratings. A sensitivity analysis was conducted including the "somewhat" adherent rating as adherent to assess whether agreement with the MMAS-8 improved. All analyses were conducted using Microsoft Excel and IBM SPSS v22.

Results: Agreement between the CHW assessment and patient reported MMAS-8 totaled 50.4% (kappa of 0.077). For the sensitivity analysis, the overall observed agreement was 40.9% (kappa of 0.036). Specifically, patients were characterized as adherent on both CHW assessment and MMAS-8 23.3%, non-adherent on both 27%, adherent (CHW) and non-adherent (MMAS-8) 38.7%, and non-adherent (CHW) and adherent (MMAS-8) 10.9% of the time. When evaluating MMAS-8 categories compared with Likert CHW responses, there appeared to be general agreement between the two scales with some notable exceptions. For example, the CHW assessment of "moderate" adherence (the second-highest level on the CHW assessment) most frequently corresponded with a "low" (18.3% of all cases) or "medium" (17.5%) adherence on the MMAS-8. Likewise, a CHW assessment of "somewhat" adherent corresponded with a "low" (8.8% of all cases) or "medium" (11.7%) adherence on the MMAS-8. As exceptions, 5.8% of patients who responded to the MMAS-8 scale as "high" adherence were assessed by CHW's as "poorly" or "somewhat" adherent. Also, 5.9% of patients responding to the MMAS-8 as "low" adherence were assessed as "very" adherent by CHW's.

Conclusion: The agreement between patients' self-report and CHW assessment had only slight agreement. These two adherence assessment methods likely focus on different adherence behaviors or domains. While the MMAS-8 measures intentional and unintentional behaviors associated with adherence, the CHW assessment offers a subjective, general assessment of adherence. Other differences may include social desirability and recall bias with self-report measures, or indistinct categorization with either method. Further studies are needed to standardize an assessment methodology performed by CHW on patient medication adherence.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5b-433

Poster Title: Evaluation of patient outcomes for daptomycin treated bloodstream infections using fixed dose, weight adjusted and standard dosing approaches

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Purpose: Daptomycin (DAP) is a frequently used therapy for Gram positive blood stream infections (BSI), usually dosed according to total body weight (TBW). In June 2013, our center adopted a standardized fixed dosing scheme for DAP according to TBW to promote safety and reduce waste. We sought to assess whether treatment outcomes differed between patients treated with weight based DAP (mg/kg) and fixed dose DAP for Gram positive BSI. Vancomycin (VANC) treated patients will be used as comparators in a case-control design.

Methods: We conducted a retrospective, pre/post interventional study comparing case failure rates to control success rates (DAP) adjusted for contemporaneous control success rates (VANC) before and after implementation of the standardized fixed dosing protocol at our academic medical center. The odds of failure on DAP will be calculated relative to the odds of failure on VANC with pre/post as the primary interest. Included subjects will have BSI due to either Staphylococcus aureus or Enterococcus spp. and received DAP or VANC as a directed therapy from January 1, 2010 to June 30, 2014. VANC treated patients will serve as controls and will be frequency matched 4:1 against DAP treated patients. Case exclusions: presence of polymicrobial BSI, recipient of DAP for more than 7 days prior to BSI, recipient of other antibiotics for more than 5 days or primary meningitis, osteomyelitis, or pneumonia caused by Gram positive organisms. Control exclusions: similar to case exclusions, except controls cannot be recipients of DAP within 7 days prior to BSI. Data elements and patient variables will be collected to determine DAP efficacy and toxicity before and after protocol implementation. A sample of convenience will be utilized.

Results: Of the patients included in this study, the average modified APACHE II score and the number of patients with a positive culture in the ICU were statistically greater in VANC treated patients than DAP treated patients. All other demographics were not significant between both groups. We defined clinical cure as culture negative by the end of the planned therapy. Treatment failure was defined as switching antibiotics due to persistence of bacteremia, metastatic infection or recurrence of S. aureus or Enterococcus spp., a positive blood culture after a negative culture during inpatient treatment. Based on the interim statistical analysis of the data there is no statistical difference in the primary outcomes between the pre- and post-protocol groups.

Conclusion: To our knowledge, this is the first study that assesses the efficacy of a fixed dose, weight based DAP dosing scheme. Based on the results, patient safety was not compromised from standardized weight-based dosing of DAP. Additional analysis will be performed as additional control patients will be included with broader range of illness severity and infected with Enterococcus spp bacteremia. An expanded case-case-control analysis of GPBSI will be conducted using 3:1 ratio of contemporary comparators to Daptomycin-treated cases in order to minimize the effect of practice variation over time, additional clinical confounders, and small sample size.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Descriptive Report

Session-Board Number: 5b-434

Poster Title: Establishing a process aimed at salvaging medications after temperature excursions

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Purpose: The control of storage and stability parameters is an important aspect of the pharmacist's role in the healthcare setting. With the collaborative system of highly developed technology and skilled pharmacy team members, medications are able to be stored in their appropriate environments ensuring administration of quality products to patients. Despite this multifaceted approach in maintaining the medication's properties, accidental events can occur which inevitably expose the medications to undesired temperatures. This process was established to salvage medications following a temperature excursion.

Methods: There was an accidental occurrence in the central pharmacy which affected the refrigerators' temperature as well as prevented pharmacists from receiving notifications regarding unstable conditions. When it was discovered that the medications were potentially exposed to out-of-range temperatures for an extended period of time, a team of two pharmacist and two pharmacy students in the administration department collaborated to address the issue. To prevent administration of drugs with potentially impaired quality, the pharmacist and students sequestered the medications away from the normal pharmacy inventory. The pharmacy team retrieved vital information regarding the various drugs' stability and storage parameters via review of package inserts and phone calls with representatives at corresponding pharmaceutical companies. The pharmacist created a scripted template to follow in order to guarantee all necessary information was obtained. All interactions with the various representatives were documented and any in-house data retrieved from them was stored for future reference. Upon assessing all available data, the destination of each medication was determined to be usable, damaged, or have an altered shelf-life.

Results: The two pharmacists and two pharmacy students examined the package insert and product labeling to acquire information regarding the storage and stability of 60 different products of concern. Phone calls with representatives at respective pharmaceutical companies were also made to collect in-house data and recommendations regarding the various drug products. After completing the assessment, forty-six out of sixty drugs (76.6 percent) were able to salvaged. All data obtained was charted on the excel spreadsheet and saved into a designated folder for future reference. In total over 400,000 dollars worth of medications were salvaged.

Conclusion: Protocolized assessment and collection of data regarding storage and stability parameters were helpful in salvaging 76.6 percent of medications with temperature excursions totaling over 400,000 dollars. This process has utility in future accidental events where drugs might have impaired quality due to storage in unwanted conditions. Ultimately, this project served as a method of establishing guidelines and preventing financial and pharmaceutical waste.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 5b-435

Poster Title: Impact of pharmacy students conducting asthma screenings and telephone calls on asthma quality measures

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Purpose: UI Health-Family Medicine Clinic (UIH-FM) is incentivized to provide high quality asthma care through pay per performance measures. Quality measures include: completion of an Asthma Action Plan (AAP) (goal greater than or equal to 80 percent), goal percentage of members with controlled asthma (greater than or equal to 66 percent), and intervention for patients without controlled asthma. To improve quality performance, pharmacy students were utilized in a telephone outreach program to conduct an Asthma Control Test (ACT) and a review of patient specific AAP. This study was analyzed to assess the program for successful completion of an ACT and AAP.

Methods: A retrospective chart review was conducted to evaluate patients in a telephone asthma outreach program at UIH-FM between October 1, 2015 and January 31, 2016. Patients were identified by insurers based on diagnosis codes, prescription claims, and emergency room (ER) visits provided to clinic. A structured intervention was designed utilizing student pharmacists to conduct an ACT and review a patient specific AAP. If patients were not reached after two calls, their AAP would be mailed with a request to contact the clinic. Outcome and time spent on phone calls were recorded. Patients with uncontrolled asthma were scheduled to make an appointment with their primary care physician (PCP) or contact the clinical pharmacist. Data was collected from Research Electronic Data (REDCap) and Microsoft Excel. Descriptive statistics were used to assess completion of asthma assessment and education as well as time effort to complete measures.

Results: A total of 137 patients were contacted through 174 calls to evaluate asthma treatment and management. A total of 63 (46 percent) patients completed ACTs, among this there were

42 (31 percent) ACTs completed on the first call and 24 (18 percent) ACTs completed on the second call There were 48 (76 percent) patients with controlled asthma (ACT 20 or higher), 7 (11 percent) poorly controlled (ACT 16 to 19), and 8 (13 percent) very poorly controlled asthma (ACT 15 or less). Without student intervention, 34 percent of patients received AAPs, however, with the additional help from the outreach program, students were able to increase AAP to 100 percent. Average total time spent on phone calls was 5 minutes (excluding student work-up time and documentation).

Conclusion: Pharmacy students were successfully utilized to complete annual ACT and AAP through a telephone intervention. Pharmacy students were able to identify poorly controlled asthma, evaluate asthma triggers, and educate on exacerbation management. The student intervention was able to increase team-based care and meet quality measures without increased work-load on clinic staff.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5b-436

Poster Title: Galleria mellonella virulence model of ciprofloxacin resistant Escherichia coli acquired during pre-prostate biopsy rectal screens

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Purpose: Transrectal ultrasonography guided prostate biopsy (TRUSBx) is one of the most commonly performed outpatient procedures, however post-procedural infections are a known complication. These infections can be due to organism virulence, efficacy of antibiotic prophylaxis or host immune system function. To study organism virulence we utilized a Galleria mellonella (GM) model using isolates obtained during TRUSBx from infected and non-infected patients.

Methods: Prior to TRUSBx, rectal swabs were obtained of ciprofloxacin resistant isolates from patients. Using standard procedures, organisms were identified and susceptibility testing was performed. Aliquots of 1-2 x 10^5 CFU per 10 uL for each isolate were injected into the hemocele of GM weighing between 250-350 mg (n= 20). The two control groups consisted of GM receiving either no injection or equivalent volumes of normal saline. All of the GM isolates were incubated at 37C and observed every 24 hours for 5 days. Kaplan-Meier survival curves and log rank tests were used to assess mortality.

Results: Mortality occurred in 20% of the saline injection GM and 5% of the no-injection GM controls. GM injected with isolates obtained from the non-infected patients had a higher incidence of mortality (75%) compared to the GM injected with isolates obtained from infected patients at 5 days (27.5%, p< 0.001). Two of the isolates produced extended-spectrum beta lactamases (ESBLs). GM inoculated with ESBL (-) isolates had a mortality rate of 47.5% while the ESBL (+) isolates had a mortality rate of 62.5%, p= 0.051%.

Conclusion: E. coli isolates obtained from non-infected patients and ESBL (+) isolates were more virulent in the GM model compared to infected patient isolates and ESBL (-) isolates, respectively.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-437

Poster Title: Student perspectives of a media evaluation assignment in a women's health elective

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Purpose: There are limited studies regarding instructing students in healthcare graduate programs to evaluate health information in the media. Surveys as validation tools have been used to evaluate health care stories in the media, but the use of such tools by student pharmacists has not been evaluated. The aims of this project are to assess the abilities of third year student pharmacists enrolled in a women's health elective to evaluate women's health related articles and to assess students' confidence and knowledge of evaluating health related media articles following a media evaluation assignment.

Methods: Students enrolled in a women's health elective were surveyed following the completion of a required class assignment to assess their confidence, knowledge, and opinions on evaluating news articles in the media following the assignment. The required assignment involved evaluating a media news story and the corresponding journal article using the Media Evaluation Rubric, completing a role-play counseling exercise in class, and giving a group presentation. Students were asked to complete a brief survey online of several Likert-style questions to assess student perceptions of the project. Participation in the survey was optional.

Results: Eight out of eleven (72.7 percent) students completed the survey. All students agreed (62.5 percent) or strongly agreed (37.5 percent) that the media evaluation assignment increased their awareness that not all media stories portray an accurate report of healthcare in the news. All students agreed that the assignment would help them to communicate with patients about reporting in the media. Most students agreed (75 percent) or strongly agreed (12.5 percent) that their knowledge on what criteria to look for when evaluating news stories was increased after the assignment and it was an effective way to help them understand how

to evaluate news stories in the media. Almost all students (87.5 percent) considered the project to be a valuable learning experience, 75 percent considered the Media Evaluation Rubric to be a useful tool to help evaluate news stories, and 87.5 percent were confident in their ability to communicate with their patients about news stories in the media. A majority of students (87.5 percent) reported that they had not previously participated in an activity in which they were to evaluate a media news story for accuracy and potential bias.

Conclusion: Utilizing a media evaluation rubric is a potentially effective way to teach pharmacy students how to evaluate media news stories for accuracy and bias. The media evaluation assignment appears to be a useful tool to help students better communicate with patients and health care professionals regarding health news stories in the media.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 5b-438

Poster Title: Asymptomatic bacteriuria and the need for antimicrobial stewardship in a large academic medical center

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Purpose: Urinary tract infections (UTIs) account for a vast majority of antimicrobial use. Hospitals have found the use of antibiotics for asymptomatic bacteriuria (ASB) to be inappropriate. Untreated ASB has not been shown to cause harm except in pregnant women and patients who endure traumatic urologic procedures. Furthermore, treating ASB can be a risk factor in developing symptomatic UTIs and multi-drug resistant pathogens. The purpose of this study was to assess the management of ASB in a large academic medical center to identify potential needs for antimicrobial stewardship efforts.

Methods: This retrospective chart review was submitted to the appropriate Institutional Review Boards for approval. Study patients were identified from a list of urine cultures (n equals 1524) generated from the microbiology department between July 2014 and June 2015. Inpatient cases of ASB defined as having a positive urine culture (greater than or equal to 10 to the fifth power CFU per mL) with undocumented signs or symptoms of a UTI were included. Patients were excluded if they had a yeast infection, urologic abnormality, cultures from a catheter or nephrostomy tube, repeated urine culture less than or equal to 7 days of index collection, underwent a urologic procedure, was neutropenic, pregnant, less than 18 years of age, received antibiotics for concomitant infections, or had greater than 2 species of organisms in urine. Using electronic medical records, the following patient variables were collected and assessed: patient demographics, urinalysis and urine culture, uropathogens, antibiotics, duration of antibiotic treatment, infectious diseases consult, and length of stay.

Results: Ninety-three unique patients met inclusion criteria for ASB. Urine cultures were obtained from the emergency department (ED) for all 93 cases of ASB regardless of an insignificant urinalysis. Many urine cultures were ordered at the same time as the urinalysis. The most common uropathogens included Escherichia coli (26 percent), Klebsiella pneumoniae (9 percent), Enterococcus species (5 percent), and alpha-hemolytic Streptoccoci, Group B (5 percent). Eighty-nine percent of cases of ASB received at least one day of antibiotics and over half of cases received an average of 5 days of treatment. Up to 92 percent of antibiotics were initiated in the ED. Fluoroquinolones were the most common antibiotic selected for treatment. Documentation of altered mental status, dementia or seizures was identified with 27 ASB cases (29 percent). Only 8 cases of ASB (8.5 percent) received an infectious disease consult during their hospital stay.

Conclusion: ASB is being inappropriately treated with antibiotics at our institution with fluoroquinolones having the most utility. Very few cases of ASB requested an infectious diseases consult for guidance. Based on our findings, antimicrobial stewardship efforts to reduce inappropriate antibiotic treatment for ASB are warranted with early attention placed in the ED.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-439

Poster Title: Health promotion and disease prevention in ethnic minority groups: Effect of a health-screening elective on student pharmacists' knowledge and confidence

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Purpose: Providing community health screenings is an area in which student pharmacists can significantly promote disease education and prevention. Variability in student learning makes it difficult to assume adequate training and education have been achieved to participate in events and/or communicate effectively with ethnic minority populations. The primary objective of this study was to compare the knowledge and self-confidence of student pharmacists who completed a health screening elective course, targeting ethnic minority groups, to non-elective students. Knowledge and self-confidence were compared between second (PS-2) and third-year student pharmacists (PS-3) as a secondary objective.

Methods: This study was approved by the Midwestern University institutional review board and performed with student consent. Thirty-two student pharmacists (16 PS-2s and 16 PS-3s) enrolled in a health screening elective course at Midwestern University Chicago College of Pharmacy during the academic year of 2016-2017 served as our case group. A quantitative longitudinal panel survey was distributed to elective student pharmacists (ES) before and after the course. This survey included a 16-question quiz, assessing their disease state knowledge on diabetes, hypertension and dyslipidemia. Technique using cardiometabolic equipment and communication skills interacting with a patient from a diverse cultural background in a simulated patient encounter were evaluated via a grading rubric. Thirty-one non-elective student pharmacists (NES), who served as our control group, were evaluated at a health-screening event using the same survey and grading rubric. Scores for knowledge, self-confidence along with technical and communication skills were compared between ES and NES. Descriptive data summaries were presented using frequencies for categorical variables and

means for quantitative variables, including knowledge scores. Bivariate analysis was conducted by using independent samples t-test, paired t-test, Chi Square, and McNemar's Chi Square. Multivariate analysis was conducted via simultaneous estimation techniques, including multiple regression and multiple logistic regression.

Results: ES performed better on the knowledge quiz questions compared to NES; however, the difference was not significant as the average percent of questions correct was 74.2 and 68.3, respectively, p equals 0.07. Confidence of disease state knowledge and application of knowledge and overall skills were significantly better with the ES versus NES, p less than 0.001. A significant difference was also observed when comparing communication and technical skills between ES and NES at the health screening event, p less than 0.001. ES obtained demographic information, asked about patient history of disease state and health beliefs, and concluded the screening session with questions from the patient. When comparing skills, more ES accurately interpreted the results, demonstrated understanding of the patients' disease state, and tailored counseling to the patients' cultural beliefs. PS-2 ES performed better on the knowledge quiz questions compared to PS-3 ES (77.3 percent versus 71.3 percent, p equals 0.164). The pre-elective survey indicated PS-3 ES were more confident than PS-2 ES. However, post-elective survey results showed PS-2 ES were just as confident as PS-3 ES. While PS-3 ES scored higher in all areas of skills, communication and technical, there were no significant differences between the two years.

Conclusion: There was no difference in knowledge between student pharmacists who were enrolled in the elective course versus those who were not. However, ES were more confident and expressed improvement in overall skills than NES. Overall, there were no significant differences between PS-2 ES and PS-3 ES in terms of skills and communication; however, PS-2 ES seemed to gain more knowledge and self-confidence upon completion of the course than PS-3 ES.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 5b-440

Poster Title: Breaking real and perceived barriers to voluntary reporting of safety events by pharmacy personnel in an acute care institution

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Purpose: Voluntary incident reporting by healthcare personnel discloses adverse events and medication errors so improvements can be made to patient safety and quality of care. It is important to establish and encourage an effective and continuous incident reporting system to promote safety and prevent recurrences of errors and adverse events. The purpose of this study is to improve voluntary reporting of medication safety events by pharmacists and pharmacy technicians in an acute care hospital setting. Increased reporting will allow for clearer identification of safety event trends, for which prevention measures can be placed.

Methods: An anonymous survey on attitudes and barriers to reporting in the Northwestern Events Tracking System (NETS) was created in SurveyMonkey and emailed in September 2016 to the pharmacy department (171 pharmacists and 112 technicians) at Northwestern Memorial Hospital in Chicago, IL. The survey was 17 questions, and included questions on awareness of the NETS, as well as attitudes on using the NETS as measured by a Likert scale. Prior to sending out the survey, pharmacy staff were informed of the optional, anonymous survey at staff meetings and team huddles, and were encouraged to complete it. Staff had 2 weeks to complete the survey and received 2 email reminders to complete it.
The same survey will be emailed to the same group after education and process improvement(s) have been implemented, in order to measure changes in awareness of the NETS process and any changes in barriers to use.
In order to assess any changes in reporting, the number of medication safety events (those that are categorized as “Adverse Drug Reactions” and “Medication/Fluid”) reported in NETS by pharmacists and pharmacy technicians will be measured during planned three-month periods

before and after education and process improvement(s) are implemented based on initial survey results. The timeframe for data collection will range from December 2015 to June 2017.

Results: Prior to this survey, it was found that 34 event reports were made by pharmacists and 3 were made by pharmacy technicians from December 2015 through February 2016. Of the 283 pharmacy personnel who received the survey, 114 completed it (40.3 percent response rate). The majority of respondents work in an inpatient setting (83.3 percent) and the majority of the respondents were pharmacists (71.9 percent). Most of the respondents are aware of the NETS (98.23 percent) and of how to access and submit reports (95.5 percent), but many reported they rarely (34.23 percent) or never (18.02 percent) report an event through the NETS. The top three reported barriers to reporting are as follows: fear of distrust among colleagues for submitting a report involving them (35.9 percent), a lack of follow-up after an incident report is submitted (33.9 percent), and fear that information can be traced back to the person submitted the report (32 percent).

Conclusion: After assessing perceived and real barriers to incident reporting, the survey results warrant a review of the NETS process and staff education. Improvements will be made through better communication to staff on events and how they are handled, education on using the NETS in forms of learning modules and presentations at staff meetings, and overall updates to the current NETS form to streamline the submission process. After staff education and improvements to the NETS process are made, the repeated survey and remeasure of reporting by pharmacy personnel will assess the efficacy in methods used to break barriers to incident reporting.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 5b-441

Poster Title: Four-factor prothrombin complex concentrate for the reversal of direct oral anticoagulants and warfarin

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Purpose: Four-factor prothrombin complex concentrate (4F-PCC) contains inactive coagulation factors II, VII, IX, X, protein C, and protein S. In the acute setting, 4F-PCC has been used successfully for the rapid reversal of warfarin and direct oral anticoagulants (DOAC) when a life threatening bleed occurs or an urgent surgical procedure is necessary. The purpose of this study is to characterize the use of 4F-PCC at Loyola University Medical Center in Maywood, Illinois.

Methods: This retrospective medication use evaluation was conducted to identify patients who received 4F-PCC for anticoagulation reversal between July 2014 and August 2016. Data collection included patient demographics, primary service, and intensive care unit (ICU) and hospital length of stay (LOS). The following laboratory parameters were collected: international normalized ratio (INR), activated partial thromboplastin time (aPTT), and prothrombin time (PT) before and after reversal. The dose and indication for reversal with 4F-PCC, along with efficacy and safety outcomes, were evaluated.

Results: Of the 78 patients, 62 (79.5 percent) were on warfarin and 16 (20.5 percent) were on a DOAC with a median age of 69 versus 77 years old (P equal 0.02). Common indications for 4F-PCC included: intracranial hemorrhage (56.5 percent warfarin versus 37.5 percent DOAC), trauma (6.5 percent warfarin versus 37.5 percent DOAC), gastrointestinal bleed (9.7 percent warfarin versus 12.5 percent DOAC), urgent surgical procedure (4.8 percent warfarin versus 6.3 percent DOAC), and anticoagulation reversal prior to heart transplant (22.6 percent warfarin

versus 6.3 percent DOAC). Upon admission, median INR for patients on warfarin of 2.2 decreased to 1.2 following administration of 4F-PCC. The median time to evaluate INR reversal was 148 minutes between administration and laboratory collection. The median PT in the warfarin and DOAC patients upon presentation was 24.3 seconds and 16.3 seconds, which then decreased to 13.7 seconds and 13.1 seconds, respectively, after 4F-PCC administration. The median aPTT from baseline to after administration of 4F-PCC was 40 seconds to 31.4 seconds for warfarin and 35 seconds to 32.4 seconds for DOACs. Adverse effects associated with the administration of 4F-PCC were limited to deep vein thrombosis (9.4 percent). Mortality during hospitalization occurred in 16 patients (20.5 percent).

Conclusion: Overall, 4F-PCC was utilized mostly commonly for patients experiencing a life-threatening bleed or in need of an urgent surgical procedure. Opportunities to improve exist for the time of laboratory collection of INR, PT and aPTT after administration of 4F-PCC.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 5b-442

Poster Title: Evaluation of post-marketing safety: A demonstration with blinatumomab-associated pancreatitis

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Purpose: To describe the multi-step process used for evaluating the available post-marketing surveillance data, regulator actions, and publications on a drug-associated adverse reaction. This was prompted by a July 13, 2016 Health Canada advisory about life-threatening pancreatitis associated with blinatumomab (Blincyto) use, that was subsequently not found in the FDA-approved product labeling. This process was conducted to help guide institutional awareness and possible monitoring in patient use.

Methods: Approved labeling for blinatumomab from the U.S. and foreign regulators was compared at several time points. Multiple drug databases were consulted to check for related content and for change over time. FDA Adverse Event Reporting System (FAERS) reports were evaluated and the European Medicine Agency's (EMA) EudraVigilance adverse event database was accessed. The medical literature and conference proceedings were searched for relevant publications. The adverse reaction signal value of the reports was investigated. The completed steps will be supplemented by checking for new FAERS and EMA reports after an additional month interval, and finally be complemented by a retrospective review of actual case use at this institution.

Results: Product labeling variance was encountered, with the U.S. and EMA lagging behind Australia and Canada for inclusion of pancreatitis as a possible adverse reaction. After the FDA updated the warnings and precautions section of the approved labeling on August 30th, the drug databases updated their content. FAERS and EudraVigilance had both included reports within their available records and overlapping cases were noted. There was also a disparity

between the ease of use of EudraVigilance compared to FAERS; the latter required extensive manipulation of downloads to extract information. A subsequently calculated adverse event signal according to the methods of Sakaeda and Evans was found to suggest a true drug-adverse reaction association. The results from additional time-points of observation will be combined with the preliminary findings for presentation. Recommendations for pharmacists will also be included to assist them in detecting, evaluating and acting on early emerging safety information that can affect patient care. The internal retrospective case series review will be provided to the Northwestern Memorial Hospital Pharmacy and Therapeutics Committee together with the post-marketing findings.

Conclusion: Post-marketing adverse drug reaction information is not uniformly recognized and incorporated into product labeling on a global scale, nor into drug databases. There is variance in response and lag time before this information is added into widely used standard drug resources. Based on the experience from this example, we can share specific steps to help pharmacists perform a uniquely proactive support role in their practices. They will understand how to watch for and evaluate emerging drug safety issues across multiple regulators in addition to the FDA, in order to apprise health practitioners of these concerns.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 5b-443

Poster Title: Community blood pressure screenings: Impact of incorporating 'teach-back" counseling and text message reminders

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Purpose: Student pharmacists frequently participate in community blood pressure screenings. Patients identified with an elevated blood pressure are provided lifestyle education (e.g. diet & exercise) and encouraged to seek further medical care. Currently, it is not clear if patients make an effort to visit a healthcare provider or incorporate lifestyle changes based on the education they receive at the screening. The purpose of this study is to determine if "teach-back" counseling during a blood pressure screening followed by electronic text message tips/reminders can improve patients' 1) knowledge of hypertension self-care behavior and 2) self-reported medication adherence and follow-up with medical care.

Methods: The Midwestern University institutional review board approved this prospective, randomized, parallel-group study, which took place over the course of one student-led community health screening event in December 2015. English speaking, adult patients with elevated blood pressure readings who provided informed consent were recruited and randomized in a 1:1 fashion into an intervention group (personalized teach-back counseling followed by weekly text message reminders about lifestyle/diet changes and medication adherence) or a usual care group (generic blood pressure counseling provided only at the health screening event). All patients received a questionnaire and an educational pamphlet during the health screening event. The questionnaire assessed patients' baseline 1) knowledge of blood pressure management (10 questions quiz) and 2) self-reported medication adherence using the Morisky Medication Adherence Scale (MMAS). The questionnaire was administered again at the end of a three month period through a telephone call follow-up. Change in the quiz

and the MMAS scores from baseline to three months was compared between the same study arm using categorical paired samples and were analyzed using McNemar's chi square test. In order to compare changes between the usual care and intervention arm at baseline and three months, an independent samples analysis was performed using a Chi-square test.

Results: Fourteen patients met the inclusion criteria (intervention arm with the mean age 52.1 years and control arm with the mean age 55.9 years). Over half (57.1 percent) of all patients had a history of hypertension. The majority of patients in the control and the intervention arms rated their health as good/fair but not excellent (71.4 percent and 85.7 percent, respectively). Approximately 42.8 percent of patients in the control arm were under the care of a physician as opposed to 71.4 percent in the intervention arm. Three month follow-up was completed with 12 patients where they were asked about their follow-up with medical care, medication adherence, and health comprehension. Five patients had followed up with their primary care physician (2 in the intervention arm; 3 in usual care) and reported being within their blood pressure goal (BP less than 140/90). Assessment quiz scores for knowledge of blood pressure management increased from baseline for all patients in both study arms (pre-quiz equals 65 percent and post-quiz equals 80 percent, p equals 0.007). Specifically, quiz scores were higher in the intervention group compared to the control group (83.3 percent versus 70 percent).

Conclusion: Overall, there was an increase in knowledge of blood pressure management from baseline in both the control and intervention arms. However, those that received “teach-back” counseling during the blood pressure screening and electronic text message tips/reminders increased their knowledge base to a greater degree than the control group.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 5b-444

Poster Title: Outcomes of a semester long student pharmacists' personalized interventions for inpatient tobacco dependence

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Purpose: Tobacco cessation prevents deadly complications. Hospitalized patients are surrounded by influential healthcare providers that can provide treatment for tobacco dependence. Student pharmacists receive education about tobacco dependence and treatment during their didactic education and are increasingly having opportunities during experiential education to assist patients with this addiction. The primary objective of this project is to characterize the interventions made and recommendations accepted by the tobacco dependence student pharmacy consult service. The secondary objectives are to document the 30-day post discharge quit rates of patients that received consults and to evaluate the learning experience of the student pharmacists.

Methods: A student pharmacist service for tobacco dependence treatment was established to serve hospital patients at the University of Illinois Hospital. Nurses assess the status of tobacco use and readiness of the patient to quit tobacco upon admission to the hospital. A consult is generated to the tobacco treatment center. Student pharmacists look up patients to address current and past medical conditions, social history, concurrent medications, prescription coverage, and laboratory results. After evaluating the patient, a patient specific plan is created. The student pharmacist presents the patient to the clinical pharmacist who approves or suggests changes to the treatment plan. The student pharmacist completes the consult in the patient's hospital room by assessing withdrawal symptoms and the need for treatment after discharge from the hospital. If medication is needed for withdrawal symptoms, the student pharmacist contacts the physician responsible for the patient to give a recommendation for treating tobacco dependence. The patient receives written educational material including resources for outpatient support, directions for proper medication use and a behavioral trigger plan. A follow up post-discharge phone call is provided to document the tobacco status and the

use of medications to treat tobacco dependence. The student pharmacist documents the consult in the electronic medical record and evaluates the learning experience by providing a letter grade in REDCap, a database for quality improvement.

Results: The service reached 51 hospital patients in an approximately 4-month period using 6 second and third-year student pharmacists. These patients were receptive to having student pharmacists ask questions and assess their tobacco cessation status. The 51 patients received behavioral trigger plans and medication recommendations, if desired. Out of the patients assessed in the hospital, 14 were reached by telephone by the same counselor who provided the consult during their hospital stay. After telephone follow up, 7 patients were confirmed to have quit tobacco since the consult. Student pharmacists spent on average, 18 minutes providing each consult and 15 minutes documenting their interventions. Twenty of the consults received an “A”, indicating that the student pharmacists learned about a new disease state or medication, provided a recommendation for treatment and the healthcare team accepted the recommendation.

Conclusion: Consults provided by student pharmacists are well received by the hospitalized patients and the healthcare team. Efforts by student pharmacists to assist patients with tobacco dependence treatment improve patient care, increase student pharmacists’ confidence with counseling patients and applying therapeutic knowledge. A student pharmacist service for tobacco dependence treatment demonstrates positive effects on quit rates for hospitalized patients and effective learning experiences.

Submission Category: Infectious Diseases

Submission Type: Case Report

Session-Board Number: 5b-445

Poster Title: Vancomycin-resistant enterococcus in the central nervous system: A case report and evaluation of outcomes with daptomycin and linezolid

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Purpose: A 47-year-old male with human immunodeficiency virus (CD4 greater than 475; viral load 1625), receiving antiretroviral therapy, presented to the hospital with chronic fatigue, night sweats, unintentional weight loss, and localized numbness to his face and feet. He was diagnosed with Burkitt's lymphoma and was subsequently started on chemotherapy. Day 10 of hospital admission, the patient was neutropenic with fevers, empirically treated with cefepime and vancomycin, and presenting with mental status changes. Day 11, blood cultures were significant for Streptococcus mitis. The following day, repeat blood cultures grew vancomycin-resistant Enteroccocus faecium (VREF) that was resistant to ampicillin (minimum inhibitory concentration (MIC) greater than 8 mg/mL) and susceptible to daptomycin (MIC equal to 2 mg/mL), linezolid (MIC less than 1 mg/mL), and positive for gentamicin synergy. The vancomycin was changed to daptomycin (8 mg/kg intravenous (IV) daily). Extended spectrum beta-lactamase producing Escherichia coli was also isolated from a urine culture and cefepime was changed to meropenem. Day 21, repeat blood cultures returned positive again for VRE. Gentamicin (1 mg/kg IV every 8 hours) was added to daptomycin therapy for synergy and the central line was removed due to concern as a potential source of bacteremia. Day 27, blood cultures were persistently positive for VRE, thus gentamicin was increased to 7mg/kg IV daily and ceftriaxone 2 grams IV every 12 hours was added for empiric coverage of infective endocarditis. Transesophageal echocardiogram was negative for vegetation. By day 30 the fever curve improved and blood cultures were cleared of infection. Treatment course was planned to finish with daptomycin alone. However, the patient also complained of concurrent headache, stiff neck pain and nausea. A cerebrospinal fluid (CSF) analysis indicated white blood cells 892 x 10^3/microliter (94 percent polymorphonuclear neutrophils), red blood cells 1,000 x

10^6/microliter, total protein count 137 mg/dL and glucose 3 mg/dL (serum 84 mg/dL). Therefore, ceftriaxone (2 grams IV every 12 hours) and ampicillin (3 grams IV every 6 hours) were initiated to cover for bacterial meningitis. Treatment course with daptomycin for VRE bacteremia was near completion when CSF cultures returned positive for VRE on day 36. Daptomycin was changed to linezolid 600 mg IV every 12 hours. Ceftriaxone and ampicillin were discontinued over the next two days. Day 42, repeat CSF analysis significantly improved and CSF cultures were negative for bacterial growth. The patient was instructed to complete 21 days of linezolid. CNS infections caused by VRE are extremely difficult to treat, limited to antimicrobial agents with in vivo activity that are capable of penetrating the CSF. Meningitis caused by VREF is rare, occurring in 0.3-4 percent of all bacterial meningitis cases. Linezolid is currently recommended for VRE meningitis. While daptomycin possesses bactericidal activity against enterococcal species, the drug's penetration into the CSF is low (5-6 percent). Linezolid, although bacteriostatic for enterococci, offers an improved meningeal concentration over daptomycin with a CSF penetration as high as 70 percent. This case introduces successful treatment of VREF with linezolid after potential failure with high-dose daptomycin and gentamicin.

Methods:

Results:

Conclusion:

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 5b-446

Poster Title: The implementation of co-curricular case-based discussion sessions: taking aim at enhancing student knowledge outside the classroom

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Purpose: The role of a pharmacist within healthcare is constantly evolving and there is need for pharmacy curriculum to adapt accordingly. While traditional therapeutics courses will always remain a staple of academic institutions, additional opportunities for a student to think critically and problem-solve through real clinical cases has the potential to increase a student's confidence and comfort level with therapeutic knowledge and better prepare them for their career in pharmacy. With this goal in mind, two student pharmacists acting as chapter presidents of their respective pharmacy organizations collaborated to develop extracurricular case-based discussion sessions.

Methods: Sessions occur on a biweekly basis, starting one hour prior to regularly scheduled class times. At each meeting, a third year student pharmacist introduces a de-identified patient case by summarizing the subjective and objective patient data. A facilitating clinician is open to interject at any point, and leads the discussion on how the presented patient should be approached by a pharmacist. Points of discussion typically include how the clinicians themselves would treat the patient, important lab values to consider, and mistakes they commonly see in treating similar patients. Moreover, facilitators introduce relevant literature to support the clinical decisions being discussed. Students in the audience are also encouraged to ask questions at any point, or answer questions as posed by the facilitator. Student coordinators are responsible for distributing an RSVP form one week prior to the next session, securing a facilitating clinical pharmacist for each session, and obtaining and de-identifying patient cases from volunteering P3 and P4 students. The patient case, relevant literature or guidelines, and a medical abbreviations and lab values "cheat sheet" for first year students is

distributed to RSVP'ed students at least 1 day before each session. A follow up e-mail with any additional literature discussed in the session is distributed to students who attended. A brief informal survey is also included in order to obtain feedback to continue to improve future sessions.

Results: Student interest and positive feedback consistently grew during the pilot semester of the case-based sessions. Throughout the spring semester of 2016, 23 students attended the pilot session, 29 attended the second session, 33 attended the third, 28 attended the fourth, 44 attended the fifth, 18 attended the sixth, 20 attended the seventh, and 26 attended the eighth session. Moreover, students interacted with 5 different clinicians, including the dean of the college. Most student feedback focused on the sessions providing a stress-free place of learning. Feedback from P1 and P2 students also indicated that students appreciated being exposed to clinical decision making earlier in their curriculum.

Conclusion: Voluntary case-based discussion sessions implemented at our college of pharmacy has become a mainstay in students' schedules, with increasing interest and positive feedback. Sessions have successfully included student pharmacists at all levels of their education, with younger students appreciating a preview for pharmacotherapy courses, and older students taking the chance to review their clinical decision making skills. Sessions will continue to be held in future semesters, complemented by new voluntary journal club sessions every other week. In the future, we aim to assess the perceived value students find in these sessions, in an effort to continue to improve pharmacy education.

Submission Category: Clinical Services Management

Submission Type: Descriptive Report

Session-Board Number: 5b-447

Poster Title: Pharmacist interventions to decrease readmission rates amongst human immunodeficiency virus (HIV)-infected patients in transitions of care settings

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Purpose: Despite innovations with antiretroviral therapy, patients with HIV continue to have significant hospital readmission rates and decreased quality of care when transitioning between hospital and ambulatory settings. A focus towards improving long-term health of these high-risk patients is necessary to provide better patient care as Medicare's Hospital Readmission Reduction Program is reducing reimbursements to hospitals with increased 30-day readmissions. A pharmacist may bridge the gap of transitioning across environments by encouraging medication adherence, resolving medication access issues, and minimizing unnecessary treatments. We sought to identify potential transitions of care environments in which pharmacists may intervene for patients with HIV.

Methods: Transitions of care interventions for pharmacists regarding patients with HIV were compiled. A primary literature search was completed to identify different environments through which patients with HIV may transition. The search was done through PubMed using keywords HIV, transitions, care, readmission, and Center for Medicare & Medicaid Services (CMS). We looked at review articles, experience interviews and clinical trials demonstrating themes for transition environments and interventions in which pharmacists were involved.

Results: Many clinical trials and review articles illustrated that patients with HIV transitioning from one environment to another usually have little to no knowledge regarding their medications and management of HIV. These transitions of care include outpatient to inpatient and then to outpatient as well as the following transitions more specific to HIV: adolescents that transition from having caregivers (e.g. parents) to becoming their own caregivers and

prisoners that transition from the prison into society. Pharmacists must work with the healthcare team throughout the transition period to utilize strategies to increase the patients' knowledge of their conditions and medications. Interventions can be made though counseling, medication reconciliation, and follow up post discharge. Counseling can be done to ensure that the patient understands why they are using their medications, how to use it, and what to expect from the medication. Pharmacists can ensure timely re-initiation of HIV therapy as well as identify and correct medication errors through medication reconciliation. In addition, they can also assist healthcare providers in finding the optimal medication regimen for each specific patient based on health, and economic factors.

Conclusion: A pharmacist can provide thorough and complete medication evaluations while providing patient education and alternative treatment options using best practice models and evidence-based guidelines. Improving communication across settings may alleviate many of the medication related issues patients with HIV face such as health illiteracy, non-adherence, and medication side effects. Counseling, medication reconciliation, and post-discharge services provided by the pharmacist can be particularly beneficial for HIV patients transitioning from one environment to another.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 7-001

Poster Title: Implementation and evaluation of a preconception peer education program for pharmacy students

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Purpose: Knowledge about preconception health is important for all healthcare providers as it pertains to every woman and man of childbearing age. Pharmacists can uniquely influence preconception health and promote positive pregnancy outcomes through counseling on nutritional supplements, medication risks during pregnancy, tobacco cessation, immunizations, disease state management, and family planning. The U.S. Department of Health and Human Services Office of Minority Health (USDHSS OMH) developed a preconception health peer education certificate training program to improve the availability of preconception health information to the public. This study describes the implementation and evaluation of this certificate program for pharmacy students.

Methods: A cohort study design was used to survey pharmacy students who elected to participate in a preconception peer education certificate program at a college of pharmacy. The certificate program, sponsored by USDHSS OMH, consisted of a one-day live training program delivered by College of Pharmacy faculty followed by additional participation in webinars and peer education events within a one-year time period. An electronic survey was created using Qualtrics LLC 2016 software and distributed via email to all participants at the completion of the certificate program. The survey assessed demographics and perceptions of the preconception peer education program. Reminder emails were sent out one week later for non-responders. Completion of the survey was voluntary. Descriptive statistics were used to characterize data. The study was approved the University's Institutional Review Board.

Results: The survey of 37 student attendees yielded a 46% response rate. Most participants were female (87%). A majority of participants (86%) indicated the reason for attending the program was to increase knowledge about their personal reproductive health and 78% indicated it was to help provide better care to patients. After completing the program, the average rating ("1" being poor and "5" being excellent) of students' self-reported knowledge and confidence increased from 2.29 to 3.21 (p equals less than 0.001) and 1.93 to 3.07 (p equals 0.002), respectively. Eighty percent of participants agreed or strongly agreed that preconception health is relevant to pharmacy practice and 33% agreed or strongly agreed that all pharmacy students should complete this program. Post program completion, 71% of the students reported that they have talked with at least one to five friends, family members, patients or classmates about preconception health with 14% talking to 11 or more people. All of the participants stated they would recommend the program to their colleagues.

Conclusion: A preconception peer education program is useful for pharmacy students. Participants would recommend the program to others. The program helped increase pharmacy students' knowledge and confidence as indicated by self-report. In addition, after completing the program, a majority of participants discussed preconception issues with others including peers and patients. Incorporating the USDHSS OMH preconception peer education program may be an option for pharmacy schools to help students increase their awareness of preconception health for themselves, their peers and patients.

Submission Category: Oncology

Submission Type: Descriptive Report

Session-Board Number: 7-002

Poster Title: Brentuximab vedotin for treatment of non-Hodgkin lymphomas: A systematic review

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Purpose: Brentuximab vedotin (BV) is an antibody-drug conjucate (ADC) comprising a CD30-directed antibody, conjugated to the microtubule-disrupting agent MMAE via a protease cleavable linker. BV is FDA approved for use in relapsed classical Hodgkin lymphoma (HL) and relapsed systemic anaplastic large cell lymphoma (sALCL). There are multiple publications for its utility in other malignancies such as diffuse large B-cell lymphoma (DLBCL), mycosis fungoides (MF), Sézary syndrome (SS), T-cell lymphomas (TCL), primary mediastinal lymphoma (PMBL), and post-transplant lymphoproliferative disorders (PTLD). We believe that BV could potentially provide a strong additional treatment option for patients suffering from non-Hodgkin lymphoma (NHL).

Methods: We performed a systematic review on the use of BV in NHL and other CD30+ malignancies in humans in which the primary study outcomes utilized objective response rate (ORR) as a measure. We searched various databases including PubMed (1946-2015), EMBASE (1947-2015), and Cochrane Central Register of Controlled Trials (1898-2015) yielding 2753 records plus an additional 43 screened from a WHO ICTRP search. Inclusion criteria specified all studies and case reports of NHLs in which BV therapy was administered. Studies with HL, non-human populations, and no reported objective response outcome were excluded from the systematic review. The titles and abstracts of screened articles were reviewed independently by three reviewers (G.K.B., S.L., K.R.). Full articles that were potentially relevant to study were reviewed with the original three reviewers in addition to the fourth reviewer (K.G.) to confirm

the eligibility. Any discrepancies were resolved after group discussion with the four aforementioned reviewers.
After excluding 1110 duplicates, the remaining 1686 records were screened for relevance based on their titles and abstracts. Of these 1686, 73 were deemed potentially eligible and retrieved for full text review. After detailed review, a total of 46 records were further excluded. A total 27 articles met our inclusion criteria: phase II (n=7), phase I (n=6), phase I/II (n=1) and case reports (n=13).

Results: Utilizing the twelve clinical subtypes that we found clinical evidence of BV, we stratify the study populations into three specific groups: B-cell malignancies (group A), T-cell malignancies (group B), and non-B or non-T-cell hematological malignancies (group C).
Across the group A malignancies (DLBCL, PTLD, GZL, PMBL, FL), there were a total of 87 patients. 48% (n=42) experienced an objective response (OR). Further stratified, 26% (n=23) achieved complete remission (CR), 22% (n=19) experienced a partial response (PR), 23% (n=20) maintained stable disease (SD), and 37% (n=32) suffered progressive disease (PD).
Across the group B malignancies (ALCL, SS/MF, TCL, LyP, pc-ALCL), there were a total of 274 patients. 74% (n=203) experienced an OR. Further stratified, 43% (n=119) achieved CR, 27% (n=74) experienced a PR, 5% (n=14) maintained SD, and 11% (n=30) suffered PD.
Across the group C malignancies (PBL, GCT, MC), there were a total of 9 patients. 44% (n=4) experienced an OR. Further stratified, 0% (n=0) achieved CR, 44% (n=4) experienced a PR, 22% (n=2) maintained SD, and 33% (n=3) suffered PD.

Conclusion: Our findings indicate that BV induces a variety of responses, largely positive in nature and variable between 10 NHL subtypes. We noted positive responses specifically within the following NHL subtypes: DLBCL, PTLD, GZL, sALCL, SS/MF, LyP, pc-ALCL, PBL and GCT. With additional, properly powered prospective studies, BV alone or in combination with other agents, need to be studied in prospective trials for various CD30+ malignancies.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 7-003

Poster Title: Assessment of a pharmacist vancomycin dosing policy and opportunities for standardization

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Purpose: Appropriate dosing and monitoring is essential for optimal antimicrobial therapy. A pharmacy pharmacokinetic (PK) dosing policy has been in place for over 10 years and was updated in early 2014 at a community hospital. This policy, in conjunction with current vancomycin dosing guidelines (Therapeutic Monitoring of Vancomycin in Adult Patients), provide recommendations for initial dosing, trough timing and frequency, and additional monitoring. The purpose of this study was to assess vancomycin dosing and monitoring by pharmacists, and identify opportunities for standardization in a community hospital.

Methods: This was a retrospective chart review of patients who were on the pharmacy PK dosing service from April – August 2016. Approximately 20 cases were selected for inclusion into the study. Demographic data such as gender, age, weight and height were collected. Microbiological data collected included positive cultures from all sites and organisms isolated. Additional information collected included patient indication for treatment, previous vancomycin therapy, vancomycin dosing, therapy duration and vancomycin troughs. The primary endpoint was to determine if vancomycin dosing and trough monitoring followed current guidelines and hospital PK policy. The secondary endpoints included length of vancomycin therapy, subsequent troughs, vancomycin dose adjustments and opportunities for de-escalation.

Results: Twenty three patient cases were included; 52.4 percent were female with an average age of 66 years. The most common treatment indication was skin and skin structure infections (10 patients). There were a total of 11 positive cultures. Ten cultures grew Gram-positive organisms (3 were methicillin resistant Staphylococcus aureus) and 3 patients grew Gram-negative organisms. Ten patients (43.4 percent) had previous vancomycin therapy and 2

patients were started on their previous dose. For the primary endpoints, six patients (26 percent) were dosed according to the current vancomycin dosing guidelines and vancomycin troughs were evaluated in 20 patients (25 percent were found in goal range based on treatment indication). For the secondary endpoints, the median length of therapy was 5 days (range 1 to 31 days). Additionally, 7 patients had initial troughs measured after three maintenance doses, 5 patients had troughs measured sooner and 8 patients had troughs measured later. There were a total of 60 troughs measured during 23 patient courses of vancomycin. Of those who had an initial trough measured, 16 patients (80 percent) had their vancomycin dose adjusted. Twenty patients (87 percent) had an opportunity to de-escalate therapy from vancomycin.

Conclusion: Variations in pharmacist dosing of vancomycin were found for initial dosing and trough monitoring, creating opportunities for education and standardization of practice. The next phase of this project will be for pharmacist education and competencies focusing on vancomycin dosing, trough timing, dose adjustments and frequency of monitoring.

Submission Category: Pain Management

Submission Type: Evaluative Study

Session-Board Number: 7-004

Poster Title: Pharmacist strategies for the self-management of pain

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Purpose: The management of pain has been a constant healthcare issue. There have been numerous pain management studies using physician and nurse subject populations, but no such studies have been conducted using a pharmacist population. The purpose of this project is to evaluate self-treatment strategies for pain used by pharmacists, and to allow for valuable insight into the methods employed when managing acute or chronic pain. The specific aims of this study are to determine preferential use between pharmacological and non-pharmacological strategies, preference between strategies for acute versus chronic pain, and whether age and gender might affect management strategies.

Methods: The survey for this study was formulated by two pharmacy professors and three pharmacy students, and adapted from several different pain management surveys. The study was approved by the University institutional review board. Upon completion, the survey was sent to all pharmacists with an email address registered with the State Board of Pharmacy. The survey was made available online through the program Qualtrics. Data collected from the survey was automatically entered into an Excel database and was de-identified. The survey was separated into the following categories: incidence and characteristics of pain, strategies for managing pain, outcomes, and demographics. The questions for descriptors of pain focused on the frequency and intensity of pain experienced. Questions for pain management evaluated how pharmacists treat their pain, including the frequency of usage for prescription drugs, over-the-counter products, and non-pharmaceutical methods. The outcomes questions evaluated treatment efficacy, and the demographics section collected participant data in regards to age,

gender, employment, etc. Additional variables analyzed include how often pain medications are taken, the use of natural or cultural medications, and the severity of pain.

Results: Responses were received from 417 pharmacists. 219 pharmacists reported acute pain (mean age of 44; 35 percent men), 206 reported chronic pain (mean age of 53; 53 percent men), and 55 reported no pain (mean age of 48; 64 percent men). The chronic pain group was more likely to have a disability with poor or fair health status (P less than 0.006). Participants with chronic pain reported higher levels of pain before treatment (6.9 versus 5.8), higher therapeutic goals and arthritis, neuropathy, or sciatica as a cause of pain (P less than 0.03). Women with any pain were more likely to report migraines than men (P less than 0.05). Older participants with chronic pain reported a higher level of tolerance to pain and a higher therapeutic goal for pain (P less than 0.05). Participants with chronic pain were more likely to use anti-inflammatory drugs, opioids, and non-medical strategies than acute pain participants (P less than 0.005). Both groups reported similar relief from all strategies (76 percent versus 78 percent; P equals 0.397), but the chronic pain group reported higher levels of pain after treatment (3.2 versus 2.0), less confidence in pain management, and less satisfaction (P less than 0.004).

Conclusion: Age and gender did not affect the use of specific pain management strategies or the amount of pain relief received from all strategies used by participants with either acute or chronic pain. Participant responses and management strategies for chronic pain differed significantly from those for acute pain in pain before treatment (5.8 versus 6.9), the level of tolerable pain (4.2 versus 4.6), pain level post treatment (2.0 versus 3.2), the therapeutic goal for pain (1.5 versus 2.2), and the ability to sleep with pain (2.8 versus 3.6).

Submission Category: Pharmacokinetics

Submission Type: Evaluative Study

Session-Board Number: 7-005

Poster Title: In vitro aerodynamic analysis of co-spray dried fluticasone propionate (FP) and salmeterol xinafoate (SX) with lactose alternative excipient

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Purpose: It is estimated that 0.5 percent of the adult population has a lactose allergy and would be unable to use the Advair Diskus (FP and SX) product since it is formulated with a lactose excipient. Furthermore, the FP and SX product is formulated via a micronization process, whereas spray dried formulations achieve greater deposition in the targeted respiratory bronchioles. The purpose of this study was to conduct an in vitro comparative analysis of the aerodynamic performance of a co-spray fried formulation of FP and SX with a mannitol excipient to the Advair Diskus 250/50 (FP and SX) product.

Methods: Utilizing mannitol as an excipient, a co-spray dried FP and SX powder was prepared using the Buchi Mini-Spray Dryer B-290 under closed system configuration. A feed solution of 5 to 1 molar ratio of FP to SX was prepared in order to match the Advair Diskus 250/50 device. The resulting feed solution was spray dried at various pump rates of 25, 50, and 100 percent with all other parameters remaining constant (aspiration, atomization rate, nitrogen gas rate). The primary outcome measure was aerodynamic performance which was assessed using the Copley Next-Generation Impactor (NGI). The resulting NGI data was used to calculate mean mass aerodynamic diameter (MMAD), geometric standard deviation (GSD), and fine particle fraction (FPF) of each powder, including the Advair Diskus device. Secondary outcomes included determining water content and size distribution using Karl Fischer titration and scanning electron microscopy, respectively.

Results: Aerodynamic analysis studies were triplicated for each powder. Calculations for FPF, MMAD, and GSD have been described elsewhere. Briefly, FPF was calculated directly from NGI data, whereas MMAD and GSD was calculated using Wolfram Alpha software using the NGI data. T-test regression analysis was used to compare spray-dried powders to the Advair Diskus powder. All statistical tests were 2-sided with p values of less than 0.05 being considered statistically significant. The MMAD values for each spray dried sample was analyzed using a t-test regression against the MMAD values from the Advair Diskus. Fine particle dose is reported as a percentage of the emitted dose, based on the mass recorded from stages 2-7, which represent aerodynamic equivalent of particles 4.46 microns or less in size.
There was no significant difference between the spray dried formulations versus the Advair Diskus for MMAD and GSD (p-values greater than 0.05). The 50 percent and 100 percent pump rate samples had similar FPF to the Advair Diskus (p-value greater than 0.05). However, the 25 percent pump rate sample had a significantly improved FPF compared to the Advair Diskus (p-value of less than 0.01).

Conclusion: In conclusion, the procedures outlined by this study demonstrate that a spray-dried formulation of FP and SX with a mannitol excipient has similar performance to the Advair Diskus product. Of significance, a 25 percent pump rate spray-dry conditions demonstrated an improved FPF compared to the Advair Diskus product. Future studies would be to focus on optimizing other spray-drying variables. Larger scale studies are needed to demonstrate replicability.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 7-006

Poster Title: Healthcare professionals as study subjects: a scoping review

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Purpose: There are several large studies, such as the Nurses' Health Study and the Physicians' Health Study, as well as a variety of other smaller studies that use healthcare professionals as study subjects. However, there is no available information on whether any of these studies involve pharmacists or on the rationale for using health professionals as subjects. The purpose of this study is to conduct a scoping review of studies involving healthcare professionals as study subjects and to describe the methods used, identify the topics researched, and to describe the rationale and limitations of using healthcare professionals as subjects.

Methods: The study was a scoping review of research utilizing health professionals as study subjects. To be included in the review, a study must have included doctors, nurses, or pharmacists as the subjects and must have been written in English. Studies were excluded if the study was a case study, commentary, or editorial. A comprehensive literature search was conducted in Embase, PubMed MEDLINE, Cochrane Library, PsycINFO, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Scopus, and International Pharmaceutical Abstracts. The Physicians' Health Study, Nurses' Health Study, and Health Professionals Follow-Up Study websites reference studies that have been derived from the original cohorts. A systematic sample of every tenth study referenced for each cohort was also collected. Two investigators independently screened the studies, collected data, and met to resolve discrepancies. Data collected included purpose of the study, data collection method, study design, population type, and rationales and limitations to using healthcare professionals as study subjects. The primary endpoint was to determine types of methods used to collect data from the population. The secondary endpoint was to identify the rationale for having health professionals as the subjects of studies.

Results: Sixty-five studies met the eligibility criteria. A total of 45 percent of the studies evaluated cardiovascular events, 25 percent evaluated cancer, nine percent examined ophthalmic events, five percent examined cognitive issues, and 17 percent consisted of miscellaneous topics. Of the 65 studies, 65 percent were prospective studies. In 58 studies (87 percent) questionnaires were utilized as the data collection method. Physicians were defined as a primary study subject in 30 studies (45 percent). Nurses were specified as a primary study subject in 20 studies (30 percent). In 20 studies (30 percent), the population was derived from the Health Professionals Follow-Up Study, where multiple types of health professionals were subjects. The number of each type was undefined. No study included in the sample identified pharmacists as a study subject. A total of 41 studies (63 percent) did not list any rationales or limitations to utilizing health professionals as subjects. Of the 24 studies that did discuss rationales and limitations, the most frequently cited advantage was reliable self-reporting (38 percent of the studies that listed rationale or limitation). The most common limitation to generalizability was high socioeconomic status (21 percent of those reporting rationale or limitation).

Conclusion: Questionnaires were found to be the most common type of method to collect data from healthcare professionals. Physicians were the most often studied type of health professional, followed by nurses. High reliability of data reporting was found to be a common rationale in using health professionals as subjects. The lack of studies utilizing pharmacists as subjects demonstrates an opportunity that should be further evaluated.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 7-007

Poster Title: Assessment of drug-induced QT interval prolongation and associated risk factors

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Purpose: Long QT syndrome (LQTS) is a cardiac disorder characterized by a prolonged corrected QT (QTc) interval on an electrocardiogram (ECG). Drug-induced LQTS is a safety concern associated with an increased risk of torsades de pointes, a condition known to cause syncope, palpitations, and sudden cardiac death from ventricular fibrillation. There are several risk factors and over 200 medications associated with QTc prolongation. The purpose of this study was to assess the incidence of QTc prolongation observed in patients taking multiple QTc prolonging drugs and with potential risk factors for LQTS.

Methods: This was a retrospective chart review which used data from electronic health records. Individuals at least 18 years of age who were admitted to the psychiatric, medical, surgical, or intensive care units of an academic medical hospital in Tucson, Arizona for a minimum of 24 hours from January 2015 to December 2015 were included if they had a recorded ECG after the administration of at least two QTc prolonging medications. A list of drugs associated with QTc prolongation was generated based on the hospital's formulary. Patients who met the inclusion criteria were assessed for risk factors for QTc prolongation, number of QTc prolonging medications received, and presence of QTc prolongation. The QTc interval was considered prolonged if it was greater than 450 milliseconds in men and 470 milliseconds in women. Risk factors examined included age over 65 years, the female sex, a history of cardiovascular disease, and electrolyte disturbances. A chi-square test was used to compare the incidence of QTc prolongation in patients taking two, three, or four or more QTc prolonging medications. Logistic regression was performed using Statistical Package for the

Social Sciences (SPSS) to find the association between risk factors and the incidence of QTc prolongation.

Results: Of the 158 patients examined, 81 (51.3 percent) had documented QTc prolongation following the administration of at least two QTc prolonging drugs. Of the individuals who received two, three, or four or more QTc prolonging drugs, 43.4 percent, 67.3 percent, and 45.5 percent, experienced QTc prolongation, respectively (p less than 0.05). Those who received three QTc prolonging drugs had a significantly greater incidence of QTc prolongation compared to those who received two QTc prolonging drugs (p equals 0.0089) and compared to those who received four or more QTc prolonging drugs (p equals 0.049). There was no difference in the incidence of QTc prolongation in those receiving two versus four QTc prolonging drugs (p equals 0.084). The incidence of QTc prolongation was associated with risk factors including being of the female sex, a history of cardiovascular disease, and electrolyte disturbances (p less than 0.05).

Conclusion: In adult hospital patients, an increase in the number of QTc prolonging drugs received was not associated with a corresponding increase in the incidence of QTc prolongation. Among patients receiving two, three, or four or more QTc prolonging drugs, the incidence of QTc prolongation was greatest in those receiving three drugs. Being of the female sex, a history of cardiovascular disease, or having electrolytes disturbances may increase the risk of QTc prolongation. The clinical significance of QTc prolongation must be determined by assessing incidence of arrhythmias or adverse effects.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 7-008

Poster Title: Evaluating the effects of alvimopan, liposomal bupivacaine and intravenous acetaminophen in colorectal surgery patients

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Purpose: Enhanced recovery after surgery (ERAS) programs are implemented with the goal of shortening hospital length of stay (LOD) while lowering health care costs. By optimizing pre-operative, intra-operative and post-operative care in colorectal surgery patients, they are able to recover at a quicker rate while preserving organ function. The purpose of this study was to determine if the addition of oral alvimopan, liposomal bupivacaine and intravenous acetaminophen as part of a comprehensive ERAS program decreases length of stay, recovery time and/or narcotic use without affecting colorectal surgery patient outcomes.

Methods: The University of Arizona Institutional Review Board (IRB) approved this retrospective chart review of patients at Tucson Medical Center (TMC). Patients before and after the implementation of alvimopan, liposomal bupivacaine and intravenous acetaminophen with an ERAS program were compared. Both groups included men and women over 17 years old who underwent colorectal surgery performed by a specified surgical group. Pre-implementation data was collected between January and December 2014. Post-implementation data included patients who received alvimopan, liposomal bupivacaine and intravenous acetaminophen with the ERAS program between January and August 2015. In total, 37 patients were included in the pre-implementation population and 52 patients were included in the post-implementation population. The primary outcome was hospital length of stay (measured in hours). Secondary outcomes included change in time to first bowel movement (measured in hours), opioid use (measured in morphine equivalent milligrams) and pain scores (measured from 0 to 10) for seventy-two hours following surgery.

Results: The mean length of stay decreased from 124.3 hours to 100.2 hours (P equals 0.13) with the addition of the ERAS program activities and the three medications. The time to first bowel movement decreased from 67.2 hours to 46 hours (P equals 0.03). The twenty-four hour morphine equivalent intervals for seventy-two hours following surgery decreased from 125.8 mg (day 1), 81.9 mg (day 2) and 44.5 mg (day 3) to 44.3 mg (day 1), 22.8 mg (day 2) and 13.22 mg (day 3) (P equals less than 0.001, P equals less than 0.001 and P equals 0.001 respectively). Pain scores were not statistically significant between the two groups.

Conclusion: The addition of alvimopan, liposomal bupivacaine and intravenous acetaminophen as part of a comprehensive ERAS program decreased length of stay but not significantly. However, the addition of these three medications with the ERAS program changes was associated with a statistically significant decrease in time to first bowel movement and opioid use. Pain scores were reduced, but not significantly. Further studies may be advantageous to further explore the benefit of specific elements of ERAS programs.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 7-009

Poster Title: Development of a pharmacist competency assessment in order to standardize vancomycin practices at a regional medical center

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Purpose: Antimicrobial stewardship aims at improving the appropriate use of antimicrobial therapy through an active role in the selection, dose, duration, and route of administration of antibiotics. To this goal, a vancomycin pharmacokinetic (PK) dosing policy has been established for over 10 years and was recently revised in 2014. The policy outlines proper dosing and monitoring to be performed by pharmacists based on current clinical guidelines. The purpose of this study was to create a vancomycin competency assessment for pharmacists in order to standardize dosing and monitoring practices at a regional medical center.

Methods: Methods for a previously conducted vancomycin MUE have been described elsewhere. In summary, it was a retrospective chart review of patients between April – August 2016 who were dosed and monitored by the pharmacy PK dosing service. Demographic and microbiologic data were collected, as well as vancomycin indication, dosing, and monitoring. The primary endpoint of the MUE was to determine if vancomycin therapy was in accordance with the vancomycin PK dosing policy and current guideline recommendations. Based on the results of the MUE, opportunities for improvement were identified. This study developed an educational program and competency assessment the pharmacist staff using online software. The education portion included a review of initial dosing, timing of troughs, dose adjustments, frequency of monitoring, and opportunities for de-escalation of vancomycin. The educational program was provided to all pharmacists to complete as part of their professional development. After completing the education portion, pharmacists were given an assessment to evaluate their understanding of the material covered.

Results: The educational materials were developed and provided to approximately 20 pharmacists. The pre-recorded video lecture reviewed current clinical guideline recommendations and the existing vancomycin PK dosing policy. Dosing, trough monitoring, and de-escalation of antimicrobial therapy were covered in detail. The assessment component included case-based questions involving initial dosing of vancomycin based on indication, timing of initial trough measurements, dose adjustments based on trough levels, and de-escalation of treatment. Pharmacists provided feedback that both the education and assessment were helpful and would likely improve their practice.

Conclusion: Education and competency assessment are useful tools for identifying knowledge gaps. These can be implemented as a means of improving patient care and reducing variation in dosing practices. The next phase of this project will be to repeat a vancomycin MUE to assess whether this intervention had any impact on standardizing vancomycin dosing practices.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 7-010

Poster Title: Retrospective medication use evaluation of intravenous acetaminophen assessing compliance of institution specific restrictions and effects of intravenous route compared to alternative routes of administration

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Purpose: The goal of this retrospective medication use evaluation aimed 1) to assess appropriateness of intravenous acetaminophen orders according to institution specific restrictions previously enacted to reduce unnecessary medication cost, and 2) to assess the effects of intravenous acetaminophen in comparison to alternative routes of administration in postoperative patients in regards to pain score, opioid consumption, and length of stay at a non-for-profit community hospital.

Methods: Medication use of acetaminophen was retrospectively assessed in patients who underwent surgery between July 1 and July 31, 2016. Patients were included in data collection if they received acetaminophen for pain management postoperatively. Patients were excluded from data collection if they did not receive acetaminophen postoperatively. Patient groups were differentiated between control and study groups based on route of administration: those receiving intravenous acetaminophen composed the study group and patients receiving alternative routes of administration of acetaminophen composing the control group. The primary endpoint was appropriateness of intravenous acetaminophen therapy based on pharmacy and therapeutics committee approved restrictions. Secondary endpoints included type of surgery, consecutive patient-reported pain scores, concurrent opioid consumption, and length of stay. All opioid consumption administered within 48 hours from the start of surgery was included in data collection and converted to oral morphine equivalents.

Results: A total of 190 patients were included in the data analysis: 95 patients in each group. Only three of 95 patients in the study group appropriately received intravenous acetaminophen based on pharmacy and therapeutics committee approved restrictions. Observed pain score

averages between the study and control groups were comparable, 3.0 versus 3.1 respectively. Concurrent opioid consumption expressed in oral morphine equivalents was slightly higher in the study group compared to the control groups, 183 milligrams versus 163 milligrams respectively. Length of stay was observed to be slightly higher in the control group compared to the study group, 4.9 days versus 4.2 days respectively. This difference in length of stay could potentially be attributed to the diminished number of orthopedic surgery patients(37% versus 47%) in the control group population in comparison to the study group.

Conclusion: Utilization of intravenous route of administration of acetaminophen was not indicated in the majority of patients who received the intravenous formulation according to the institution specific restrictions. Pain scores, opioid consumption within 48 hours postoperatively, and length of stay for postoperative patients were similar in patients who received intravenous acetaminophen and patients who received alternative routes of acetaminophen. Oral or rectal routes of acetaminophen should be utilized, unless contraindicated, to provide cost-effective patient care.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 7-011

Poster Title: Influence of negative procalcitonin (PCT) levels on length of hospital stay and antimicrobial duration in patients with a diagnosis of sepsis

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Purpose: Procalcitonin (PCT) is the peptide precursor of the hormone calcitonin. Normal PCT levels are < 0.05 ng/mL in healthy individuals, but may rise in response to systemic inflammation. Advantages include specificity for bacterial infections, a rapid rise then decline with infection control, and it often parallels severity of illness. It has been studied primarily in lower respiratory infections and sepsis. The primary outcomes of this study were to determine if negative PCT levels in patients diagnosed with sepsis resulted in a shorter length of stay and antimicrobial duration compared to a control group with no PCT levels.

Methods: This was a single center, retrospective chart review conducted in a 210 bed community hospital from May 31, 2014 to August 30, 2016. Patients with a diagnosis code of sepsis were included in the study. Patients were excluded if they were immunocompromised or transitioned to comfort care during admission. Demographic data, serum creatinine, intensive care unit (ICU) admission, ICU length of stay (LOS), hospital LOS, antimicrobials administered, duration of inpatient and outpatient antimicrobial therapy, culture data, 30 day all-cause mortality, and 30 day hospital re-admission for infection were collected. Patient characteristics and outcomes were compared using two-sample t-tests and Pearson chi-square tests for continuous and categorical data, respectively.

Results: A total of 196 patients with a diagnosis of sepsis were included (n=98 negative PCT, n=98 control). The mean patient age was 66.3 years (range of 25-98) and 62.4 years (range of 19-91) for the negative PCT and control groups, respectively (p=0.13). Baseline characteristics were similar between groups, with the exception of patients with a history of pulmonary disease (n=34 negative PCT, n=16 control, p= 0.003). The length of hospital stay was similar

between groups (5.6 days negative PCT, 5.2 days control, p=0.34). Antibiotic duration was also similar between groups (10.6 days negative PCT, 10.7 days control, p=0.91). A subgroup of patients with negative cultures were evaluated in each arm (n=49 negative PCT, n=31 control). The antibiotic duration was shorter for the negative PCT group when cultures were negative (9.1 days), but was longer for the control within this subgroup (12 days). The difference was not significant between study groups (p=0.13).

Conclusion: Length of hospital stay and antibiotic duration were not statistically different between septic patients with a negative PCT compared to a control group with no PCT levels. There were no differences in either outcome when a subgroup of patients with negative cultures were compared between study arms. Patients on antibiotic therapy prior to admission were included, which is a limitation. Based on findings of this study, the negative PCT levels may not have influenced antibiotic duration. Proper utilization of PCT levels should be examined to encourage antimicrobial stewardship principles, including de-escalation of antibiotics when indicated.

Submission Category: Clinical Services Management

Submission Type: Evaluative Study

Session-Board Number: 7-012

Poster Title: Comprehensive medication management of psychiatric patients initiated on antimicrobial therapy

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Purpose: Identify medication interactions, including category and potential adverse effects, between commonly prescribed psychotropic and antimicrobial medications at Mercy Hospital Northwest Arkansas. When psychotropic and antimicrobial medications are taken concurrently, medication interactions have been reported, including serotonin syndrome or QTc prolongation. There is limited data to guide clinicians on how to discontinue psychotropic medications. This study aims to use comprehensive medication management to identify the most common interactions and the warning and category of the interactions identified.

Methods: This was a single center, observational study conducted at a 210 bed community hospital in Northwest Arkansas. Data was collected from August through mid-September 2016. Data was obtained for patients 18 years and older with concomitant psychotropic and antimicrobial orders utilizing an electronic health record system (EPIC). Patients with an interaction resulting in a category C, D or X were included. Lexicomp® was used to classify interactions. The medications involved in these interactions were recorded to develop a list of the most common medication interactions.

Results: Over a 6-week period, 59 patients were identified as having at least one category C, D or X medication interaction occurring between a concurrent psychotropic and an antimicrobial medication. A total of 79 medication interactions were recorded; 55.7% were category C interactions, 15% were category D and 29% were category X. The majority of patients had only one medication interaction, while the rest had two or more interactions. QTc prolongation was the most common warning indicated from the medication interactions. The most common antimicrobial class interacting with psychotropics were fluoroquinolones, accounting for 77% of

the interactions. The most common psychotropics prescribed were the selective serotonin reuptake inhibitors and mirtazapine.

Conclusion: The most common interactions identified were category C followed by category X interactions. QTc prolongation accounted for the majority of the potential adverse effects. To overcome this common occurrence of potentially harmful medication interactions, a baseline EKG should be considered throughout therapy to monitor patients. Further studies are needed to address effective methods to alter medication therapy when interactions are a concern between psychotropics and antimicrobials.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 7-013

Poster Title: Incidence and prevention of QTc interval prolongation when using combinations of QTc-prolonging antimicrobials and antipsychotics

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Purpose: Drug-induced prolongation of the QTc interval, or acquired Long QT Syndrome (LQTS), can lead to an arrhythmia called Torsades de Pointes (TdP). The risk of LQTS increases when multiple QTc-prolonging medications are prescribed. Some risk factors for developing LQTS may be considered modifiable, allowing prescribers to monitor them and decrease patient risk. The primary objective of this study was to examine the effects on the QTc interval when QTc-prolonging antimicrobials and antipsychotics were prescribed. The secondary objectives were to define the incidence of other cardiac abnormalities during dual therapy, and to determine how effectively providers monitored modifiable LQTS risk factors.

Methods: This was a retrospective chart review of 106 drug class combination events occurring between January 1, 2016 and September 7, 2016 in a 210-bed community hospital. Events were selected if patients were administered an antibiotic (azithromycin, ciprofloxacin, or levofloxacin) and an antipsychotic (haloperidol, quetiapine, or ziprasidone) within 24 hours of each other. Events were analyzed for demographic information, the presence of baseline and follow-up EKG data, the magnitude of QTc prolongation during dual therapy, occurrence of arrhythmias or other cardiac abnormalities, and whether lab values for magnesium and potassium were maintained at goal levels.

Results: The QTc interval increased an average of 40.7 msec from baseline for all combination events. The greatest increase occurred with the combination of levofloxacin and ziprasidone (98.8 msec), while ciprofloxacin and ziprasidone had a smaller increase (16.5 msec). The most frequent combination events were levofloxacin with quetiapine or haloperidol. Several patients had multiple risk factors for LQTS, including arrhythmias, cardiac and electrolyte abnormalities,

QTc prolongation at baseline, lack of follow up EKGs, and documentation of QTc prolongation both prior to and during dual therapy. An arrhythmia was documented during dual therapy for 27.4 percent of events, and other cardiac abnormalities occurred in 66 percent of events. When monitoring electrolytes, 52 percent of the lab values for magnesium did not meet the goal of 2 mEq per L or greater, and 44 percent of potassium lab values did not meet the goal of 4 mEq per L or greater. Baseline QTc values were greater than 450 msec in 20.6 percent of dual therapy events. Follow up EKG monitoring was ordered in only 70.8 percent of events. A prolonged QTc interval was documented before dual therapy in 3.8 percent of events, and during therapy in 4.7 percent of events.

Conclusion: This study found that prolongation of the QTc interval does occur with co-administration of QTc prolonging medications, specifically macrolide and fluoroquinolone antibiotics combined with first and second generation antipsychotics. Electrolytes, such as potassium and magnesium, were at goal only half of the time, and follow up EKGs were not ordered in 29.2 percent of dual therapy events. These factors increased patient risk, and represent future opportunities for improvements in reducing modifiable risk factors for LQTS and TdP.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 7-014

Poster Title: Process evaluation and effectiveness of potassium replacement in the medical intensive care unit

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Purpose: Rules of thumb for the replacement of electrolytes, including potassium, are used without regard to numerous patient specific factors that may affect the achievement of target serum concentrations. Similarly, follow-up on the results from electrolyte replacement may not be performed within the desired and safe time frame. Our purposes were to evaluate the effectiveness and safety surrounding potassium replacement in the medical intensive care unit at our institution.

Methods: This was a single-center, IRB approved, retrospective, observational evaluation of intravenous and oral potassium replacements ordered for patients admitted to a medical intensive care unit from May 2014 to April 2016. Days on which patients received renal replacement therapy, bicarbonate infusion, loop diuretic infusion, insulin infusion, amphotericin B, or digoxin were excluded from analysis. Baseline demographics and clinical characteristics were described with descriptive statistics (count, percentage, and mean). The primary effectiveness outcome (achievement of target serum potassium concentration) and safety outcome (potassium concentration checked within 24 hours of replacement) were evaluated with counts and percentages.

Results: In total, 581 potassium replacements were evaluated. The average day of hospitalization was 14 (range: 1-73) and age was 54.6 years. Co-morbid disease states that could have affected patients' response to potassium replacement were alcohol abuse disorder (17.4%), diabetes mellitus (15.0%), and chronic kidney disease (15.8%). Only 374 replacements (64.4%) had a serum potassium concentration checked within 24 hours of replacement. Of

these 374 replacements, only 117 (31.3%) achieved the target serum potassium concentration of 4 mEq/L.

Conclusion: Safe and effective potassium replacement is not the current standard of practice in this medical intensive care unit. Staff education and development of an evidence-based replacement algorithm should be pursued.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 7-015

Poster Title: Process Evaluation and Effectiveness of Phosphate Replacement in the Medical Intensive Care Unit

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Purpose: Rules of thumb for the replacement of electrolytes, including phosphate, are used without regard to numerous patient specific factors that may affect the achievement of target serum concentrations. Similarly, follow-up on the results from electrolyte replacement may not be performed within the desired and safe time frame. Our purposes were to evaluate the effectiveness and safety surrounding phosphate replacement in the medical intensive care unit at our institution.

Methods: This was a single-center, IRB approved, retrospective, observational evaluation of intravenous and oral phosphate replacements ordered for patients admitted to a medical intensive care unit from May 2014 to April 2016. Days on which patients received renal replacement therapy, bicarbonate infusion, loop diuretic infusion, insulin infusion, amphotericin B, or digoxin were excluded from analysis. Baseline demographics and clinical characteristics were described with descriptive statistics (count, percentage, and mean). The primary effectiveness outcome (achievement of target serum phosphate concentration) and safety outcome (phosphate concentration checked within 24 hours of replacement) were evaluated with counts and percentages.

Results: Results: In total, 112 phosphate replacements were evaluated. The average day of hospitalization was 12 (range: 1-73) and age was 52.8 years. Co-morbid disease states that could have affected patients' response to phosphate replacement were alcohol abuse disorder (8.0%), diabetes mellitus (19.6%), and chronic kidney disease (17.9%). Only 58 replacements

(51.8%) had a serum phosphate concentration checked within 24 hours of replacement. Of these 58 replacements, only 34 (58.6%) achieved the target serum phosphate concentration of 3 mmol/L.

Conclusion: Safe and effective phosphate replacement is not the current standard of practice in this medical intensive care unit. Staff education and development of an evidence-based replacement algorithm should be pursued.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 7-016

Poster Title: Evaluating the impact of advanced pharmacy practice experience (APPE) rotations on student pharmacists' attitudes and perceptions toward interprofessional practice

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Purpose: Interprofessional healthcare teams have been shown to decrease costs, improve patient satisfaction, and ultimately enhance the quality of patient care. To become successful team members, healthcare professional students must develop competency in interprofessional practice (IPP). APPEs are key to developing skills in IPP. Assessing the impact of APPEs on student pharmacists' perceptions of IPP is crucial to adapt training and ensure practice readiness. The Student Perceptions of Interprofessional Clinical Education–Revised (SPICE-R) instrument was developed to assess students' attitudes of IPP and could be used to better integrate IPP experiences into the APPE curriculum.

Methods: Fourth-year student pharmacists were given a paper version of the SPICE-R instrument prior to and after completion of their APPE rotations. Participating students' demographic and characteristic information was collected from the experiential education system and described using descriptive statistics. Wilcoxon signed rank or paired student t-tests were employed to determine changes in all SPICE-R domain scores. Factors associated with SPICE-R domain scores were evaluated using multiple regression analysis.

Results: Sixty-nine student pharmacists were included in the analysis. Of these, 53 (77%) were female and the average age was 27.7 years. Twenty-two (32%) students pursued post-graduate residency training (PGRT) following graduation and 47 (68%) did not. Among all students, the overall mean SPICE-R score was 4.32 pre-APPEs and 4.51 post-APPEs (max= 5; p=0.027). The differences in pre- and post-APPE scores for Domains II and III yielded significant differences

(p=0.0026 and p=0.031, respectively). Students who did not pursue PGRT recorded significantly higher comprehension of Domain II subjects, both pre- and post-APPEs, than those who did pursue PGRT (p=0.025 and p=0.045, respectively).

Conclusion: Assessing student pharmacists' perceptions of IPP, especially regarding APPEs, is vital to improving its incorporation into the pharmacy school curriculum. Further investigation is needed to identify strategies to improve student understanding of the IPP statements addressed in Domain II. Qualitative investigation is required to understand the differences in Domain II scores between students who pursued PGRT and those who did not.

Submission Category: Leadership

Submission Type: Evaluative Study

Session-Board Number: 7-017

Poster Title: Knowledge gap analysis of first year student pharmacists regarding residencies and career paths

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Purpose: Student pharmacists often begin their fourth year rotations with inadequate knowledge about the variety of health-system careers. It is essential for all student pharmacists to understand the diverse pharmacy career opportunities that are available, including post-graduate training options and their importance to certain future desired careers. The purpose of this survey was to assess the knowledge of and attitudes towards health-system pharmacy careers and post-graduate training opportunities that incoming students have.

Methods: All data were collected through a survey administered to the entering pharmacy class of 2019 at the University of Arkansas for Medical Sciences College of Pharmacy. The first portion of the survey requested basic demographic information such as age, gender, previous education, and pharmacy experience/setting. The second portion of the survey focused on students' perception of their knowledge of post-graduate training opportunities, i.e. residencies, certification, dual-degrees. The third segment asked for students' level of understanding about various pharmacy careers. The final portion of the survey was centered around students' attitudes toward post-graduate training and its perceived importance to their career goals. Answers were compared using Chi-square and Fisher exact tests. A p-value < 0.05 was determined to be statistically significant.

Results: Analysis of baseline demographics for survey participants demonstrated a class that is 23 years of age on average, predominantly Arkansas residents (84%), and starting pharmacy as their first career (84%). Comparing results between beginning and end of year, students

interested in pursuing residency training decreased 27% to 16% (p=0.057). For analysis, students were divided into two groups based on whether or not they were interested in pursuing a residency. By the end of the year, levels of familiarity with job duties of a hospital staff pharmacist and decentralized hospital pharmacist were higher in the group of students who planned to complete a residency (p=0.01 and p=0.046). Other career areas were similar between groups, but positions such as medical liaison pharmacist, informatics pharmacist, investigational drugs pharmacist, and home infusion pharmacist had very low responses for levels of familiarity between both groups (mostly < 40%). Students interested in residencies felt that post-graduate training was necessary for obtaining a position in the future (63% vs. 6%, $p < 0.001$). Those interested in post-graduate training also felt residencies were needed due to new and challenging roles pharmacists will have in the future (89% vs. 40%, $p < 0.001$).

Conclusion: Students appear to have very different knowledge and attitudes on health-system career opportunities depending on their future plans. A concerted effort to equally teaching all students about the health-system opportunities available is needed to better prepare them for future pharmacy careers.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Evaluative Study

Session-Board Number: 7-018

Poster Title: Integration of Clinical Pharmacy Services into Emergency Medicine: Cost Avoidance and Qualitative Outcomes

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Purpose: Integration of clinical pharmacy services into the emergency department team is a relatively recent emergence and expansion of pharmacy practice. Two goals of this study were to obtain quantitative and qualitative data to determine the effect of implementation of clinical pharmacy services into the emergency department. Clinical pharmacy specialist interventions were recorded to determine cost avoidance, while integration and acceptability were determined by emergency staff personnel interviews. Implementation and integration of a clinical pharmacy specialist into the emergency department is still an unfamiliar process, this study demonstrates a successful model that could be used in the future.

Methods: This prospective, IRB approved four-month study (August 2015 – November 2015) was conducted at a single-center, tertiary care, academic medical center, adult level 1 trauma center with approximately 60,000 annual emergency department visits and included a mixed-methods approach. The pharmacy specialist prospectively documented interventions in the electronic medical record. At the end of the four-month investigational period, all interventions were categorized into cost avoidance measures and sub-categorized by clinical function. Cost avoidance categories were Drug-Drug Interactions, Drug-Disease Interactions, or Drug Incompatibilities Identified, Therapeutic Recommendations, Adverse Drug Event Prevented, and Medication Error Prevented. Qualitative analysis included sixteen semi-structured interviews with a clinical sociologist that occurred between April 2016 and September 2016. The interviews were conducted individually and in person with six emergency department registered nurses, one emergency department nurse manager, five emergency department

resident physicians, three emergency department attending physicians, and the emergency department service line director. Interviews included a multi-stakeholder analysis of feasibility and acceptability of pharmacist clinical roles in emergency department teams. Semi-structured interviews were guided around the implementation and integration of a pharmacist's position into the emergency department. The interviews were recorded, transcribed, and coded to reveal relevant and common themes.

Results: A total of 352 interventions were analyzed. The clinical pharmacy specialist was in the emergency department for 227 total hours during this investigation. The overall cost avoidance was estimated to be $138,601.67, or $610.58 in cost avoided per pharmacist staffed hour. The projected cost avoidance with a full time pharmacist in the ED over the course of a year was estimated to be $1,221,160.09. The clinical category that provided the most cost avoidance was Medication Error Prevented at $65,243.75 or 47% of the total cost avoided. Therapeutic Recommendations was the second most cost avoiding clinical category at $51,749.28 or 37% of the total cost avoided. Approximately one-third of the interventions were categorized as Other and included pharmacy functions such as medication reconciliation, administrative duties, and facilitating communication and medication transport between emergency department and inpatient pharmacy. Emerging qualitative themes were categorized by Implementation (e.g. preparation of staff to utilize the pharmacist, what communication occurred departmentally, SOP with pharmacist in work flow), Drug Information Specialist and Resource (e.g. availability of frequently used medications, improvement of work flow), Code Response (e.g. drawing up medications, clinical assessment support, individualized patient needs) and Future Pharmacist Integration (e.g. personality, fit, student opportunities).

Conclusion: This study establishes a successful model for implementation of clinical pharmacy services into the emergency department with potential cost avoidance of more than $1,000,000 per year. Research suggests cost of a pharmacist's salary is the largest barrier to integration. This cost avoidance trial with an implementation model provides support for the expansion of clinical pharmacy roles into the emergency department. A standardized integration protocol benefits the emergency department medical teams to prepare for implementation of a pharmacist's role. The expanding role of clinical pharmacy practice continues to evolve the profession into integrated clinicians on the medical team.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 7-019

Poster Title: Evaluation of the effects of changing the time vancomycin concentrations are drawn in medical ICU patients.

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Purpose: Vancomycin is a first line antibiotic therapy for the treatment of infections caused by methicillin resistant Staphylococcus aureus (MRSA) and Staphylococcus epidermidis (MRSE). Most institutions do not have established clinical practice guidelines for the initiation and therapeutic drug monitoring of serum vancomycin levels. This can lead to inappropriate timing of trough collection, resulting in sub- or supratherapeutic levels. The purpose of this study was to evaluate if a difference in the proportion of serum vancomycin trough concentrations drawn appropriately differed before and after an initiative to change the time when vancomycin concentrations were drawn in medical intensive care unit settings.

Methods: This was a retrospective chart review of patients in the medical ICU setting from May 2014 to May 2016 who received intravenous vancomycin at a scheduled interval. A policy changed that was implemented in August 2015, allowing pharmacists to be consulted to manage vancomycin therapy and encourage standard dosing intervals to include a dose within 1 hour following morning labs. Descriptive statistics (mean, standard deviation, counts, and percentages) were performed. Chi-square and student t tests per performed between groups, as appropriate. In order to detect a 15% change in the percentage of serum vancomycin trough concentrations that were drawn appropriately with 80% power and an alpha value of 0.05, 122 patients in each group would need to be evaluated. . However, we were only able to evaluate 68 patients in the pre-intervention group, and 176 patients in the post-intervention group.

Results: Patients in the pre- and post-intervention groups received a similar frequency of loading doses (12% vs. 10%) and similar weight-based maintenance dosing (13.7 mg/kg vs. 14.5 mg/kg). Standard dosing intervals (every 12 or 24 hours) were used in the majority of patients

(85.3% vs. 86.9%). Vancomycin troughs were drawn more frequently with morning labs in the post-intervention group (5.9% vs. 80.7%, $p < 0.001$). There was no significant difference in the percent of vancomycin troughs drawn appropriately at 30 (33.8% vs. 30.1%), 60 (58.8% vs. 59.7%), or 75 (69.1% vs. 71.6%) minutes from the next scheduled dose.

Conclusion: Implementation of a universal vancomycin trough schedule did not appear to affect the percentage of inappropriately drawn vancomycin troughs. This finding may be the result of the morning lab draws occurring earlier than expected, frequently more than an hour before the next vancomycin dose. We will consider moving the scheduled lab draws closer to 0500 or move the scheduled vancomycin doses closer to 0400.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 7-020

Poster Title: Evaluation of the effects of changing the time vancomycin concentrations are drawn in non-ICU patients.

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Purpose: Vancomycin is a first line antibiotic therapy for the treatment of infections caused by methicillin resistant Staphylococcus aureus (MRSA) and Staphylococcus epidermidis (MRSE). Most institutions do not have established clinical practice guidelines for the initiation and therapeutic drug monitoring of serum vancomycin levels. This can lead to inappropriate timing of trough collection, resulting in sub- or supratherapeutic levels. The purpose of this study was to evaluate if a difference in the proportion of serum vancomycin trough concentrations drawn appropriately differed before and after an initiative to change the time when vancomycin concentrations were drawn in non-intensive care unit (ICU) settings.

Methods: This was a retrospective chart review of patients in the non-ICU setting from May 2014 to May 2016 who received intravenous vancomycin at a scheduled interval. A policy changed that was implemented in August 2015, allowing pharmacists to be consulted to manage vancomycin therapy and encourage standard dosing intervals to include a dose within 1 hour following morning labs. Descriptive statistics (mean, standard deviation, counts, and percentages) were performed. Chi-square and student t tests per performed between groups, as appropriate. In order to detect a 15% change in the percentage of serum vancomycin trough concentrations that were drawn appropriately with 80% power and an alpha value of 0.05, 122 patients in each group would need to be evaluated. For the non-ICU portion of our research we evaluated 124 patients in the pre-intervention group and 122 patients in the post-intervention group.

Results: Patients in the pre- and post-intervention groups received a similar frequency of loading doses (16% vs. 14.5%). Patients in the pre- and post-intervention groups did not have similar weight-based maintenance dosing (15.3mg/kg vs. 16.5 mg/kg, $p < 0.03$). Standard dosing intervals (every 12 or 24 hours) were used in the majority of patients (76% vs. 84%). Vancomycin troughs were drawn more frequently with morning labs in the post-intervention group (14% vs. 87%, $p < 0.001$). There was no significant difference in the percentage of vancomycin troughs drawn appropriately at 30 (40% vs. 42%), 60 (57% vs. 63%), or 75 (60% vs. 68%) minutes from the next scheduled dose.

Conclusion: Implementation of a universal vancomycin trough schedule did not appear to affect the percentage of inappropriately drawn vancomycin troughs. This finding may be the result of the morning lab draws occurring earlier than expected, frequently more than an hour before the next vancomycin dose. We will consider moving the scheduled lab draws closer to 0500 or move the scheduled vancomycin doses closer to 0400.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 7-021

Poster Title: Norepinephrine and early vasopressin versus norepinephrine alone for septic shock: Retrospective, cohort study

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Purpose: End-organ damage due to septic shock is reduced when adequate perfusion is restored. Norepinephrine is recommended as the initial vasopressor for septic shock. Vasopressin may be added to raise mean arterial pressure or to decrease the norepinephrine dose, which may be useful in reducing some of norepinephrine's unfavorable side effects. The purpose of this study was to determine whether norepinephrine in combination with vasopressin or norepinephrine monotherapy had more beneficial effects on time to target mean arterial pressure.

Methods: A retrospective, single center, cohort study comparing the early addition of vasopressin to norepinephrine versus norepinephrine alone from May 2014 to October 2015 was conducted. Medical intensive care unit patients with septic shock were included. An unadjusted analysis of time to goal mean arterial pressure was conducted using student t-test. Linear regression was performed to examine the effect of time to mean arterial pressure in the treatment group. Baseline variables were examined for a bivariate relationship with time to goal mean arterial pressure. Variables with a p-value less than 0.2 were included in the model (treatment group, gender, height, heart rate and mean arterial pressure at septic shock onset, culture with non-lactose Gram-negative bacilli, and sequential organ function assessment score at 72 hours).

Results: 96 patients were evaluated. Sequential organ function assessment scores at 6 hours were greater in early vasopressin patients (9.9 vs 8.8, p-value 0.01) but similar at 24 and 72 hours. Mean arterial pressure (61.5 vs 58.6 mm Hg) and intravenous fluid volume at vasopressor initiation (1669 vs 1385 mL) were similar. In unadjusted analysis, goal mean arterial pressure was achieved and maintained sooner in early vasopressin patients (6.2 vs 9.9 h, p-value 0.023). Norepinephrine was used for a shorter duration (54.3 vs 88.3 h, p-value 0.05) and at a higher maximum dose (28.8 vs 21.5 mcg per min, p-value 0.046) in early vasopressin patients. Hospital duration was halved in early vasopressin patients (343 vs 604 h, p-value 0.014). No difference in new-onset arrhythmia (6 vs 8 percent, p-value 0.999) or mortality (40 vs 42 percent, p-value 0.999) existed. Norepinephrine alone was associated with increased time to goal mean arterial pressure (Beta: 3.26, p-value 0.067); however, sufficient power was not achieved to show statistical significance.

Conclusion: Vasopressin, when initiated early in patients with septic shock, achieved and maintained goal mean arterial pressure sooner despite similar initial mean arterial pressure and fluid volumes and higher sequential organ function assessment scores.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 7-022

Poster Title: Process evaluation and effectiveness of magnesium replacement in the medical intensive care unit

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Purpose: Rules of thumb for the replacement of electrolytes, including magnesium, are used without regard to numerous patient specific factors that may affect the achievement of target serum concentrations. Similarly, follow-up on the results from electrolyte replacement may not be performed within the desired and safe time frame. Our purposes were to evaluate the effectiveness and safety surrounding magnesium replacement in the medical intensive care unit at our institution.

Methods: This was a single-center, IRB approved, retrospective, observational evaluation of intravenous magnesium replacements ordered for patients admitted to a medical intensive care unit from May 2014 to April 2016. Days on which patients received renal replacement therapy, bicarbonate infusion, loop diuretic infusion, insulin infusion, amphotericin B, or digoxin were excluded from analysis. Baseline demographics and clinical characteristics were described with descriptive statistics (count, percentage, and mean). The primary effectiveness outcome (achievement of target serum magnesium concentration) and safety outcome (magnesium concentration checked within 24 hours of replacement) were evaluated with counts and percentages.

Results: In total, 152 magnesium replacements were evaluated. The average day of hospitalization was 13 (range: 1-46) and age was 51.3 years. Co-morbid disease states that could have affected patients' response to magnesium replacement were alcohol abuse disorder (18.4%), diabetes mellitus (5.9%), and chronic kidney disease (9.2%). Only 82 replacements

(53.9%) had a serum magnesium concentration checked within 24 hours of replacement. Of these 82 replacements, only 37 (45.1%) achieved the target serum magnesium concentration of 2 mEq/L.

Conclusion: Safe and effective magnesium replacement is not the current standard of practice in this medical intensive care unit. Staff education and development of an evidence-based replacement algorithm should be pursued.

Submission Category: Leadership

Submission Type: Descriptive Report

Session-Board Number: 7-023

Poster Title: Pharmacy school interprofessional education models - A retrospective evaluation of California and nationally cited models

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Purpose: In the previous Accreditation Council for Pharmacy Education (ACPE) Standards from 2011, interprofessional education (IPE) was listed as a recommended component of the pharmacy school curriculum. The new 2016 ACPE Standards now officially require interprofessional education to be part of the pharmacy curriculum. This change was made to better prepare students to enter the field ready to participate as members of an interprofessional, patient-centered team.1 The goal of our research is to formulate the best IPE delivery model based on studying different pharmacy schools' curricula.

Methods: The California Northstate University (CNU) 2014 CAPSLEAD (California Pharmacy Student Leaders) Team conducted a retrospective study to determine if and how California pharmacy schools were implementing IPE prior to the new 2016 requirement standards.6 Based on information gathered, the CNU CAPSLEAD Team formulated an ideal model to most effectively deliver IPE.6 As an extension to this previous study, our team collected current data on California schools' implementation and delivery of IPE, and evaluated interesting IPE models from other pharmacy schools in the US. This study was performed in an effort to evaluate and make any necessary adjustments to the previous CNU CAPSLEAD IPE model with the passing of the new accreditation standards. The team also reported new findings on common pitfalls that IPE models are lacking; including lack of standardized metrics to measure the success of implemented IPE models.

Results: Analysis of data showed: a variety of IPE delivery formats ranging from group discussions to actual courses where IPE was delivered, all IPE delivery ranged from the 1st through 4th years of pharmacy school, the schools' disciplines that were included ranged from two to nine disciplines, and measures of success ranged from surveys to grades with undefined parameters. Based on these findings, the CNU 2014 CAPSLEAD model was adjusted to a four stage model including a longitudinal component. Stage 0 consisted of specific training of faculty to specialize in delivering IPE instruction. Stage 1 consisted of introductory IPE encompassing foundations of IPE. Stage 2 consisted of participation in face to face patient care sessions with other health care students followed by simulation or patient case presentation days. Stage 3 consisted of student surveys to assess IPE experience, as well as a graded portion to assess individual student performance outcomes during the APPE General Medicine cumulative portion. The longitudinal component consists of volunteering at health fairs or free-clinics to perform counseling, blood pressure screenings, and immunizations to provide real patient care while practicing within an interdisciplinary team in order to perform case based problem solving, learning and collaborative care delivery.

Conclusion: Since implementation of the new 2016 ACPE Standards, current pharmacy schools' curricula data showed that adjustments of the CNU 2014 CAPSLEAD model were needed. Common pitfalls for IPE implementation include a lack of validated metrics for success of IPE programs and a noticeably short durations of IPE in general.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 7-024

Poster Title: The effect of Ginger use on lipid levels: A meta analysis

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Purpose: Ginger has been studied in randomized control trials (RCTs) for its lipid-lowering effects, however the studies have been small and results of those studies have been conflicting. No prior meta-analysis have been performed to evaluate all data. We conducted a meta-analysis of RCTs evaluating ginger's effects on lipid levels.

Methods: PubMed, Cochrane Central Register of Controlled Trials, and Scopus were searched through January 2016. Included RCTs evaluated ginger (Zingiber officinale) compared with placebo/control in patients with hyperlipidemia and reported at least one of the following: total cholesterol, low-density lipoprotein cholesterol (LDL-C), or high-density lipoprotein cholesterol (HDL-C). Weighted mean differences (with 95% confidence intervals) for endpoints were calculated using random-effect models.

Results: In a meta-analysis of 11 RCTs (n=569), ginger doses of 2g/d to 9g/d given over 45 days to 12 weeks showed no significant effect on total cholesterol (-8.81 mg/dL; 95% CI, -20.87 to 3.25 mg/dL), LDL-C (-6.09 mg/dL; 95% CI, -13.02 to 0.84 mg/dL), HDL-C (0.57 mg/dL; 95% CI, -1.36 to 2.50 mg/dL), but showed a statistically significant reduction in triglycerides levels (-21.51 mg/dL; 95% CI, -42.90 to -0.13 mg/dL) . Moderate degrees of heterogeneity were present for all analysis except LDL-C which showed no heterogeneity (I2 ranging from 0% to 50.5%).

Conclusion: The consumption of ginger showed a statistically significant reduction in triglycerides. However, the consumption of ginger does not show a statistically significant effect in levels of total cholesterol, LDL-C, or HDL-C. Further studies in larger samples may be needed to determine ginger's true effect on lipid levels. Heterogeneity in results may be due to variation in doses evaluated and in study durations.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 7-025

Poster Title: Observational study on the effectiveness of an antimicrobial stewardship program and prescriber responsiveness to pharmacy interventions

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Purpose: According to the Centers for Disease Control and Prevention, misuse of antibiotics presents several issues including increased incidence of resistance and cost. The implementation of antibiotic stewardship programs has improved the use of antibiotics by optimizing clinical outcomes while minimizing adverse events. Utilizing student pharmacists in antimicrobial stewardship programs has shown to be beneficial through their recommendations under the supervision of clinical pharmacists, informing physicians when de-escalation or discontinuation of antibiotics is appropriate; therefore, the purpose is to examine the effectiveness of utilizing student pharmacists to intervene in antibiotic therapy management and to uncover the monthly trend of pharmacy interventions.

Methods: This is a single-centered, retrospective, observational study that examined student pharmacists' interventions made from February to June of 2016. The study was conducted at Desert Valley Hospital using data obtained from electronic administration records from the Meditech computer system. Patients were divided among six groups based on pharmacy intervention: change antibiotic, de-escalate from broad- to narrow-spectrum antibiotic, discontinue antibiotic, adjust renal dose of antibiotic, and switch antibiotic from intravenous to oral route. The rate of de-escalation was also examined for each investigated month to see the monthly trend for the study period. Descriptive statistics were then used to summarize the data to see the total amount of recommendations that were used per category and how responsive prescribers were to pharmacy interventions.

Results: There was a total of 1320 patients on antibiotics from February to June of 2016. Student pharmacists under the supervision of pharmacists found that 74 percent of these patients required no change in their antibiotic therapy. Less than 1 percent of the studied population underwent renal dosing adjustment for their medications, and 1 percent was de-escalated from broad-spectrum to narrow-spectrum antibiotics. 11 percent was discontinued on their antibiotics due to inappropriate use while 5 percent of the study population was switched to another, more appropriate, medication. Lastly, 9 percent of the population switched from intravenous to oral route of therapy after being prompted by the inpatient pharmacy. Looking at the monthly intervention trend during the study period, it was observed that 26 interventions were made in February, 37 in March, 34 in April, 118 in May, and 126 in June. According to the collected data, the rate of change initiated by the pharmacy progressively increased during the first five months of the implementation of the antimicrobial stewardship program.

Conclusion: The data suggests that student pharmacists are increasingly intervening through the antimicrobial stewardship program, and physicians are progressively accepting pharmacy recommendations. Since the launch of the program in February, more students arrived for training and rounded with clinical pharmacists more frequently, visiting patients and sharing face-to-face dialogue with physicians and nurses in addition to sending consultation notes. Opening up more lines of communication to multiple health professionals and utilizing student pharmacists may explain the increased prescriber responsiveness to pharmacy interventions made later in the program, indicating that being proactive can lead to higher rates of interventions and better outcomes.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 7-026

Poster Title: Statin therapy: Evaluation of clinical practice adherence to the current guidelines

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Purpose: The American College of Cardiology/American Heart Association (ACC/AHA) 2013 guidelines recommend statin therapy in both primary and secondary prevention in high-risk individuals with a notable shift from specific lipid goals to dose intensity. Accordingly, the American Diabetes Association (ADA) 2016 guideline has recommended statin therapy in almost all patients with diabetes. However, less data is available regarding the adherence to aforementioned guidelines. Therefore, the primary endpoint of the current study was to evaluate clinical practice adherence to the guidelines in patients with clinical atherosclerotic cardiovascular disease (ASCVD) and/or diabetes mellitus (DM).

Methods: This was a retrospective chart review of patients who were hospitalized between January 1, 2016 and June 30, 2016 at Loma Linda University Medical Center in the internal medicine wards. Patient charts were screened and were included for analysis by the following criteria: Patients 18 years of age and older, history of ASCVD and/or DM.

Results: A total of 1,585 patients were screened and 687 patients were identified to be eligible for statin therapy. Among 302 patients with DM and no ASCVD, 56 (18.5 percent) were on correct statin therapy, 45 (15 percent) had medically justifiable reasons to warrant the omission of statin therapy (e.g., aspartate transaminase (AST)/alanine transaminase (ALT) greater than five times the upper limit of normal, cirrhosis, rhabdomyolysis, pregnancy), and 151 (50 percent) were not on any statin therapy without justifiable reasons. Fifty patients (16.5 percent) with diabetes were on statin therapy but were not on the recommended intensities. Among 385 patients with previous ASCVD, 130 (34 percent) patients were on correct statin

therapy, 21 (5 percent) patients had medically justifiable reasons to warrant the omission of statin therapy, and 122 (32 percent) patients missed statin therapy without justification. There were 112 (29 percent) patients with previous ASCVD who were on statins but were not on the recommended intensities.

Conclusion: This study demonstrates the lack of adherence among prescribers to current statin therapy recommendations. The most significant population of patients with therapy omission is within those with diabetes without previous ASCVD. According to this study, there is room for improvement among clinicians to initiate appropriate statin therapy. A future study assessing clinicians' knowledge and attitude on statin therapy may be useful to find ways to increase compliance to the guidelines.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 7-027

Poster Title: Aspirin Utilization Review in Primary and Secondary Cardiovascular Disease Prevention in Patients with Diabetes

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Purpose: The American Diabetes Association (ADA) 2016 guidelines recommend low-dose aspirin (75-162 mg/day) as a primary prevention for patients with diabetes and increased risk for atherosclerotic cardiovascular disease (ASCVD). Specifically, the population at risk is defined as patients 50 years of age or older with one of the following: Family history of premature ASCVD, hypertension, dyslipidemia, albuminuria, or smoking. Low-dose aspirin is also recommended as secondary prevention in those with diabetes and ASCVD.
The endpoint of this study is to evaluate if patients with diabetes are on appropriate aspirin therapy for primary or secondary ASCVD prevention.

Methods: This was a retrospective chart review of patients who were hospitalized between January 1, 2016 and June 30, 2016 at Loma Linda University Medical Center in the internal medicine wards. Patient charts were screened and were included for analysis by the following criteria: Patients of any age with diabetes and ASCVD, patients age of 50 and over with diabetes and one additional cardiovascular risk factor (hypertension or smoking). Descriptive analysis was used to report the results.

Results: A total of 1,585 patient charts were screened and 396 patients were included for analysis. Among 202 patients with diabetes without previous ASCVD, 74 (36.6%) patients were appropriately on aspirin therapy for primary prevention. Twenty-one (10.4%) patients had a history of clinically significant bleeding or asthma and were not on aspirin therapy. These patients were considered to have potentially justifiable reasons to withhold aspirin therapy.

There were 107 (53%) patients not on aspirin therapy without previous bleeding or asthma and did not have justifiable reasons to withhold aspirin therapy.
Among 194 patients with comorbid diabetes and previous ASCVD, 149 (76.8%) patients were appropriately on aspirin for secondary prevention. Thirteen (6.7%) patients had previous clinically significant bleeding or history of asthma and were not on aspirin therapy. Thirty-two (16.5%) patients were not on aspirin therapy and were without justifications to withhold therapy.

Conclusion: This study demonstrates a significant lack of prescriber focus on primary prevention of ASCVD in patients with diabetes compared to secondary prevention. It seems that asthma and history of bleeding are the primary hindrances of aspirin therapy. Therefore, practitioners need to assess risk versus benefit regarding aspirin initiation or omission.
There is room for improvement in practice among clinicians to initiate aspirin therapy. A future study assessing clinicians' knowledge and attitude on aspirin therapy may be useful to find ways to increase the compliance to the guidelines.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 7-028

Poster Title: Review of antibiotic usage interventions within an antibiotic stewardship program

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Purpose: Desert Valley Hospital implemented an antibiotic stewardship program on February 2016. The goals of this program were to decrease both antibiotic costs and development of antibiotic resistance. Under the supervision of clinical pharmacists, student pharmacists made recommendations to physicians when de-escalation or discontinuation of antibiotics was appropriate. The purpose of this study was to determine antibiotic usage in the antibiotic stewardship program at Desert Valley Hospital for patients with approved de-escalations, no de-escalations, and recommended but not approved de-escalations.

Methods: This is a single-centered, retrospective study that examined student pharmacists' interventions made in February 2016. A total of 257 patients with listed antibiotics were divided into three groups. The three groups included patients with approved de-escalations, no de-escalations, and recommended but not approved de-escalations. With descriptive statistics, we analyzed to see the acceptance of de-escalation recommendations by physicians and the most commonly used antibiotics in the group with approved de-escalations.

Results: The first group included 164 patients (64 percent) who were treated appropriately with antibiotics and did not require de-escalation. The second group included 40 patients (15 percent) who required de-escalation, but physicians did not accept student pharmacists' recommendations. The third group included 53 patients (21 percent) who were appropriately de-escalated after physicians accepted recommendations made by student pharmacists. These recommendations included discontinuing an antibiotic, switching to a narrow-spectrum antibiotic based on cultures and switching from an intravenous to oral antibiotic. Of these three

recommendations, switching to a narrow spectrum antibiotic had the most acceptances by physicians, while switching from an intravenous to oral antibiotic had the least. The most commonly used antibiotics among the group that had approved de-escalations were ceftriaxone, vancomycin, piperacillin/tazobactam, azithromycin, linezolid, metronidazole and levofloxacin, thus illustrating that admitted patients were started on broad spectrum antibiotics and eventually de-escalated down to narrow spectrum antibiotics.

Conclusion: While the antibiotic stewardship program has shown improvement in antibiotic use, a 15 percent rate of recommended but not approved de-escalations showed that antibiotics were not used appropriately. To decrease this rate, the hospital has begun a residency program in which the resident will provide more in-services as well as improve the physician-pharmacist relationship. Although emphasizing narrow spectrum antibiotics is beneficial, more improvements can be made to encourage physicians to switch from intravenous to oral medications.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 7-029

Poster Title: Evaluation of selexipag in pulmonary arterial hypertension (PAH) related complications and death

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Purpose: Pulmonary arterial hypertension (PAH) is a life threatening disease. Despite current treatments targeting the endothelin, nitric oxide, or prostacyclin pathways, prognosis remains poor. Prostacyclin dysregulation is associated with PAH pathogenesis. Selexipag is a new oral selective IP prostacyclin agonist which may have potential pharmacologic advantages in safety and efficacy compared with other prostacyclin vasodilators. The purpose of this study is to evaluate the impact of selexipag on death and complications related to PAH as compared to placebo.

Methods: The institutional review board approved this randomized, double blind, placebo controlled trial. Patients between ages 18-75 years who provided written informed consent and had confirmed PAH diagnosis that was either idiopathic, heritable, or associated with human immunodeficiency virus infection, drug use, toxin exposure, connective tissue disease, or repaired congenital systemic to pulmonary shunts were enrolled. Patients already on prostacyclin analogue treatment were excluded. Patients were randomly assigned to either receive selexipag (n equals 574) or placebo (n equals 582). Selexipag was initiated at 200 mcg twice daily and increased weekly in twice daily 200 mcg increments until patients experienced unmanageable adverse effects or a max dose of 1600 mcg twice daily was reached. The primary end point was a composite of death from any cause or complication related to PAH until the end of treatment period. Secondary outcomes included the change in 6 minute walk distance, absence of worsening world health organization (WHO) functional class, death due to PAH, hospitalization due to worsening PAH, and death from any cause. It was determined that 331 primary outcomes would be needed for the study to achieve 90 percent power to detect a hazard ratio for the primary endpoint.

Results: The primary outcome occurred in 155 patients (27 percent) in the selexipag group versus 242 (41.6 percent) in the placebo group (HR 0.60; 99 percent CI, 0.46 to 0.78; P less than 0.001). At week 26, the 6 minute walk distance median had decreased from baseline by 9 meters in the placebo group and increased in by 4 meters in selexipag group (treatment effect, 12 meters; 99 percent CI, 1 to 24; P equals 0.003). There was no significant difference in worsening of WHO functional class between the two groups (odds ratio 1.16; 99 percent CI, 0.81 to 1.66; P equals 0.28). Death due to PAH or hospitalization for worsening of PAH was significantly higher in placebo group (hazard ratio in the selexipag group, 0.70; 95 percent CI, 0.54 to 0.91; P equals 0.003). Death from any cause was comparable with 105 patients (18.0 percent) in selexipag group and 100 patients (17.4 percent) in placebo group (HR in the selexipag group, 0.97; 95 percent CI, 0.74 to 1.28; P equals 0.42). No serious adverse events were reported more frequently in selexipag group than placebo group.

Conclusion: Use of selexipag yielded significantly lower rates of the primary composite end point of death or complications related to PAH as compared to placebo. There was no significant difference in mortality between the two groups. The clinical significance of these results suggests that selexipag may be a promising treatment option for patients suffering from PAH. However, studies will need to assess its efficacy as compared to the standard of therapy that is already available for these patients.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 7-030

Poster Title: Effectiveness of Thromboembolism Prophylaxis Regimens in Obese Patients

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Purpose: Obese patients have been under-represented in current guidelines and clinical trials of chemical thromboprophylaxis. The optimal dose in obese patients remains unclear, with studies showing inadequacy of current fixed doses of enoxaparin and suggesting multiple differing dosing strategies in this population. Obesity is a growing epidemic in the United States; therefore, it is crucial to gain a better understanding of optimal thromboprophylaxis in this population. This study aimed to compare the effectiveness of enoxaparin 40mg subcutaneously (SQ) daily versus enoxaparin 30mg SQ twice daily at preventing venous thromboembolic (VTE) events in obese patients at an academic teaching hospital.

Methods: A single center, retrospective chart review was conducted from February 28, 2013 to May 1, 2014, with patients identified via medication administration records. All adult patients with body mass index (BMI) greater than or equal to 30 and aged 18 through 85 years, who received enoxaparin 40 mg SQ daily or enoxaparin 30 mg SQ twice daily, with an admission of at least 72 hours at Loma Linda University Medical Center, were eligible for inclusion. Patients with creatinine clearance less than 30 mL/min, active bleeding, history of previous recurrent VTE, on therapeutic anticoagulation, pregnant, and greater than 85 years old were excluded. Data collected from an individual patient chart review included patients' gender, weight, height, BMI, age, platelets, serum creatinine, hemoglobin, hematocrit, Doppler ultrasound, chest computerized tomography (CT scans), and incidence of VTE after enoxaparin thromboprophylaxis administration. Incidence of VTE was defined as symptomatic proximal lower limbs (popliteal vein or more proximal) deep vein thrombosis or objectively diagnosed pulmonary embolism. The Padua risk score was calculated for each patient to evaluate the risk of VTE development. The primary endpoint was the incidence of VTE in enoxaparin 40 mg SQ

daily versus 30 mg SQ twice daily. Secondary endpoint was to evaluate factors associated with VTE in obese patients diagnosed with VTE. Data was analyzed using descriptive statistics.

Results: A total of 281 patients were included in the final data analysis. During hospital stay, 234 patients received enoxaparin 40 mg SQ daily, while 47 patients received enoxaparin 30 mg SQ twice daily. Baseline characteristics were well balanced between the two groups except significant differences of gender, active cancer, recent trauma or recent surgery (within the last month), ischemic stroke, and acute infection. Total number of VTE events in the population receiving enoxaparin 40 mg SQ daily was five (2.1%) (p=0.311), and no events occurred in those receiving enoxaparin 30 mg SQ twice daily. Among those VTE events, four were symptomatic deep vein thrombosis (DVT) in the proximal lower limbs, and one was an objectively diagnosed pulmonary embolism (PE). Calculated average Padua risk score for patients diagnosed with VTE was 3.4 (SD=1.8), while patients with no VTE had an average Padua score of 3.98 (SD=1. 6). Patients with active cancer (40% VTE versus 20.6% no VTE), congestive heart failure (20% versus 3.6%), ischemic cerebral vascular accidents (20% versus 7.2%), acute infection (60% versus 30.4%), and 70 years and older (20% versus 13.7%) had greater incidence of VTE.

Conclusion: There was no statistical difference in the incidence of VTE in obese patients using enoxaparin 40 mg SQ daily versus 30 mg SQ twice daily for thromboprophylaxis. However, all VTE events were seen in obese patients receiving enoxaparin 40 mg SQ daily, which may suggest enoxaparin 30 mg SQ twice daily as a better prophylaxis option. Further studies are needed to compare the efficacy of current enoxaparin thromboprophylaxis dosing versus weight-based dosing.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 7-031

Poster Title: Do males cheat more than females? An analysis of Northern California pharmacy students

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Purpose: Academic dishonesty is of particular importance among students in the healthcare field as such actions may lead to continued unethical behavior. A prior study performed by our research team revealed that 11.8% of pharmacy students admitted to cheating in pharmacy school. However, limited data exists contrasting male and female pharmacy students regarding academic dishonesty. The objectives of this study were to analyze differences between male and female pharmacy students regarding academically dishonest behavior as well as perceptions of academic dishonesty using hypothetical scenarios.

Methods: Between November 2014 to March 2015, a 45-item cross-sectional survey was conducted at all four Northern California pharmacy schools (Touro University California College of Pharmacy, University of California San Francisco School of Pharmacy, University of the Pacific Thomas J. Long School of Pharmacy & Health Sciences, and California Northstate University College of Pharmacy). Inclusion criteria consisted of pharmacy students in the second year of their didactic curriculum who consented to take part in the study. The survey was distributed as a hardcopy paper survey by a pharmacy student on the research team. The current subanalysis compared male and female pharmacy students. Data analyses were conducted using STATA version 13.0 (College Station, TX). Means and standard deviations were reported for continuous data, and frequency and percentages for categorical data.

Results: A total of 331 students (115 male, 215 female) completed the survey. No statistically significant differences were found between males and females regarding admitted cheating in pharmacy school (10.4 vs. 12.6%; p=0.569) as well as various other forms of academically

dishonest behavior (e.g. plagiarism, asking details of an oral exam/OSCE, fabricating lab data, etc.). Regarding hypothetical scenarios, there were two instances where males and females differed in their responses to cheating. One scenario involved a student stealing an exam and sharing with his friends; male respondents were less likely to perceive this as cheating compared to females (45.2 vs 77.2 %; $p < 0.0001$). Another scenario presented a student who had directly copied another student's calculations assignment; male respondents were less likely to report observing this in pharmacy school compared to females (19.1 vs 31.6%; $p=0.015$).

Conclusion: Overall, there were no major differences between male and female pharmacy students regarding admitted cheating and performing various forms of academically dishonest behavior. Males may view certain forms of academically dishonest behavior as less severe than females.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 7-032

Poster Title: Evaluation of non-protocolized management of therapeutic temperature modulation (TTM) following cardiac arrest

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Purpose: Therapeutic temperature modulation (TTM) is a cooling strategy used to decrease metabolic needs and improve neurologic function following cardiac arrest. A common complication of therapeutic temperature modulation is shivering, which has a number of proposed detrimental effects. Small studies, largely in healthy volunteers have identified pharmacologic agents that may be used to prevent or reduce shivering; however consensus guidelines outlining an optimal treatment strategy has yet to be identified. The purpose of this study was to assess the efficacy of anti-shivering strategies during therapeutic temperature modulation at a large academic medical center prior to implementation of a post-arrest hypothermia protocol.

Methods: A retrospective cohort study that examined adult intensive care unit patients at a large academic medical center undergoing therapeutic temperature modulation (TTM) following cardiac arrest from July 2013 – July 2015 (prior to implementation of a formal post-arrest hypothermia protocol). Medication administration records, temperature logs, and shivering scores were evaluated for the first 48 hours following therapeutic temperature modulation. Patients were excluded from review if they were less than 18 years of age or received therapeutic temperature modulation for reasons outside of post-cardiac arrest care. The primary outcome assessed was the incidence and severity of shivering, which was evaluated using the Bedside Shivering Assessment Scale (BSAS). Scores range from 0, indicating no shivering to 3, indicating severe shivering with involvement of the upper and lower extremities. Secondary outcomes included use of anti-shivering medications, time to target

temperature (less than 33 degrees Celsius), and incidence of hyperthermia (greater than or equal to 38 degrees Celsius) during the re-warming period.

Results: Fifty-six patients underwent therapeutic temperature modulation following cardiac arrest prior to the implementation of a post-arrest hypothermia protocol. Average intensive care unit length of stay was 7 plus-minus 8 days, with 34 percent of patients being alive at discharge. Bedside Shivering Assessment Scale was positive in 46 percent of patients, with 16 percent having a score of 1, 25 percent having a score of 2, and 5 percent having a score of 3. Shivering was managed with buspirone (3.5 percent of patients), meperidine (7 percent of patients), and neuromuscular blocking agents (14 percent of patients). Time to target temperature (less than 33 degrees Celsius) was 6.6 plus-minus 3.5 hours, with patients spending an average of 10 plus-minus 5.5 hours above the target temperature within the first 24 hours. During the re-warming stage (24 to 48 hours post-arrest), time to temperature greater than 36.5 degrees Celsius was 14.5 plus-minus 14 hours, with 36 percent of patients having at least one febrile episode (greater than or equal to 38 degrees Celsius), and 11 percent of patients with a positive Bedside Shivering Assessment Scale score during this time.

Conclusion: Time to target cooling temperature was prolonged at approximately 7 hours. In addition, 50 percent of patients had a positive Bedside Shivering Assessment Scale score, with 14 percent of patients necessitating neuromuscular blocking therapy. It is hypothesized that implementation of a post-arrest hypothermia protocol will optimize management of patients undergoing targeted temperature modulation, including a decreased time to target cooling temperature, decreased incidence of a positive Bedside Shivering Assessment Scale score, and fewer febrile instances during rewarming. Future studies will compare data following the implementation of a post-arrest hypothermia protocol to current data.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 7-033

Poster Title: Factors Affecting Confidence Levels in Lifestyle Counseling Among Pharmacy and Medical Students and Faculty

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Purpose: The increasing burden of chronic diseases linked to poor diet and physical inactivity places pharmacists and physicians in an optimal position to counsel patients about lifestyle. Studies have shown that healthcare providers (HCPs) and healthcare professional students with healthy diets and lifestyle are more likely to counsel/emphasize lifestyle counseling. Little is known about factors that empower HCPs to feel confident in lifestyle counseling. We aimed to evaluate the lifestyle habits of pharmacy and medical students and faculty, and determine whether their confidence levels in lifestyle counseling are related to their nutrition knowledge, diet quality and practice of mindful eating.

Methods: First year male and female students (aged 18 and over) and faculty members from Touro University California College of Pharmacy (COM) and College of Medicine (COM) programs were invited to participate. Participants recorded their dietary intake for 3 consecutive days (2 weekdays and 1 weekend day) using an online application (HealthWatch360). To assess lifestyle practices a survey was administered, which contained the following sets of questions: 1) Starting the Conversation (STC) dietary assessment tool (8 items), 2) nutrition knowledge (5 items), and mindfulness eating (6 items) followed by questions about demographics, and dietary and exercise behaviors. Physical activity levels were classified based on the Institute of Medicine designations. Statistical analyses were performed using JMP (SAS Institute, version 11). Fisher's exact test was used to analyze categorical data, and one-way analysis of variance was used for continuous data. P values less than 0.05 were considered statistically significant.

Results: The cohort (N=254) comprised students from COP (N=101), COM (N=115) and faculty (N=38). Sixty five percent of students and 53 percent of faculty had normal body mass indices, and less than 13 percent of participants reported a pre-existing health condition. Regarding diet quality, faculty trended toward having lower STC scores, indicative of healthier dietary choices, compared to students (P=0.08). Faculty also had higher mean scores in nutrition knowledge (P less than 0.0001) and dietary mindfulness (P less than 0.0001). A higher proportion of faculty were “completely confident” or “confident” about lifestyle counseling (P less than 0.0001) compared to students, the majority of whom felt “somewhat confident” about lifestyle counseling. Notably, participants with higher confidence in lifestyle counseling also had lower mean STC scores (indicative of healthier diets), and higher scores in nutrition knowledge and dietary mindfulness (P less than 0.01 for all). While all groups met minimal requirements for weekly physical activity, faculty trended toward allocating more time to exercise than students (P=0.07) and a higher percentage of them were active/very active. Conversely a higher percentage of COP students were low active/sedentary (P less than 0.05). COP and COM students had otherwise comparable STC scores, nutrition knowledge and dietary mindfulness.

Conclusion: Our findings indicate that compared to pharmacy and medical students, faculty members in these programs tend to have healthier diets, are more knowledgeable about nutrition and engage more in mindful eating. In turn, these attributes are associated with greater confidence in lifestyle counseling. Taken together, these findings suggest that providing healthcare professional students with adequate education and training in nutrition could increase the likelihood that they will adopt healthy lifestyle practices and, as such, may feel more empowered and confident in their ability to provide lifestyle recommendations to their patients.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 7-034

Poster Title: Intrapleural administration of tissue plasminogen activator for the management of complicated pleural effusions

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Purpose: Complicated pleural effusions are a common source of morbidity and mortality for hospitalized patients. Management often includes chest tube placement and antibiotic therapy, however surgical intervention with decortications or Video Assisted Thoracic Surgery (VATS) may be necessary in cases where drainage fails. Intrapleural administration of t-PA may play an important role in reducing the need for surgical intervention; however a lot remains unknown in terms of optimal dose and frequency of administration. The purpose of this study was to evaluate the use of intrapleural t-PA for the management of complicated pleural effusions, and to determine if a dose-response relationship exists.

Methods: This was a retrospective cohort study that examined all adult patients at the University of California San Francisco Medical Center who received t-PA for the management of a complicated pleural effusion from July 2013 to July 2016. Patients were excluded if they received t-PA for indications other than pleural effusions. The primary outcome assessed was success of t-PA therapy, which was defined as avoidance of surgical interventions (i.e. VATS or decortication). Secondary outcomes assessed included chest tube output pre and post t-PA administration, radiographic improvement following t-PA administration (as documented by the thoracic surgery team), t-PA dose administered, number of t-PA doses administered, and bleeding complications.

Results: Fifty-six patients received intrapleural t-PA for the management of complicated pleural effusions from July 2013 to July 2016. Patients were 59 ± 17 years of age, with 61% of patients being male. Pleural effusions were caused by infection (63%), malignancy (16%), hemothoraces

(5%), and unknown causes (16%). Successful pharmacologic management with t-PA occurred in 86% of patients. Average 24-hour chest tube output increased from 140 ± 180 ml to 715 ± 737ml after administration of t-PA (p=0.001). Radiographic improvement occurred in 59% of patients. Average single t-PA dose administered was 5.6 ± 4 mg, with an average cumulative t-PA dose of 12 ± 15 mg. Forty percent of patients received only one dose of t-PA, with 36% receiving two doses, 15% receiving three doses, 6% receiving four doses, and one patient receiving 9 doses. Two patients had minor bleeding complications.

Conclusion: Intrapleural administration of t-PA in patients with complicated pleural effusions significantly increased chest tube output and successfully prevented further surgical interventions. The findings in this study confirm the beneficial role of t-PA in patients with reduced chest tube outflow, and had minimal bleed risk. However, differences in t-PA dosing, number of doses, and frequency of administration needed to achieve optimal output indicate a need for protocolized management at institutions. Future studies will include analyzing the relationship between subsequent t-PA doses and response.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Case Report

Session-Board Number: 7-035

Poster Title: Theoretical use of Novel Oral Anticoagulants (NOACs) in Heparin Induced Thrombocytopenia (HIT)

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Purpose: This case report presents a patient who received anticoagulation with a novel oral anticoagulant (NOAC) after a positive diagnosis with heparin-induced thrombocytopenia (HIT). Patient RW was admitted to the hospital for aortic valve replacement and experienced post-operative paroxysmal atrial fibrillation (A-fib). During this hospitalization the patient received heparin and was maintained on foot pumps bilaterally without anticoagulation post-surgery. Subsequently upon discharge, the patient refused anticoagulation for both paroxysmal atrial fibrillation and deep vein thrombosis (DVT) prophylaxis. Approximately one month later, RW presented to the emergency department with symptoms of infection and was diagnosed with health care associated pneumonia for which she received treatment with levofloxacin and vancomycin. While inpatient, she complained of pain and swelling in her legs and a duplex scan of her bilateral lower extremity was positive for DVT and a CT chest angiogram was positive for extensive pulmonary embolic disease involving all lobes of the lungs. Upon arrival to the hospital, RW's platelet count was normal at 247 K/mcL. The patient was started on a heparin drip (which was later switched to lovnenox) and received treatment for 5 days when it was stopped due to the fall in her platelet count by greater than 50% to a level of 96 K/mcL. The patient had a 4 T's Test score of 5 putting her at an intermediate probability of HIT (2 points for > 50% fall in platelet count, 2 points for timing of platelet count fall of < 1 day with recent heparin exposure, and 1 point for other causes of thrombocytopenia present – vancomycin use for pneumonia treatment). Based on these inconclusive intermediate results further HIT antibody testing was conducted. Both the immunoassay and optical density (OD) were positive for HIT, but the OD was not confirmatory, so an additional serotonin release assay was ordered which later confirmed positive HIT diagnosis (SRA results were pending at discharge). Patient RW was presented with three options: the first was bridging treatment with Arixta until warfarin is therapeutic (outpatient treatment); the second was bridging treatment with Argatroban until warfarin is therapeutic (would require inpatient treatment); and the last option was outpatient treatment with a NOAC (not an approved indication). The patient was

unable to afford Arixtra and unable to remain hospitalized for Argatroban treatment, and so she received a prescription for Eliquis 10 mg BID for 4 days, then 5 mg BID with recommendation to follow-up with cardiology in one week. The patient followed up one week later and her platelet counts rebounded to 510 K/mcL, the patient was noted to be stable with no concern for thrombocytopenia or venous thromboembolism (VTE). Theoretical benefits of NOACs in HIT include not causing platelet aggregation or activation in the presence of HIT antibodies, not causing platelets to release platelet factor 4 (PF4), and not interacting with PF4 that may be present. Heparin induced thrombocytopenia is a rare immune mediated reaction that can occur with exposure to heparin. Patients are at a higher risk of thrombosis and require anticoagulant therapy with non-heparin products. Currently NOACs are not approved for treatment of HIT, however additional large-scale studies are needed to confirm the safety and efficacy of NOACs in patients diagnosed with HIT.

Methods:

Results:

Conclusion:

Submission Category: Geriatrics

Submission Type: Evaluative Study

Session-Board Number: 7-036

Poster Title: Comparison of the Incidence and Prevalence of Tardive Dyskinesia in Adult and Elderly Populations

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Purpose: Tardive dyskinesia (TD) is a movement disorder that has long been associated with antipsychotic drug use. Early studies have suggested elderly patients are at increased risk of developing TD, but this is largely confounding with duration of antipsychotic use. A recent meta-analysis estimated that the risk of developing TD has been reduced threefold in elderly patients using newer second generation antipsychotics (SGAs) as compared to first generation antipsychotics (FGAs). This study aims to determine if there is a significant difference in the incidence and prevalence rates of TD in the adult and elderly populations since the introduction of SGAs.

Methods: This study was a literature review of clinical studies published between 1995 and August 2016. Two reviewers independently conducted a literature search using electronic databases including PubMed, Web of Science, and Google Scholar. Studies were included if they reported an incidence or prevalence rate of TD in participants exposed to antipsychotics and if they rated and diagnosed TD using a validated rating scale and diagnostic criteria. Adult subjects were defined as subjects between the ages of 18 and 55 and elderly subjects were defined as older than 55 years old. Studies were excluded from analysis if less than 50 subjects were included, if they were case reports, or if the reported TD rates were not stratified by age group when the study population had mixed adult and elderly subjects. Statistical analysis of the studies was done by Wilcoxon rank-sum test in STATA 13.1 to assess for differences in incidence and prevalence rates between adults and geriatric populations. This test was also used to determine if there was a difference in the incidence rates based on use of FGAs versus SGAs, both within the age groups and regardless of age.

Results: A total of 104 studies were identified that met the initial search criteria and 36 studies were included in the final analysis. There was not a statistically significant difference found in the incidence or prevalence rates between the adult and elderly populations (p=0.40, p= 0.057, respectively). The median incidence rate of TD was 6% (range 0-23%) in the adult population and 5.5% (range 3-26%) in the elderly population. The median prevalence rate in the adult population was 24% (range 4-33%) and elderly population was 38% (range 19-47%). The median incidence rate in the adult population was 6% for FGAs compared to 3% for SGAs, while the elderly population was 10.5% for FGAs compared to 5.5% for SGAs, although no significant difference was found within either the adult or elderly populations (p= 0.68, p = 0.19, respectively). The median incidence rate of FGA users was 6% compared to 4% for SGA users regardless of age group, which also produced no significant difference (p= 0.089).

Conclusion: Overall, this study found no statistically significant difference in incidence or prevalence of TD between adult and elderly populations. The incidence and prevalence studies conducted before 1995 used higher doses of FGAs in the elderly compared to current practices, which likely increased reported rates. In addition, the widespread use of SGAs may be contributing to the narrowing gap of incidence and prevalence rates of TD in the elderly compared to adults. There may not have been enough studies to find a significant difference between incidence rates in SGA and FGA users or between prevalence rates.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 7-037

Poster Title: Impact of antiretroviral therapy on non-AIDS-defining cancer mortality among persons with AIDS: San Francisco, California, 1996 to 2013

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Purpose: Widespread use of combination antiretroviral therapy (ART) since 1996 has led to a decreased number of deaths due to AIDS-defining cancers (ADCs) in people with AIDS (PWAs). In contrast, the effect of ART on non-AIDS-defining cancers (NADCs) is less well known. In this investigation, we aimed to evaluate the impact of ART on NADC mortality by examining temporal trends in causes of death among PWAs.

Methods: A retrospective cohort study was conducted using data from San Francisco Public Health Department HIV/AIDS surveillance registry. The study included AIDS cases aged 13 or older who died during the years 1996 through 2013. Information on underlying causes of death was obtained from matches with the National Death Index through 2013 (the most recent year available). Observation time was divided into three periods corresponding to improvements in ART: 1996-1999, 2000-2005, and 2006-2013. For each time period, we calculated proportional mortality ratios (PMRs) for all NADCs combined, and performed age, race and sex-adjusted standardized mortality ratios (SMRs) with 95 percent Poisson confidence intervals (CI) for NADC-specific underlying causes of death using the California population as the reference group. This study was exempt from institutional review board review.

Results: The study included 5,822 deceased PWAs. Of these, 90 percent were male, 68 percent aged 35 to 54 at time of death, 61 percent survived more than 4 years post-AIDS diagnosis, and 79 percent initiated ART. Sixty-three percent were White, 20 percent African American, and 12 percent Hispanic; 59 percent were men who have sex with men (MSM), 22 percent MSM with a

history of injection drug use (IDU), and 16 percent IDU. From 1996 to 2013, the PMRs significantly increased for all NADCs combined (4.3 percent in 1996 to 1999, 7.0 percent in 2000 to 2005, 12.3 percent in 2006 to 2013, p less than 0.01). Meanwhile, the SMRs significantly decreased for all NADCs combined (SMR 3.6 CI 2.9 to 4.3 in 1996 to 1999, SMR 2.3 CI 1.9 to 2.7 in 2000 to 2005, SMR 1.9 CI 1.6 to 2.1 in 2006 to 2013, p less than 0.01). NADC-specific SMRs did not change significantly over time. Nonetheless, the SMRs were significantly elevated for anal, liver and lung/larynx cancer in 1996 to 2013, and for rectal cancer in 2000 to 2013.

Conclusion: The temporal increase in PMRs for all NADCs combined are likely due to the advent and widespread use of ART which may have indirectly shifted the cancer burden from ADCs to NADCs. While NADC-specific SMR trends were not significant, cancer mortality among PWAs is still significantly elevated above mortality in the general population for anal, liver, lung/larynx and rectal cancer in the ART era. Thus, these cancers should be targeted for improved cancer prevention, screening, and treatment strategies among persons living with HIV/AIDS.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 7-038

Poster Title: Pendulum Swings: Hypoglycemia in Adult Inpatients at UCSF Medical Center with Diabetic Ketoacidosis and Hyperosmolar Hyperglycemic Nonketotic Syndrome

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Purpose: The purpose is to determine the number of patients who experienced a hypoglycemic event (blood glucose < 70 mg/dL) or severe hypoglycemic event (blood glucose < 40 mg/dL) while receiving an insulin infusion from the Adult Diabetic Ketoacidosis or Hyperosmolar Coma Management Order Set before and after order set change.

Methods: Retrospective chart review of adult inpatients presenting with diabetic ketoacidosis or hyperosmolar hyperglycemic nonketotic syndrome who received insulin infusions from the Adult Diabetic Ketoacidosis and Hyperosmolar Coma Management Order Set during the pre-implementation period (Mar 11, 2015 - Dec 11, 2015) and the post-implementation period (Dec 12, 2015 - Sept 11, 2016) of the new order set in the inpatient setting at UCSF Medical Center.

Results: In the 66 pre-implementation order set patient group, 12 patients experienced a hypoglycemic event with an average Adult Diabetic Ketoacidosis or Hyperosmolar Coma Management Order Set time of 7.07 hours, and only 1 patient received dextrose IV infusion 3.3 hours after blood glucose decreased to 200 mg/dL. In the 84 post-implementation order set patient group, 2 patients experienced a hypoglycemic event with an average Adult Diabetic Ketoacidosis or Hyperosmolar Coma Management Order Set time of 7.5 hours, and no patients received dextrose IV infusion after blood glucose decreased to 200 mg/dL. In both groups, there were no severe hypoglycemic events.

Conclusion: After changing the Adult Diabetic Ketoacidosis and Hyperosmolar Coma Management Order Set, there was an improvement in patient safety as the number of hypoglycemic events decreased. However, the non-compliance of administering dextrose IV infusion when blood glucose decreased to 200 mg/dL after patients received these order sets can compromise patient safety as it can contribute to preventable hypoglycemic events during the inpatient course.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 7-039

Poster Title: Infrequent use of oseltamivir phosphate in hospitalized patients with suspected or confirmed influenza at an academic medical center

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Purpose: Respiratory infections caused by influenza type A and B are associated with significant morbidity and mortality. CDC guidelines recommend early antiviral therapy in all patients with severe disease requiring hospitalization. Oseltamivir phosphate (Tamiflu®) is the preferred antiviral agent for the treatment of influenza. Although studies have demonstrated benefits of antiviral treatment in hospitalized patients with influenza, delays between the release of guidelines and changes in clinical practice commonly exist. The purpose of this study was to assess the uptake of CDC recommendations by evaluating the utilization of oseltamivir phosphate in hospitalized patients with suspected or confirmed influenza.

Methods: This study was a single center, cross-sectional, retrospective chart review of adult patients hospitalized with influenza-like symptoms who underwent a diagnostic test for influenza within five days of admission. The primary study objective was to evaluate the proportion of patients with suspected or confirmed influenza who were prescribed oseltamivir phosphate. Additionally, all patients who received at least one dose of oseltamivir phosphate were evaluated for the dose, frequency, duration and appropriateness of the prescription. Secondary objectives included an assessment of predictors for the use of empiric vs targeted therapy, and an evaluation of clinical outcomes in treated patients who tested positive for influenza. Empiric therapy was defined as patients who received therapy prior to the availability of their influenza test result in the medical record, while targeted therapy was defined as patients who did not receive therapy until their influenza test resulted. Early therapy was

defined as patients who received therapy within 24 hours, while delayed therapy was initiated greater than 24 hours from when the diagnostic test was ordered.

Results: In this study, 1,075 patients met inclusion criteria and of these, 149 (13.9%) were prescribed at least one dose of oseltamivir phosphate during hospitalization; 75/149 (50.4%) of patients received empiric therapy and 74/149 (49.6%) received targeted therapy. Of the 149 patients who were prescribed oseltamivir phosphate, 133 (89.3%) were prescribed the medication with appropriate dose, frequency, and duration as recommended by the manufacturer. The majority of influenza-positive patients (146/149, 98.0%) were prescribed the standard 75 mg twice daily dose of oseltamivir and were treated for a median duration of 5.5 ± 2.34 days. Treatment was stopped after 1.0 ± 1.36 days in patients who tested negative for influenza. The only statistically significant patient predictor of type of oseltamivir phosphate therapy prescribed was age ≥ 65 years; patients receiving targeted therapy were more likely to be elderly compared to patients receiving empiric therapy (54.1% vs 36.0%; p = 0.0171). Patients receiving empiric therapy were less likely to be readmitted within 30 days compared to patients receiving targeted therapy (8.2% vs. 37.5%; p = 0.0408).

Conclusion: In this study, prescribers at an academic medical center empirically treated only a small fraction of patients (75/1,075; 7.0%) with suspected influenza using oseltamivir phosphate. The majority of patients hospitalized at an academic medical center did not receive antiviral treatment in concordance with current CDC guidelines, which recommend treatment of all patients with suspected influenza, and future studies to elucidate reasons for clinician noncompliance would be of interest.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 7-040

Poster Title: Preliminary Evaluation of Clinical Outcomes 12 Months After Discharge from a Pharmacist Led Diabetes Intense Medical Management "Tune Up" Clinic

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Purpose: We recently reported positive outcomes for complex diabetes patients in an Endocrinologist-PharmD collaborative practice, called the Diabetes Intense Medical Management (DIMM) "Tune Up" clinic, as compared to patients receiving usual care from primary care providers (PCPs). The purpose of this study was to determine patients' hemoglobin A1c (HbA1c) levels 12 months after discharge from the DIMM clinic. We hypothesized HbA1c levels would not be significantly different than discharge and would be significantly lower than initial DIMM clinic visit. Secondary objectives examined changes in other metabolic outcomes and correlation of age and length of stay in the DIMM clinic with outcomes.

Methods: A retrospective cohort study was conducted on 64 eligible patients who had been discharged from the DIMM clinic. Patients were referred to the DIMM clinic by their PCPs. The DIMM clinic "tune up" model couples pharmacist-provided medication therapy management with patient-specific diabetes education during approximately three 60-minute visits over a 6-month period, to achieve treatment goals before the patient is discharged back to their PCP. Patients included in this study must have been diagnosed with type 2 diabetes mellitus, have been treated at the DIMM clinic and discharged at HbA1c goal, and have remained in the VA healthcare system for at least 12 months post-discharge. The discharge HbA1c and other metabolic levels were those observed at the final DIMM clinic visit. Data for HbA1c, fasting plasma glucose (FPG), total cholesterol (TC), low-density lipoprotein (LDL), high-density lipoprotein (HDL), triglyceride (TG), blood pressure (BP), and body mass index (BMI) at 6 and 12 months post-discharge were collected from the VA patient electronic medical record system

using a +/- 3 month window. The last observation carried forward approach was used to assign missing values at 6 and 12 months. Because data were not normally distributed median values were compared using Wilcoxon signed rank test and McNemar's test was used to compare proportions at goal.

Results: Median HbA1c was greater at 12 months post-discharge compared to the level at discharge date [HbA1c 7.7% (range 4.9-15.5) vs. 6.9% (range 5.6-8.8), $p < 0.05$]. However, HbA1c at 12 months post-discharge was still significantly lower than at baseline [HbA1c 7.7% (range 4.9-15.5) vs. 10.0% (range 7.9-17.2), $p < 0.05$].
At 12 months post-discharge, FPG had increased compared to discharge date [FPG 150 mg/dL (range 43-716) vs. 117.5 (range 60-448), $p < 0.05$], but was still significantly lower than the baseline value [200 mg/dL (range 45-472), $p < 0.05$].
LDL and HDL (normal levels), TG, weight and BMI 12 months post-discharge were not significantly different than the discharge values. Systolic and diastolic BP were significantly higher 12 months post discharge [133 mmHg (range 71-189) vs 124 mmHg (range 90-162), 73.5 mmHg (range 41-100) vs. 71.5 mmHg (range 51-92)].
All DIMM clinic patients were discharged at the goal HbA1c of < 9%. At 12 months post-discharge, 78% of patients remained at this goal level. Additionally, 81% of patients maintained their HbA1c goal at 6 months post-discharge.
No significant correlation was detected between change in HbA1c 12 months post discharge and duration in DIMM clinic ($r=0.07$) nor age ($r=0.12$) p's>0.05.

Conclusion: While 12 months following discharge from the DIMM tune up clinic, patients' median HbA1c rose significantly by 0.8, the value of 7.7% remained clinically significant, with 78% of patients maintaining HbA1c goal of < 9%. Compared to baseline HbA1c values, patient's median HbA1c at 12 months post discharge remained 2.3 points lower. Overall, after receiving medication therapy management combined with patient-specific diabetes education, preliminary results demonstrate patients discharged from the DIMM clinic have exhibited sustained positive glycemic control.

Submission Category: Pain Management

Submission Type: Descriptive Report

Session-Board Number: 7-041

Poster Title: Characteristics of opioid prescriptions for the treatment of chronic nonmalignant pain in a resident physician-run primary care clinic

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Purpose: The purpose of this study was to describe the current prescribing practices and characteristics of chronic nonmalignant pain patients prescribed 90 or more days of opioids by physicians at the Kaweah Delta Family Medicine Center, a resident physician-run primary care clinic in Visalia, California, from January 2015 to January 2016.

Methods: A single-center retrospective chart review was completed to describe the indications for opioids, daily dosages prescribed in morphine milligram equivalents (MME), concurrent use of non-opioids, and documentation of controlled substance user agreements in patients with chronic nonmalignant pain. A list of opioid prescriptions written by clinic physicians between January 1, 2015 and January 31, 2016 was analyzed to identify patients who were prescribed 90 or more days supply of opioids within the study period. A total of 39 adult patients with chronic nonmalignant pain were identified and analyzed. The data collected from chart review included a patient's age, sex, insurance, referral specialties, documented opioid prescriptions, concurrent non-opioid therapies for pain or psychiatric disorders, history of substance abuse, physician documentation of a Controlled Substance Utilization Review and Evaluation System (CURES) report, and physician documentation of clinic controlled substance use agreements. Total daily doses of opioids over the course of the study period were calculated as MME per day. Descriptive statistics were used to characterize these data.

Results: Patients were a median age of 48 years old with 36 percent males and 64 percent females. The primary insurance types held were Medi-Cal (59 percent), Medicare (8 percent), and dual coverage with Medi-Cal and Medicare (33 percent). The most common indications for opioids were back, neck, or thoracic pain (69 percent) and joint pain (51 percent). The most

commonly referred specialties were physical therapy (49 percent) followed by pain management (46 percent). History of substance use included tobacco use (56 percent), marijuana (10 percent), methadone (5 percent), methamphetamine (5 percent), and heroin (3 percent). The daily opioid dose prescribed was an average of 25 MME per day, median 16 MME per day, and range 5 to 211 MME per day. The most common dose range was 1 to 19 MME per day prescribed to 62 percent of patients. The most common concurrently prescribed non-opioids were antidepressants followed by benzodiazepines, where oral nonsteroidal anti-inflammatory drugs (NSAIDs) and gabapentin were the most common non-opioids prescribed specifically for pain. Controlled substance user agreements were signed and documented in 87 percent and CURES reports run on 44 percent of patients. The most common psychiatric comorbidities were depression (49 percent) and anxiety (44 percent).

Conclusion: Patients with chronic nonmalignant pain were most likely to receive opioids for back, neck, or thoracic pain at a dose range of 1 to 19 MME per day, be on concurrent benzodiazepines or antidepressants, have tried or been concurrently taking oral NSAIDs or gabapentin, and have signed a controlled substance user agreement with their primary care physician. These descriptive data serve as a baseline for future studies on the impact of interprofessional management of patients with chronic pain at the Kaweah Delta Family Medicine Center.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 7-042

Poster Title: The role of a clinical pharmacist as part of a multidisciplinary care team in the treatment of HCV in HCV/HIV co-infected patients

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Purpose: There are limited data on the role of clinical pharmacists in patients living with HIV who are co-infected with hepatitis C (HCV). We evaluated the role of a clinical pharmacist in HCV treatment of HIV and HCV co-infected patients.

Methods: This was a descriptive study of the role of a clinical pharmacist in the HCV treatment of HIV/HCV co-infected adults (18 years old and older) receiving care at a publicly-funded safety-net clinic in San Francisco between March 18, 2015 and September 15, 2016. HCV treatment was chosen based on the 2015/2016 American Association for the Study of Liver Disease (AASLD) guidelines and patient specific factors. Patients' care was coordinated through the efforts of a multidisciplinary team consisting of a physician, a nurse, rotating infectious diseases fellows, and a clinical pharmacist. The role of the clinical pharmacist was categorized and quantified into eight main categories: (1) HCV medication adherence counseling, (2) HCV drug-drug interaction (DDI) counseling and screening, (3) HCV medication adverse reactions counseling, monitoring, and interventions, (4) HCV counseling regarding HCV treatment outcomes and risk of re-infection, (5) ordering laboratory tests and interpretation of HCV laboratory values, (6) pharmacy prior authorization (PA) initiation and submission, (7) HIV medication adverse event assessment, and (8) other (including refilling medications and management of other comorbidities).

Results: We identified 138 HIV/HCV co-infected patients who were treated with direct-acting antiviral (DAA) therapy during this period. Among these patients 76.1% were male, 42.0% Caucasian, 55.1% non-cirrhotic, 76.8% HCV treatment-naïve, and 44.9% HCV genotype 1a. The majority of patients were initiated on the fixed-dose combination of ledipasvir/sofosbuvir

(82.6%) for 12 weeks (93.5%). The clinical pharmacist completed 126 PAs (91.3%), counseled on HCV medication adherence in 57.3% of patients, conducted HCV DDI counseling and screening in 39.9%, monitored HCV medication adverse events reactions in 54.3% and intervened on 6% of patients, counseled on possibility of HCV cure and risk of re-infection in 37.7%, ordered laboratory tests in 32.6% and reported and interpreted laboratory values for 31.9% of patients, evaluated HIV medication adverse events in 23.2%, and participated in other activities in 31.2% of patients, including 24.6% medication refills. Thirty-six patients (26%) experienced HCV medication-related adverse events but none discontinued treatment due to adverse effects. Sustained virologic response at 12 weeks (SVR12) was achieved in 137 (99%) of the patients. One treatment-experienced patient did not achieve SVR12 due to treatment failure but was later successfully treated in a study using triple DAA therapy.

Conclusion: In a multidisciplinary care team, clinical pharmacists play a critical role in assisting patients achieve SVR through PA initiation and submission, DDI screening, HCV counseling on adherence, adverse events, and risk of re-infection, laboratory test ordering and interpretation, and helping manage other medication-related issues.

Submission Category: Pharmacy Law/ Regulatory/ Accreditation

Submission Type: Descriptive Report

Session-Board Number: 7-043

Poster Title: Barriers and solutions to providing pharmacy services to patients with limited English proficiency: A qualitative study

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Purpose: Patients who have a limited ability to read, write, speak or understand English can be limited English proficient (LEP) and are at higher risk for medication non-adherence and other medication problems. Despite increasing regulatory efforts to improve access to language assistance services such as verbal counseling and prescription labels in non-English languages, availability of these services varies greatly among pharmacies. The purpose of our study is to better understand the barriers and challenges that pharmacists encounter when providing services to LEP patients and to identify possible solutions among community and outpatient hospital pharmacies.

Methods: We conducted semi-structured interviews with pharmacists practicing in the following pharmacy categories: retail or chain, independent, or outpatient hospital. A purposive sampling strategy was employed to ensure an adequate representation of participants from each pharmacy category between February to September 2016. Pharmacists were eligible to participate if they had worked at their respective pharmacy for at least one year and were recruited by phone or e-mail. We developed an interview guide based on previous studies reported in the existing literature. Interview questions were designed to assess if and how pharmacists provide non-English prescription labels and verbal counseling, any barriers or challenges in doing so, and potential solutions or ideas to improve these services. Lastly, we solicited pharmacists' attitudes and opinions regarding these services and their awareness of policies to improve LEP patients' understanding of their medications. Interviews were conducted in person or by telephone and were audiotaped and transcribed. A modified grounded theory analysis was used to identify emergent themes based on extensive reviews of transcripts, summaries and note taking. The UCSF Institutional Review Board approved this qualitative study.

Results: We interviewed 16 pharmacists representing all three pharmacy categories (6 retail pharmacies, 5 independent pharmacies and 5 outpatient hospital pharmacies). Nearly all pharmacies provided non-English labels or verbal counseling. The most common languages were Spanish, Chinese, Russian, Vietnamese, Tagalog and Korean. All pharmacists expressed concerns over the accuracy and quality of translating written labels with computer software. They preferred using staff to translate and write or type medication instructions instead of using software, or use pre-printed translated template labels. Similarly they preferred using pharmacy staff or patients' family members to verbally interpret and counsel LEP patients rather than using telephonic language translation services. Emerging themes about attitudes and opinions of pharmacy services for LEP patients included discomfort with verifying a prescription label when the accuracy of translation is questionable and although language assistance services improve patient care, not all pharmacists should be required by law to do so because incorrect translation could cause harm and it is not feasible or necessary for all pharmacies. Potential solutions included using pharmacy staff who could translate and interpret, creating pre-printed labels with correct translation or improved software, or finding a pharmacist who can translate the language of interest.

Conclusion: Community and outpatient hospital pharmacists face a number of challenges and barriers to effectively provide translated prescription labels and verbal counseling to LEP patients. We have identified common barriers, attitudes and potential solutions which may help pharmacists, policy makers and other healthcare entities decide on ways to improve pharmacy services for LEP patients. Doing so may lead to better health outcomes by ensuring safer, more accurate medication use and reducing potential adverse drug events in this high risk population.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 7-044

Poster Title: Evaluation of Antiretroviral Drug Regimens and Drug Interactions in CalOptima Patients: A Retrospective Claims Data Analysis

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Purpose: Appropriate antiretroviral therapy (ART) is highly effective in preventing the transmission of HIV if that therapy can lead to sufficient viral suppression. Identifying interactions, adherence, and appropriateness of ART based on the Department of Health and Human Services (DHHS) is imperative for optimal efficacy of a particular regimen. The purpose of this study is to assess interactions between HIV-positive CalOptima patients' ART regimens with their other current medications, adherence to ART regimen, and if regimens agree with current recommended therapies per DHHS.

Methods: This is a descriptive, retrospective analysis using blinded claims data from CalOptima patients. Inclusion criteria included adult patients submitting claims data on ART medications from January 1, 2016 to June 30, 2016. Claims data were analyzed for interactions, adherence, and DHHS-guideline recommended therapy for the treatment of HIV.
Drug Interactions with ART regimen: Each of a patient's non-ART medications were classified into therapeutic groups. Total number of interactions per therapeutic group was quantitatively measured for each CalOptima patient. Drug interactions were identified using Micromedex.
Adherence: Adherence was measured using the Proportion of Days Covered (PDC) developed by the Pharmacy Quality Alliance which has been studied and developed as our standard measurement. Calculations and determination of adherence was based on fill dates and days supply for each patient's HIV ART regimen. PDC was calculated by taking the ratio of days covered by claims data to the difference between the last day of the measurement period (6/30/2016) and the first ART fill date.

ART regimen Appropriateness: Regimens were separated into five categories based on DHHS guideline recommendations which includes: recommended, alternative, other, not recommended, or pre-exposure prophylaxis (PrEP). It was also documented whether the regimen was a single-pill regimen or required multiple pills to complete the regimen.

Results: A total of 279 patients were analyzed. For regimen appropriateness, 127 patients (45.5%) had a DHHS recommended regimen, 89 (31.9%) had an alternate DHHS regimen, 35 (12.5%) had a regimen not recommended by DHHS, 3 (3.2%) had another antiretroviral regimen, and 19 (6.8%) had a PrEP regimen. Only 66 (27%) of all ART were single-tablet regimens. For PDC, 86 (30.8%) patients had ratios less than 0.9, 30 (10.8%) patients had ratios between 0.9 and 0.94, and 163 (58.4%) patients had ratios greater than 0.9. A total of 225 drug interactions were found. The top 4 groups of medications represented in these interactions were antidepressants (43, 25.3%), analgesics (35, 20.6%), antimicrobials (31, 18.3%), and antihyperlipidemics (19, 11.1%). All other groups of medications accounted for 6% or less of the interactions.

Conclusion: There were several limitations to our claims analysis. For regimen appropriateness, there was had no way to discern if patients were treatment naive or treatment experienced. The analysis of drug interactions did not include over the counter medications. Lastly, the analysis of adherence could not accommodate for deliberate holds of ART therapy. Nevertheless, the data suggest that the majority of patients are not on DHHS recommended therapies, which often interact with other medications. A large number of patients have poor adherence to ART. All these factors can contribute to poor virological suppression.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 7-045

Poster Title: Medication error rates with a newly implemented integrated glycemic management system

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Purpose: On March 16, 2016, Kaweah Delta Health Care District, an eight-campus, 581-bed healthcare organization in Visalia, California, underwent a hospital-wide transition from sliding scale insulin to Glucommander (Glytec Systems) for inpatient glycemic control. Glucommander computer software individualizes insulin dosing and administration based on its proprietary algorithm in accordance with American Diabetes Association best practices. It has shown positive outcomes; however, nation-wide use is limited and studies assessing implementation errors are scarce. Currently, Glucommander settings cannot be changed once initiated. Therefore, we aim to identify errors preventing optimal glycemic control and recommend implementation strategies to better inform future institutions considering Glucommander.

Methods: A retrospective chart review of 512 adult patients receiving intravenous and/or subcutaneous insulin therapy with Glucommander software from March 16, 2016 to April 16, 2016 at Kaweah Delta Health Care District in Visalia, California was conducted. Patient population included adults 18 years old or older continued on insulin therapy for at least 24 hours. Major exclusion criteria were expecting mothers, infants, and patients on inpatient insulin therapy for greater than 30 days. Hyperglycemia was defined as blood glucose values greater than or equal to 180 mg/dL (10.0 mmol/L) and hypoglycemia was defined as blood glucose values less than 70 mg/dL (3.9 mmol/L). Patient reports were generated by Glucommander and each patient meeting the inclusion criteria was further examined in both Glucommander and Cerner Soarian for relevant data collection. The primary endpoint was transcription error rates of insulin orders prescribed by physicians versus manual nurse inputs into Glucommander software for patients experiencing at least one hyperglycemic or

hypoglycemic event during the designated time period. Secondary endpoints were total number of hyperglycemic or hypoglycemic events 31 days post-Glucommander implementation, identification of errors not associated with the primary endpoint, and number of interventions required to adjust out-of-range blood glucose values. Initial training requirements for each hospital department were explored and compared. Descriptive statistics were used for data analysis.

Results: During the first 31 days post-implementation of Glucommander, 391 unique patient visits experienced at least one hyperglycemic episode and 121 unique patient visits experienced at least one hypoglycemic episode during the course of their admission. The hyperglycemic group consisted of 51.7% males and 48.3% females, while the hypoglycemic group consisted of 57% males and 43% females. The primary endpoint of transcription error rates resulted in 33.3% versus 16.7% of total errors found in the hyperglycemic and hypoglycemic groups, respectively. Secondary endpoints resulted in 3,596 versus 244 separate blood glucose values classified as hyperglycemic and hypoglycemic events, respectively. Errors not related to the primary endpoint were categorized as charting errors. Hyperglycemic patients warranted 46 interventions in contrast to 246 interventions in the hypoglycemic group. There were 388 unique patients with 3 hospital readmissions in the hyperglycemic group and 114 unique patients with 7 readmissions in the hypoglycemic group during the study period. A weekly downward trend in number of interventions required in the hyperglycemic group was observed with each succeeding week while no such trend was observed in the hypoglycemic group.

Conclusion: We hypothesized that transcription errors may result in suboptimal control of blood glucose because initial nurse manual inputs from insulin physician orders cannot be changed once initiated. However, the incidence of transcription errors may be misleading due to a limitation in program settings where data needed to assess transcription errors retrospectively were unavailable. To better evaluate rate of transcription errors, and therefore improve patient safety, we recommend a change in Glucommander settings to display initial input parameters for all insulin orders. Future implementation can benefit from greater standardization and uniformity in both training and utilization of Glucommander features.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 7-046

Poster Title: Time to reinitiation of anticoagulation in patients following a major bleed

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Purpose: After patients experience a major bleed while on active anticoagulation, there is limited evidence guiding the ideal time to restart anticoagulation following the event. Specifically, data is limited for patients who experience intracranial hemorrhage (ICH). This project aims to evaluate the average time frame in which providers at the University of California Davis Medical Center (UCDMC) restart anticoagulation in patients admitted for ICH and the associated clinical outcomes.

Methods: The institutional review board approved this retrospective chart review. Electronic medical records were used to identify patients with suspected ICH who received anticoagulant reversal agents from May 1, 2014 to August 1, 2016. Patients 18 years old or greater who experienced ICH on admission or during hospitalization while on active anticoagulation, and were given at least one reversal agent (4-factor PCC (KCentra), idarucizumab, factor eight inhibitor bypass activity (FEIBA), vitamin K, or recombinant activated factor VII (rFVIIa)) were included in the study. Patients who did not restart anticoagulation or were restarted after more than 30 days, died or were discharged within 7 days of onset of bleed, were on a Vitamin K antagonist but with a subtherapeutic INR < 1.5 at the time of bleed, had incomplete medical records, or who experienced a major bleed with secondary etiologies such as tumor, major trauma, acute thrombolysis, aneurysmal subarachnoid hemorrhage, or other coagulopathies were excluded. The primary outcome measure was time to reinitiation of either prophylactic or therapeutic anticoagulation. Our secondary outcomes include the incidence of thrombotic events or worsening/recurrent bleed as well as 30-day mortality.

Results: Of 237 patients who met screening criteria, 26 patients were included. Eleven (42.3%) patients were restarted on either prophylactic or therapeutic anticoagulation. The mean time to restarting anticoagulation in this ICH population was 15 + 7.8 days. Five out of the 11 patients were initially restarted on prophylaxis anticoagulation with either heparin or enoxaparin, and one of those five patients was resumed on home-dose warfarin. The remaining six patients were restarted on warfarin with a majority of them at a lower dose (4.6 + 2.0 mg restarting dose vs 5.8 + 2.3 mg PTA dose). Seven patients did not restart anticoagulation throughout the admission or in the outpatient setting. Two patients were restarted on anticoagulation after 30 days. There were no incidences of thrombotic events or worsening/recurrent bleed in this sample population.

Conclusion: At UCDMC, patients who were admitted for an ICH restarted anticoagulation on average after 15 days of bleed compared to current literature and trials with a restart time frame between 7-30 days. The optimal start of anticoagulation time that is associated with a reduced rate of thromboembolism with no significant increased risk of bleed should be determined with a larger sample population. There was no differences in bleeding or VTE in patients who were restarted on AC versus those who did not.

Submission Category: Geriatrics

Submission Type: Evaluative Study

Session-Board Number: 7-047

Poster Title: Development and implementation of the Care Ecosystem: A medication management program for patients with dementia and their caregivers using innovative technology

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Purpose: Potentially inappropriate medication use (PIMs) are common and dangerous among patients with dementia leading to worsening cognition, adverse drug events and death. Prescribing is often suboptimal because medication management is frequently lacking and safer medication alternatives and non-drug treatments are not always trialed. The Dementia Care Ecosystem (DCE) provides proactive, coordinated, continuous and personalized medication management through an innovative digital platform. The objectives are to characterize the types and frequencies of PIMs and other high risk medication changes over time among patients with dementia between intervention and control groups.

Methods: The Care Ecosystem is a telephone-based intervention designed to complement primary care services in managing patients with dementia. It consists of healthcare navigators, nurses, social workers and pharmacists who reconcile and monitor medications and provide expert advice, education and counseling to optimize medication use. This ongoing multicenter randomized controlled trial compares the Care Ecosystem (intervention group) to standard of care (control group) in the San Francisco Bay Area and Nebraska. We evaluated PIMs use relevant to dementia and delirium over time among intervention and control groups. PIMs were defined using the 2015 Beers Criteria and included anticholinergic, antipsychotic, benzodiazepine, non-steroidal anti-inflammatory drugs, systemic corticosteroids, hormone replacement therapy, histamine two receptor antagonists, alpha blockers, stimulants, benzodiazepine receptor hypnotics and other drug classes. We analyzed rates of PIMs use

among intervention and control groups for patients who have been enrolled in the trial for 5 or more months. The UCSF Institutional Review Board approved this study. This project was made possible by Grant Number 1c1cms331346 from the Department of Health and Human Services, Centers for Medicare & Medicaid Services. The contents of this abstract are solely the responsibility of the authors and do not necessarily represent the official views of the U.S. Department of Health and Human Services or any of its agencies.

Results: Among 403 patients with 5 or more months of follow up, 324 patients were available for analysis (80 percent follow up rate). 50 percent of control patients were prescribed any PIMs at baseline and this increased to 53 percent at follow up. In contrast 55 percent of intervention patients were prescribed any PIMs at baseline and this decreased to 52 percent at follow up. Differences in specific drug classes were observed. Intervention patients were prescribed fewer anticholinergics and benzodiazepines, whereas control patients were prescribed more of these drugs. Non-steroidal anti-inflammatory drugs decreased in both groups at similar rates. Antipsychotics increased in both groups, however this rate was slower among intervention patients. Overall, relative risk reductions for anticholinergics (26 percent), benzodiazepines (22 percent), antipsychotics (12 percent) and non-steroidal anti-inflammatory drugs (12 percent) resulted among intervention patients compared to control patients.

Conclusion: PIMs are common among dementia patients (50 percent), demonstrating the need for active, ongoing medication management. Preliminary results suggest that the Care Ecosystem medication management service reduces PIMs use compared to standard of care. This novel dementia care model that incorporates pharmacy review and consultations in collaboration with navigators, nurses, social workers and primary care providers shows promise in improving safe medication use and reducing potential adverse drug events in this high risk population.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Descriptive Report

Session-Board Number: 7-048

Poster Title: Correlating Thromboelastograph Platelet Mapping (TEG-PM) with incidence of hematologic events in patients on Mechanical Circulatory Support (MCS) devices and antithrombotic therapy

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Purpose: Ventricular assist devices (VADs) and Total Artificial Hearts (TAH) providing durable mechanical circulatory support (MCS), as bridges to transplant or destination therapies, have commonly become an alternative treatment in end-stage heart failure patients. Hematologic adverse events and complications frequently occur in MCS patients leading to increased risk of mortality. Post implantation patients are given antithrombotics consisting of antiplatelets and anticoagulants to counteract adverse thrombotic events. TEG-PM allows for a personalized approach in optimizing antithrombotic therapy and minimizing hematologic complications. The purpose of this study is to evaluate the incidence of hematologic events in MCS patients on TEG-PM guided antithrombotic therapy.

Methods: This Institutional Review Board (IRB) approved, retrospective analysis reviewed data from December 2014 to August 2016. The study evaluated patients (n=71) implanted with a continuous flow left ventricular assisted device (LVAD) (n=41) vs. a pulsatile total artificial heart (TAH) (n=30). Patients' antithrombotic therapy and INTERMACS (Interagency Registry for Mechanically Assisted Circulatory Support) profile were reviewed. INTERMAC describes the clinical state of advanced heart failure (HF) patients by assigning them into seven levels according to their hemodynamic profile and level of target organ damage. Data collected included: dosage titration of aspirin and dipyridamole, INR at post implant discharge, TEG-PM parameters, major bleeding events and major thrombotic events, days from implant date to adverse event date, and high molecular weight multimer loss. Patients that experienced a

hematologic event < 14 days of implantation were excluded. The primary endpoint was to assess incidence of hematological events in MSC patients whose antithrombotic therapy was guided by TEG-PM results. The secondary endpoint was to evaluate the antiplatelet therapy correlated by TEG-PM in patients either on VADs or TAH.

Results: 44 out of the 71 patients (62%) did not experience hematologic events with TEG-PM guided dosing. 27 out of the 71 patients (38%) experienced hematological events. 15 out of the 27 patients experienced an event >14 days post implantation. Out of these 15 patients, 9 (60%) were TAH patients and 6 (40%) were LVAD patients. Of the 9 TAH patients, there were 8 incidences of strokes and 7 incidences of major bleeding events. Of the 6 LVAD patients, there were 2 incidences of strokes, 8 incidences of major bleeding events, and 1 experienced a device thrombosis. Of the 15 patients who had hematological events at >14 days post implantation, 12 of them had an INTERMACS profile that corresponded to high severity status prior to device implantation. Analysis of the data revealed a correlation between hematologic events and patients with high severity status as determined by INTERMACS.

Conclusion: Patients with TAH appear to be at higher risk for thrombosis while patients with LVADs appear to have a higher risk for bleeding. Due to the design of the devices, LVAD patients are at additional risk of bleeding due to von Willebrand Factor multimer loss (acquired von Willebrand Disease). Correlation of TEG-PM parameters with the hematologic events and the antiplatelet therapy will be reported along with mean dose of aspirin and dipyridamole for each device, which will be analyzed per thrombosis and bleeding event.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 7-049

Poster Title: Insulin prescribing habits of resident physicians in a rural family medicine clinic

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Purpose: Diabetes is a metabolic disease that affects many people worldwide. According to a 2014 report by the California Department of Public Health, Tulare County has the highest prevalence of Type 2 diabetes in patients 18 years and older in California. Appropriate insulin prescribing was identified as a quality improvement initiative crucial to improving outpatient management of this chronic disease at Kaweah Delta Family Medicine Center in Tulare County. This study describes insulin prescribing habits of resident physicians at Kaweah Delta Family Medicine Center prior to the integration of clinical pharmacist services through a Health Resources and Services (HRSA) grant.

Methods: This institutional review board-approved retrospective chart review examined 82 patient records between January 01, 2015 and January 31, 2016. Inclusion criteria included: patients 18 years of age and older, patients with a diagnosis of type 1 or type 2 diabetes mellitus, and patients prescribed insulin. Patients under 18 years of age, those who had gestational diabetes, or were only prescribed oral anti-diabetic medications were excluded. The following data were collected: demographics, insulin initiations, insulin types and doses, number of insulin dose and product changes, number of insulin sliding scale (ISS) regimens, number of adjunctive anti-diabetic medications, number of basal-bolus regimens, A1c changes, self-monitoring blood glucose (SMBG) frequency as instructed by provider, number of diabetes-related visits, discrepancies between prescription instructions and provider notes regarding insulin dose, and patient history of hyperglycemic or hypoglycemic events. Data were analyzed using mean, median, mode, and ranges in order to describe insulin prescribing habits.

Results: The majority of patients (62 percent) were on a basal-bolus regimen, with insulin glargine as the most commonly prescribed long-acting (79 percent) and insulin lispro as the most commonly prescribed short-acting (38 percent). Most patients (76 percent) who established care at the clinic were insulin experienced, 31 percent were prescribed insulin sliding scale (ISS), and 48 percent were prescribed adjunctive oral anti-diabetic medications. Forty-eight percent of prescriptions did not match dosage adjustments documented in provider notes. The majority of dose changes were documented in provider notes (73 percent), while only 38 percent of dose changes were documented in outgoing prescriptions. The average number of visits was 6.5 within the 13 month time frame. Twenty-seven percent of patients had an increase in A1c and 23 percent had a decrease in A1c. The most commonly instructed frequency for self-monitoring of blood glucose was 3 times daily. Thirty-two percent of patients experienced hypoglycemic events, hyperglycemic events, or both, with 11 percent resulting in hospitalizations.

Conclusion: Knowledge of resident insulin prescribing habits is essential in evaluating the need for education and implementation of clinical pharmacist services to improve the collaborative management of diabetes in a rural setting. Physician residents may benefit from further education and a standardized approach to insulin management to minimize discrepancies, prevent adverse outcomes, and optimize patient care.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 7-050

Poster Title: Evaluation of the effects of weight-based norepinephrine continuous infusion

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Purpose: The Surviving Sepsis Campaign guidelines recommend norepinephrine (NE) as the vasopressor of choice for septic shock. The implementation of both weight-based and non-weight-based dosing of NE leads to inconsistency between different institutions. There are currently no studies comparing the effects of weight-based and non-weight-based NE. Antelope Valley Hospital (AVH) initiated a weight-based NE protocol using ideal body weight. In the protocol, NE is not recommended unless the patient had been adequately fluid resuscitated. This study explores the effects of weight-based dosing of NE compared to non-weight-based dosing in adult ICU patients at AVH.

Methods: This retrospective cohort study utilized Vigilanz, a healthcare technology software, to electronically generate a list of patients who were on NE continuous infusions from March 1, 2015 to May 30, 2016. Patient's information was further analyzed by the medical record database HEIDI and a retrospective chart review was performed. Patients admitted to the ICU at AVH, Lancaster, California, and patients 18 years and older who required continuous NE infusions were included in the study. Patients were excluded if they were less than 18 years old, were not admitted to the ICU, or whose names were on the electronically generated list but did not receive any NE. The primary outcome measure was to evaluate the mean NE dose and duration of infusion required in patients. The secondary outcome measures included time to reach goal MAP, volume of fluid resuscitation administered 12 hours before NE initiation, mortality and the use of additional vasopressors. Patient demographics, baseline characteristics, and outcome variables of patients were compared. Categorical variables were compared using the Fisher exact test. Continuous variables were analyzed using t-test.

Results: A total of 100 patients were analyzed - 50 in the non-weight-based NE group and 50 in the weight-based NE group. All patients were followed until hospital discharge or death. There were no significant differences between the two groups with regard to baseline characteristics. The mean NE dose required in the non-weight-based group was 0.10 mcg/kg/min vs. 0.30 mcg/kg/min in the weight-based group (P equals 0.007). The average duration of infusion required in the non-weight-based group was 48.62 hours vs. 52.99 hours in the weight-based group (P equals 0.736). In the non-weight-based group, 18 patients were already at MAP goal at NE initiation, compared to 13 patients in the weight-based group (P equals 0.432). The average time to goal MAP was 82.19 minutes in the non-weight-based group vs. 55.49 minutes in the weight-based group (P equals 0.535). The non-weight-based group required more fluid resuscitation within 12 hours prior to NE initiation (7.8 hours vs. 5.8 hours, P equals 0.359). 19 patients expired in the non-weight-based group vs. 30 patients in the weight-based group (P equals 0.197). 13 patients required additional vasopressors in the non-weight-based group whereas 11 patients in the weight-based group (P equals 0.714).

Conclusion: The non-weight-based group required a statistically significant lower average dose of NE infusion than the weight-based group. However, the weight-based NE group reached MAP goal faster than the non-weight-based NE group, although this was not statistically significant. To summarize, the weight-based group received higher doses of NE infusion, and subsequently reached MAP goal faster than the non-weight-based group. These results require further evaluation due to limitations of retrospective studies and small sample size. Future randomized studies with multiple centers and sufficient sample size are warranted to broaden the generalizability and to confirm the clinical significance of these results.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 7-051

Poster Title: Student-run health fairs effective at motivating and educating minority communities

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Purpose: Pharmacy schools across the nation host multiple health fairs to reach underserved communities who may lack health insurance or access to primary care. Health fair participants are educated on numerous disease states and the importance of their health screening values. Despite providing these screening opportunities, there is a knowledge gap in terms of perceived public satisfaction toward these services. Health fair satisfaction surveys were created to receive feedback on how the public perceived student pharmacists' services, what they liked or appreciated, and what points University of Southern California School of Pharmacy could improve upon for future health fair events.

Methods: The survey was a 9-item questionnaire that focused on the participants' experiences at the health fair in English, Vietnamese, and Chinese languages. Participants were provided with the voluntary surveys at the health fair registration and reminded to fill out the surveys after each participated health screening. The survey included questions asking how participants heard about the health fair and the reasoning for their participation. Participants were also asked to rate the quality of the health fair and professionalism of the student volunteers as well as the amount of time spent at the health fair. Additionally, participants were asked to mark each health screening they participated in and whether participation in the health fair motivated them to change an unhealthy behavior. All returned surveys were collected and data analyzed by descriptive statistics on a nominal and ordinal scale.

Results: Throughout Los Angeles County, eight health fairs provided the health fair participation surveys, in which a total of 477 responses were collected. Participants were aware of the health fair through word of mouth (35%) and other (37%), where majority of specified answers were "walked by." Participants were also asked the reasoning for attending, in which ~60% answered

"curious about health" and 33% answered "convenient." Additionally, 72% reported that the health fair conducted was "excellent" and 84% rated professionalism of the volunteers "excellent." For screening events, blood pressure and blood sugar had highest attendance with 64% and 68% respectively, following cholesterol and body fat at both 42%. 63% of surveyed participants spent about one hour at the health fair and 75% agreed this participation motivated them to change an unhealthy behavior. Furthermore, 75% answered "yes" for planning to follow-up about an abnormal value detected at their physicians' offices, with 43% to follow-up within the next week or month. Lastly, 98% of participants surveyed answered "yes" to participating in a health fair again next year. Participants provided valuable feedback and positive responses including: "I learned a lot about how to care for my diabetes" and "[students] took their time to answer questions."

Conclusion: Newly implemented health fair surveys were helpful in obtaining a better idea of the values of free health screenings and additional ways on how student-run health fairs can improve screenings and health education. Feedback from participants guided students to better address needs of community members in providing more effective and higher quality of care.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 7-052

Poster Title: Identifying risk factors and patients at risk for Clostridium difficile infections at Antelope Valley Hospital

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Purpose: Clostridium difficile infection (CDI) is the most common healthcare-associated infection in US hospitals. The incidence of CDI is increasing with significant economic burden, and the three major risk factors are antibiotic exposure, advanced age, and hospitalization. The purpose of this study is to analyze and identify factors associated with CDI at Antelope Valley Hospital (AVH) in order to identify potential interventions to reduce CDI.

Methods: The institutional review board approved this cross-sectional study from January 2014 to June 2016 at Antelope Valley Hospital, a 420-bed district hospital located in Lancaster, California. Data was collected through retrospective chart review using McKesson OneContent, McKesson Horizon Clinicals, and the Horizon Physician Portal. All patients with hospital-acquired C. difficile, defined as a positive C. difficile toxin 48 or more hours after admission, between January 2014 and June 2016 were included in the study. Community-acquired C. difficile, defined as having a positive C. difficile toxin on or less than 48 hours after admission were excluded. The analyzed study variables include time to onset, previous C. difficile episode, residence at a skilled nursing facility (SNF), previous hospitalization and antibiotic use in the last 90 days, inpatient antibiotic use, intensive care unit admission, gastrointestinal procedures (endoscopy, colonoscopy, and bowel surgery), and probiotic use (Saccharomyces boulardii or Lactobacillus acidophilus). One variable statistics and associated analyses were performed using Microsoft Excel.

Results: A total of 146 patients were included in this study. Baseline characteristics on admission demonstrated that the average age of CDI was 66.3 years. 25 percent of the patients resided in a SNF and 43 percent has had a previous hospitalization or antibiotic use in the last 90 days. Inpatient factors such as ICU stay (20 percent), gastrointestinal procedure (33 percent), and antibiotic use (92 percent) were associated with CDI. Patients were on an average of 1.9 plus or minus 1.3 antibiotics for 8 plus or minus 5.9 days. In these 146 patients, 61 patients were on a quinolone, 40 on ceftriaxone, 39 on cefepime, 35 on piperacillin-tazobactam, and 25 on a carbapenem during hospital stay. Quinolones were the most commonly used in combination antibiotic therapy. Probiotic use before positive C. difficile collection was only 20 percent, but out of those, about 44 percent has had a previous C. difficile episode in the past year.

Conclusion: Characteristics on admission at AVH demonstrated that CDI was associated with advanced age, previous hospitalization and antibiotic use in the last 90 days, and residence at a SNF. Inpatient risk factors such as the use of broad spectrum antibiotics (e.g. quinolones), duration of antibiotic use, ICU stay, and gastrointestinal procedures were all correlated with CDI. These identified risk factors are similar to those reported in previous studies. Given these findings, we aim to restrict use of quinolones, narrow empiric therapy before day 8, and focus antimicrobial stewardship efforts on geriatric patients to reduce the incidence of CDI at AVH.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 7-053

Poster Title: Retrospective study of the impact of Vancomycin dosing in patients with Methicillin resistant S aureus (MRSA) infections and their clinical outcomes

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Purpose: Vancomycin is considered first line therapy for most MRSA infections at LAC-USC Medical Center. With increasing vancomycin MIC to MRSA, higher doses of vancomycin may be needed. However, this will need to be balanced with increased risk of nephrotoxicity. We currently do not use loading doses of vancomycin, which may delay obtaining therapeutic levels early in therapy. The objective of this study was to first determine if there is a delay in obtaining therapeutic vancomycin levels without giving loading doses, then whether this would negatively affect clinical outcomes of MRSA skin and soft tissue (SSTI), bacteremia, pneumonia and osteomyelitis infections.

Methods: This was a single center retrospective analysis of adult patients (>17yo) with documented MRSA infection, initially treated with vancomycin from January 2016-June 2016. Microbiology reports were screened for positive MRSA cultures at Los Angeles County-University of Southern California Medical Center from January to June 2016. Inclusion criteria was 1) received vancomycin therapy >48 hours 2) minimum 1 trough level drawn, and 3) vancomycin dosed per pharmacy. The target trough levels were defined per IDSA guidelines: 10-15mcg/ml for SSTI and >15mcg/ml for all other indications. Patients were grouped into therapeutic (T) vs non-therapeutic (NT) initial trough concentration and compared for outcomes. Clinical success was defined as resolution of infection.

Results: A total of 46 patients were included: 80% were male and mean age was 46.5 years old. The most common indication for vancomycin was SSTI (63%), then osteomyelitis (15%), bacteremia (11%) and pneumonia (11%). 89% of patients did not meet initial therapeutic trough concentrations (NT group). Baseline Scr was higher at 1.05 mcg/ml, with lower estimated CrCl at 98ml/min in the NT group. The initial total daily dose was similar between the

groups at 2000mg/day. The initial average trough level was 12.7mcg/mL in the T group and 8.4mcg/mL in the NT group. 100% of patients in the T group had MRSA isolates with MIC□1 mcg/mL compared to 85.4% of patients in NT group. Median duration of vancomycin therapy was 3 days longer in the T group at 9 days and longer length of hospital stay at 17 days. Of those who did not have a therapeutic initial trough, only 38.7% had a therapeutic second trough. There was one clinical failure in the NT group in a patient with bacteremia, where vancomycin therapy did not clear the organism from blood cultures.

Conclusion: Majority of patients evaluated did not reach therapeutic initial troughs in our populations, which can partly be explained by lack of giving loading doses. Our preliminary data showed that clinical outcomes may not be significantly compromised, however our numbers were small. This outcome may be partially explained by majority of the infections being SSTI source. Prospective education can be provided for the hospital staff to select more appropriate initial doses in order to achieve therapeutic initial goals.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 7-054

Poster Title: Meeting the challenge of medical benefit management of specialty medications: A novel interdisciplinary intervention program

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Purpose: Much attention has been focused on specialty medication driving pharmacy spend to record levels in the face of rising prices and accelerating drug development. Yet, nearly half of the $124 billion specialty costs in 2015 were billed through the medical benefit rather than the pharmacy benefit. To answer the unique challenges of complex drug regimens, limited access to real-time data, quickly evolving medical evidence, and the need for individualized care, a multidisciplinary program was implemented to aid the medical benefit management (MBM) of specialty medications. The purpose of this study was to evaluate the intervention program.

Methods: This exploratory, prospective descriptive analysis employed medical benefit claims and provider reports. Enrolled patients were under the care of independent physician groups located in California, Arizona, and Utah. Inclusion criteria were requests regarding high-cost medications; requests that will be billed through the medical benefit. Specialty medication authorization requests and consultative reviews completed in an 18-month time frame from January 1st, 2015, through June 30th, 2016, are evaluated here. Clinical reviews were done by pharmacists and physician specialists in hematology, rheumatology, oncology, and nephrology. Requests and reviews for multi-drug regimens were evaluated holistically as a treatment plan. Interventions were stratified by disease category, medication, and rationale, including clinical appropriateness, failure to meet evidence-based step therapy, and dose optimization.

Results: A total of 8158 study patients were studied through these medication requests, and had a mean age of 52.5 years; 35% were male; and 95% resided in California, 4% resided in Arizona and 1% resided in Utah. Of the 14162 reviews completed in the study period, 15% were

identified as requiring intervention. A total of 2098 requests were identified for an intervention. In terms of percentage of total requests (TR) and percentage of total interventions (TI), Oncology had a 88% TR and 8% TI; Rheumatology had a 8% TR and 1.1% TI; Neurology had a 0.49% TR and 0.06% TI. The most frequent reasons for intervention were for a lack of documented medical necessity (47%); being clinically inappropriate (19%); dose optimization (12%); and not meeting recommended step therapy (11%).
Conclusion: The novel, interdisciplinary intervention program was demonstrated to be an effective strategy in specialty medication medical benefit management, making interventions based on the practice of evidence-based medicine with careful regard to individual patient needs.

Conclusion: The novel, interdisciplinary intervention program was demonstrated to be an effective strategy in specialty medication medical benefit management, making interventions based on the practice of evidence-based medicine with careful regard to individual patient needs.

Submission Category: Critical Care

Submission Type: Descriptive Report

Session-Board Number: 7-055

Poster Title: Appropriate fentanyl monitoring at Antelope Valley Hospital

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Purpose: Because fentanyl has both analgesic and sedating properties, it is highly used in mechanically ventilated patients in the intensive care unit. However, it is important to wean patients off so that they can eventually be extubated and transferred out of the intensive care unit. In addition, it is important to titrate fentanyl properly based on regular pain and sedation assessment scores. This project was designed to assess if the fentanyl drip protocol was being followed appropriately by nurses in the intensive care unit at Antelope Valley Hospital, before and after its protocol change.

Methods: This study was performed on 26 patients on fentanyl before the fentanyl protocol change (November 2015) and 26 patients on fentanyl after the fentanyl protocol change (June 2016) at Antelope Valley Hospitals' Intensive Care Unit in Lancaster, California. Data collection was done through the patient chart review. Variables such as fentanyl starting rate, maximum rate, average time the Critical-Care Pain Observation Tool (CPOT) and Richmond Agitation Sedation Scale (RASS) scores were recorded, appropriate titrating and tapering of fentanyl, and if as needed pain medication were given appropriately were captured. Postpartum patients and patients on intrathecal fentanyl were excluded.

Results: After the fentanyl protocol was changed, the number of times the RASS and CPOT were checked per nursing shift improved slightly. RASS was checked 0.42 times more (3.58 versus 4) while CPOT was checked 0.61 times more (4.04 versus 4.65) per 12 hour nursing shift. The protocol states that both scores need to be assessed every 2 hours, a total of 6 times per 12 hour nursing shift. The percentage of times PRN pain medications were given or fentanyl titration was increased when CPOT was greater than or equal to 2, was 74% before the change and 75% after the change. Of the 52 patients observed in the study, 58% were started on the

appropriate initial infusion of 50mcg/hr. 19/52 patients were started on the maximum fentanyl rate (300mcg/hr) but 7 of those patients were trauma patients. Of the 52 patients, 20% of them were titrated up and down on the fentanyl drip correctly at increments of 25mcg/hr. The majority of the patients (36/52) were titrated by 50mcg/hr. 46/52 patients were on another sedation medication along with fentanyl to help keep the patient sedated while they were intubated.

Conclusion: Although the fentanyl drip protocol was reworded and modified, monitoring of pain and sedation scores as well as correct fentanyl titrations were not different among nurses before and after the protocol change. From this snapshot, we learn that as pharmacists, it is crucial to not only update protocols but also educate all intensive care unit nurses on appropriate monitoring and titrating of fentanyl so that patients who are mechanically ventilated are comfortable, without pain, and eventually weaned off all sedation when appropriate. This study shows the importance of communication between health care professionals to improve patient care.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 7-056

Poster Title: To restrict or not to restrict? Antimicrobial Stewardship evaluation of vancomycin prescribing patterns at a large academic hospital

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Purpose: The goal of Antimicrobial Stewardship (AS) is to limit inappropriate use of antimicrobials to improve patient outcomes to infection. An antimicrobial restriction policy is one example of an AS strategy to limit overuse of key antimicrobials. At LAC-USC Medical Center, an antibiotic restriction policy is utilized; vancomycin is currently unrestricted, however is highly utilized. The objective of this study was to evaluate the prescribing patterns of vancomycin in order to determine the most effective AS intervention to improve utilization for appropriate cases.

Methods: This was a retrospective review of hospitalized adult patients, greater than 17 years old, between June 15, 2016 and June 29, 2016 who received at least one dose of intravenous (IV) vancomycin. Patients were identified through the electronic medical record system through pharmacy reports for all patients prescribed IV vancomycin. We collected data on vancomycin indication, prescribing team, duration of use, drug toxicity, and clinical outcome for each patient and recorded all data in a secure database (Microsoft Excel).

Results: 187 total patients were prescribed vancomycin during the study period; 75 were randomly selected for inclusion. The average weight was 75.3 kilograms. 53.5 percent received an initial total daily dose of 2000 milligrams with an average starting dose of 14.2 milligrams per kilogram per dose. Half of vancomycin prescriptions were by medicine teams and 61 percent were dosed by pharmacy. 56 percent of patients had appropriately drawn initial trough levels (average of 11.5 milligrams per liter). The most common indications for vancomycin were purulent skin and soft tissue infections (17.3 percent), pneumonia (17.3 percent), and cellulitis (13.3 percent). 34.7 percent of patients received vancomycin therapy for less than or equal to 3

days; 72 percent received it for less than or equal to 7 days. Indications for those who received vancomycin past 7 days included cellulitis, pneumonia, prophylaxis while ventricular drain in place, endocarditis, and osteomyelitis. 10 percent had inappropriate vancomycin prescriptions, including methicillin-sensitive Staphylococcus aureus (MSSA) bacteremia without therapy de-escalation, cellulitis without abscess, sepsis without a clear source, and intra-abdominal infection. 17.3 percent reached clinical stability within three days after empiric initiation and 90 percent had clinical success of infection. 1 patient experienced vancomycin-associated nephrotoxicity and 1 had neutropenia.

Conclusion: Of the 75 patients evaluated, 90 percent of vancomycin prescriptions had appropriate initial indications. Areas of future Antimicrobial Stewardship intervention to decrease inappropriate use can be focused on educating prescribers on identifying risk factors for methicillin-resistant Staphylococcus aureus (MRSA), appropriate duration of therapy per indication, and appropriate timing of trough monitoring. These interventions can potentially affect positive change without restricting the use of the antibiotic.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 7-057

Poster Title: Comparison of epidemiology, management, and outcomes in patients presented to the emergency department for urinary tract infection: Those discharged from emergency department vs those hospitalized

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Purpose: Urinary tract infections (UTIs) are among one of the most common indications for prescribing antibiotics and are the most common infections treated in the emergency department (ED). The high turnover rate of patients and varying prescribers providing care present unique challenges to antimicrobial prescribing in the ED. Thus, antimicrobial stewardship strategies to reduce inappropriate antimicrobial prescribing are much needed in the ED. The purpose of this study is to compare the epidemiology, management, and outcome of UTI in patients discharged from the ED vs. those hospitalized in order to identify potential areas for improvement in the management of UTIs.

Methods: Adult patients over 18 years of age presenting to the ED between July 1, 2015 and June 30, 2016 with a diagnosis of UTI (ICD-9 and ICD-10 codes: 599 for UTI, 595.9 for cystitis, and 590.10 for pyelonephritis) were identified. Patients were excluded if under 18 years of age, transferred to an outside hospital, medical chart was unavailable, or evaluation or treatment was refused by the patient or family. A total of 500 patients (150 admitted inpatient and 350 discharged from the ED) were randomly selected and stratified based on the month of presentation to the ED. Relevant demographic and clinical data was extracted from the medical records of eligible patients and recorded using a standardized data collection form with precise definitions for each variable. Data regarding patient demographics, medical history, social history, presenting symptoms, vitals and lab values, urinalysis, and urine cultures were collected. The primary outcome was patient returning to the ED within 72 hours or hospital

readmission within 30 days of discharge. All statistical analysis was performed using GraphPad Prism.

Results: The median age of study patients was 59 years; discharged patients were younger (47 vs 81 years) with higher proportion being female (87 vs 67 percent) and presenting from home (90 vs 71 percent). Patients in the discharged group had a lower proportion of positive urine culture (42 vs 76 percent) and positive urinalysis (69 vs 79 percent) compared to those admitted. A positive qSOFA score (score 2, 3) was found in 2 percent of discharged patients compared to 37 percent of admitted patients. IV antibiotics (mostly ceftriaxone) were administered in the ED to 62 percent of patients discharged compared to 99 percent of patients admitted. For patients discharged from the ED, 45 percent of patients were discharged with cephalexin, 19 percent with nitrofurantoin, 16 percent with ciprofloxacin, and 15 percent with trimethoprim/sulfamethoxazole. The rates of return to ED within 72 hours of discharge for the above antibiotics were highest for cephalexin at 12 percent and lowest for nitrofurantoin at 2 percent. The rate of 30-day readmission in admitted patients was higher (12 percent) when compared to 72-hour return to the ED (6 percent) but similar (11 percent) to 30-day return to ED in discharged patients.

Conclusion: Patients discharged from the ED were more likely to be younger females presenting from home who were less likely to have a positive qSOFA and a positive urinalysis and urine culture. The outcomes for patients who were admitted to the hospital showed a greater rate of return to the hospital compared to patients who were discharged from the ED. Among patients who were discharged from ED with antibiotics, treatment with nitrofurantoin was associated with the lowest rate of return to the ED, supporting guideline recommendations that nitrofurantoin should be used first line for uncomplicated urinary tract infections.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 7-058

Poster Title: Dextromethorphan/quinidine (DM/Q) plasma concentrations in patients with percutaneous esophageal gastrostomy tubes (PEG-tubes): Using phase 3 trial data to investigate a common drug information question

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Purpose: Dextromethorphan and quinidine combination (DM/Q; Nuedexta, Avanir Pharmaceuticals, Inc.) is the only FDA-approved treatment for pseudobulbar affect (PBA). PBA occurs secondary to neurologic disease or injury and is characterized by sudden, frequent, involuntary episodes of laughing or crying that are independent of mood. Since many patients with neurological conditions have difficulty swallowing, the Avanir Drug Information Call Center is frequently asked whether DM/Q capsules can be opened for administration in food or via PEG-tube. This project evaluated patients receiving DM/Q in phase 3 clinical trials to determine whether any had DM/Q plasma concentrations measured while receiving medication via PEG-tube.

Methods: Three trials [AVR-102, AVR-107, AVR-123] included blood draws to determine dextromethorphan, dextrorphan (an active metabolite of dextromethorphan) and quinidine plasma concentrations. Patients with PEG-tubes were identified by searching patient medical history and medication administration records within each trial. Dates of PEG-tube placement were compared to dates of blood draws to identify patients with PEG-tubes at time of blood draw. To provide a preliminary indication of whether administration via PEG-tube affected DM/Q absorption, plasma concentrations for patients with PEG-tubes were compared with average [mean (std dev); 95% CI; median] plasma concentrations within each trial by dose, time period [Day 29 or Day 57 (AVR-123 only)], and metabolizer status [cytochrome P450 2D6 extensive (EM) or poor metabolizer (PM)]. Demographic data and Center for Neurologic Study Lability Scale (CNS-LS) Scores, a trial efficacy measure, were also evaluated.

Results: Seventy-three patients randomized to DM/Q [8 in trial AVP-102, 49 in trial AVP-107, and 16 in trial AVP-923] had a PEG-tube placed prior to, or during trial participation. Of these, 16 patients [6, 1, and 9 respectively] had PEG-tubes confirmed in place at the time of at least one pharmacokinetic (PK) blood draw. All patients were genotyped as cytochrome P450 2D6 EMs, except 2 (1 PM, and 1 unknown). One patient also had a full PK profile to evaluate plasma drug concentration time curve. Dextromethorphan plasma concentrations for 11 of these 16 patients [69%] were lower than the median concentration within each trial dose group and time period, but remained within 1 standard deviation of the group mean in all but 4 of cases. Analysis of the CNS-LS efficacy measure showed response generally consistent with that seen for the overall trial.

Conclusion: Plasma concentrations for 5/16 patients with PEG-tubes were above group medians. For the 11 patients with concentrations below group median, 7 were within one standard deviation of the group mean for each DM/Q dose, time period and metabolizer type. This analysis was limited by the small sample size and post-hoc methodology. Still these data could be helpful, with proper transparency, to answer unsolicited medical information requests. Given the frequency of this request, a formal pharmacokinetic study may be worthwhile.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 7-059

Poster Title: Evaluation of urinary tract infection treatment at a public teaching hospital

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Purpose: Treatment of urinary tract infections (UTI) contribute to significant healthcare and economic burden. Despite the existence of national guidelines to assist practitioners in diagnosis and management, over-prescription of antimicrobials continues to be a significant concern. As antimicrobial resistance continues to increase in Enterobacteriaceae, judicious use of antimicrobials is critical. The goal of this study was to assess the appropriateness of UTI diagnosis and management in a large teaching hospital in order to target future Antimicrobial Stewardship strategies to limit overuse of unnecessary antimicrobials.

Methods: This was a retrospective review of hospitalized adult patients, greater than 17 years old, who had a positive urine culture over a period of one week at LAC-USC Medical Center in Los Angeles, California. Medical charts were reviewed for demographics, prescriber, details of UTI, including urinalysis (UA), and UTI management. Outcomes included appropriateness of management of the positive urine culture and hospital length of stay. All data was recorded in a secure database (Microsoft Excel).

Results: Over one week, 109 patients had positive urine cultures. Overall mean age was 50 and 70 percent were female. 39 percent were ED patients, 16 percent were in outpatient clinics, 33 percent were admitted to non-intensive care unit (ICU) floors, and 12 percent were admitted to the ICU. Predominant risk factors were diabetes (40 percent), previous UTI (17 percent) and urinary catheterization (14 percent), with 21 percent possessing multiple risk factors. The most common organism was Escherichia coli at 40 percent, of which 30 percent were extended spectrum beta-lactamase (ESBL)-producers. Klebsiella pneumoniae was isolated in 8 percent of patients with 11 percent being ESBL-producers. 60 percent of patients had a positive UA and 63 percent were symptomatic. 19 percent of patients had no documented symptoms yet were

prescribed antibiotics. 6 percent of patients had a negative UA and were asymptomatic and yet received antibiotics. ED and internal medicine physicians inappropriately treated these patients. Ciprofloxacin was most commonly prescribed for cystitis (31 percent), followed by ceftriaxone (22 percent); mean treatment duration was 5.8 days. Patients treated for pyelonephritis were equally prescribed ciprofloxacin or ceftriaxone (36 percent); mean duration was 6.1 days. Of hospitalized patients, average length of stay was 10.5 days.

Conclusion: Of the 109 patients evaluated, 81 percent of patients were treated appropriately with antimicrobials for UTI. The internal medicine and ED physicians were the most frequent providers to prescribe unnecessary antibiotics. For treated cystitis patients, ciprofloxacin was the most frequently prescribed antibiotic. Patients treated for pyelonephritis were equally prescribed ciprofloxacin or ceftriaxone. Future Antimicrobial Stewardship interventions can target educating prescribers to use alternatives to fluoroquinolones when possible, documenting urinary symptoms in the chart, and appropriate management of cystitis, including recognizing those who do not need antimicrobials.

Submission Category: Pharmacy Law/ Regulatory/ Accreditation

Submission Type: Descriptive Report

Session-Board Number: 7-060

Poster Title: Medication Delivery Using Unmanned Aerial Systems: A Systematic Review and Policy Primer

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Purpose: In recent years, the use of unmanned aerial systems (UAS)/drones, have gained popularity and industry giants (e.g. Amazon, Google) have begun pilot projects with drone delivery. Community pharmacy practice is plagued with long wait times at the pick-up counter with a national average of 45 minutes. Several mechanisms to facilitate drug delivery are currently being utilized such as mail order, automated delivery systems, and home-delivery. As such, the use of drone technology appears inevitable. The purpose of this systematic review is to aggregate existing regulations on drone delivery and discuss implications it may have on pharmacy and its stakeholders.

Methods: An initial search of PubMed was done using the following terms: “drone”, “unmanned aerial system” or “remotely piloted aircraft” in conjunction with “pharmacy”, “medicine”, “medication”, or “drug.” An online search was performed using a multitude of terms to find companies already looking to deliver medications using drones and for news articles regarding safety and privacy of patients. Additionally, relevant agency (Federal Aviation Administration, NABP, NTSB) documents were evaluated for any information that may pertain to drug delivery using UAS. A full review of the current Board of Pharmacy law handbook was done to search for laws on drug delivery.

Results: The literature search identified no relevant articles in peer-reviewed journals. The bulk of the data is in the form of news articles or brief commentary from stakeholders. The Federal Aviation Administration website provided regulations and guidance on the use of small UAS and the role of law enforcement agencies on this matter. The California Board of Pharmacy provided no laws on drone delivery of medications. Our search identified two companies (QuiQui and Flirtey) currently looking into drone delivery of medications. Some cities have provided local ordinances on the use of UAS but not specifically on the commercial delivery

aspect. Upon synthesis of the available data, pharmacy regulations will have to consider, not only the typical commercial challenges (distance, GPS accuracy, weather conditions, etc) but also HIPAA, patient counseling, drug delivery accountability, storage and stability, drug diversion, amongst others.

Conclusion: Data suggest that drug delivery using drones is already in the pilot phases and pharmacy regulators and stakeholders need to create policies around the topic. The delivery of medications with drones has the potential to drastically improve patient access to medications if done in an appropriate manner. With several companies already looking to implement this service in the near future for independent pharmacies, it is crucial that major stakeholders such as the Board of Pharmacy quickly take steps to ensure the privacy and safety of patients.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 7-061

Poster Title: Utilizing mock consultations to improve pharmacy students' emotional intelligence and confidence in counseling skills

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Purpose: Pharmacy students with strong social emotional intelligence have a foundation to grow and meet the continually expanding realm of pharmacy practice focused on patient-provider care. Emotional intelligence is a skill that is learned, rather than inherited. There are a variety of ways schools can integrate communication development into their curricula. The purpose of this project was to evaluate the impact of mock consultations with the use of standardized patients and teaching assistants on the development of pharmacy students' social and emotional competence as well as perceptions and attitudes towards the activity.

Methods: A total of 204 P1 students enrolled in the Practicum I Course completed an over-the-counter mock consultation assessment and were randomly assigned to either a teaching assistant (TA), comprising of second year students, or a standardized patient (SP), a paid actor who played the role of a patient. Students completed a pre and post test that consisted of the Personal-Interpersonal Competence Assessment (PICA) tool and Likert-scale questions assessing students confidence and perceptions of their consultation skills. The PICA tool is a self-report instrument that assesses eight domains of social and emotional competence.

Results: Results from the PICA tool showed significant improvements ($p < 0.01$) in four domains: Connection to Others - Sociability (NS), Influence Orientation - Inspiration (IS), Influence Orientation - Initiative (II) and Consideration of Others - Empathy (CE). The largest area of improvement was seen in the categories related to Influence Orientation. Overall, mock consultations increase students' confidence and perception of their abilities ($p < 0.01$).

Conclusion: Mock consultations were beneficial in improving students' emotional intelligence and confidence in their over-the-counter counseling skills. The National Association of Boards of Pharmacy (NABP) and Center for the Advancement of Pharmaceutical Education (CAPE) have recently revised their standards to further reflect the increasing importance of having strong social and communication skills in the pharmacy practice. These results confirm that mock consultations can serve as one way to assess and help develop students' emotional intelligence.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 7-062

Poster Title: Cost-Effective Analysis to Evaluate Potential Replacement of Traditional aPTT testing with Anti-Factor Xa at a Small Community Hospital

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Purpose: Most hospitals use a protocol-based heparin dosing and monitoring system with nurse-driven activated prothrombin time (aPTT) lab draws. Compliance is often incomplete with protocols because of frequent testing and adjusting required to achieve therapeutic levels placing patients at risk for bleeding. It is suggested that anti-Xa heparin assay monitoring is more efficacious than aPTT monitoring having less frequent lab draws and faster time to therapeutic levels. However, anti-Xa assaying is more expensive. This project investigates the extent of non-compliance in current aPTT monitoring, whether this delinquency leads to adverse outcomes, and if converting to anti-Xa would be more cost-effective.

Methods: This is a retrospective chart review of fifteen patients. Patients were included if they were at least 18 years old, admitted for acute coronary syndrome, myocardial infarction, pulmonary embolism, thrombosis, or atrial fibrillation, and were on heparin for at least 24 hours. To analyze compliance to the protocol in place, data was collected on whether STAT baseline aPTT, PT and CBC with platelets was drawn prior to initiation of heparin, whether the correct loading dose was given, whether the heparin drip was correctly dosed, whether aPTT was drawn six hours after initiation of the drip, whether adjustments to doses were correct, whether patients reached therapeutic goal of 1.5 – 2.5 times their baseline aPTT, the proportion of the hospital stay in which the heparin levels were subtherapeutic or supratherapeutic, and whether any adverse events took place. The values used for the cost analysis of using antifactor Xa assay testing in place of aPTT testing were based on pricing for O'Connor Hospital in San Jose, California. The primary outcome of this study is to evaluate compliance to the current heparin protocol in place at O'Connor Hospital, time to therapeutic

levels, and adverse events of non-therapeutic patients. The secondary outcome of this study is to analyze the cost-effectiveness of switching from aPTT heparin monitoring to anti-Xa assay heparin monitoring.

Results: 15 patients were reviewed. Average age was 62 years, average weight 81 kg, and 73 percent were male. NSTEMI patients made up 40 percent of the patients, atrial fibrillation 13.3 percent deep vein thrombosis 13.3 percent, pulmonary embolism 13.3 percent, occlusion 13.3 percent and thrombosis 6.7 percent. Baseline aPTT levels were drawn every time except for one patient but only 40 percent of patients had aPTT levels drawn per protocol heparin initiation. 27 percent of patients had the correct dose adjustments made according to protocol. 53 percent of patients reached therapeutic levels, there were instances in which heparin levels during at least 50 percent of their stay were subtherapeutic (n=3) or supratherapeutic (n=2). No adverse events were reported in the patient charts. There were in platelet count (n=4) and hematocrit levels (n=4) that did not lead to negative outcomes. The average length of stay was 6.6 days and the average number of days patients were on heparin was 3 days. Analysis showed that using anti-Xa assay would cost O'Connor Hospital approximately $62 more than aPTT per patient for the average stay.

Conclusion: The protocol set in place at O'Connor Hospital is not being utilized appropriately and therefore almost half of patients on heparin are not reaching therapeutic goal. This poses higher risk for adverse events for patients as evident in the fluctuation of heparin levels, downtrend of platelet count, and down trend of hematocrit. Although use of anti-Xa costs more than aPTT testing, it brings the majority of patients to therapeutic levels sooner. Note that the cost difference does not take into account the amount of time, wages, and room for error spared by having nurses draw blood less frequently.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 7-063

Poster Title: Effect of enhanced external counterpulsation on plasma glucose levels in a healthy subject following an oral glucose bolus.

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Purpose: Enhanced external counterpulsation (EECP) is a noninvasive 7-week long treatment, consisting of 35 one-hour sessions, which is indicated for refractory angina and heart failure. Some studies have suggested that EECP treatment affects fasting plasma glucose. There may be safety concerns to consider for diabetic patients during EECP treatment sessions. The purpose of this study is to determine if one 1-hour session of EECP can produce a change in the plasma glucose levels of a healthy subject compared to control, following an oral glucose bolus.

Methods: This crossover, proof-of-concept assessment involved one healthy, non-diabetic, male subject. The primary outcome was plasma glucose levels. The subject underwent plasma glucose testing with and without a standard session of EECP on two separate days. The subject was instructed to consume a 20 ounce container of soda, containing 69 grams of fructose and glucose, within 3 minutes. Plasma glucose levels were measured using a point-of-care fingerstick blood glucose meter (Precision Xtra) at the following times: baseline (prior to study drink), 15, 30, 60, 90, and 120 minutes. The subject was instructed to perform a 9 hour fast prior to assessment days and not consume anything during the course of the study duration. Data were compared using descriptive statistics. Baseline plasma glucose levels were compared to each subsequent time point and reported as “change from baseline”.

Results: The change from baseline plasma glucose levels in the EECP arm were 43, 54, 54, 19, and 2 mg/dL at 15, 30, 60, 90, 120 minutes, respectively. The change from baseline plasma glucose levels in the control arm were 21, 32, 46, 18, and 15 mg/dL at 15, 30, 60, and 90 minutes, respectively. The change from baseline plasma glucose levels at 2-hours was 13 mg/dL

lower in the EECP arm compared to the control arm. Peak plasma glucose was reached at 30 minutes in the EECP treatment arm compared to 60 minutes in the control arm. The rate of decline in plasma glucose from 60 minutes to 120 minutes was greater in the EECP arm (0.87 mg/dL/min) compared to the control arm (0.52 mg/dL/min).

Conclusion: Peak plasma glucose was reached in a shorter time and the rate of decline in plasma glucose was faster in the EECP compared to the control arm. This suggests that one session of EECP does have an effect on plasma glucose levels in the body. Since EECP mimics passive exercise, these effects seem reasonable. However, the degree of change in plasma glucose does not appear to be clinically significant to warrant glucose testing post EECP treatments. As such, larger prospective studies are necessary to validate these results and their clinical significance.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 7-064

Poster Title: Impact of bitter melon (Momordica charantia) on fasting blood glucose: A meta-analysis

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Purpose: Type 2 Diabetes accounts for 90-95% of all diabetes cases. Pharmacotherapy, dietary interventions, and dietary supplements are important factors in the management of type 2 diabetes. Bitter melon (Momordica charantia) has been purported to help lower blood glucose, but only a few studies have been done to support this claim. We planned to perform a meta-analysis evaluating the impact of bitter melon on fasting blood glucose levels in patients with type 2 diabetes.

Methods: Pubmed and Cochrane Library were used to identify randomized clinical trials of a minimum of 4 weeks that compared the fasting blood glucose levels before and after taking M. charantia. Search terms included “Bitter Melon”, “Momordica charantia”, “Karela”, “Ampalaya”, “Balsam apple”, “Cerasee”, “Glucose”, and “Diabetes”. Selection of the trials were individually assessed and determined by four investigators. A weighted mean difference from baseline was calculated using the DerSimonian-Liard methodology along with the corresponding 95% confidence interval. Publication bias was assessed using the Eggers statistic and inspection of the funnel plot. Heterogeneity was assessed using the I squared statistic.

Results: A total of 197 individual subjects were included in the overall analysis (4 clinical trials). Study duration ranged from 4 weeks to 12 weeks. The addition of bitter melon significantly decreased blood glucose by 6.23 mg/dl (95% CI = 0.41 to 12.04; P = 0.036) when compared to baseline. Significance was maintained when using the fixed-effects model (8.20 mg/dl, 95% CI = 4.70 to 11.71; P < 0.0001) The Egger statistic showed a lack of publication bias (p=0.112) but could not be ruled out based on inspection of funnel plots. The I square suggested a moderate

degree of heterogeneity (56.3%). This was driven mostly by the inclusion of studies of 4 weeks in duration.

Conclusion: Bitter melon significantly reduces fasting blood glucose in patients with type 2 diabetes after 4 weeks of consumption. This moderate degree of effect could serve as a valuable adjunct to other pharmacotherapeutic agents avoiding dose escalation or the addition of additional agents. As such, more studies are needed to determine the long term effects of bitter melon on fasting glucose levels, hemoglobin A1c, concomitant use with pharmacotherapy, and risk of hypoglycemia.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 7-065

Poster Title: Assessing adherence to guideline weight-based dosing of pre-surgical antibiotic prophylaxis in OB/GYN patients at a community hospital

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Purpose: Published guidelines recommend antibiotic prophylaxis for patients undergoing an obstetric or gynecological (OB/GYN) surgery to lower the risk of infectious complications. First-generation cephalosporins are recommended. The recommended cefazolin dose is 1 gram but should be increased to 2 grams if BMI is greater than 35 or weight is greater than 100 kilograms. Treatment failures have been reported when prophylactic antibiotics are under-dosed and weight is not considered appropriately. The purpose of the study was to determine if patients at a community hospital received appropriate weight-based doses prior to OB/GYN surgery. The patients were reviewed to determine if post-operative infections occurred.

Methods: In this retrospective chart review, 29 OB/GYN surgery patients admitted between December 29, 2015 and January 15, 2016 were studied for appropriate antibiotic prophylaxis. BMI was calculated and administered doses documented. Charts were reviewed for signs and symptoms of infection, e.g. an increase in white blood cells, fever, wound infection. Adverse drug reactions and allergic reactions were also noted.

Results: Average age of our patient population was 24.2 years old (range: 13-87 years old). The average duration of prophylaxis was 1 day (range: 0-2 days). The average length of stay was 4 days (range: 2-9 days). Average body mass index was 32.2 (range: 20.5-76.7). Six of the patients were obese (20.7 percent). Out of the 29 patients 20 received cefazolin (69 percent), 3 received cefotetan (10.3 percent), and 3 received ampicillin-sulbactam (10.3 percent). Ten percent of patients did not receive antibiotic prophylaxis. 1 of the 29 patients (3.4 percent) received a dose less than recommended while 11 patients (38 percent) received higher than recommended doses of prophylactic antibiotics based on their weight. These patients had a

BMI less than 35 but received 2 grams of cefazolin. None of the patients experienced an allergic reaction or any adverse reaction to prophylactic antibiotics.

Conclusion: Based on published guidelines, the choice of antibiotic and weight based dosing was appropriate in 69 percent of patients. One of the patients was actually underdosed. Patients receiving higher than recommended doses were more common. Excessive doses can increase the risk of adverse events and increase hospital costs. The cost of a one gram IV piggyback of cefazolin is $3.10 while the cost of the 2 gram IV piggyback is $4.15. Administering two grams of cefazolin would increase cost by 35%. Ensuring that the appropriate antibiotic and dose is given can help decrease costs and eliminate unnecessary wastes.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 7-066

Poster Title: Evaluation of microvascular predictors in Latino patients with diabetes

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Purpose: Diabetes, in the US, is highly prevalent in the Latino population. Furthermore, there is a well-known correlation between diabetes and microvascular complications. Studies have demonstrated that, compared to non-Hispanic whites, Latinos with diabetes have a significantly higher prevalence of retinopathy and End-Stage Renal Disease, with conflicting data about diabetic neuropathy. There is also lacking data investigating associated risk factors for microvascular complications in Latino patients, which may allow opportunities to better manage the risks. The purpose of this study was to identify predictors that may be associated with diabetic kidney disease, retinopathy, and neuropathy in Latino patients with diabetes.

Methods: This IRB-approved retrospective chart review utilized electronic medical records from Harbor UCLA Family Medicine Clinic. Patients were included who were Latino ethnicity, had type 2 diabetes, and had ≥1 pharmacy clinic appointment in 2015. Data collected included demographics (i.e; age, gender, race), comorbidities (i.e; DKD, Retinopathy, and Neuropathy) and laboratory parameters (i.e; Systolic Blood Pressure, A1C, Weight). Diabetic Kidney Disease (DKD) was assessed and defined by patient having microalbuminuria over 30 mg and macroalbumin over 300 mg, diabetic retinopathy was confirmed by ophthalmologic exam interpretation, and neuropathy was confirmed using ICD-9/ICD-10 diagnosis codes. Each risk factor was categorized as either continuous or dichotomized data. Statistics included univariate analysis with Chi-squared test for categorical data and student's t-test for continuous data.

Results: Of 120 Latino patients with an average age of 53.4 years, 73 (60.8%) were female, and average baseline A1C was 10.2%. Prevalence of microvascular complications was 66% for retinopathy, 50% for diabetic kidney disease and 43% for neuropathy. Compared to females, males were found to have 40% higher rates of retinopathy (P=0.0010), as well as a 10% higher

rate of diabetic kidney disease although this was not statistically significant (P=0.34). Females however had a 40% higher rate of neuropathy compared to males (P=0.03). Patients with diabetic kidney disease had a statistically significant higher Systolic Blood Pressure (SBP) (136.1mmHg vs. 129.6 mmHg; Difference: -6.5mmHg; 95% CI: -11.8 to -1.2; P=0.017). It did not appear that A1C, weight, age, or diastolic blood pressure (DBP) were significant predictors associated with DKD. The data showed that A1C, weight, age, or SBP did not appear to be significant predictors associated with neuropathy.

Conclusion: Potential associations of microvascular complications in Latino patients with type 2 diabetes were gender and SBP. In addition female patients may be associated with a higher rate of neuropathy and patients with an elevated SBP may be associated with DKD. Identifying higher risk populations and quantifying the risk can help healthcare providers target populations for prevention strategies that assist in reducing morbidity and mortality.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 7-067

Poster Title: The effect of discharging patients with a prescription for an antipsychotic on alcohol related readmissions in patients suffering from bipolar and alcohol use disorder

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Purpose: The rate of alcohol-use disorder (AUD) in the general population is 6.8 percent, a rate which more than doubles to 16.1 percent in patients suffering from concurrent bipolar disorder (BD). The primary objective of this study was to evaluate if a new prescription for antipsychotic medication upon discharge at index admission is associated with a reduction in future acute alcohol hospital readmission in patients suffering from both BD and AUD and if new prescription for antipsychotic will prolong the time between index and readmission. The secondary objective is to identify factors that may influence readmission rates.

Methods: This retrospective medical record review study spanned from January 1, 2005 to December 31, 2015 at Olive View Medical Center in Sylmar, CA. After an IRB protocol was approved by both Western University of Health Sciences and Olive View Medical Center, a query based on International Classification of Diseases-9/10 codes for BD was conducted to identify admissions related to bipolar and alcohol-induced events. Initial query provided 16,417 patients. Inclusion criteria included: documented diagnosis of bipolar, history or current alcohol abuse (either by Alcohol Use Disorders Identification Test -C score greater than 3 for females and 4 for males or chart documentation), and no current use of an antipsychotic medication on index admission. Exclusion criteria included: those under the age of 18, those without patient data available, and those without diagnoses of bipolar or without admissions due to alcohol-related events. Data on demographics, patient medical and social history, comorbidities, urinary toxicological screening results, index admission date, date of readmission, medications, and discharge diagnoses was collected. Independent t-tests and Mann-Whitney test was performed on continuous variables and chi-square tests was performed on predictor variables

for readmission such as discharge with an antipsychotic medication, gender, smoking history, homelessness, concurrent depression, and inpatient psychiatric evaluation. Statistical significance was set at a P level less than 0.05.

Results: A total of 101 patients met inclusion criteria patients (n equals 75 for patients discharged with antipsychotics and n equals 26 for patients discharged without antipsychotics). Baseline characteristics were not statistically significant between the two cohorts. For the primary objective, patients discharged with antipsychotics (9 percent) had significantly lower rates of alcohol-related readmissions compared to those who were discharged without an antipsychotic (42 percent, P less than or equal to 0.0001, OR equals 0.13, 95 percent CI 0.043 to 0.39). Median days between index admission and alcohol-related readmissions were 276 days and 125 days for those discharged with an antipsychotic and those who were not, respectively (P equals 0.12). Potential factors that may influence readmission revealed statistical significance for smoking history (P equals 0.03, OR equals 3.26, 95 percent CI 1.15 to 9.29), cocaine abuse (P equals 0.03, OR equals 25.3, 95 percent CI 1.16 to 55.2), and inpatient psychiatric evaluation (P equals 0.01, OR equals 0.23, 95 percent CI 0.08 to 0.70). Other factors such male gender (P equals 0.78) homelessness (P greater than 0.99), concurrent depression (P equals 0.73), amphetamine abuse (P equals 0.44) were not statistically significant for readmissions.

Conclusion: Alcohol related readmission rates were statistically significant between patients discharged on antipsychotics and those who were discharged without antipsychotics. Time between readmission was not significant. This suggests antipsychotics upon discharge may have a positive effect on AUD and reduce future alcohol-related readmissions in patients suffering from concurrent BD and AUD. Prospective studies and the inclusion of other institutions are necessary to substantiate these findings.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 7-068

Poster Title: Cost-effectiveness analysis of palifermin in the prevention of severe oral mucositis (OM) among patients undergoing allogeneic hematopoietic stem cell transplantation (allo-HSTC)

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Purpose: Oral mucositis (OM) is an inevitable and debilitating side effect resulting from intensive chemotherapy and radiation frequently used as a conditioning regimen for hematopoietic stem cell transplantation (HSCT). Palifermin, a recombinant keratinocyte growth factor, has demonstrated a reduction in duration and severity of OM after fractionated total body irradiation (FTBI) conditioning based regimen in patients with hematologic malignancies requiring HSCT. The objective of this study was to evaluate the cost-effectiveness of palifermin for preventing severe OM in allogeneic-HSCT (allo-HSCT) patients conditioned with FTBI and etoposide.

Methods: This was a cost-effective analysis of palifermin in preventing severe OM after allo-HSCT. Clinical outcomes were based on an extended retrospective medical record review examining patients who received palifermin for prevention of OM after FTBI and etoposide post allo-HSCT at the City of Hope Medical Center in Duarte, California, spanning from January 2005 to December 2009. The economic analysis of the current study was based on the healthcare provider's perspective. Cost of palifermin was taken from the Red Book. Other direct medical costs including costs of bacteremia, other infections (fungemia and viremia), OM, and severe OM were obtained and/or derived from previously published studies. All costs were adjusted to 2015 US dollars using Consumer Price Index. A decision tree analysis was performed to determine the cost-effectiveness of the palifermin group compared to the control group. Incremental Cost-Effectiveness Ratio (ICER) was calculated in terms of cost per one hospital day avoided.

Results: A total of 184 patients were included in the clinical study, of which 101 patients received palifermin treatment and 83 patients did not receive palifermin (the control group). The percent of patients who experienced severe OM, OM, and no OM in the palifermin versus control groups were 25 percent versus 84 percent, 70 percent versus 16 percent, and 5 percent versus 0 percent (p less than 0.01), respectively. The total costs of palifermin versus control groups were 24,403 vs. 19,505 dollars; and the total length of stay between the groups were 49.8 days vs. 42.6 days (p less than 0.01). The resulting ICER for treatment with palifermin was 1,374 dollars per one hospital day avoided.

Conclusion: In addition to its clinical benefits, the use of palifermin in the prevention of severe OM in patients undergoing allo-HSCT with FTBI and etoposide appeared to be cost-effective when comparing to the current (2015) average cost per hospital day of 1,878 dollars. Further studies are warranted to evaluate quality of life in these patients as well as cost-utility analysis of palifermin.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 7-069

Poster Title: Outcomes of sofosbuvir-based regimens for hepatitis C virus (HCV): A community-based experience

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Purpose: The purpose of this study is to retrospectively evaluate the efficacy and predictors of response of sofosbuvir-based treatment regimens in hepatitis C patients treated in a community-based ambulatory care practice. Study results are compared to the clinical trials which served as the basis for FDA approval as well as to the outcomes observed in other community-based studies.

Methods: Patients with HCV genotypes 1 through 6 were treated at a community-based ambulatory care center with sofosbuvir-based regimens. The primary outcome measure was percent of sustained viral response achieved at 12 weeks (SVR12) evaluated per genotype, medication regimen, cirrhosis status, and level of treatment experience. The secondary endpoints assessed the following patient characteristics as a predictor of treatment response: cirrhosis, race, gender, platelet level, and co-infection with Hepatitis A or B and HIV. Data was collected retrospectively through chart review of the electronic medical record, health plan portal, and clinical laboratory portals. The following data elements were collected for patients with post-treatment follow-up due between January and June 2016: medication regimens, patient demographics, baseline characteristics, and laboratory values. Providers prescribed a sofosbuvir-based regimen to each patient according to their baseline viral load, cirrhosis status, and level of treatment experience. Patients were treated for 8 to 24 weeks with one of the following regimens: sofosbuvir plus ribavirin, sofosbuvir plus peginterferon plus ribavirin, sofosbuvir plus simeprevir plus ribavirin, sofosbuvir plus daclatasvir, sofosbuvir plus daclatasvir plus ribavirin, ledipasvir/sofosbuvir, and ledipasvir/sofosbuvir plus ribavirin. 275 patients were

screened; consisting of 189 with SVR12, 6 with treatment failure, 5 with interrupted treatment, and 75 lost to follow up. Study endpoints were evaluated for patients with an obtained clinical outcome (n = 195). The institutional review board granted study approval.

Results: Overall SVR12 observed was 97 percent (189/195). The SVR12 rate achieved by drug regimen and duration were: ledipasvir/sofosbuvir 97 percent (29/30) for 8 weeks, 96 percent (88/92) for 12 weeks, and 100 percent (9/9) for 24 weeks; sofosbuvir plus ribavirin 100 percent (17/17) for 12 weeks, 100 percent (4/4) for 16 weeks, 100 percent (2/2) for 24 weeks; sofosbuvir plus daclatasvir 100 percent (22/22) for 12 weeks, 100 percent (9/9) for 24 weeks; sofosbuvir plus ribavirin plus peginterferon 100 percent (1/1) for 12 weeks; sofosbuvir plus daclatasvir plus ribavirin 100 percent (1/1) for 12 weeks, 0 percent (0/1) for 24 weeks; ledipasvir/sofosbuvir plus ribavirin 100 percent (6/6) for 12 weeks, 100 percent (2/2) for 24 weeks. SVR rates for patients with cirrhosis was 95 percent (41/43) and 97 percent (148/152) for non-cirrhosis. SVR rates were 96% (132/137) for genotype 1, 100% (22/22) for genotype 2, 97% (32/33) for genotype 3, 100% (1/1) for genotype 4, and 100% (2/2) for genotype 6. A statistically significant association for virological failure was observed for African American patients (p=0.0257).

Conclusion: In conclusion, this study suggests that treatment success with sofosbuvir-based regimens in a community-based practice is comparable to outcomes achieved in published clinical trials and other real-world studies. Ongoing research is warranted to further identify specific patient characteristics as a predictor of response in achieving SVR12. Based on our findings in the African American population, further research is warranted to identify which clinical parameters are associated with treatment success in order to guide treatment practice and improve patient outcomes.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 7-070

Poster Title: Evaluating prescribing patterns of estrogen therapy based on age and cardiovascular risk in post-menopausal women

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Purpose: Heart disease is the leading cause of death in women experiencing atypical cardiac symptoms due to micro-vascular disease pathology. Manson, Menopause 2014, has shown that post-menopausal women starting estrogen replacement therapy (ERT) 10 years post menopause have increased cardiovascular disease risks and that oral ERT promotes even higher risks compared to non-oral ERT. The American College of Obstetricians and Gynecologists discourages routinely discontinue ERT after age 65 even if previously prescribed. Conflicting evidence, recommendations, and prescribing patterns of ERT prompts us to seek an evaluation of prescribing practices and promotes the importance of pharmacist intervention for appropriate ERT.

Methods: This retrospective observational study includes 207 post-menopausal women on ERT from 2014 to 2016 in the electronic health record (EHR). This study uses gender-specific ischemic vascular disease (IVD) risk factors and the arteriosclerotic cardiovascular disease (ASCVD) 10-year risk estimator to identify patients with IVD, which includes ischemic heart disease, stroke, and peripheral artery disease. We categorized participants based on age groups of less than 50, 50 to 55, 56 to 60, and greater than 60 years of age, as well as ASCVD 10-year risk scores groups of less than 5 percent, 5 to 10 percent, and greater than 10 percent. Cardiovascular event risk levels were ranked based on these categories. The highest risk belongs to patients greater than 60 years old and with an ASCVD score greater than 10 percent. After classifying patients into each risk group we further stratified them based on the dosage form of ERT that they were prescribed. A subset population was also evaluated, which included

patients with either a confirmed IVD event, or with diabetes type 1 or type 2 based on a current HbA1C value of greater than or equal to 6.5 percent as defined by the American Diabetes Association. We also evaluated patients that had both diabetes and a confirmed IVD event.

Results: Of the 207 women on ERT, 14 (6.8 percent) were diagnosed with at least one IVD event, 25 (12 percent) met criteria for diabetes, and 5 (2 percent) had both diabetes and IVD event. Of the 14 women who have IVD, 8 patients (57 percent) had an ASCVD score greater than 10 percent and are all over the age of 60. Of the same 8 high-risk women, 4 are on oral estrogen, and 4 are on vaginal estrogen cream. None of the women less than 60 years of age had an ASCVD score greater than 10 percent. Of the 25 women with diabetes, 13 had an ASCVD score greater than 10 percent. However, only 2 are between 56 and 60 years of age, and 11 are greater than 60 years of age. The evaluation of this data allows us to identify women on ERT into separate risk categories and can therefore make possible interventions for appropriate therapy.

Conclusion: Prescribing practice trends in our population demonstrates a preference for oral ERT in high-risk patients, which may facilitate higher risk for cardiovascular events. We encourage the use of non-oral ERT, such as transdermal ERT, to reduce cardiovascular events for postmenopausal women with an ASCVD score greater than 10 percent or age greater than 60. Pharmacists in the ambulatory care setting can intervene in the selection process of ERT based on a woman's ASCVD risk score and age in order to minimize the risk of cardiovascular events that may be associated with oral ERT.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 7-071

Poster Title: Patients with schizophrenia and substance use disorder: Should they be discharged with an antipsychotic?

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Purpose: Approximately, 8.4 percent of Americans suffer from substance-use disorder (SUD), which increases by 50 percent in patients with concurrent schizophrenia. The primary objective of this study was to evaluate if an antipsychotic prescription at discharge was associated with a reduction in future SUD related hospital readmission in patients suffering from both schizophrenia and SUD. Secondary objectives were to evaluate the impact of a new antipsychotic prescription on the time to readmission and to identify potential factors that may be associated with readmission rates.

Methods: This retrospective medical record review spanned from January 1, 2005 to December 31, 2015 at Olive View Medical Center in Sylmar, CA, which is a large academic hospital serving Los Angeles County. After an Institutional Review Board (IRB) protocol was approved by both Western University of Health Sciences and Olive View Medical Center, a query based on International Classification of Diseases (ICD)-9/10 codes for schizophrenia was conducted to identify admissions related to schizophrenia and SUD. Inclusion criteria included documented diagnosis of schizophrenia, SUD, and no current use of antipsychotics on admission. Patients under the age of 18 or unavailable electronic medical record were excluded from analysis. Data on demographics, patient medical and social history, comorbidities, urinary toxicological screening results, admission date, date of readmission, medications, and discharge diagnoses was collected. Baseline comparison between the groups was conducted using independent t-test for continuous data and chi-square test for discrete data. Logistic regression models were constructed to evaluate the association between patients discharged with an

antipsychotic and readmission. Results were presented as odds ratios (OR) and 95 percent confidence intervals (CI). Covariates included in the model were age, gender, ethnicity, length of stay (LOS), history of antipsychotic use, social history, comorbidities, and inpatient psychiatric evaluation. Statistical significance was set at a P value less than 0.05. All analyses were performed using STATA/SE 13 (College Station, TX).

Results: A total of 104 (85 percent) of 126 eligible patients were discharged with an antipsychotic after a SUD related admission. Baseline characteristics (age, gender, social history, comorbidities) were similar between the two cohorts with few exceptions. Patients who received a prescription for antipsychotic upon discharge had longer LOS (P less than 0.0001), more psychiatric evaluations (P less than 0.0001), higher positive urinary toxicology results for marijuana (P equals 0.003), but fewer positive urinary results for cocaine (P equals 0.016). For the primary objective, patients discharged with an antipsychotic had a higher but non-significant SUD-related readmission (19 percent) compared to patients discharged without an antipsychotic (18 percent, OR equals 5.71, 95 percent CI: 0.79 to 41.34, P equals 0.085). Mean days between discharge and readmission were not significantly different between patients discharged with and without an antipsychotic (441 versus 524 days, P equals 0.584). Other potential risk factors for readmission such as gender (P equals 0.274), smoking (P equals 0.941), and alcohol use (P equals 0.658) were not statistically associated with higher readmission rates.

Conclusion: Discharging patients suffering from both schizophrenia and SUD with an antipsychotic was not associated with a reduction in future SUD-related readmissions and emergency department visits, nor did it increase the number of days to readmission. Furthermore, potential risk factors were not associated with an increase in SUD-related readmissions. However, reduced power due to small sample size may have threaten the internal validity of this study by increasing type II error. Future studies will need to increase the sample size and include other confounders such as psychiatric support, adherence, and follow-up appointments to assess whether these potential confounders impact outcomes.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 7-072

Poster Title: Assessing the appropriateness and effectiveness of a pharmacokinetics program utilization for vancomycin dosing: Experience at a community hospital in Hilo, Hawai'i

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Purpose: Many institutions dose vancomycin according to their specific protocol that takes into account the patient population they serve and their characteristics such as weight and creatinine clearance. At this institution, a pharmacokinetics program is utilized in lieu of a protocol whereby patient specific data is inputted on a case by case basis. While conducting prospective audits and reviews, vancomycin trough levels were frequently observed to be sub-therapeutic. The purpose of this study is to evaluate the appropriateness and effectiveness of utilizing this pharmacokinetics program to dose vancomycin or whether there is a potential need to develop an institution specific protocol.

Methods: The Institutional Review Board approved this retrospective Drug Use Evaluation project (Protocol ID: 2016-30636). For the purposes of this retrospective study, data was collected from electronic medical records during the months of April 2016 – July 2016 over a period of 45 days. Inclusion criteria were all patients over 18 years of age admitted to the institution during the specific time period, received vancomycin, and had at least one trough level collected. A data collection spreadsheet was developed and included patient demographic information such as age, gender, height, weight, serum creatinine, and indication for vancomycin use. Information about vancomycin regimen was collected and included initial dosing regimen, trough levels along with timing of levels, and any adjustments made thereafter along with new troughs, if applicable. Our primary outcome was to measure the rate of initial therapeutic trough levels achieved according to each indication. Secondary outcomes included the timing of levels in association with number of doses received and measuring rates of subsequent therapeutic through levels.

Results: Data on a total of 150 patients was collected. Of these 150 patients, 62.6 percent (94 cases) were male, and 37.3 percent (56 cases) were female. The rate of initial therapeutic trough levels was 24 percent (36 cases), sub-therapeutic and supra-therapeutic levels accounted for 69.3 percent and 6.7 percent respectively. 40 percent of trough levels (60 cases) were not taken at steady-state levels.73 patients had repeat troughs taken. 53 percent (39 cases) of the patients who had repeat troughs yielded therapeutic troughs, 24.6 percent (18 cases) had supra-therapeutic troughs, and 23 percent (17 cases) had sub-therapeutic troughs. . Interestingly, there was a total of 81 patients who weighed over 80 kilograms and 65 percent (53 cases) of these patients received an initial vancomycin dose of one gram or less in contrast to current guidelines recommending 1250 mg or more for this specific subset of patients.

Conclusion: The majority of the patients receiving vancomycin in our study were being dosed inappropriately as confirmed by the high percentage of initial sub-therapeutic trough levels. Trough levels not taken at steady state may lead to inappropriate adjustments since the true trough level might be underestimated. These findings suggest that the use of the pharmacokinetics program may not be optimal and the institution could potentially benefit from developing an institution-specific vancomycin dosing protocol. With appropriate dosing and trough level drawings, the institution could prevent extra costs, utilize personnel more efficiently and more importantly, improve patient outcomes and decrease length of stay.

Submission Category: I.V. Therapy/ Infusion Devices/ Home Care

Submission Type: Descriptive Report

Session-Board Number: 7-073

Poster Title: Process to patient: the lifecycle of a total parenteral nutrition order in a neonatal intensive care unit

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Purpose: Total parenteral nutrition (TPN) serves as a vital source of calories and electrolytes for many premature neonates to promote growth and neurodevelopment. It is classified as a high-alert medication per the Institute for Safe Medication Practice (ISMP). Due to its increased risk of patient harm, attention to detail when calculating, ordering, compounding and administering is imperative. Establishing a consistent workflow is important to guide all personnel involved to reduce the risk of error. This project was designed to look at all the steps involved in safely and effectively processing TPNs for infants in a neonatal intensive care unit (NICU).

Methods: A student pharmacist directly observed the process of TPN orders, including the observation of pharmacists, pharmacy technicians and other clinicians in a women and children's hospital. The TPN process in the hospital's level III NICU was assessed. The process involved calculating components, ordering, verification, preparation, delivery and administration. A flow chart was generated to describe the lifecycle of a TPN order in its various stages. It was noted how many times an individual TPN was checked, including the order, label, and visual inspection. The amount of personnel needed to safely process a batch of TPNs per day was described. The flow chart was also used to identify any potential errors during each stage, as well as provide insight for future improvements of best practice.

Results: After observing the lifecycle of a TPN order in a hospital's NICU, a flow chart of the various stages involved in the process was generated. There were ten main steps recognized in the process of a TPN order. Five double-checks of a single TPN order were identified throughout its lifecycle. An average of ten people were involved during the process of a single TPN, from the decision of an order to administration to the patient. Potential errors at each step were also identified. Future improvements of best practice were suggested such as implementing a TPN

ordering system that is linked to the hospital's electronic medical record (EMR) to reduce the risk of transcription error.

Conclusion: It is important to safely and effectively process TPNs. Serving as a critical need for many premature neonates, there is no room for error. A TPN workflow process was established in a women and children's hospital to serve as best practice to guide personnel involved. In comparison to the usual medication use process, TPNs are complex, high risk and involve many steps which need to be checked and re-checked to reduce the risk of error. The overall process involved personnel from different departments in the hospital. Improvements in best practice are always possible.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Case Report

Session-Board Number: 7-074

Poster Title: Potential risk of opioid agonist overdose in the setting of chronic use of low-dose opioid antagonist

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Purpose: This case illustrates the potential harm of an opioid agonist administered with prior chronic use of a low-dose opioid antagonist. A 68-year-old male presented to the Emergency Department (ED) for multiple wounds including the left ankle, buttocks, and sacral region with possible osteomyelitis. The patient was previously diagnosed with multiple sclerosis and has been wheelchair-bound for the last 4 years. Prior to admission, his home medications were pertinent for a chronic low-dose opioid antagonist: naltrexone 2 mg by mouth once daily for multiple sclerosis. The patient arrived to the ED at 1600 and was given 5 mg of oxycodone by mouth once for pain at 1730. At around 1915 he was unresponsive to deep sternal rub with no witnessed seizure activity. His blood sugar resulted normal. He subsequently received 2 mg of naloxone intravenously which restored responsiveness and alertness. Within half an hour he became unresponsive again, which led to initiation of naloxone drip infusing at 0.4 mg per hour that restored consciousness. At around 2330 the naloxone drip was stopped and within fifteen minutes he became unresponsive again. The naloxone drip was restarted with subsequent return of consciousness. He was thereafter transferred to the critical care unit (CCU) for further management with continuation of the naloxone drip. After about 3 hours in the CCU, the naloxone drip was tapered and stopped at 0415 and he remained stable with no further complications. Naltrexone normally has antagonistic properties on mu-, delta-, and kappa-opioid receptors. However, in limited studies, low-dose naltrexone (LDN) is thought to exert its clinical benefits through an elevation of endorphin levels which has an antagonistic effect on toll-like receptor 4 (TLR4). Endorphins are displaced and opioid receptor levels are up-regulated to compensate for the lack of hormone-binding. Endorphins then bind with TLR4 on other cells,

such as macrophages, which halt cytokine release, production of nuclear factor-kappa B (NF-kB), and progression through the pain pathway. This leads to a decrease in pain, spasticity, fatigue, relapse of disease, inflammation, and down-regulation of oncogenes, thereby substantiating the theoretical use of LDN in autoimmune disorders and diseases such as cancer. In animal studies, there is also a reported up-regulation of opioid receptors with LDN. It is theorized that the up-regulation of opioid receptors with LDN can cause hypersensitivity to opioid agonists, leading to respiratory decompensation and unresponsiveness even with the use of low dose opioid agonists. As this case suggests, opioid agonist overdose may have been precipitated by chronic low-dose opioid antagonist use due to hypersensitivity. Therefore, pharmacists and other healthcare providers should remain alert to prior chronic use of low-dose opioid antagonists when deciding appropriate pain management for such patients.

Methods:

Results:

Conclusion:

Submission Category: Pain Management

Submission Type: Descriptive Report

Session-Board Number: 7-075

Poster Title: Interdisciplinary assessment of multimodal pain management strategies in patients undergoing elective bilateral total hip arthroplasty

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Purpose: Total joint arthroplasty is often associated with significant postoperative pain that can slow rehabilitation and influence the overall success of surgery. Multimodal pain management strategies involve the addition of adjunctive agents to achieve optimal postoperative pain control with a lower reliance on opioids. Currently, clinical trials published on multimodal pain management for bilateral total hip arthroplasty is limited. The purpose of this evaluation is to assess the impact of adjustments made to multimodal pain medications on hospital length of stay, pain assessment, opioid consumption, time to ambulation, and medication cost in patients undergoing bilateral total hip arthroplasty.

Methods: Since 2014, an interdisciplinary team including orthopedic surgeons, anesthesia providers, nurses, and pharmacists focused on ongoing adjustment and assessment of the multimodal pain management regimens in total joint arthroplasty. A retrospective chart review of adult patients who underwent an elective bilateral total hip arthroplasty by a single orthopedic surgeon was completed during a two month period in 2015 and 2016. The multimodal pain management regimens in 2015 included preoperative celecoxib, intraoperative liposomal bupivacaine, and postoperative intravenous acetaminophen for 24 hours. In 2016, the protocol was modified by removing preoperative celecoxib and switching to a bupivacaine based intra-articular solution and postoperative oral acetaminophen. Anesthesia also began administering perineural additives to prolong the action of the local anesthestic block. All patients continued to receive preoperative gabapentin and oxycodone extended release, a peripheral nerve block with bupivacaine, and intraoperative tranexamic acid for

blood conservation and venous thromboembolism prophylaxis. Outcomes including patient demographics, length of stay, pain assessment, opioid consumption, ambulation, and medication cost were assessed. This project was deemed exempt from institutional review board review.

Results: Seventeen patients undergoing elective bilateral total hip arthroplasty were reviewed; eight patients in 2015 and 9 patients in 2016. Hospital length of stay was similar in 2015 and 2016 (3.1 days versus 3.0 days, respectively). Mean visual analog pain scores in 2015 was slightly higher than in 2016 in the post-anesthesia care unit (PACU) (4.0 versus 1.0), similar on postoperative day one (2.6 versus 2.7), and lower prior to discharge (0.8 versus 2.7); differences were not statistically significant. Opioid consumption was measured using morphine equivalent units. In the PACU, 50% of patients in 2015 required an average of 1.7 mg, whereas no patients in 2016 required opioid therapy. Patients in 2015 had a higher mean opioid consumption during hospitalization than in 2016 (35.4 mg versus 28.0 mg) and a lower mean time to first postsurgical opioid (8.3 hours versus 18.5 hours); differences were not statistically significant. Patients in 2015 had a faster mean time to ambulation than in 2016 (13.7 hours versus 17.0 hours); difference was not statistically significant. Mean medication cost per patient was statistically significantly lower in 2016 compared to 2015 ($497.50 versus $1,109.83), attributed to the discontinuation of liposomal bupivacaine and intravenous acetaminophen.

Conclusion: The total joint arthroplasty multimodal pain regimen was adjusted in 2016. Although outcomes cannot be attributed to the use or discontinuation of any specific medication, the results indicate that discontinuation of preoperative celecoxib, conversion of liposomal bupivacaine to a bupivacaine intra-articular solution, and use of postoperative oral acetaminophen instead of intravenous acetaminophen did not significantly impact length of stay, pain management, opioid consumption, and ambulation. Changes resulted in a significant decrease in mean medication cost per patient of $612, with an annual savings of approximately $23,880 based on the number of total bilateral hip arthroplasty procedures completed in 2015 (39).

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 7-076

Poster Title: Medicare Part D prescribing changes of tricyclic antidepressants between 2013 and 2014

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Purpose: Tricyclic antidepressants were the primary pharmacologic treatment for depression in the United States from the 1960s to the late 1980s. Since then, other classes of antidepressants, such as Selective Serotonin Reuptake Inhibitors, have replaced its use as first-line agents due to their more favorable side-effect profile and proven equal efficacy. Tricyclic antidepressants are included in the Beers Criteria because of their potentially harmful side effects in the elderly (e.g. cognitive impairment, delirium, sedation, and orthostatic hypotension). The purpose of this study is to evaluate the changes in prescribing of tricyclic antidepressants from 2013 to 2014 in Medicare beneficiaries.

Methods: The dataset included patients enrolled in a Medicare Part D prescription drug plan and included total number of beneficiaries, providers, prescriptions, and drug costs during 2013 and 2014. Medicare Provider Utilization and Payment Data: Part D Prescriber Public Use Files were used to compare the use and cost of each tricyclic antidepressant both at the state level and in aggregate. Tricyclic antidepressants listed in both the 2012 and 2015 Beers Criteria updates (amitriptyline, clomipramine, doxepin, imipramine, and trimipramine) were included in the study as they were thought to be potentially inappropriate for use in the elderly over the 2013 and 2014 time period. T-tests were used to determine if there were statistically significant differences in use and cost over time. In addition, we calculated per capita use and cost at the state level by dividing the values by the population over age 65 with data obtained from census bureau. We ranked states by cost, and number of beneficiaries, prescribers, and prescriptions, per 1000 persons over age 65, and examined how the rankings changed between 2013 and 2014. Because this was a de-identified public use data file from the federal government, it did not meet the criteria of human subjects research and was exempt from IRB approval.

Results: Between 2013 and 2014, the number of beneficiaries taking the five tricyclic antidepressants decreased by 24,966, the number of prescriptions decreased by 50,470, and the number of prescribers decreased by 21,687. During the same time period, however, costs increased by over $62 million. From 2013 to 2014, the total cost for Medicare beneficiaries for amitriptyline increased significantly by $24.3 million ($p < 0.001$), for clomipramine, by $36.6 million ($p < 0.001$), and for doxepin by $3.1 million ($p < 0.001$). The number of prescribers for clomipramine also increased significantly ($p=0.007$), but there were not significant increases in the number of prescribers for the other medications. In contrast, during the same time period, the total cost of imipramine decreased by $1.4 million, but this change was not statistically significant. The total cost of trimipramine decreased by $182,682 ($p < 0.001$). The total number of prescribers also significantly decreased for trimipramine by 3,064 ($p=0.001$). In both 2013 and 2014, Kentucky had the most prescriptions and beneficiaries per capita, Maine had the most prescribers, and Rhode Island had the highest cost. The state with the lowest beneficiaries, prescribers, prescriptions, and cost of tricyclic antidepressants per capita during both 2013 and 2014 was Hawaii.

Conclusion: From 2013 to 2014, utilization of the five tricyclic antidepressants decreased. This suggests that Medicare beneficiaries may be switching to medications with fewer adverse effects. The fact that total costs significantly increased for most tricyclic antidepressants, despite decreased utilization, suggests that price increases are responsible. While we do not have information on patient copayment levels, this may pose a problem for Medicare beneficiaries on a fixed budget. Moreover, although there was a drop in utilization, there were still 67,192 prescriptions of these potentially inappropriate medications to 37,742 Medicare beneficiaries, indicating there may still be room for improvement.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 7-077

Poster Title: Retrospective study to identify opportunities for de-escalation of empiric vancomycin therapy in suspected methicillin-resistant Staphylococcus aureus pneumonia

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Purpose: The 2016 Infectious Disease Society of America (IDSA) guidelines for hospital-acquired and ventilator-associated pneumonia emphasize the need to de-escalate empirical antibiotic therapy to reduce direct healthcare costs, antimicrobial resistance, and side effects associated with therapy. The purpose of this study was to identify opportunities for de-escalation of vancomycin used as empirical treatment of methicillin-resistant Staphylococcus aureus (MRSA) pneumonia.

Methods: A single-center retrospective study of hospital patients with pneumonia treated with vancomycin was conducted over a three-month time period at Wilcox Memorial Hospital. Electronic medical records were screened for patients treated with vancomycin who received a diagnosis of pneumonia. Of these patients, those without a resulted MRSA nasal swab polymerase chain reaction (PCR) test, resulted blood cultures, or resulted sputum cultures were excluded due to inability to identify opportunities for therapy improvement. Bulk charges, drug returned to stock, and duplicate hospital account record (HAR) numbers were also excluded. The remaining patients were stratified into two groups. Group One was defined as patients with a MRSA nasal swab PCR and blood or sputum cultures. Opportunity for de-escalation was defined as continuation of therapy post 24 hours of negative result from MRSA nasal swab PCR. MRSA nasal swab PCR had to have been associated with admission for acute event related to vancomycin use. Group Two was defined as patients with only blood or sputum cultures. In Group two, opportunities for de-escalation were defined as continuation of therapy 24 hours

beyond 48-hour culture result. Blood or sputum cultures had to have been associated with admission for acute event related to vancomycin use.

Results: Search of electronic medical records identified 2918 reports of vancomycin use during the study period, 2894 records met exclusion criteria. Twenty-four individual patient records were identified to have vancomycin use with a diagnosis of pneumonia for the acute event date. One patient was excluded due to expiration prior to result of cultures, another was excluded with a diagnosis of pneumonia secondary to MRSA bacteremia associated with intravenous drug use. Thirteen patients had reported results from a MRSA nasal swab PCR associated with hospital admission event and were placed in Group One. The remaining nine patients with only blood or sputum culture results comprised Group Two. There were no positive MRSA nasal swab PCR results in Group One and opportunities for de-escalation were found in ten patients (77 percent). All patients in Group One also had blood or sputum cultures with negative results for MRSA. Of the nine patients in Group Two, all had record of blood cultures and three also had sputum cultures. There were no positive results for MRSA reported from any final culture in Group Two and opportunity to de-escalate therapy was found in five patients (56 percent).

Conclusion: Our results identify opportunities for de-escalation of vancomycin in patients with suspected MRSA pneumonia and verify the strong negative predictive value of the MRSA nasal swab PCR test. It is our recommendation that all patients with pneumonia placed on vancomycin therapy receive a MRSA nasal swab PCR test to screen for MRSA colonization prior to administration of therapy. Should results be negative, vancomycin should be de-escalated within 24 hours. In the absence of a MRSA nasal swab PCR, blood or sputum cultures showing no growth at 48 hours may also be used as an indicator to de-escalate therapy.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 7-078

Poster Title: Naloxone medication use evaluation

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Purpose: To conduct a medication use evaluation which characterizes the use of the drug naloxone in hospitalized patients within a Health System. The objective is to identify how often naloxone is used to reverse respiratory depression in adult in-patients who have been receiving opioids for pain control and determine a metric that can be used as a surrogate for opioid safety across time and across facilities. Additionally, we will investigate the use of the Pasero Opioid-Induced Sedation Scale (POSS) and pain scores in relation to naloxone administrations.

Methods: Inclusion criteria consists of any adult in-patients admitted to one of four hospitals within a health system who received opioids and naloxone during the months of April and June 2016. Our exclusion criterion consists of any patient who presented to the hospitals with an overdose, or were not administered a narcotic in the hospital. Additionally, anyone who was prescribed naloxone for itching or if administered in the operation room was excluded. Data collection utilized the electronic medical records (EMR). Investigators retrieved the records of every naloxone administration in April and June of 2016. Each administration was evaluated based on inclusion and exclusion criteria. Of administrations that fit within the criteria, the following information was collected for opioids and naloxone: dose, route, frequency and time of administration. In addition, the total dose in twenty-four hours and morphine equivalent dose were calculated. Patient assessments were recorded including POSS score and pain score. Descriptive analysis was performed on all variables. Averages from April and June data were compared using unpaired t-tests.

Results: A total of 20 patients (10 each in the months of April and July) met all inclusion criteria. This is a rate of 0.044 percent in April and 0.043 percent in June (defined as number of patients requiring rescue divided by the Case Mix Index Adjusted patient days). The results characterizing the use of naloxone include: demographics of patients, which opioid was most

frequently implicated, and the percentage use of the POSS. The average age of April and June were 68.9 and 61.7 years (p = 0.379) respectively, with 60 percent males in April and 90 percent males in June (p=0.0573). Additionally, 50 percent of patients were at an intermediate level of care at time of naloxone rescue. The average morphine equivalent milligrams of hydromorphone per administration was 9.3 milligrams, making it the worst offender of opioid induced respiratory depression. Additionally, it had the highest number administrations of any drug implicated in the study. When evaluating the use of POSS scores, the percent of patients that received a POSS within the previous twenty-four hours prior to naloxone administration was 89.4 percent, but only 47 percent of patients had received a POSS score within 6 hours to administration of naloxone.

Conclusion: When considering the results of this study, the percentage of patients requiring rescue was low. Now that a metric has been defined, it can be monitored across the health system to identify the impact additional safety and quality measures may effect this metric. Hydromorphone appears to be the worst offender in terms of opioids requiring naloxone administration. Due to its lower doses, it might be viewed as a less potent analgesic and additional education may be warranted. Another opportunity for improvement may be to increase the frequency of sedation assessment and documentation using the POSS score.

Submission Category: Critical Care

Submission Type: Case Report

Session-Board Number: 7-079

Poster Title: Use of ketamine in refractory status epilepticus

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Purpose: This is a case report of the use of ketamine in refractory status epilepticus. The current 2012 Neurocrtical Care Status Epilepticus Guidelines do not provide any recommendations on safety, efficacy, dosing, or monitoring in the use of ketamine in refractory status epilepticus. The guidelines recommend reserving the use of ketamine to patients who do not respond to refractory status epilepticus treatment options. N-methyl-D-aspartate antagonists, such as ketamine, have an emerging role in refractory status epilepticus treatment. The patient is a 36-year-old female who presented with unspecified sensory loss and then progressed into generalized convulsive seizures with status epilepticus of unknown etiology. The patient had a past medical history of newly diagnosed hyperthyroidism and no prior seizures. She was initially treated in the emergency department with lorazepam, propfol, and phenytoin. Upon admission to the critical care unit propofol and phenytoin were continued, as well as adding phenobarbital, levetiracetam, valproic acid, and midazolam. Ketamine was the next antiepileptic agent added at a beginning dose of 0.48 milligrams per kilograms per hour. The goal of therapy was to achieve 80% burst suppression. After two days of ketamine therapy and up-titrating the dose, 40-50% burst suppression was documented. The maximum dose of ketamine was 2.52 milligrams per kilograms per hour, which was reached on the third day of treatment. A burst suppression of 80% was achieved after six days of therapy. Ketamine was the last agent added prior to obtaining adequate burst suppression. After achieving stable burst suppression at 80% for two days, a taper of burst suppressive therapy was initiated. Ketamine was tapered at a rate of 0.3 milligrams per kilogram per hour every 30 minutes after eight days of treatment. Ketamine was the last burst suppressive agent to be removed, however, other antiepileptic agents were continued. After the removal of ketamine, the patient has had no clinical seizures to date. After burst suppression therapy was discontinued, two other antiepileptic agents were removed, leaving three antiepileptic maintenance medications remaining. It is difficult to conclude which antiepileptic medication controlled this patient's status epilepticus due to multiple agents used for treatment. However, because ketamine was the last agent added prior to burst suppression control, it is likely what provided control of status epilepticus. The patient did not experience any side effects attributable to ketamine use

during the course of treatment. Further studies are needed to provide recommendations for safety and efficacy of ketamine in the use of refractory status epilepticus.

Methods:

Results:

Conclusion:

Submission Category: Pain Management

Submission Type: Descriptive Report

Session-Board Number: 7-080

Poster Title: Evaluating the appropriateness of parenteral opiate use in rural clinics affiliated with a large integrated health-system in the Dakotas

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Purpose: The rising opioid epidemic has led to increased scrutiny and focus on reducing unwarranted narcotic use. The aim of this study was to review the appropriateness of parenteral opiate use in Sanford Health's rural North Dakota clinics. Additionally, this study sought to investigate if implementing opiate prescribing guidelines at these sites would reduce opiate prescribing and improve narcotic documentation in the electronic medical record.

Methods: A review of all patients who received parenteral opiates in the rural clinics was completed using retrospective chart audits. Patients were selected using narcotic transfer forms from each site between the dates March 1, 2016 through March 30, 2016. Outcomes evaluated in the chart audits included indication, medication administered, dose administered, drug concentration, amount wasted, pain scores, ICD-10 scores, and approving provider. Additionally, evaluation of opiate use and waste on narcotic tracking forms was completed. This included matching drug, matching concentration, and reconciled drug given and wasted. Headache/migraine was the most common indication for parenteral opiate prescribing (International Classification of Diseases (ICD) 10 code R51 and G43). A treatment guideline was established to aid appropriate prescribing with preference towards evidence-based non-opiate analgesia. The suggested prescribing guideline and the results of this audit were discussed with the ambulatory medication safety committee, nursing groups, hospital and clinic physicians, inventory supervisors, and pharmacy managers to discuss appropriate follow-up. Audits are ongoing to evaluate whether opiate prescribing and documentation errors have decreased following the dissemination of these results and approval of new inventory controls.

Results: The most common indications for parenteral opioid prescribing were headache/migraine (ICD-10 R51/G43 25.4 percent), procedure-related pain (19.4 percent), and abdominal pain (ICD-10 R10 13.4 percent). The average pain scores on presentation for the rural clinics was 8.69/10 with a range of 8.14 to 9.38 in sites carrying parenteral opiates. Of the 67 entries, 18 errors in documentation were identified (26.7%). These errors were broken down into four categories: narcotic transfer forms revealed 9 concentration errors, 4 waste documentation errors, 3 administrations not documented, and 2 incorrect doses documented. Individual sites with high documentation error rates received follow-up and education on appropriate tracking and strategies to standardize narcotic records. Upon follow-up with physicians and pharmacy management, all but two sites decided to eliminate all parenteral narcotics from their inventory. The other two sites standardized their formulary to include only one concentration of morphine limited to emergency use.

Conclusion: Parenteral opiate usage in rural clinics within a large integrated health-system was evaluated. The implementation of parenteral opiate prescribing restrictions were implemented in these clinics, which resulted in reduced opiate prescribing and improved narcotic documentation in the electronic medical record. These changes make a significant impact in efforts to reduce unwarranted narcotic use in the rural clinics.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 7-081

Poster Title: Operationalization of the guideline advantage criteria by centralized clinical pharmacists for primary care medical offices

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Purpose: Previous studies have found clinical pharmacists were effective in significantly lowering blood pressures, improving guideline adherence and decreasing HbA1C levels. The Guideline Advantage (GA) program was developed to promote consistent use of evidence-based practice guidelines in outpatient settings in support of the Million Hearts national initiative to prevent one million heart attacks and strokes by 2017. The purpose of our study is to operationalize an algorithm used by clinical pharmacist to measure the Guideline Advantage criteria in patients participating in two large clinical trials to improve cardiovascular disease health.

Methods: We implemented the Guideline Advantage criteria in 2 cluster-randomized, clinical trials evaluating a centralized, web-based cardiovascular (CV) risk service managed by clinical pharmacists. In order to develop the scoring system to measure guideline adherence, we identified criteria from the 2011 & 2013 versions of the GA criteria and new national guidelines for the management of hypertension and cholesterol that could be used as part of the primary outcome for the studies. The specific criteria chosen by the research team were based on objective variables that could be measured and obtained as part of the research protocol. Extensive data were collected at the baseline visit by a research study coordinator that includes a structured BP measurement and laboratory draw for lipids and HbA1C. Baseline data were uploaded into the web-based Iowa Personal Health Record (Iowa PHR). The Iowa PHR patient and clinical pharmacist web interfaces interacted with a database “back-end”. A computer algorithm analyzed information in the database in order to automatically identify which GA criteria applied to each patient based on baseline variables that were collected by study

coordinators at each medical office. The PHCVRS pharmacists used this information to create a personalized care plan for each patient based on GA criteria that had not been achieved and are not contraindicated for the patient.Each eligible criteria was scored at baseline.

Results: The Guideline Advantage criteria were implemented in 15 control and 15 intervention offices. A total of 302 (study 1) and 402 (study 2) subjects were enrolled. This abstract highlights the Guideline Advantage criteria scores in one trial in which baseline data are available. Baseline composite scores for intervention and control sites were 64.4 (±13.4)% and 63.9 (±12.6)%, respectively. Baseline scores for CV and diabetes-related criteria were 75.1 (±17.0)% intervention and 77.0 (±17.8)% control and 65.7 (±19.9)% intervention and 67.7 (±16.2)% control, respectively.

Conclusion: The Guideline Advantage criteria were successfully implemented and baseline scores were much better than expected. This study demonstrated generally good adherence to Guideline Advantage criteria. We theorized that linking the concepts in the GA criteria to operational definitions and providing results for individual patients at the point of clinical pharmacist care would create a pragmatic bridge from guideline concepts to individual patient care. Operationalizing the GA criteria using the PHCVRS model is intended to improve guideline concordant therapy and decrease the risk of CV disease. The results from both trials will be available by 2019.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 7-082

Poster Title: Safety of interchange between brand-name to generic phenytoin

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Purpose: Phenytoin is an antiepileptic drug used to treat generalized and partial seizures. The FDA indicates that generic formulations of phenytoin are not bioequivalent to brand-name formulations. The purpose of this study retrospective study was to determine if individuals that switched from brand-name to generic phenytoin had decreased serum concentration levels and change in seizure frequency in an intermediate care facility for intellectually disabled.

Methods: Medical staff evaluated 25 individuals aged 29-68 for brand-name to generic phenytoin interchange. 18 were deemed capable of interchange. Of the 18 individuals interchanged, only 12 were selected for review due to health status and dose stability. The other 6 individuals were excluded due to acute hospitalization at interchange, dose change at interchange, and periods of nonadherence. Each individual's phenytoin total serum concentration levels and seizure frequencies were collected 6 months prior to the interchange and 2 months after. Phenytoin levels were excluded if not collected for more than 2 weeks after the interchange or if there was an acute illness at the time of the drug level, if dose amount changed, or if drug regimen changes included drug interactions. The primary outcome measure was a decrease from baseline serum concentration after reaching steady state with generic phenytoin. Secondary outcomes were change in seizure frequency and differences in number of additional antiepileptic medications. Power analysis was not done due to the nature of study having a limited number of individuals in the population. The Glenwood Research Committee approved this retrospective chart review. Informed consent was provided by the guardians of all participants.

Results: 4 of the 12 (33.3%) participants were female. The mean age of patients was 53.4 years. Participants were more likely to be diagnosed with generalized seizures than partial seizures. The average daily dose of phenytoin was 300mg (SD plus or minus 45.38mg). The mean serum phenytoin concentration before (14.91mg/L) and after (14.12mg/L) interchange was not significantly different (-0.785mg/L; 95 percent CI, -0.855mg/L to 2.425mg/L, P equals 0.197). The change in seizure activity after interchange was not different (-16.6 percent; 95 percent CI, -41.3 percent to 8.12 percent-8.12 percent to 41.3 percent, P equals 0.166). No association was found between increased total number of antiepileptic medications and phenytoin level changes greater than 1mg/L vs. those with changes less than 1mg/L (2.83 vs. 1.67 antiepileptic medications, P equals 0.110).

Conclusion: The interchange from brand to generic phenytoin does not cause a change in serum phenytoin concentrations. Further, lack of change in seizure frequency during interchange suggest that interchange is safe. However, the information collected after interchange in this study is relatively short for time period of collection compared to information collected before the interchange. The clinical significance for safety of the interchange must be assessed further with larger, and long-term studies.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 7-083

Poster Title: Unrestricted ertapenem use evaluation at a large academic medical center

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Purpose: Ertapenem is a broad spectrum antibiotic that can be administered intravenously to patients admitted to the University of Iowa Hospitals and Clinics. Many institutions restrict ertapenem prescribing privileges to specific clinical criteria or infectious diseases consultant physicians for several reasons. Ertapenem has a broad spectrum of activity, relatively high acquisition costs, increasing concern for developing antibiotic resistance, and infectious complications like diarrhea and bacterial superinfection. Ertapenem is not restricted at this hospital and can be ordered by any prescriber within the health system. We performed a medication use evaluation to better understand ertapenem prescribing practices.

Methods: The University of Iowa institutional review board approved this retrospective, electronic health record review. Inpatients who received ertapenem between November 1, 2014 and October 31, 2015 were included in the analysis. Manual retrospective chart review was performed for each unique patient to determine the indication for ertapenem therapy. Antibiotic allergies, length of therapy, and infectious diseases consultation were also collected from the electronic medical record. Ertapenem indication was categorized into empiric, definitive or surgical prophylaxis groups and further sub-classified based on documented or suspected Gram-negative resistance phenotypes. SPICE organisms were defined as the following: Serratia species, Providencia species, Proteus species (not P. mirabilis or P. penneri), Citrobacter species, Enterobacter species, and Morganella species. Particular emphasis was made to determine the incidence of treatment for SPICE organisms, extended-spectrum beta-lactamase producing organisms, and patients with penicillin or cephalosporin allergies. Extended-spectrum beta-lactamase phenotype was identified in Gram-negative organisms using the Clinical and Laboratory Standards Institute 2015 guidelines (ceftriaxone, ceftazidime, or aztreonam minimum inhibitory concentration of greater than or equal to 2). Ertapenem

administration data was combined with patient census data to quantify the antimicrobial utilization metric, days of therapy per 1000 patient days.

Results: A total of 768 ertapenem treatment courses were evaluated. Gastrointestinal and genitourinary surgical prophylaxis was the most frequent ertapenem indication 344/768. Ertapenem was initiated empirically for the treatment of SPICE organisms 25/768, patients with prior cultures positive for extended-spectrum beta-lactamase-producing or SPICE organisms within three months 23/768, and for treatment of various other indications 216/768. Post-hoc analysis identified the most common other indications for empiric treatment as osteomyelitis 112/216, documented penicillin or cephalosporin allergy 66/216, sepsis/bacteremia 27/216, and abscess 25/216. Ertapenem was initiated for the definitive treatment of Extended-spectrum beta-lactamase-producing (non-SPICE) organisms 33/768, SPICE organisms susceptible to cefepime or ceftriaxone 34/768, SPICE organisms resistant to cefepime or ceftriaxone 8/768, documented penicillin or cephalosporin allergies without an identified extended-spectrum beta-lactamase-producing organism 18/768, and various other indications 67/768. Post-hoc analysis also identified the most common other indications for definitive treatment as Gram-negative organisms susceptible to narrow therapies 35/67, sepsis/bacteremia 14/67, osteomyelitis 10/67, and abscess 8/67. Excluding surgery patients, the average length of ertapenem therapy was five days and an infectious diseases consult was obtained in 179/424 of treatment courses. Ertapenem days of therapy per 1000 patient days was calculated and stratified monthly for analysis.

Conclusion: Ertapenem was prescribed primarily for surgical prophylaxis and empiric therapy in a variety of disease states. Several prescribing trends were identified with significant potential for reducing indiscriminate ertapenem use within the institution. Targets for antimicrobial stewardship intervention could include empiric prescribing without microbiology data to guide therapy, definitive therapy for SPICE organisms, empiric and definitive therapy for patients with penicillin or cephalosporin allergies, definitive therapy for organisms susceptible to narrow therapy, and surgical prophylaxis protocols. Further evaluation is warranted to assess the clinical and economic outcomes attributable to any interventions derived from this medication use evaluation.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 7-084

Poster Title: Antibiotic resistance: a 20-year perspective from a large academic medical center

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Purpose: The Centers for Disease Control and Prevention report over 2 million illnesses and 23,000 deaths annually from infections that are resistant to antibiotics. The use of antibiotics is the single most important factor leading to resistance. Fighting antibiotic resistance is a public health and national security priority. Secondary to differences in regional and institutional rates of antibiotic resistance, hospital-specific antibiograms are developed to provide more accurate susceptibility data. This project was designed to evaluate trends in antibiotic resistance over the last 20 years at the University of Iowa Hospitals and Clinics.

Methods: Antibiograms from 1996 through 2016 at the University of Iowa Hospitals and Clinics were collected to create an electronic database, with individual susceptibility profiles created for 45 unique organisms. The number of isolates, antibiotics tested and percent susceptibility were recorded for each year within each organism profile in the database. Staphylococcus aureus, Streptococcus pneumoniae, Enterococcus species, Escherichia coli, Klebsiella pneumoniae, Pseudomonas aeruginosa and Bacteroides fragilis were chosen for further evaluation. Yearly variations and absolute differences in susceptibility rates were assessed and, subsequently, graphed to visualize longitudinal trends. Human Subjects Research Determination from the University of Iowa Institutional Review Board determined that study approval was not necessary as this project does not contain any patient-level data.

Results: The number of oxacillin-susceptible S. aureus isolates declined from 90% in 1996 to a low of 61% in 2007, but has been stable over the last decade and has even increased to an average 65% since 2012. S. pneumoniae susceptibility to penicillin and ceftriaxone has remained grossly unchanged over the study-period with greater rates of resistance seen for

meningitis breakpoints, especially for penicillin. Over the last 20 years, undifferentiated Enterococcus species displayed a 9% increase in vancomycin resistance. Further evaluation revealed this is predominantly due to a considerable decrease in susceptibility from 85% in 1996 to 33% in 2016 among the faecium species. Fluoroquinolone-susceptibility rates for E. coli have declined substantially from 96% to 80% over the last decade, while susceptibility to other commonly-used agents, such as ceftriaxone and sulfamethoxazole-trimethoprim, has remained within 5% of baseline values. Resistance rates among K. pneumoniae isolates have consistently been minimal. The susceptibility of P. aeruginosa to anti-pseudomonal β-lactams and aminoglycosides remains broadly unchanged, while susceptibility to ciprofloxacin has risen from 76% in 2005 to 84% in 2016. B. fragilis susceptibility to clindamycin exhibited some yearly fluctuation, but is largely resistant. However, these isolates have continually shown 100% susceptibility to metronidazole.

Conclusion: The largest absolute increases in resistance were seen with S. aureus to oxacillin, E. faecium to vancomycin and E. coli to fluoroquinolones. Tracking susceptibility rates over time and may aide in early identification of consistent, incremental decreases that result in large changes in susceptibility over the long-term. Furthermore, this type of research is imperative to guide and support clinical decision making as well as promote antimicrobial stewardship. Further research is needed to determine if this will be an effective tool for informing and directing antimicrobial stewardship interventions.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 7-085

Poster Title: Assessing patient awareness and concern of risk associated with concurrent opioid and central nervous system depressant use: a quality improvement study.

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Purpose: Emergency department visits and drug overdose deaths involving concurrent use of opioid analgesics and benzodiazepines has increased significantly between 2004 – 2011. As a result, the FDA has issued a black box warning for this potentially dangerous combination. The objective of this Quality Improvement (QI) study was to identify patients taking opioids and other Central Nervous System (CNS) depressants concomitantly, assess patient understanding of the risks associated with the combination, and determine their willingness to de-intensify therapy to lessen the risk of harm.

Methods: Northeast Iowa Family Practice Center (NEIFPC) participated in the Primary Care Practices Research Network (PPRNet) which provided a list of patients whose active medication list showed concurrent use of an opioid and a CNS depressant - a benzodiazepine, a muscle relaxant, or a non-benzodiazepine sleep aid. The QI study incorporated the following steps: 1.) contact each patients' primary care physician, 2.) request the physician's insight into the co-prescription, 3.) complete a current Prescription Monitoring Program (PMP) report to assess current controlled substance usage. Patients were excluded if the PMP report indicated more than 3 months had elapsed since their days supply of their opioid had expired, 4.) attempt up to three telephone contacts of each patient and educate via a scripted interview regarding CNS depressant use, 5.) assess patient concern of medication risk and willingness to reduce CNS depressant therapy, and 6.) inform the primary care physician if a patient was willing to reduce the dose or discontinue one of their CNS depressants

Results: The PPRNet report identified 102 patients with an opioid and an additional CNS depressant on their active medication list. After conducting PMP reviews and removing patients no longer taking opioids, 62 (60.8%) patients were actively receiving concomitant opioid/CNS depressant therapy. Of those 62 patients, 13 were excluded for having passed away, on hospice, or their primary care physician requested we do not contact them. Telephone contact was attempted with 49 patients. Of those, 23 answered the phone after a maximum of three attempts. Of the 23 patients, 14 (60.9%) were aware of the risks and 8 (34.8%) patients wanted to make a dose reduction.

Conclusion: Opioid use in combination with other CNS depressants increases serious risks. A majority of patients receiving the combination were aware of the increased potential for harm. Following a short, scripted educational interview, one-third of contacted patients receiving the combination expressed a willingness to modify their regimen to lessen this risk.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 7-086

Poster Title: Cannabis effects on human reproduction

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Purpose: Cannabis, the most commonly used illicit drug worldwide, is used by approximately 3-5% of pregnant women. This number is expected to increase as legalization occurs throughout the United States. There are 43 states that allow medical, recreational or have limited access cannabis product laws. Further, more potent cultivars of the cannabis plant are becoming available. The purpose of this project is to familiarize health professionals with the effects of cannabis on male and female reproductive hormones and pregnancy outcomes.

Methods: A PubMed advanced search was done on the term cannabis and: Follicle-stimulating hormone, luteinizing hormone, gonadotropin-releasing hormone, thyrotropin-releasing hormone, prolactin, estrogen, progesterone, testosterone, anandamide, pituitary, fertility, and pregnancy. These terms and results were independently verified with a Google Scholar search. Statistics on use were obtained from government based agencies including the National Institute on Drug Abuse, Office of National Drug Control Policy, and Centers for Disease Control and Prevention.

Results: Cannabis use and its effects on reproduction have not been well studied. CB1 receptors are primarily found in the nervous system, connective tissues, ovaries, endometrium, testes, vas deferens, urinary bladder and placenta, while CB2 receptors are mostly found in the immune system. Anandamide and 2-arachidonoylglycerol are endogenous endocannabinoids that have been studied. In females, anandamide has been found in follicular and oviductal fluid which facilitates the ability of sperm to fertilize an egg. Various studies have shown cannabis to cause a prolonged follicular phase, decreased luteal phase and delayed ovulation. Males, who reported daily cannabis use, displayed lower sperm counts with higher testosterone levels compared with nonusers. CB1 and CB2 receptors are present in sperm, but their function is unclear. Exogenous cannabinoid exposure during fetal brain development results in adverse

outcomes including lower birth weight, decreased gestational age, and reduced head circumference. Human placental studies have shown that CB1 receptors are present in all placental membrane layers and stimulation of these receptors will harm fetal growth by inhibiting cytotrophoblastic proliferation.

Conclusion: More research is needed on the reproductive effects of cannabis on men and women and its impact on fertility. Additionally, more research is needed on the effects of cannabis during pregnancy, fetal outcomes and early childhood development. Current studies are limited by including men and women who have used cannabis, tobacco and other substances. Future studies should include participants who have only used cannabis. Based on our results, men and women should avoid the use of cannabis before becoming pregnant, and women should avoid the use of cannabis during pregnancy to prevent danger to the baby.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 7-087

Poster Title: Daptomycin medication use evaluation: a focus on continual quality and safety improvement

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Purpose: Daptomycin is a cyclic lipopeptide antibiotic that can be administered intravenously for the treatment of infections caused by aerobic and anaerobic Gram-positive organisms. Based on the spectrum of activity, high acquisition costs, concern for antibiotic resistance, and infectious complications like diarrhea and bacterial superinfection, daptomycin prescribing is restricted at the University of Iowa Hospitals and Clinics (UIHC). Hospital-approved criteria-for-use help guide prescribing practices to ensure judicious use of daptomycin. A medication use evaluation was performed in order to better understand daptomycin prescribing practices at UIHC and assess adherence to the institutional prescribing criteria.

Methods: The University of Iowa institutional review board approved this retrospective, electronic health record review. Inpatients who received daptomycin between August 1, 2015 and June 30, 2016 were included in the analysis. Manual retrospective chart review was performed for even numbered months to determine the daptomycin indication, microorganisms cultured, attending physician prescriber and pharmacist who verified the orders. Patient location, administration date and time, dose, and frequency were also collected from the electronic medical record. Daptomycin indications were stratified according to the following UIHC criteria-for-use: recommended by an infectious disease (ID) consultant, documented vancomycin-resistant Enterococcus species (VRE), methicillin-resistant Staphylococcus aureus (MRSA) infection refractory to vancomycin therapy, or MRSA infection with allergy or intolerance to vancomycin. Enterococcus species and Staphylococcus aureus infections were further stratified according to ampicillin and oxacillin susceptibility, respectively. Susceptibility testing was determined by the microbiology laboratory using Vitek 2 (bioMérieux, Inc., Hazelwood, MO) and the Clinical and Laboratory Standards Institute 2015 guidelines.

Results: A total of 247 patients received treatment with daptomycin, of which 121 were evaluated through manual chart review. A recommendation by an ID consultant was the most frequent daptomycin indication 50/121. VRE infections were the second most common indication 22/121, while MRSA infection refractory to vancomycin and MRSA infection with allergy or intolerance to vancomycin were the least common indications with 3/121 and 1/121 patients prescribed, respectively. None of the hospital-approved criteria were met for 45/121 patients prescribed daptomycin. Upon further analyses, daptomycin was used to treat ampicillin-sensitive Enterococcus species in 7/121 cases, ampicillin-resistant Enterococcus species in 22/121 cases, oxacillin-sensitive Staphylococcus aureus in 11/121 cases, and oxacillin-resistant Staphylococcus aureus in 19/121 cases. In 38/121 patients, no organism was grown in culture; within this group, 28/38 did not meet any approved criteria. The most common prescribing hospital services were bone marrow transplant 59/247, hematology/oncology 22/247, general medicine 21/247, medical intensive care unit 19/247, and surgery specialty 16/247. Notably, the bone marrow transplant and hematology/oncology services used daptomycin empirically for neutropenic fever in many cases. The mean and median daptomycin dose prescribed was 5.86 mg/kg and 6 mg/kg, respectively. The most common prescribers and pharmacist verifiers were identified for internal reporting.

Conclusion: Regular assessment of antimicrobial prescribing trends is essential for continual quality and safety improvement in antimicrobial stewardship. In this study, daptomycin prescribing was driven primarily by infectious diseases consultants. However, a large percentage of patients treated did not meet any approved criteria-for-use and several prescribing patterns were identified with significant potential for improvement. Antimicrobial stewardship interventions could target empiric initiation of daptomycin without targeted susceptibilities and definitive therapy for Staphylococcus aureus infections. Further evaluation is warranted to assess the clinical and economic outcomes attributable to any interventions derived from this medication use evaluation.

Submission Category: Pain Management

Submission Type: Case Report

Session-Board Number: 7-088

Poster Title: Parenterally administered diphenhydramine for headache pain relief

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Purpose: These cases demonstrate the therapeutic benefit of using parentally administered diphenhydramine for the short-term relief of headache-associated pain. Patient 1 had been experiencing migraine headaches for over fifteen years. Her headaches were described as unilateral with throbbing and sharp pain, with accompanying symptoms of nausea, photophobia, phonophobia, and aura. Recently, she had been experiencing roughly ten headache free days per month. She had missed eleven days of work in the past six months. A two-week history of persistent aura drove her to seek admission at an inpatient headache unit. In the month preceding inpatient admission, she had experienced only three headache free days. Failed medications for short-term relief included acetaminophen, ibuprofen, Fiorinal, hydrocodone, indomethacin, ketorolac, morphine, and eletriptan. At one point during her admission, she rated her pain at a five on a 10-point pain scale. Three hours following administration of fifty milligrams of intravenous diphenhydramine, her pain had completely resolved and was rated at a zero that evening. Patient 2 was a 51-year-old male with a long history of both chronic cluster and migraine headaches. In the six weeks prior to admission, he had experienced ten headaches per day on average, with an average intensity of ten on a 10-point pain scale. These were typically located behind his right eye, and were often accompanied with congestion, a runny nose, nausea, vomiting, and photophobia. His headaches were resulting in difficulties functioning at work. Medications he had tried and failed included acetaminophen, ibuprofen, ketorolac, orphenadrine, and methadone. During his inpatient stay at the headache unit, he rated his headache pain at a nine on a 10-point pain scale. Fifty milligrams of intravenous diphenhydramine was administered, and two and a half hours later his pain was rated at a five on a 10-point pain scale. While this was not a complete resolution of pain, it is uncommon to find one agent that can decrease pain so significantly in a short amount of time. Both of these cases illustrate the potential benefit of the use of parenterally

administered diphenhydramine for the acute resolution of pain associated with multiple headache presentations, particularly in patients who have tried and failed other therapies.

Methods:

Results:

Conclusion:

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 7-089

Poster Title: Evaluation of high-dose, oral vitamin D stoss therapy in pediatric patients with vitamin D deficiency

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Purpose: Vitamin D deficiency is common among certain pediatric populations primarily due to diseases that cause malabsorption of vitamin D and other essential vitamins. Examples include cystic fibrosis, gastrointestinal disorders, like Crohn's disease and inflammatory bowel disease, and oncology patients receiving chemotherapy. The term "stoss" in German means "to push", thus stoss therapy is a one-time, high-dose administration of vitamin D and may be superior to traditional daily dosing in certain conditions due to malabsorption and non-compliance. The purpose of this study is to evaluate current usage of stoss therapy in pediatric patients at the University of Iowa Hospitals and Clinics.

Methods: This study was approved by the institutional review board at the University of Iowa Hospitals and Clinics. A retrospective cohort study was completed using the electronic health record system to identify pediatric patients who received a one-time, high-dose vitamin D treatment with either cholecalciferol or ergocalciferol between March 2016 until September 2016. Patients receiving daily doses of vitamin D or a single dose of 50,000 units or less were excluded from the analysis. The primary outcome was to evaluate the change in vitamin D level from baseline after one-dose of therapy. Secondary objectives were to compare absolute and percent change in vitamin D levels between patients treated with ergocalciferol (E) and cholecalciferol (C) and the proportion of patients treated according to established protocols. Descriptive statistics were used to compare baseline characteristics of the patient cohort. Paired student's t-test were used for repeated measures, and independent samples t-test was used for unpaired comparisons. The chi-squared test was used for dichotomous variables. Linear regression analysis will potentially be used to adjust for any identified confounders.

Results: Our retrospective analysis included a total of 28 pediatric patients, 17 treated with cholecalciferol and 11 treated with ergocalciferol. The most common diagnoses were Crohn's disease, colitis, and ulcerative colitis (10/28) followed by oncology patients (4/28), and cystic fibrosis patients (3/28). Nine patients had both baseline and follow-up vitamin D levels completed. In this matched cohort, vitamin D levels were significantly higher at follow-up for patients receiving stoss therapy, baseline levels 14.3 vs 33.4 (p=0.013). Ergocalciferol doses ranged from 100,000-800,000 units and cholecalciferol doses ranged from 150,000-800,000 units. Percent change (101% versus 326%, p=0.17) and absolute increase (11.25 versus 26.6, p=0.18) in vitamin D levels were not statistically different between treatments for ergocalciferol and cholecalciferol, respectively. The proportion of patients being treated according to established protocols was also not different between treatments.

Conclusion: Despite our small sample size, it represents most of the pediatric disease states we expected to receive stoss therapy as these conditions can cause malabsorption of vitamin D and other minerals. High-dose vitamin D therapy resulted in significantly increased vitamin D levels. Preliminary analysis indicates no difference between treatments with ergocalciferol compared to cholecalciferol.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Descriptive Report

Session-Board Number: 7-090

Poster Title: Ophthalmic steroid and antibiotic formulary streamlining across Ascension Health

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Purpose: Ascension is the largest not for profit Catholic health system, with over 130 facilities, in the United States. With the goal of providing high quality care, following high-reliability principals, and delivering patient value, evidence-based recommendations are organized and implemented across the health-system. Ophthalmic combination antimicrobial products are used to treat ocular infections including blepharitis, conjunctivitis, keratitis and several others. Ophthalmic tobramycin-dexamethasone and neomycin-polymyxin B-dexamethasone are both FDA approved and used to treat inflammatory ocular conditions. The purpose of this report is to describe the creation and implementation of therapeutic streamlining of this ophthalmic medication class.

Methods: Through an established process, an expert group of multidisciplinary clinicians met to create a system-wide recommendation to streamline the ophthalmic steroid/antibiotic products. The expert group first agreed on the scope of the initiative and researched literature on the medication class. This review was used to develop evidence-based recommendations and subsequent streamlining of the ophthalmic steroid and antibiotic products. A document consisting of the situation, background, assessment, recommendation (SBAR) and executive summary slides was created to assist with the implementation of the clinical initiative on the facility level. Various committees across the health-system reviewed and approved the initiative recommendations. An executive memo from senior leadership was disseminated to each site for comment and subsequent 90-day implementation. Each site monitors the initiative for successful compliance, which is additionally tracked on a national compliance dashboard.

Results: Assessment of primary literature and current clinical guidelines found that tobramycin-dexamethasone is non-inferior to dexamethasone-neomycin-polymyxin in controlling inflammation in patients after cataract surgery. There are no significant differences in adverse effects observed between the two ophthalmic products. The final evidence based recommendations are to eliminate tobramycin-dexamethasone ophthalmic ointment from pharmacy stock and implement therapeutic interchange from tobramycin-dexamethasone ophthalmic ointment to neomycin-polymyxin B-dexamethasone ointment. The overall goal is to reduce the use of tobramycin-dexamethasone ophthalmic suspension by 90% across the health-system. Patients with a history of allergy to neomycin may consider alternative therapy such as ciprofloxacin and dexamethasone ophthalmic agents.

Conclusion: This clinical initiative development and implementation process resulted in the successful creation and implementation of the ophthalmic steroid and antibiotic interchange across Ascension. Reduced use of ophthalmic tobramycin-dexamethasone has been observed along with a projected cost savings of over $370,000 through formulary streamlining to ophthalmic neomycin-polymyxin-dexamethasone. This evidence-based initiative supports the mission to provide care that is high quality, low cost, and that delivers patient value. With the effective implementation of this initiative, Ascension continues in its efforts to deliver optimal patient care.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 7-091

Poster Title: Improving Community Opioid Safety via Multimodal Initiatives Implemented at St. Anthony's Medical Center in St. Louis Missouri

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Purpose: Drug overdose is a leading cause of death in the United States, with at least 28,000 occurring from opioid related overdose in 2014. According to the St. Louis County Department of Public Health, the death rate from drug-poisoning doubled from 2012 to 2014 within the service area of St. Anthony's Medical Center (SAMC). In 2015, SAMC saw 76,412 cases in the Emergency department, twenty percent of those were due to injury or poisoning. In order to improve opioid safety, SAMC is encouraging safe use, storage and disposal of prescription opioids along with naloxone (Narcan) availability for their patients and community.

Methods: Pharmacists and pharmacy students will counsel patients at discharge on safe storage and disposal of prescription opiates. Through collaboration with St. Anthony's marketing and community outreach departments, pharmacists will educate the public about safe storage and disposal of opioids. The SAMC pharmacy staff will provide a booth at the Nursing Skills Fair to further educate nurses and promote opioid overdose awareness. Additionally, educational materials will be developed for St. Anthony's Hospice House. SAMC will also partner with the National Council on Alcoholism and Drug Abuse – St. Louis Area (NCADA) to obtain and distribute Deterra drug deactivation system bags and work with the medical staff to explore means for providing nasal naloxone to the community, pending legislative changes in the state of Missouri.

Results: Through partnership with NCADA, Deterra bags were donated for inclusion in select discharge opioid prescriptions at no charge. An additional grant was obtained from the SAMC Charitable Foundation to provide written information about safe storage and disposal with each opioid prescribed at discharge. Pharmacists and pharmacy students distributed Deterra bags to the community during several local safety fairs. All SAMC hospital nursing staff received education about safe storage and disposal. The hospice staff was also educated on safe storage and disposal of opioids. At the time of admission, each hospice patient and family now receives education along with a Deterra bag. Information about medication drop off locations was added to the SAMC website. With the recent passage of House Bill 1568 in Missouri, pharmacists will move forward with a protocol to provide nasal naloxone to patients and family visiting our emergency department. Missouri received a federal grant to curb heroin and opiate overdoses; this grant is administered in part by NCADA and will allow them to provide free naloxone to those who need it. It is our hope that our established relationship with NCADA will provide the opportunity to obtain the nasal naloxone for our patients at no charge.

Conclusion: Opioid abuse is a public health crisis. SAMC has taken steps to educate and empower the community to safely use, store and dispose of opiates. New legislation and a federal grant support lifesaving services to turn this epidemic around. St. Anthony's Medical Center is uniquely positioned to make a difference in the lives of those they serve. Pharmacists will continue to seek opportunities to reduce and prevent opioid overdose deaths.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 7-092

Poster Title: Evaluation of methylnaltrexone use for opioid-induced constipation in a large community hospital

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Purpose: In a previous drug utilization evaluation performed in a metropolitan hospital, methylnaltrexone was shown to be inappropriately prescribed based on many factors including indication, dose, and presence of preexisting contraindications. The purpose of this study was to retrospectively evaluate methylnaltrexone use at North Kansas City Hospital, a 450 bed Midwestern community hospital.

Methods: A retrospective drug use evaluation was performed by reviewing medical records of patients receiving methylnaltrexone during hospitalization at North Kansas City Hospital from June 1, 2015 to May 31, 2016. The evaluation was conducted to determine appropriate use based on indication, dose according to weight and renal function, and contraindications. Appropriate laxative use prior to administration was also evaluated.

Results: A total of 101 patient admissions were identified for inclusion, resulting in 265 doses received. Overall, methylnaltrexone was appropriately prescribed in 78.9% of doses administered. The greatest proportion of inappropriate doses were attributed to presence of preexisting contraindication (9.4%), weight based dosing (4.9%), renal adjusted dosing (3.4%), two doses given on the same day (0.4%), and more than one of the previous listed reasons (3.0%). An adequate trial of laxative use prior to methylnaltrexone administration was shown in 81.9% of doses.

Conclusion: This evaluation revealed methylnaltrexone was appropriately administered in 78.9% of doses at North Kansas City Hospital. This study may be utilized in the development of a bowel protocol for a step-wise treatment approach to include an adequate laxative trial

before methylnaltrexone is prescribed and a suggested dosing regimen based on weight, renal function, and presence of preexisting contraindications.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 7-093

Poster Title: Evaluation of post-percutaneous coronary intervention education at an urban safety-net hospital

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Purpose: Coronary artery disease is a condition that affects approximately 15.5 million people in the United States and accounts for nearly 1.4 million hospital admissions annually. In 2010, 954,000 inpatient percutaneous coronary intervention (PCI) procedures were performed. Following the procedure, patients require targeted intervention to reduce risk of recurrent events, readmission, and cardiovascular death. The purpose of this study was to retrospectively determine the characteristics of the patients undergoing PCI at an urban safety-net hospital. A secondary objective was to explore the impact of post-PCI education and post-discharge follow-up phone calls on 30-day readmission rates and emergency department (ED) visits.

Methods: The institutional review board approved this retrospective cohort study evaluating a post-PCI pharmacy driven education program at an urban safety-net hospital. Education was verbally provided to patients in person prior to discharge by student pharmacists trained to utilize standardized printed education materials that patients kept following the session. Points emphasized during education included indications of each cardiovascular medication, side effects, disease state management pearls, and the importance of adherence to prescribed medications. Study participants consisted of inpatients with coronary artery disease discharged between January 1st and December 31st 2015 who underwent a PCI procedure while hospitalized. The following data points were collected on a standardized form utilizing the electronic medical record system: patient demographics, length of stay, indication for PCI, discharge medication regimen, patient education specifics, and follow-up considerations.

Results: During the study period, 225 PCI procedures were performed on 223 patients averaging 56.9 years of age, 69.3 percent of whom were male. Length of stay averaged 2.86 days. Indication for PCI was elective in 31.1 percent of patients, 21.8 percent were ST-segment elevation myocardial infarctions, and 47.1 percent were non-ST-segment myocardial infarctions. Education was completed with 71.6 percent (n equals 161) of patients and a post-discharge follow-up phone call was completed with 76.9 percent of patients (n equals 173). The time spent educating each patient averaged 16.26 minutes. The average time to follow-up phone call was 91.65 hours post-discharge. Thirteen percent of patients were readmitted within 30 days after discharge (n equals 30); however, 3.1 percent (n equals 7) of these patients were readmitted for a planned procedure. Nineteen percent (n equals 43) of patients returned to the ED within 30 days post-discharge. There were less 30-day readmissions in the group that received inpatient education compared to the group that did not (11.2 percent versus 18.8 percent, respectively) as well as those who received a follow-up phone call (12.1 percent versus 17.3 percent, respectively); however, these differences were not statistically significant (p equals 0.132 and p equals 0.336, respectively).

Conclusion: In an urban safety-net hospital setting, student pharmacists provided education regarding cardiovascular medications to 71.6 percent of inpatients who underwent a PCI procedure in 2015. The secondary measures showed favorable results with 7.6 percent fewer patients who received inpatient education readmitted within 30 days after discharge and 5.2 percent fewer readmissions within the group that received a post-discharge follow-up phone call; however, these results were not found to be statistically significant.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 7-094

Poster Title: Patient-controlled analgesia use at a metropolitan community hospital: a drug-use evaluation

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Purpose: A request for modifications of the patient-controlled analgesia protocol at North Kansas City Hospital, a 451 bed community hospital, led pharmacy to inquire about current prescribing practices, patient demographics, and safety and efficacy outcomes. Before any changes could be made or suggested, an evaluation of the use of morphine, fentanyl, and hydromorphone patient-controlled analgesia was necessary.

Methods: A retrospective chart review was completed to determine the current practice regarding patient-controlled analgesia. The formulary includes three medications for patient-controlled analgesia: morphine, fentanyl, and hydromorphone. Twenty-five patients per opioid were randomly selected from patient-controlled analgesia orders between March 1 and May 31, 2016. Charts were evaluated for opioid tolerance, indication, prescriber specialty, dosing parameters, adjustments made to the dosing parameters, duration of use, amount of drug used, concurrent opioid medications, percentage of time pain was controlled, and naloxone use. Opioid tolerance was defined as using 60 milligram oral equivalents of morphine for greater than or equal to seven days. Pain was considered controlled if the patient reported a pain score less than seven on a scale of one to ten.

Results: In total, 29/75 (39%) patients were male and 46/75 (61%) were female. Majority of patients were opioid naive, 70/75 (93%), and most patients were prescribed patient-controlled analgesia after procedures, 65/75 (87%). General surgery and orthopedics prescribed morphine in 18/25 (72%) patients, cardiothoracic surgeons prescribed fentanyl in 18/25 (72%) patients, and orthopedics prescribed hydromorphone in 17/25 (68%) patients. The percentage of

patients that had their pain controlled for more than or equal to 70% of the time while receiving patient-controlled analgesia was 56% for morphine, 88% for fentanyl, and 52% for hydromorphone. Concurrent pain medications were ordered in 67/75 (89%) patients with patient-controlled analgesia while 58/75 (77%) patients were administered concomitant pain medications. Only 13/75 (17%) patients had documented changes to their patient-controlled analgesia dosing parameters after initiation. No naloxone was administered to patients included in the study.

Conclusion: Overall, administration of patient-controlled analgesia was safe at North Kansas City Hospital based on no reversal agent use. Concomitant pain medications were predominantly administered near the end of the patient-controlled analgesia to transition to oral therapy and no changes are being made to this practice. Pain was only well controlled in the fentanyl group, and the majority of patients did not have changes to their dosing parameters during treatment. Modifications are being made to North Kansas City Hospital patient-controlled analgesia protocol to align dosing adjustments with current literature and recommendations.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 7-095

Poster Title: Effects of short-term proton pump inhibitor use on rates of Clostridium difficile infection

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Purpose: Proton pump inhibitors (PPIs) are frequently used in hospitals as stress ulcer prophylaxis (SUP) and in the community setting for treatment of gastric acid reflux disease. Long-term use of PPIs has been associated with increased risk of C. diff development. However, it is uncertain if short-term use shares the same risk. The purpose of this study was to evaluate existing literature in order to determine whether evidence exists to link short-term use of PPIs for SUP in hospitalized patients to increased risk of developing C. diff.

Methods: A comprehensive literature search was performed through Medline using the search terms “proton pump inhibitors,” “stress ulcer prophylaxis,” “gastric acid reducing agents,” “Clostridium difficile,” “enteric infections,” “short term use,” and “hospitalized” in order to identify trials evaluating short-term PPI use and rates of C. diff in hospitalized patients. Trials fitting the evaluation criteria were analyzed and summarized for results, efficacy, methodology, and adverse events. Evaluation criteria included enrollment of hospitalized patients receiving only short term gastric acid reducing therapy for SUP, assessment of rates of C. diff, and consideration of risk factors with known increased rates of C. diff such as antibiotic use, age, and clinical condition by use of matched controls.

Results: Four retrospective trials were identified through literature search evaluating 105,649 patients of which 964 developed C. diff during hospitalization. All trials reviewed observed PPI use for SUP during hospitalization positively increased risk for developing C. diff infection. Odds ratios ranged from 1.74 to 3.11 compared to no gastric acid reducing agent. Interestingly, histamine-2 receptor antagonists (H2RAs) were not associated with this same increased risk. One study assessed duration of PPI use and its association with C. diff acquisition. Results

indicated PPI use greater than 1 day in previously hospitalized patients or greater than 2 days in previously un-hospitalized patients directly correlated with increased rates of C. diff. The level of acid suppression therapy (no acid suppressive agent, H2RA use, daily PPI use, and more than daily PPI use) was assessed in a study which observed the risk of developing C. diff increased from 0.3 percent with no acid suppressive therapy to 1.4 percent in patients with more than daily PPI use (p less than 0.001).

Conclusion: Results from four trials indicate that even short-term PPI use (greater than or equal to 1 day) for SUP increases the risk of developing C. diff. Trials reviewed were not prospective and had limitations; however, evidence clearly links short-term PPI use and C. diff development. Therefore, consideration of use of another gastric acid reducing agent for SUP is warranted. Moreover, based on lack of evidence for SUP in most hospitalized patients outside the ICU, pharmacists should actively seek to identify and discontinue unnecessary use of SUP agents.

Submission Category: Pain Management

Submission Type: Descriptive Report

Session-Board Number: 7-096

Poster Title: : Managing chronic opioid therapy (COT) at an outpatient ambulatory care clinic

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Purpose: By improving opioid prescribing patterns, patient access to safe and effective treatment options for chronic pain can be achieved while reducing abuse, misuse and overdose. The purpose of this project was to develop and implement a process to more safely and consistently manage patients receiving chronic opioid therapy at an ambulatory care clinic. Interprofessional education was provided to the family medicine team to ensure successful integration of the project into practice.

Methods: This quality improvement initiative was exempt by the institutional review board. A chart audit conducted in July of 2015 revealed the following deficiencies in management of patients on chronic opioid therapy: annual pain contracts, routine urine drug screens, proper ICD-10 codes and pain assessment tools. This prompted a secondary chart audit for all opioid transactions occurring from January 1st, 2016 to May 31st, 2016, to identify patients managed with chronic opioid therapy (COT). Patients met COT criteria if they were on opioid therapy greater than or equal to 3 months and/or prescribed greater than or equal to 15 mg morphine equivalents per day. A drug interaction check was also conducted for all 156 patients. An interprofessional team was established to develop an evidence based, standardized process to address deficiencies in the management of COT patients. Packets consisting of COT contracts, urine drug screen forms, primary pharmacy forms and assessment tools for pain, risk and functionality were compiled for the physicians to review with patients at upcoming appointments. Three sessions were held to educate the clinic and medical office staff on the new COT management process and simplified pocket guide consisting of the process and opioid clinical pearls was created for quick reference and to ensure consistency. The COT policy was

enacted on August 11th, 2016. Future audits will be conducted to assess compliance and sustainability.

Results: 156 COT patients were identified from the 366 patients audited. The average age of COT patients was 55.2. 43 (27.6 percent) patients had a chronic pain ICD-10 code documented in the problem list. The average total daily dose in morphine equivalents was 51.72 mg, ranging from 5 mg to 375 mg. 27 (17 percent) COT patients had ever had a urine drug screen, and 16 (10 percent) COT patients had a urine drug screen in 2016. 118 (75.6 percent) patients had at least one drug interaction that was severe or major according to Clinical Pharmacology. 41 (34.7 percent) patients had at least one drug interaction that involved an opioid according to Clinical Pharmacology.

Conclusion: Implementing a guideline based, standardized process to manage patients on chronic opioid therapy will facilitate routine completion of the following: signage of pain contracts, conduction of urine drug screens, proper documentation of ICD-10 codes, and utilization of pain functionality scales and opioid risk tools. Ongoing interprofessional education will ensure continued success and sustainability of the project in the future.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 7-097

Poster Title: Evaluating the use of dalfampridine in veterans with multiple sclerosis (MS)

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Purpose: Dalfampridine (Ampyra), used in patients with MS to ameliorate slow and/or unsteady gait, improves conduction along nerve fibers with damaged myelin by blocking potassium channels on the surface of affected nerves. The purpose of this medication use evaluation (MUE) was to determine the efficacy and safety of dalfampridine in Kansas City Veterans Affairs Medical Center (KCVAMC) patients with MS. Additionally, adherence to criteria for use (CFU) parameters were assessed, current procedures regarding responsiveness and quality of life (QoL) improvement assessments were analyzed, and analysis of factors that contribute to or hinder patient response within the KCVAMC veteran population were evaluated.

Methods: A retrospective chart review of 15 veterans with a MS diagnosis who received dalfampridine (inclusion criteria) from 1/1/2014 to 12/1/2015 was completed. This review was approved by the KCVAMC pharmacy department as a quality assurance/quality improvement project. The primary outcome was to identify the number of patients achieving a clinically significant improvement in walking speed (greater than or equal to 20 percent decrease in time) on the timed 25-foot walk (T25FW) test after initiation of dalfampridine. Secondary outcomes included evaluation of adherence to VA CFU criteria for dalfampridine initiation; evaluation of adherence to appropriate baseline and follow-up assessments; identification of patient specific factors such as age, MS phenotype, or baseline T25FW test score that may predict which patients are most likely to achieve a clinically meaningful response on the T25FW test; and identification of safety concerns regarding dalfampridine use including occurrence of seizures, infections, insomnia, weakness, nausea, dizziness, and paresthesias. Additional patient information collected was: race, age, age at dalfampridine initiation, age at diagnosis of MS, MS course (phenotype), current disease modifying therapy (if applicable), duration of

dalfampridine use, T25FW test times pre and post dalfampridine therapy, and self-perceived efficacy. Exclusion criteria was patients that did not have the diagnosis of MS or had MS, but did not receive one dose of dalfampridine.

Results: Over 50 percent of the veterans reviewed experienced a clinically significant improvement in the T25FW test post initiation of dalfampridine. The ages of those veterans ranged from 47 to 71 years of age and each had been diagnosed with the most common phenotype, relapsing remitting multiple sclerosis (RRMS). Of those who achieved clinical significant improvement no veterans reported urinary tract infections, insomnia, or nausea post dalfampridine initiation. Frequently reported side effects were weakness and cramping. One patient experienced a seizure. All patients meet VA CFU standards to receive dalfampridine therapy and over 70 percent of veterans had appropriate follow up assessment (T25FW test at 2-4 weeks post initiation). A formal validated scale, such as the 12-item Multiple Sclerosis Walking Scale (MSWS-12) or the Subject Global Impression (SGI), was not used to record the veterans' self-perceived efficacy of therapy, however, 60 percent reported positive self-perceived efficacy during follow-up examination.

Conclusion: The clinical significance of the improved T25FW test was moderate. Documented adverse reactions were infrequent other than weakness and cramping, which could be attributed to the disease state rather than an adverse reaction to dalfampridine. The VA CFU initiation criteria was met in each case and follow up was completed in the majority of veterans taking dalfampridine. Standard utilization of tools, such as the MSWS-12 or the SGI, would help to better assess the VA CFU parameter and determine the clinical significance of QoL improvement with dalfampridine use. Additionally, improved adherence to follow up monitoring is needed to ensure efficacy.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 7-098

Poster Title: Evaluation of dornase alfa utilization in an academic pediatric hospital

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Purpose: Dornase alfa is approved by the Food and Drug Administration for patients with cystic fibrosis 6 years of age and older to improve pulmonary function in conjunction with standard respiratory therapies. Despite insufficient clinical evidence beyond the cystic fibrosis population, dornase alfa is frequently used off-label in hospitalized patients for airway clearance. The purpose of this review was to evaluate the current prescribing and utilization practices of dornase alfa within a tertiary care pediatric hospital.

Methods: The Institutional Review Board approved a retrospective chart review that included patients admitted between January 1, 2013 and February 28, 2014 and received at least one dose of dornase alfa throughout hospitalization. All data was collected via the electronic medical record and included demographic information, characteristics of dornase alfa therapy, and additional mucolytic use.

Results: During the evaluation period, a total of 5,185 doses of dornase alfa were administered to 284 patients. Of the study population, a majority were male (n=154, 54 percent), and a majority did not have a diagnosis of cystic fibrosis (n=156, 55 percent). Most patients were admitted for either respiratory distress or a cystic fibrosis exacerbation. The medical services that represented the highest use of dornase alfa during the study period included pulmonary medicine (41 percent), general medical/surgery (26 percent) and pediatric intensive care (22 percent). The most common indication for dornase alfa among patients without a diagnosis of cystic fibrosis was atelectasis or mucous plugging (n=142, 50 percent). Dornase alfa was the only mucolytic therapy utilized in 19 percent (n=54) of observed patient encounters. Twice daily

dosing was prescribed for 83 percent (n=236) of patients and the number of doses administered per patient ranged between 1 to 684 doses.

Conclusion: The majority of dornase alfa administered was utilized off-label at the study institution. With the lack of data beyond the cystic fibrosis population, there is potential for significant cost savings by defining criteria for appropriate use of dornase alfa.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 7-099

Poster Title: Evaluation of a vancomycin dosing protocol in the neonatal intensive care unit (NICU) at a regional healthcare system

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Purpose: Vancomycin is an antibiotic that is routinely used as empiric therapy for late onset sepsis in the neonatal population. Current dosing guidelines at this institution are based on a previous Neofax recommendation to dose to a goal trough of 5-10 mcg/mL. Neofax has since updated their recommendation to trough greater than 10 mcg/mL in order to prevent resistance and achieve an area under the curve to minimum inhibitory concentration greater than 400, however has not changed their empiric dosing recommendation. The purpose of this study was to observe how often this protocol achieves the goal trough level in our population.

Methods: This study was approved by the Institutional Review Board as a quality improvement project. Patients who were admitted to the NICU between April 2014 and March 2016, and received at least one dose of vancomycin were included in the initial retrospective data collection. Patients were then excluded if no vancomycin trough was drawn or the vancomycin trough was improperly drawn. Additional data collected for assessment included corrected gestational age, postnatal age, dosing weight, dose given, dosing frequency, number of doses before first trough, time between trough and previous dose given, number of troughs before therapeutic, adjusted dosing for adequate trough, serum creatinine, urine output, white blood cell, C-reactive protein, immature to total neutrophil ratio at initiation of therapy and end of therapy, culture location, organism and organism minimum inhibitory concentration, organism eradication, concurrent aminoglycoside or indomethacin therapy, days between initiation and negative culture, and if discharged to home. Data was analyzed by assessing number of patients achieving outcomes and median calculations.

Results: Of the 33 patients evaluated, 23 patients met inclusion/exclusion criteria. Eleven patients achieved goal therapeutic vancomycin troughs between 10 and 20 mcg/mL (47.8 percent). Overall, the median trough concentration equaled 10.45 mcg/mL. Seven patients were considered sub-therapeutic with a trough less than 10 mcg/mL (30.4 percent), with the median trough being 7 mcg/mL. Limitations of this study include a small patient population and the retrospective nature of the study.

Conclusion: The current neonatal vancomycin dosing protocol at our institution refers to Neofax recommendations. Less than half of the neonatal patients that received vancomycin and obtained a trough concentration, met the goal trough concentration of 10 to 20 mcg/mL. Although the number of patients in this study is small, it does trend toward results seen in larger studies based on the same dosing protocol. To increase achievement of therapeutic vancomycin trough concentrations in neonatal intensive care unit patients, a more aggressive vancomycin empiric dosing protocol may be warranted.

Submission Category: Infectious Diseases

Submission Type: Case Report

Session-Board Number: 7-100

Poster Title: Transient low-level viremia after switch from efavirenz to elvitegravir based antiretroviral therapy in well-controlled patients with human immunodeficiency virus (HIV)

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Purpose: This case series illustrates the potential drug interaction between efavirenz, an HIV non-nucleoside reverse transcriptase inhibitor, and elvitegravir, an HIV integrase inhibitor, in patients whose antiretroviral therapy (ART) is switched from a regimen that includes efavirenz to one that includes elvitegravir. Efavirenz is a cytochrome P-450 3A4 (CYP3A4) inducer, while elvitegravir is a CYP3A4 substrate. Efavirenz also has a significantly long half-life (40 to 55 hours). When efavirenz is discontinued, this long half-life may increase the ability of efavirenz to decrease concentrations of elvitegravir via a CYP3A4 mediated interaction. The two patients described are 50 and 69 year old males. Patient one initiated treatment with efavirenz and lamivudine/zidovudine two years after initial diagnosis with HIV. After eleven years on this regimen, complaints of fatigue and ongoing depression prompted switch to elvitegravir/cobicistat/emtricitabine/tenofovir disoproxil fumarate. Patient two initiated treatment with efavirenz and emtricitabine/tenofovir immediately after initial HIV diagnosis and after 10 years on this regimen was switched to elvitegravir/cobicistat/emtricitabine/tenofovir alafenamide due to a new diagnosis of osteopenia. Both patients had routine monitoring of viral load and CD4 count performed before therapy switch in accordance with guideline recommendations and both patients were well-controlled (viral load less than 20 copies/mL and CD4 count greater than 500 cells/µL) on ART for at least one year before switching medications. No new medications were initiated for either patient within the two months prior or at the time of the switch. Patient one had an undetectable viral load (less than 20 copies/mL) and a CD4 of 1213 cells/µL prior to the switch. Patient two also had undetectable viral load prior to the switch and a CD4 count of 776 cells/µL. A complete drug interaction review was completed for all medications each patient was taking

at the time of the switch, including over-the-counter and herbal supplements, with no significant potential interactions identified. Labs four weeks after the switch for patient one revealed a viral load increase to 55 copies/mL and a CD4 count of 1176 cells/µL. Upon follow-up laboratory evaluation after four additional weeks, viral load was again undetectable and CD4 count was 996 cells/µL. Labs completed five weeks after the switch for patient two also revealed a viral load increase to 189 copies/ml and a CD4 count of 875 cells/µL. Follow-up laboratory evaluation two weeks later showed viral load was again undetectable and CD4 count was 781 cells/µL. Both patients reported taking the new ART with food, as recommended, at the same time each day, with no missed doses. Complete compliance, reported by both patients, was supported by refill history. Since the rationale for switching ART was regimen simplification and potential for improved tolerance, resistance testing was not indicated. No prior resistance test results were available for patient one. Patient two had prior resistance testing without any nucleoside reverse transcriptase resistance mutations present. Neither patient had a history of exposure to integrase strand transfer inhibitors (ISTIs) or testing for resistance to ISTIs. As this case series suggests, a theoretical CYP3A4-mediated interaction between efavirenz and elvitegravir could have resulted in transient low-level viremia in patients switching ART. The clinical significance of transient low level viremia is not clearly established. While generally not considered to have long term impact, it can cause considerable concern for both patients and practitioners in the setting of a recent change in antiretroviral therapy. The healthcare practitioner should be aware of this interaction to be able to provide proper education and reassurance to the patient to help minimize or prevent patient concerns should transient viral load increases occur.

Methods:

Results:

Conclusion:

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 7-101

Poster Title: Evaluation of pain, agitation and delirium management in mechanically ventilated intensive care unit patients before and after order set implementation

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Purpose: Pain, agitation and delirium management is very important in mechanically ventilated patients, as pain is one of the most commonly reported and distressful experiences for intensive care unit (ICU) patients. Pain is one of the potential causes of agitation in patients, so it is very important to evaluate and treat pain before giving the patient a sedation agent. The purpose of this study was to evaluate the impact of order set implementation and education on ICU management of pain, agitation and delirium in mechanically ventilated patients.

Methods: This study was conducted through a retrospective chart review that compared ICU patients that were mechanically ventilated in January 2015 and January 2016. If the patient was mechanically ventilated due to surgery or a procedure, they were excluded from the study. The primary objective of the study was to assess if order set implementation and education improved pain treatment in mechanically ventilated patients. All data, which included patient demographics, characteristics of pain medication management—including time to first pain medication, average dose in morphine equivalents and if as needed sedation medication was inappropriately used in place of pain medication—and routine monitoring, including Critical Care Pain Observation Tool (CPOT), Richmond Agitation-Sedation Scale (RASS) and Confusion Assessment Method-Intensive Care Unit (CAM-ICU), was collected via electronic medical record. Patients were determined to have delirium if they were administered haldol or if indicated by the CAM-ICU. Collected data were analyzed for central tendencies, such as: median, mean and standard deviation and chi-square test was conducted for nominal data using SPSS.

Results: During the evaluation period, a total of 69 ICU patients were mechanically ventilated. A majority of the study population was female (n=36, 52.2 percent) and had an average age of 52.5 years with a standard deviation of 17.8. In the pre-implementation group, sedation medication was given prior to pain medication when pain treatment was indicated 45 percent (n=25/35) of the time compared to 33 percent (n=22/34) in the group analyzed post-implementation. The pre-implementation group also had more instances of patients receiving sedation medication before pain medication at an average of 50 percent or greater (n=12/35) compared to the post-implementation group (n=6/34), p=0.12. Overall, RASS scores were similar between groups with an average RASS score of negative 1.68 in the pre-implementation group compared to negative 1.81 in the post-implementation group. Results were also similar for CPOT documentation with average CPOT scores of 0.35 in the pre-implementation group and 0.51 in the post-implementation group. Both groups had a median time to first pain medication after intubation of zero minutes. Of note, the pre-implementation group also had more instances of delirium (n=15/35) compared to the post-implementation group (n=9/34), p=0.15.

Conclusion: Overall, a trend towards significant improvement in treating pain in mechanically ventilated ICU patients by a reduction in patients receiving sedation medication before pain medication post-implementation of an order set and education series was shown. There was also an improvement in instances of delirium in patients, which could be secondary to better pain management during mechanical ventilation.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 7-102

Poster Title: Evaluation of anticoagulation in patients with atrial fibrillation at an urban safety-net hospital

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Purpose: Atrial fibrillation (AF) is a common disease state affecting between 2.7 to 6.1 million Americans. Complications, including stroke and heart failure, commonly occur in patients with atrial fibrillation; it is responsible for nearly 15-20 percent of ischemic strokes. Anticoagulation drugs are commonly used to treat patients with AF and reduce the risk of stroke by two-thirds. New agents offer a different risk benefit ratio than traditional warfarin as well as different cost considerations. The purpose of this study was to retrospectively determine the characteristics of the AF population and current discharge medications prescribed at Truman Medical Center-Hospital Hill.

Methods: The institutional review board approved this retrospective cohort study evaluating patients discharged with atrial fibrillation at an urban safety-net hospital. The primary objective of the study was to determine the demographics of the atrial fibrillation population, and investigate the medication regimens at discharge. Study participants consisted of patients discharged with a diagnosis code of atrial fibrillation between July 1, 2015 and September 30, 2015. The following data were collected using a standardized form with which to perform chart reviews of patient age, gender, diagnosis, history of valvular disease, renal disease, and discharge medications. CHA2DS2VASc and HASBLED scores were determined to assess each patient's risk of atrial fibrillation-related stroke and to assess risk of bleeding. Patient demographics were analyzed and reported using mean plus or minus standard deviation or percentages where appropriate. Collected data were analyzed for central tendencies, such as: mean and standard deviation. The student's t-test and chi-squared were used for analysis to identify the significance of the results.

Results: During the study period, 132 admissions occurred. The study population included 74 males (56.1 percent) aged 63.5 plus or minus 14.7 years. Upon admission, 46 patients (18.2 percent) had a CHA2DS2VASc score of 2 or less and 86 patients (81.8 percent) had a score greater than 2. Patients in the latter group were older (p-value less than 0.0001), weighed more (p-value of 0.007) and had worse renal function (p-value less than 0.0001). More men were among the 2 or less group (75 percent vs. 58.9 percent; p-value of 0.039). Thirty patients (22.7 percent) were not on anticoagulation therapy and 59 patients (44.7 percent) taking aspirin at a mean dose of 129 mg. Forty-six patients (34.8 percent) took warfarin with an average weekly dose of 38 mg and mean time in therapeutic range of 34.88 percent plus or minus 29.3 percent. Eleven of the 12 patients taking a novel anticoagulant had CHA2DS2VASc scores less than or equal to 2. Forty-six point three percent of patients taking aspirin had CHA2DS2VASc scores greater than 2. Warfarin use was greater in the group with CHA2DS2VASc greater than 2 (16.7 percent vs. 38.9 percent; p-value of 0.039).

Conclusion: Within an urban safety-net hospital, patients with a CHA2DS2VASc greater than 2 were more prevalent (81.8 percent) and fewer patients in this group received no therapy, though that was not statistically significant. Aspirin use was similar between groups. Warfarin use was more common in patients with a score greater than 2. Apixaban, dabigatran, and edoxaban were not utilized when the CHA2DS2VASc was 2 or less and only one patient in the novel anticoagulant group received rivaroxaban. Patients with atrial fibrillation at this institution were more commonly discharged on aspirin or warfarin for anticoagulation over newer agents regardless of CHA2DS2VASc score.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 7-103

Poster Title: Utilizing pharmacy students and technicians in obtaining medication histories at a community hospital

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Purpose: Medication reconciliation is an important part of the admission process, with obtaining a medication history as the first critical step. Inaccuracies in the medication history at admission can lead to medication errors, both inpatient and at discharge. Liberty Hospital, a 250-bed not-for-profit hospital, admits an average of 28 patients per day to inpatient services. The purpose of this project was to show the importance of involving the pharmacy department in the admission medication history process utilizing pharmacy students and technicians, with the goal of developing a technician-driven medication history program at Liberty Hospital.

Methods: For approximately one week in each month of July 2015, August 2015, and January 2016, a pharmacy student and technician obtained medication histories for patients admitted to Liberty Hospital. The patients included those who were admitted within the previous 24 hours and had an outpatient medication record completed by a registered nurse. Medication histories were obtained by conducting patient interviews and contacting patient's family, caregiver, outpatient pharmacy, or doctor's office. This was then compared to the history obtained by the registered nurse and any discrepancies were recorded. Errors were divided into three categories: medications requiring changes (incorrect dose, frequency, directions, etc.), inclusion of inactive medications, and medication omissions. All activities were performed under the supervision of a registered pharmacist.

Results: A total of 87 outpatient medication records were reviewed by the student and technician. Of these, 84 percent (73 of 87 records) were found to be incomplete, with 307 student and technician documented errors. The most common type of error found was medications requiring changes, accounting for 44 percent (135 of 307) of errors, followed by

medication omission (98 of 307; 32 percent) and inclusion of inactive medications (74 of 307; 24 percent).

Conclusion: Involvement of pharmacy personnel, including students and technicians, in the admission medication reconciliation process improves the accuracy of the gathered information. Providing physicians with a complete and accurate medication history on admission will reduce inpatient medication errors and ease the discharge process. By demonstrating the need for additional resources with this study, six positions were approved at Liberty Hospital for medication history technicians.

Submission Category: Infectious Diseases

Submission Type: Descriptive Report

Session-Board Number: 7-104

Poster Title: Retrospective evaluation of student pharmacist impact on an Urban Indian Health Center (UIHC) immunization program

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Purpose: The purpose of this evaluation was to determine the impact of student pharmacists on processes and outcomes of immunization programs for an Urban Indian Health Center (UIHC) in western Montana.

Methods: The evaluation used a pre-post study design with a historical control and retrospective data collection methods. The study design was approved as exempt by the campus institutional review board. The study period spanned from fall 2009 through spring 2016 and the subjects were American Indian/Alaska Native (AI/AN) tribal members living in western Montana. The "pre period" (fall 2009-spring 2011) did not involve the student pharmacists or the Operation Immunization program; the "post period" (fall 2011 – spring 2016) did involve student pharmacists and their ongoing efforts to increase the number of immunizations given through added program enhancements. Data collected included the number of clients immunized at events, types of vaccinations offered, types of enhancements added, types of events including social gatherings where attendees could be vaccinated, and client satisfaction with the program. Three to four student pharmacists were involved at each event. Descriptive analyses were performed.

Results: The number of vaccinations given through the various programs was 59 in the "pre period" and 940 during the "post period" for an annual average (SD) of 29.5 (40.31) and 188 (60.61) patients vaccinated in the pre and post years, respectively. The majority of vaccine administered each year was the seasonal influenza (flu) vaccine (79.7% across all post years).

The types of vaccines offered increased from one (flu) to six (flu, tetanus/diphtheria/pertussis (Tdap), pneumococcal conjugate (PCV) and pneumococcal polysaccharide (PPSV), human papillomavirus (HPV), herpes zoster (Zoster), Hepatitis B (Hep B) with student pharmacists giving all but the HPV immunizations. Pre and post numbers of vaccinations given by students were as follows: flu (59 to 753); Tdap (0 to 114); PCV/PPSV (0 to 37); Zoster (0 to 8), and Hep B (0 to 7). Enhancements increased from one activity (basic education) to six with the addition of more in-depth education, counseling, increased attendance (among students and tribal members), adding student nurses, and administering the immunizations. Annual events grew to include two wellness fairs, two community round dances, flu shootouts and group wellness classes. Patient satisfaction comments collected in 2015 indicated positive reactions to the events and enhanced immunization services.

Conclusion: Student pharmacist involvement has enhanced the vaccination program at an Urban Indian Health Center (UIHC), which has resulted in an increase in both the number and types of vaccines administered to the AI/AN patients.

Submission Category: Small and Rural Pharmacy Practice

Submission Type: Evaluative Study

Session-Board Number: 7-105

Poster Title: Continued impact of blood pressure education and monitoring by student pharmacists on members of an urban American Indian health center in western Montana.

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Purpose: Heart disease is the leading cause of death amongst American Indians/Alaskan Natives (AI/AN). The AI/AN population makes up approximately 6.5% of Montana's total population, which is proportionally larger than most other states. An urban American Indian health center in western Montana focused on providing healthcare to the AI/AN population through wellness classes. The purpose of the study is to determine if regular blood pressure monitoring and education, provided at the wellness classes, improved blood pressure in this AI/AN population.

Methods: In 2011, wellness classes were offered to American Indians in western Montana. This series includes 16 biweekly classes throughout the year. Classes are two and a half hours long, involve the whole family, and provide education on diabetes prevention and self-management, nutrition, and physical activity. University of Montana student pharmacists provide blood pressure screenings and education at the classes. In addition, a heart healthy recipe was provided to each participant at each class event. One blood pressure reading was obtained and recorded per patient at the classes.
Blood pressure readings from the 14/15 academic year 2015 were compared to readings from 15/16. Patients with systolic blood pressure greater than or equal to 140 mmHg and/or diastolic blood pressure greater than or equal to 90 mmHg were referred to their primary care provider for follow-up. Differences in student pharmacist involvement between the 2 years included the healthy recipes, dedicated education wellness classes, assessment of blood pressure medications, and education on medication adherence.

Results: In 14/15, an average of 18 people attended each wellness class, although the same people did not always attend each class. For the 16 classes, 260 blood pressure readings were recorded by student pharmacists, 58 of which were elevated (22.3%). In 15/16, blood pressure readings were obtained at 8 classes and one-on-one blood pressure education were provided at the other 8 wellness classes. Each participant was provided a heart healthy recipe at each class. An average of 12 people attended each class with blood pressure readings; 96 blood pressures were obtained. In addition, student pharmacists participated at two wellness fairs for AI/AN patients, which resulted in 85 blood pressure recordings. A total of 186 blood pressure values were recorded, and 14 blood pressures were elevated (7.5%). A total of 41 patients were taking blood pressure medication (22%).

Conclusion: The percentage of patients with elevated blood pressures decreased between 14/15 and 15/16 wellness classes (22.3% vs. 7.5%). Although blood pressure medication use was not assessed in 14/15, the 22% of patients who reported taking medication in 2015/16 is comparable to the percent of patients referred to their primary care provider during 14/15. Student pharmacists can benefit the AI/AN population by providing blood pressure screenings in addition to increased education on blood pressure, encouraging patients to “know their numbers”, stressing medication adherence, and providing heart healthy recipes.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 7-106

Poster Title: Evaluating medication adherence in patients who receive financial assistance for prescriptions

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Purpose: Financial barriers are a common contributor to medication non-adherence. For vulnerable, uninsured patients who do not qualify for federal programs, initiatives have been implemented by some non-profit organizations to enable better access to healthcare. This project was designed to assess adherence in such a population who received healthcare at a free clinic and financial coverage of prescription medications for chronic conditions. These prescriptions were filled at a university outpatient pharmacy participating in the program.

Methods: A pharmacist intern who worked in the university outpatient pharmacy conducted a literature search for how to best evaluate medication refill adherence. It was determined that the Proportion of Days Covered equation would be used to analyze the results. Data was collected over a 26-month period for patients who had at least three consecutive medication fills covered by the free clinic during this time to treat a chronic condition. Patients and/or medication fills paid for by insurance or out-of-pocket were excluded, as well as any medications not used to treat a chronic condition. The Proportion of Days Covered equation was calculated for each patient and respective medication/therapeutic class.

Results: Twenty-six patients who utilized this assistance program met the inclusion criteria. Twelve (46.2%) of these patients were classified as "highly adherent" during the 26-month period (Proportion of Days Covered ?80%). Nine out of the 26 total patients received concurrent medications from more than one therapeutic class. Majority (21) of these patients received medications to treat hypertension. Ten out of the 21 hypertension patients were classified as highly adherent. Six patients received medication to treat depression, four patients

for hypercholesterolemia, and two for hypothyroidism. For each of these three therapeutic classes, 50% of patients were classified as highly adherent.

Conclusion: Financial barriers appear not to be the sole contributor to medication non-adherence. Because 100% adherence was not met overall even when patients received their medications at no cost, it is clear that this factor alone cannot necessarily achieve successful adherence outcomes. Further evaluation needs to be conducted for other potential factors such as health literacy, transportation, the patient's priorities, and the free clinic's allocation of resources.

Submission Category: Critical Care

Submission Type: Case Report

Session-Board Number: 7-107

Poster Title: Chromaturia secondary to hydroxocobalamin

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Purpose: Chromaturia is the abnormal coloration of the urine. Hydroxocobalamin (Cyanokit) is indicated to treat known or suspected cyanide poisoning. Red colored urine or chromaturia is a known yet under recognized consequence of hydroxocobalamin. Reports suggest that transient chromaturia may last for up to 5 weeks following hydroxocobalamin administration. This report describes a case of chromaturia in a patient receiving dialysis. A 53-year-old male was found to be in metabolic acidosis with an elevated lactate, acute kidney injury, and anion gap of greater than 25 secondary to the ingestion of an unknown substance. The differential included cyanide, toluene, methemoglobin, ethylene glycol, isopropyl alcohol, and metformin. Dialysis was initiated upon presentation to the ICU. Poison control was contacted and the patient was given hydroxocobalamin for possible cyanide poisoning. Ten minutes following an IV dose of 5 grams of hydroxocobalamin, the dialysis machine started alarming of a blood leak. No leak was identified and again the dialyzer alarmed. The patients' urine looked purple-red in color. It was suspected that the bloody looking urine caused the dialyzer to alarm. Dialysis treatment was terminated to be restarted at a later time. Dialysis was delayed for approximately 9 days due to the persistence of the chromaturia. At this time the nephrologist recommended to defer dialysis due to improving metabolic panel and impressive urine output without diuretics. While the package label for hydroxocobalamin (Cyanokit) includes a statement that the product may cause hemodialysis machines to shut down due to an erroneous detection of a blood leak, many clinicians are not familiar with this reaction. Clinicians should consider this potential before hemodialysis is initiated in patients recently treated with hydroxycobalamin.

Methods:

Results:

Conclusion:

Submission Category: Critical Care

Submission Type: Case Report

Session-Board Number: 7-108

Poster Title: Baclofen for treatment of central hyperthermia

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Purpose: Central hyperthermia (CH) is a rare complication of intracranial hemorrhage that is associated with poor prognosis and high mortality. To date, there are limited case reports describing the use of baclofen to treat CH. Baclofen is a skeletal muscle relaxant and analog of gamma-aminobutyric acid (GABA). While the mechanism of action is not fully understood, it is thought that baclofen stimulates the GABA-B receptor and ultimately inhibits the release of excitatory neurotransmitters including glutamate and aspartic acid. Peak blood concentrations occur two to three hours following an oral dose and it is used to reduce symptomatology associated with multiple sclerosis, muscle spasm, and spinal cord injury. This report describes a case of CH successfully relieved by baclofen. A 67 year old female developed a temperature of greater than 38 degrees Celsius two days after left basal ganglia hemorrhage. Non-pharmacologic measures were implemented and standard pharmacologic treatment with acetaminophen was given. Medication causes of hyperthermia were ruled out. Thromboembolic workup was unrevealing. Fevers persisted despite prolonged course of broad spectrum antibiotics. Multiple blood, sputum and urine cultures identified no infectious cause of fevers. Infectious disease was consulted and recommended stopping all antibiotics. CH was diagnosed by process of exclusion. Temperature readings were between 37.2 to 38.8 degrees Celsius (99 to 101.9 degrees Fahrenheit) prior to baclofen administration. After 17 days of unresolved CH, baclofen was initiated at 5 mg taken via feeding tube for one day and then advanced to 10 mg three times daily. Temperature readings were consistently lower after baclofen therapy was initiated, between 36.2 to 38.2 degrees Celsius (98.2 to 100.8 degrees Fahrenheit). Baclofen was continued for 12 days until patient was discharged to a skilled nursing facility with only two temperature excursions beyond 38 degrees Celsius. In this

patient, baclofen taken 10mg three times daily was an effective treatment strategy for management of CH secondary to intracranial hemorrhage. Further studies are needed to clarify the definitive role of baclofen in the treatment of CH.

Methods:

Results:

Conclusion:

Submission Category: Critical Care

Submission Type: Case Report

Session-Board Number: 7-109

Poster Title: Possible case of propofol-induced QT prolongation

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Purpose: QT interval is the measurement of myocardial repolarization. Delayed myocardial repolarization significantly increases risk for development of fatal cardiac arrhythmias, particularly torsades des pointes. Genetic factors can predispose patients to QT prolongation, but medications and medical conditions are the primary cause. Propofol is an intravenous general anesthetic used for induction and maintenance of anesthesia. As a gamma-aminobutyric acid (GABA) receptor agonist and N-methyl-D-aspartate (NMDA) glutamate receptor inhibitor, propofol causes central nervous system (CNS) depression. QT interval values are recorded as corrected QT (QTc) values to account for changes in heart rate. Normal QTc in women is less than 460 msec and QTc greater than 500 msec is associated with an increased risk of arrhythmia. Propofol is not typically associated with QT prolongation, although this linkage has been reported in a few small studies and case reports. This report describes a case of QT interval prolongation linked to the administration of propofol. A 33-year-old white female presented to the emergency department (ED) with progressive tongue swelling and laryngeal edema. She was quickly intubated for airway protection, sedated, and transferred to the intensive care unit (ICU). The patient's past medical history included systemic lupus erythematosus, hypertension, asthma, Raynaud's disease, and illicit drug use. No cardiac history was documented. Per ED physician notes, the ECG upon presentation showed normal sinus rhythm and a normal QT interval. Following successful intubation in the ED, propofol was initiated at 100 mcg/kg/min continuous infusion and continued for approximately one hour. The patient was then transferred to the ICU for further management. An ECG was obtained approximately 90 minutes after the initiation of propofol, where the QTc was documented at 446 msec. The infusion was titrated down to 60 mcg/kg/min upon transfer and decreased further to 50 mcg/kg/min throughout ICU day 1. The next ECG was obtained 20 hours after the

initiation of propofol and the QTc interval increased from 446 msec to 552 msec. At the time of the ECG, the patient was given intravenous magnesium and potassium in attempt to correct the QT prolongation. QT prolongation due to infectious etiology or other medications was ruled out and the propofol infusion was discontinued approximately 36 hours after initiation. Concern for propofol-induced QT prolongation was extensively documented in the charting as the likely cause of the ECG abnormality. On the two subsequent days following discontinuation, the QTc interval decreased from 552 msec to 548 msec, and then 453 msec. Five days after the initial propofol infusion was started, the QTc interval was 425 msec. Use of the Naranjo probability scale indicated a probable relationship between propofol and prolongation of the QT interval. Although propofol was not the only drug administered on the day of the QT interval prolongation, it is the most likely cause. When compared to other potential medication causes, propofol hadthe longest continual administration time and the onset of QT prolongation was consistent with administration time. Additionally, the reaction resolved when propofol was discontinued. In a subsequent admission two months later, the patient's QTc interval was within normal limits. The patient was administered a bolus of 150mg of propofol during this second admission, but there was no documented sequelae or QT interval prolongation. This case adds to the growing list of medications reported to cause QT interval prolongation.

Methods:

Results:

Conclusion:

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 7-110

Poster Title: Evaluation of hepatitis C virus screening practices for patients with human immunodeficiency virus managed by a primary care interdisciplinary team

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Purpose: Guidelines recommend that all patients with human immunodeficiency virus (HIV) receive a one-time screening for hepatitis C virus (HCV) and some require annual screening. A higher proportion of patients with HIV also have HCV as compared to the general population. An interdisciplinary team, including a pharmacist, reviewed their HIV population for the presence of co-infection with HCV and found a lower than expected prevalence. The purpose of this study is to assess the adequacy of screening for HCV in patients with HIV managed at a primary care clinic in Omaha, Nebraska.

Methods: A retrospective chart review was conducted for patients at the Catholic Health Initiatives (CHI) Health Clinic-Old Market with an HIV diagnosis whom have been seen within the past 2 years and were HCV negative in May 2013. Data collected included demographics, social history, laboratory measurements, concomitant disease states, presence of HCV risk factors, HCV screening results and method for HCV screen. Unprotected sex was defined by the presence of the diagnosis code or completion of a sexually transmitted infection screening test within the past 2 years. Descriptive statistics and comparison of proportions via Chi-Square tests were utilized for analysis.

Results: Criteria for inclusion in the study were met by 136 patients, average age 49 (standard deviation equals 10.6), 90 percent male, 75 percent Caucasian, 20 percent African American. History of current or previous drug use was present in 32 percent with the most common agents being marijuana and methamphetamine. HCV screening was completed at least once

within the past 3 years in 43 percent of the patients and within the past year in 25 percent of the patients. At least one HCV risk factor was noted in 73 patients and 51 percent of that subset had been screened for HCV in the past 3 years. The proportion of patients without risk factors for HCV that have been screened within 3 years is 33 percent which is significantly different than those with risk factors (p equals 0.041). No other characteristics significantly impacted whether a patient was screened. Forty-nine patients were identified as men who have unprotected sex with men, recommended to receive annual screening, and 29 percent of those have been screened for HCV within the last year.

Conclusion: Patients with HIV are more likely to have HCV and those HIV positive men who have unprotected sex with other men are at the highest risk thus are recommended to receive annual HCV screening. This evaluation of the current screening practices has identified areas needing improvement. Electronic medical record prompts are being developed to better identify patients with HIV that are in need of HCV screening. If co-infection is identified, the patients are referred to pharmacists for initiation of HCV treatment. Due to the inadequacy of nationwide screening for HCV, other institutions should also consider evaluating their screening practices.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 7-111

Poster Title: For the greater good: pharmacy student interventions to optimize therapy and cost savings at Healing Gift Free Clinic

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Purpose: Healing Gift is a free clinic located in downtown Omaha, Nebraska. First opening its doors in 2010, Healing Gift makes a lasting impact in the community. In 2015, 1,782 patients were seen, providing healthcare to the working poor and homeless of Omaha. Funded through private donations and staffed by volunteers, the greatest expense is medications. This program displays how student pharmacist interventions can reduce costs while also providing optimal treatment of the most common and costly disease states prevalent at the Healing Gift Free Clinic.

Methods: At Healing Gift, student pharmacists assist in therapeutic selection and cost-saving initiatives. Diabetes, asthma and chronic obstructive pulmonary disease (COPD) are the costliest diseases to treat at Healing Gift. Patient selection for this initiative occurs by drug utilization review performed at the beginning of clinic. Patients with rescue or maintenance inhalers are screened for the TevaCares Prescription Assistance Program (PAP). TevaCares provides Qvar and ProAir inhalers at no cost to qualifying patients. Patients must be uninsured and low income to qualify. If a patient qualifies for the TevaCares PAP, their application is completed and faxed. Once approved, patients are mailed their inhalers monthly. Healing Gift also utilizes copay cards to maximize savings in patients using maintenance inhalers or basal insulin. The Breo copay card allows commercially insured or uninsured patients to receive a Breo inhaler each month at no cost. The Toujeo copay card allows commercially insured or uninsured patients to receive a monthly supply of basal insulin for $15 (covering up to $500 a month). After qualifying for assistance through the Toujeo or Breo copay cards, the patient's prescription and copay card information is called

into a local pharmacy by the student pharmacist for the patient to pick up, with Healing Gift covering the copay for Toujeo prescriptions.

Results: Phase 1 began January of 2016, focusing on asthma and COPD patients. Fifteen patients (of 43 potential candidates) receive assistance from TevaCares. The clinic normally provides patients with one 60-actuation Ventolin inhaler per month, costing $19.22 each. Utilizing TevaCares with these patients has produced a monthly savings of $288.30 and a projected yearly savings of $3,459. Phase 2 began June of 2016 with Breo and Toujeo copay cards. Maintenance inhalers are too costly for the clinic's formulary, thus prescribers often dispense sample inhalers. Due to this, student pharmacists began recommending Breo copay cards. Because the clinic does not purchase maintenance inhalers, no cost-saving data is available. For the Toujeo copay card, student pharmacists began converting patients on NPH to Toujeo insulin. Six patients (of 43 potential candidates) qualified. One 10 mL vial (1000 units) of NPH costs $25, while the Toujeo card allows patients to receive their prescribed monthly quantity for $15 (up to 2500 units of insulin). Based on each patient's initial conversion from NPH to Toujeo, the clinic spent $200.00 monthly on NPH for these six patients; $90 total is now spent on their Toujeo, for a monthly savings of $110 and projected yearly savings of $1,320.

Conclusion: Healing Gift Free Clinic opens its doors weekly, providing healthcare to the indigent. In 2015, $86,318.75 were spent on medications over 47 total clinic days. Since the program's initiation, $3,034 have been saved due to this program, with many more qualifying patients yet to be enrolled. These measures have provided patients with a better quality of care, as patients are now able to access effective medications with lower side effect profiles.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 7-112

Poster Title: Assessing attitudes and behaviors of college freshman in dormitories related to influenza vaccination

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Purpose: Creighton University (CU) Student Health and our Pharmacy-based Operation Immunization (OI) volunteer group partner annually to provide free influenza immunizations to students and employees. In considering student response to this vaccination opportunity, dormitory living students are a population of special interest. A survey was developed to query students living in CU freshman dormitories on their behaviors and attitudes towards this immunization. They were also asked about any experience of influenza-like illness (ILI) during the 2015-16 influenza season as well as about parental level of education.

Methods: The short survey included demographic questions, as well as questions about any ILI experiences (sore throat, fever, headache, muscle aches and soreness, congestion and cough), vaccination receipt, the student's reasons for obtaining or rejecting influenza vaccination during the 2015-16 influenza season and on parental level of education. The survey was administered through an electronic survey sent through email to the residents of one dormitory (K) and a paper survey offered twice at each of the two dormitories (G and K) during the last two weeks of April, 2016. This survey study was exempted from IRB review as Student Health Quality Assurance research; the survey was anonymous with completion considered consent to participate.

Results: A total of 168 participants responded to the survey, for an overall 26 percent response rate. Those responding to the survey indicated an overall (on or off-campus) vaccination rate of 66 percent, (G: 62 percent; K: 71 percent). Student Health records demonstrated on-campus immunization rates for the freshman dormitories as: 32 percent (G) and 43 percent (K). Students who were health sciences majors had a higher influenza vaccination rate (80 percent).

Students were most commonly motivated to receive the influenza vaccination due to: 1) their parent's encouragement (59 percent), 2) did not want to risk getting influenza (48 percent), and 3) received one annually (36 percent). Reasons students gave for not receiving a vaccine was due to: 1) their belief of being healthy (41 percent) or 2) not having time (40 percent). Of students who received the influenza vaccination, 54 percent claimed to have experienced an ILI between August 15,2015 and March 31,2016. Of students who did not receive the influenza vaccination, 67 percent claimed to have experienced an ILI. Students who experienced an ILI, 53 percent missed class or work. There was no clear association between parental level of education and the likelihood of receiving an influenza vaccination.

Conclusion: This student survey suggests that college students have similar attitudes and behaviors to influenza immunization compared to the general population. A substantial proportion of these students reject influenza immunization due to their perception of personal good health and low need. Lack of time and forgetting publicized opportunities were also common reasons for failure to obtain vaccination. Reported attitudes and behaviors of pre-health or health professions students showed somewhat higher interest and response to influenza immunization opportunities. Students often claimed to experience at least one episode of ILI regardless of whether they received the vaccination.

Submission Category: Critical Care

Submission Type: Evaluative Study

Session-Board Number: 7-113

Poster Title: A Retrospective Evaluation of IV Magnesium Use at an Academic Medical Center

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Purpose: The objectives of this study were to examine (1) indications for the use of IV magnesium sulfate supplementation (2) adverse outcomes, if any, from a one-time dose of IV magnesium sulfate, and (3) to evaluate the monitoring parameters used to assess patients during or after magnesium sulfate administration.

Methods: A retrospective chart review was conducted within an academic medical center. Patients were identified from pharmacy billing records. Abstracted data of medical records included demographics, clinical characteristics, and the dose and time of IV magnesium sulfate administered, and adverse events (if any) that could possibly be related to therapy. This project was approved by the institution's IRB.

Results: A total of 100 patients (52% female, 48% male) who received a one-time IV dose of magnesium sulfate were evaluated. The average age for the population was 54.31 years. Sixty-two percent of the patients were Caucasian, with the remainder being African American (22%), Hispanic (3%), Asian (2%), or unlisted (11%). The average baseline magnesium level was 1.6 mg/dL. Eighty-two percent of patients receiving magnesium received a 2g/50mL premix. Thirty-two percent received a dose in the ICU, while 25% received a dose in the CCU. A majority of patients received a dose within 24 hours of admission (69%), and 12% of the population received a dose within two days. Fifty-nine percent of patients did not have a listed indication for the administration of magnesium. Nine percent of patients received magnesium from alcohol-induced malnutrition, 11% of patients received magnesium specifically to obtain a baseline reading >2mg/dL, and another 11% of patients received magnesium for a cardiac complication, including myocardial infarction or various arrhythmias. Other indications included respiratory arrest (1%), asthma exacerbation (4%), seizures (2%).). Four percent of patients who

were administered IV magnesium did not have a baseline magnesium level, and 99% of patients had a baseline level of < 2 mg/dL.

Conclusion: In this sample, a single dose of magnesium was given empirically for a clinical history of hypomagnesemia with a treatment goal to achieve a magnesium level of 2mg/dL. No adverse effects were noted and no concerns were identified with magnesium monitoring. Further evaluation is planned for patients receiving multiple doses of IV magnesium.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 7-114

Poster Title: Evaluation of redundant medication therapies in the management of acute exacerbations of chronic obstructive pulmonary disease in hospitalized patients

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Purpose: Medications used to manage acute exacerbation of chronic obstructive pulmonary disease (AECOPD) in the hospital setting include systemic corticosteroids, bronchodilators, and antimicrobials. In our healthcare system, AECOPD is often treated with short-acting bronchodilators and systemic corticosteroids plus long-acting bronchodilators and inhaled corticosteroids. To our knowledge there are no studies evaluating the safety or efficacy of redundant therapies in the management of AECOPD. Clinical practice guidelines do not address this topic nor are there any reports on how frequently this occurs. The purpose is to determine the proportion of patients with AECOPD receiving redundant therapy, associated costs, and adverse outcomes.

Methods: A retrospective chart review of adult patients admitted to a Catholic Health Initiatives (CHI) Health hospital from January 1, 2016 through March 31, 2016 with a primary ICD-10 diagnosis of AECOPD (J44.1) was performed. The primary outcome was the proportion of patients who received an ICS and a systemic corticosteroid, a scheduled short-acting and long-acting inhaled beta-agonist, and a scheduled short-acting and long-acting inhaled anticholinergic. The secondary outcomes included hospital length of stay, readmission within 30 days, bronchodilator and corticosteroid acquisition cost, and safety outcomes such as tachycardia (heart rate above 100 beats per minute), thrush, acute onset psychiatric symptoms (delirium, psychosis, agitation, or anxiety), and new onset urinary retention. Patients were excluded if they were admitted or transferred to the intensive care unit or if they were transferred from an outside hospital.

Results: One hundred eighty patient records were reviewed; 43 patients were excluded. Of the 137 patients included, 99 (73 percent) received redundant medication therapy for the management of AECOPD. The median age, Charlson Comorbidity Index, and female gender were similar in the redundant and nonredundant therapy group. Of the 99 patients that received redundant therapy, 88 received an ICS and systemic corticosteroid, 95 received scheduled short-acting and long-acting inhaled beta-agonist, and 23 received scheduled short-acting and long-acting inhaled anticholinergic. While the median length of stay was 4 days in each group, the median hospital cost of corticosteroids and bronchodilators was higher for those receiving redundant therapy ($135.14 versus $12.50). Adverse outcomes were similar.

Conclusion: Redundant medication therapy for patients admitted for AECOPD in our healthcare system is common and is associated with more than a 900% increase in drug acquisition cost. Hospital length of stay and adverse outcomes appear similar. More data are needed to evaluate whether redundant medication therapy in AECOPD justifies the associated increase in cost.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 7-115

Poster Title: Pharmacogenomics of R-CHOP in Patients with Diffuse Large B-cell Lymphoma

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Purpose: Diffuse large B-cell lymphoma (DLBCL) is one of the most common types of non-Hodgkin lymphoma. First-line treatment is R-CHOP (rituximab plus cyclophosphamide, doxorubicin, vincristine, and prednisone). Prognosis correlates with the International Prognostic Index (IPI). In this study, we analyzed selected SNPs to determine their association with response to R-CHOP in DLBCL patients.

Methods: In this retrospective cohort study, we evaluated 166 patients with newly diagnosed DLBCL treated with R-CHOP from Aug. 2007 to Dec. 2010. Patients with unclear pathologic diagnosis (i.e. grey zone lymphoma), primary CNS DLBCL, and incomplete records for treatment were excluded. The study was approved by the IRB of Peking University Cancer Hospital. Based on a review of the literature, we selected eleven SNPs for further evaluation: rs396991 (rituximab); rs3957357 and rs4880 (cyclophosphamide); rs8133052, rs1045642, rs25678, rs20572, rs9024, rs1800566 and rs1049255 (doxorubicin); and rs1870377 (angiogenesis). DNA samples were obtained from the institutional DNA bank and sent to Capitalbio Corporation for targeted SNP analysis with the Sequenom MassARRAY® system. Age, gender, IPI, stage, germinal center B-cell-like vs non-B-cell-like (GCB/nGCB), treatment outcome were obtained from medical records in June 2014. Progression-free survival (PFS) was calculated from the first day of treatment to the time of confirmed progression or last day of follow-up (whichever came first). Factors that differed between groups in the univariate analysis with Kaplan-Meier plots and log-rank tests with a p-value < 0.2 were included for further analysis. A Cox proportional hazards model was then used as multivariate analysis to evaluate the association between target SNPs and PFS.

Results: Mean age of the 166 patients was 53 years; the distribution of stage I/II and III/IV was patients was 45% and 55%, respectively. Mean PFS was 957 days, ranging from 18 to 2347 days, with 94 (57%) out of 166 progression free in June 2014. Based on the univariate analysis, molecular subtype (GCB vs. nGCB), IPI (0-2 vs. 3-5), stage (I/II vs. III/IV) and rs4880, rs1800566 and rs1870377 were included in the multivariate analysis. After adjustment for IPI, molecular subtype, and stage, two SNPs were significantly associated with PFS in the multivariate analysis. For rs4880 (SOD2 T47C), the CC allele was associated with shorter PFS (CC vs. TC, HR 3.63, 95% CI 1.11-11.87, P=0.033; CC vs. TT, HR 2.26, 95% CI 0.79-6.49, P=0.128). For rs1870377 (VEGFR2 T1416A), the AA allele was associated with longer PFS (AA vs. TA, HR 0.46, 95% CI 0.22-0.98, P=0.043; AA vs. TT, HR 0.57, 95% CI 0.26-1.22, P=0.14).

Conclusion: In this retrospective cohort study of patients with DLBCL treated with R-CHOP, rs4880 and rs1870377 were associated with PFS. Further studies are needed to confirm their association.

Submission Category: Pediatrics

Submission Type: Descriptive Report

Session-Board Number: 7-116

Poster Title: Pharmacist-driven optimization of immunization administration in a pediatric heart transplant recipient patient population

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Purpose: Immunizations are among the most effective ways to stop vaccine-preventable infectious diseases from spreading. Children post-heart transplantation are at an increased risk for infectious complications due to known immunosuppression. This project was developed in accordance with the most recent guidelines published by the Advisory Committee on Immunization Practices, the Centers for Disease Control and Prevention and the current guidelines for patient management published by the International Society for Heart & Lung Transplantation. The goal was to optimize the immunization status of the heart transplant patient population at Children's Hospital & Medical Center in Omaha, NE (CHMC).

Methods: A pharmacy intern and pediatric heart transplant pharmacist identified all patients seen in the heart transplant clinic at CHMC as of July 1, 2015. Immunization records were obtained and updated in a database and the electronic health record (EHR) system Epic. The immunization records were evaluated for missed immunizations and/or those immunizations that would be due within the next 12 months. All patients were seen in clinic at least once within the year and the immunization recommendations identified were discussed with the patient and/or guardian and their primary care provider. The patient/guardian was also presented with a letter outlining the importance of vaccination, specifically in this high-risk patient population, as well as the recommended immunizations for the patient. Immunizations were administered at CHMC in heart transplant clinic, if possible, or else at the office of the patient's primary care provider. Follow-up was continued throughout the year and immunization status at approximately 1 year after initiation of the project was evaluated.

Results: A total of 31 patients were included in the initial evaluation of immunization status prior to July 1st, 2015, with two additional patients added to the population who were transplanted after the July 1st initiation date. At that time, only 1 patient within the heart transplant population was up-to-date on all immunizations. Subsequently, a total of 110 immunizations were recommended to be completed in this patient population. As of September 1st, 2016, 50 of the 110 (45%) immunization recommendations had been completed compared to baseline ($p < 0.01$). Additionally, 12 of the 33 patients (36%) within this heart transplant population were up-to-date on immunizations based on the pharmacist recommendations as compared to baseline ($p < 0.05$). The statistically significant improvement in immunization status of this at-risk population is highly attributable to the pharmacist's recommended interventions as well as the entire transplant team's participation in optimization of patient care.

Conclusion: Pharmacist-led optimization of immunization status in the pediatric heart transplant population at CHMC was instrumental in improving the overall health status of this fragile and susceptible patient population. This method may be beneficial when applied to other patient populations to optimize immunization status in order to protect our at-risk populations and those in our community.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 7-117

Poster Title: Standardization of compounded oral formulations with e-prescribing capability at The University of New Mexico Hospital

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Purpose: It has been shown that patient safety increases when concentrations for medications are standardized within an institution. Additionally, regulatory and safety organizations recommend that commercially available products are used when available to decrease the opportunity for error during compounding. Furthermore, in computerized physician order entry (CPOE) systems, pharmacy compounded products are often not visible to the provider during medication reconciliation and are not able to be e-prescribed. To improve patient safety and facilitate medication reconciliation, The University of New Mexico Hospital (UNMH) standardized pharmacy compounded products and made improvements to e-prescribing.

Methods: Initially, pharmacy compounded products were reviewed to determine if a commercial product was available. Following this, a literature review was performed to determine the validity of the compounding recipe for pharmacy compounded products. Compounded products were researched with respect to stability and the expiration of the compound. Once the literature review was conducted, the different concentration possibilities were evaluated to determine the product that would best accommodate the patient population at UNMH. Order extract reports for the prior 6 months were run for drugs with different concentrations to help determine the best option. When determining the best concentration, the following criteria were taken into account: 1) the minimum dose anticipated for a 0.5 kg patient, 2) maximum dose anticipated for 70 kg patient, 3) based on minimum and maximum doses, the ability to accurately draw up the corresponding volume. Once the standard concentrations for UNMH were determined, the correct formulations were updated in both the inpatient and outpatient pharmacy catalogs. The updates included the order catalog of the

CPOE system. In order for e-prescribing to be an option, an IT pharmacist created a new order entry format (OEF) which allows for e-prescribing and filled for the patient.

Results: There were a total of 190 oral solutions/suspensions, of which 74 were compounded. There were many areas improved upon. The following changes were made: products without a reference were updated (8), purchased commercially available products that were being compounded (1), standardized to one concentration if multiple drug concentrations were utilized (3), removed compounding recipe for medications that were both compounded at UNMH and commercially available (8). Additional, areas that were improved upon include: compounding recipes were added to the outpatient pharmacy system (70), and new compounding recipes for formulary medications were added to the inpatient pharmacy (13). Lastly, the ordering catalog of the CPOE needed to be updated. The updates included adding the drug name, the concentration, and a description (susp) for all oral suspensions (125). An OEF was built in the CPOE to allow physicians to utilize e-prescribing for non-commercially available suspensions.

Conclusion: The possible causes of medication errors with respect to oral suspensions have been addressed. Patient safety can improve due to the standardizing of oral compounded medications and the addition of an OEF for discharge prescriptions. The new OEF and addition of pharmacy compounded products in the CPOE catalog, will allow providers to perform medication reconciliation and e-prescribe these products. However, further research is needed on the success of the OEF and the impact on medication reconciliation.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 7-118

Poster Title: Discharge strategy to allow seamless continuation of hospital-initiated bulk medications for outpatient transition

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Purpose: Bulk medication therapies such as inhalers initiated in the inpatient setting often end up only partially used and then discarded. Patients are unable to leave with bulk medications in most instances because inpatient labels do not meet the requirements of an outpatient label as described by state and federal law. This study describes a new discharge process implemented at University of New Mexico Hospital that allows for bulk medications to be re-labeled and discharged with the patient. Our goal was to reduce wasted medications, and prevent disruption of therapy during the inpatient to outpatient transition.

Methods: This project was initially discussed with the patient care area pharmacists (PCAP), information technology, and nursing staff in the adult medicine units in late February 2016. Planning occurred from late February to March, with initial implementation on April 11, 2016 and final implementation May 19, 2016. Our new discharge process involved a discharge label printed in the central inpatient pharmacy when discharge orders are placed by the provider and the patient is on an inpatient bulk medication. The PCAP is then notified by our central technician that there is a patient discharging from their floor on a bulk medication. The pharmacist then evaluates the bulk medication for appropriateness. If the bulk medication is part of the patient's depart summary as written by the provider and clinically appropriate, the PCAP relabels the medication and sends the patient home with their bulk medication.

Results: In the 5 months prior to late February, when initial discussion of the project began, an average of 7.6 discharge medications were relabeled for continuation on discharge by the PCAPs. After final roll-out for the months May, April, June, July and August; there were 27, 64, 39 and 54 medications relabeled for discharge respectively. Results of this process change will be followed through June 2017 to determine its effect over the course of a year.

Conclusion: Creating a process through which pharmacy is made aware of potential patients being discharged with bulk medications automatically can decrease medication wastage and improve transitions of care by increasing patient access to medications. As a result of our process improvements, more patients were able to discharge from the hospital with medications in hand. Future implications may include expanding a similar process to involve automatic notifications for outpatient pharmacy delivery of non-bulk medications.

Submission Category: Ambulatory Care

Submission Type: Case Report

Session-Board Number: 7-119

Poster Title: Gender dysphoria in identical twins: A focus on inter-disciplinary and individualized care

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Purpose: This case illustrates 16-year-old transgender male identical twins (natal female, identify as heterosexual male, attracted to heterosexual females, use male pronouns) receiving individualized care for gender dysphoria. Patient 1 and Patient 2 began their transition 1.5 years ago and established care at a multi-disciplinary, inter-professional, transgender care clinic including a pharmacist clinician. The goal for gender dysphoria is lasting individual comfort with the gendered self through psychotherapeutic, endocrine, and/or surgical therapies. Both patients started to self-identify as male starting at age 13. Patient 1 and 2 had normal childhood development without any medical problems aside from migraines (Patient 2) and asthma (Patient 1). Both patients report smoking marijuana twice a day but deny any alcohol or other substance use. Patient 1 and patient 2 had support from biological father and stepmother, but biological mother had reservations about the gender transition and gender dysphoria/incongruent sex traits resulting in depression/anxiety in both patients. The family received behavioral health care in addition to individual behavioral health care for the patients. At first, Patient 1 and Patient 2 were unable to start cross sex hormone therapy (csHT) without consent from biological mother. Patients did not like ovarian puberty due to the difficulty of being seen socially by others as male, and because they felt the sex traits were not congruent with their male identities. They both experienced high amounts of anxiety and depression during menstruation, leading to self injury in Patient 1 thus both began medroxyprogesterone injections at their first visit to prevent menstruation and the associated dysphoria. Both patients were breast binding and have sex reassignment surgery goals including subcutaneous mastectomy and possible genital surgery. After over 7 months of 10 clinic visits, including endocrinology, behavioral health, clinical pharmacy, and primary care, patients were able to change their names and legal gender markers. After 7 months of visits and with consent from biological parents, Patient 1 and 2 were started on 30mg of subcutaneous testosterone

cypionate 200mg/mL. Both patients are aware of the reversible and irreversible impacts of testosterone and the associated medical side effects. After initiation of subcutaneous testosterone both patients displayed improvement in their gender identity dysphoria and quality of life. As this case study suggests, an inter-professional approach to treat patients experiencing gender identity dysphoria with cross sex hormone therapy may be beneficial. Although more studies are needed in this patient population it is important for providers to be aware and up-to-date with current treatment options for patients experiencing gender identity disorder.

Methods:

Results:

Conclusion:

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 7-120

Poster Title: College campus perceptions of academic and social capabilities and treatment options for children with attention-deficit hyperactivity disorder (ADHD)

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Purpose: Attention-deficit hyperactivity disorder (ADHD) is commonly diagnosed in children greater than 6 years of age and is characterized by hyperactivity, impulsivity, and inattention. ADHD often affects academic, social, and occupational capabilities, even into adulthood. Previous research shows that many individuals have negative perceptions related to ADHD and medication therapy, which may contribute to suboptimal treatment, impaired social capabilities, and poor academic outcomes. The purpose of this project was to assess perceptions of ADHD on a college campus, specifically regarding academic and social capabilities of individuals with ADHD and common pharmacologic and non-pharmacologic treatment options for ADHD.

Methods: A 30-item survey was created from a review of the literature and expert analysis, containing: demographic information, familiarity and knowledge of ADHD (2 multiple choice, 5 true/false), and perceptions of ADHD (15 items, 5-point Likert-type). Perceptions of academic and social capabilities were assessed by asking likelihood of the following: achieving a GPA greater than 3.0 in high school and higher education, dropping out of high school or higher education, continuing on to higher education, making and keeping friendships, and getting fired from a future job. Positive perceptions were defined as choosing somewhat or extremely likely on positively-worded and somewhat or extremely unlikely on negatively-worded questions. Perceived effectiveness and harm were assessed for each type of pharmacotherapy (stimulants, non-stimulants), complementary and alternative medicine (CAM), and non-pharmacologic therapy. After IRB approval, the survey was distributed via email to all faculty, staff, and students on a private, faith-based college campus with two reminder emails. Data were analyzed in SPSS v. 24.0 using descriptive statistics, a Mann-Whitney-U test, and Spearman correlations, as appropriate.

Results: A total of 583 complete survey responses were collected and analyzed, achieving an approximate 13 percent response rate. Most respondents had positive perceptions of the social and academic capabilities of individuals with ADHD. Psychostimulants were perceived as being the most effective (N equal to 398, 68.3 percent), followed by CAM (N equal to 304, 52.1 percent) then non-stimulant pharmacotherapy (N equal to 281, 48.2 percent). Psychostimulants were also perceived as being the most harmful followed by non-stimulants, then CAM. For non-pharmacologic therapy, home behavior interventions were perceived as most effective (N equal to 490, 84 percent), followed by school-based interventions (N equal to 413, 70.9 percent), and finally social interventions (N equal to 395, 67.8 percent). When separated into familiar with ADHD (N equal to 284) vs. unfamiliar with ADHD (N equal to 299) groups, there were significant differences in their perceptions of an individual with ADHD's chances of getting fired from a future job, the efficacy of psychostimulant therapy, the harmfulness of psychostimulant therapy, and the effectiveness of school-based therapy (p-values of 0.011, 0.006, 0.041, and 0.002, respectively). Spearman correlation revealed that knowledge level of ADHD had significant positive associations for all Likert-type questions.

Conclusion: Overall perceptions on a college campus regarding social and academic capabilities of individuals with ADHD were positive. In terms of pharmacotherapy, the most negative perceptions were observed toward psychostimulants. Non-pharmacologic interventions were perceived as being the most effective out of all therapy options. Knowledge and familiarity with ADHD had a significant impact on perceptions. Pharmacists and other healthcare professionals have an opportunity to influence perceptions associated with ADHD pharmacotherapy through patient education and safety monitoring.

Submission Category: Clinical Services Management

Submission Type: Evaluative Study

Session-Board Number: 7-121

Poster Title: Impact of free health screenings at community pharmacies on diabetes

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Purpose: Diabetes is a prevalent issue in the United States, with an estimated 8.1 million people un-diagnosed as of 2012. Health screenings have been proven to identify diseases earlier, thereby resulting in earlier and more satisfactory treatment. Community pharmacies can offer many of the same screenings as those provided by primary care physicians. The objective of this study was to assess the impact of free health screenings in community pharmacies on patient follow-up, perceptions, and knowledge of diabetes through blood glucose screenings and patient education.

Methods: The study design was a pre-post observational study using surveys, blood sugar screenings, and patient education on diabetes. Participants were voluntary patients from four REM Corporation pharmacies in Ohio who were 18 years of age or older, not recently tested for diabetes, non-diabetic, not pregnant, and without disorders that could hinder survey responses and education. Pre- and post-surveys assessed both patient perceptions on free health screenings in community pharmacies and on diabetes knowledge.

Results: Results among the 26 participants showed there was no statistically significant difference between patient perception pre- and post-surveys (all p-values less than or equal to 0.05), however there was a statistically significant difference between pre and post diabetes knowledge surveys (p less than 0.001). Limitations of this study were the small sample size due to the relatively small pharmacies utilized and short length of study time. Future directions should focus on using more demographically diverse pharmacies and a longer study time. Due to patients already having highly positive perceptions of health screenings in community

pharmacies, future research should assess patient knowledge of diseases and the impact of patient education on overall health outcomes. Results of the study showed patients had positive opinions on free health screenings in community pharmacies and these screenings can help patients understand disease states and be more aware of their health.

Conclusion: This study demonstrates that patients are receptive to the idea of free health screenings in community pharmacies and see a benefit of the services that could be offered. The research also showed that knowledge can be gained through administering education during health screenings. Overall, free health screenings in community pharmacies can raise awareness of diseases and may positively impact health outcomes.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 7-122

Poster Title: The Development and Psychometric Properties of the Bipolar Disorder Knowledge Scale

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Purpose: Bipolar Disorder (BD) presents in up to 4% of the world's population, carrying significant financial and functional consequences. Patients with BD also experience a high degree of stigma, and their medication adherence tends to be poor. Knowledge appears to play a role in mitigating both stigma and non-adherence; however these relationships have not been fully elucidated. Currently, no validated tool exists to measure knowledge of BD. Thus, the purpose of this project was to evaluate the reliability and validity of The Bipolar Disorder Knowledge Scale (BDKS), which was designed to explore the role of knowledge in stigma and medication adherence.

Methods: Forty-seven items were developed to assess knowledge of BD. The 47-item survey was sent out to two groups: first a group of 43 pharmacists with BCPP credentials from the College of Psychiatric and Neurologic Pharmacists (CPNP) who were recruited from the CPNP directory, and second a group of 250 members of the general public who were recruited using Qualtrics Online Sample service. Participants were surveyed on their education status, health literacy, BD diagnostic status, and exposure to patients with BD. Participants then completed the 47-item scale. After 48 hours 100 members from the original general public group were sent the same survey to assess test-retest reliability. For each item a difficulty index to evaluate how well participants performed on the item and a discrimination index to determine how well each item performed in high-scorers versus low scorers were calculated. Additionally, Cronbach's alpha was calculated to determine internal consistency validity and a pearson correlation was run to determine test-retest reliability. Items were removed based on the results from the difficulty index, discrimination index, and Cronbach's alpha. Finally the pharmacist final scores were compared to the general public using an unpaired t-test to assess

whether content experts were more likely to perform better on the scale. Following item removal, the scale was finalized at 25-items.

Results: The mean score for the scale was 33.76 (71.83%; SD: 5.502) and the Cronbach's alpha was 0.773 before item analysis. Following item analysis, 22 items were dropped leaving 25 items on the final version of the scale. The remaining items retained a difficulty index below 90% and a discrimination index above 20%. The mean of the 25-item scale was 18.41 (73.6%; SD: 4.134) for the general public and 23.20 (92.8%; SD: 1.36) for the pharmacists group ($p < 0.001$). The Cronbach's alpha for the finalized scale was .760, indicating a high-degree of internal consistency. While this is lower than the original alpha, this may be explained by the reduced number of scale items. A 25-item scale is much more practical and the items on the scale retain stronger item analysis statistics. Finally the Pearson Correlation for the group who underwent the test-retest procedure was 0.841 ($p < 0.001$) indicating strong test-retest reliability.

Conclusion: The BDKS is a 25-item true-false scale that takes approximately 5-10 minutes to complete. The scale assesses knowledge of BD with items targeting diagnosis, etiology, disease course, symptoms, treatment, and life impact. The scale has shown strong internal consistency and test-retest reliability in a general population and will be useful for evaluating knowledge of BD as it relates to stigma, non-adherence, and other variables.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 7-123

Poster Title: Pharmacist's empathy in smoking cessation counseling

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Purpose: Pharmacists are both uniquely accessible and highly knowledgeable of drug use, yet the understanding of the relationship between pharmacists' empathy and smoking cessation is lacking. This study sought to address a current gap in the literature by studying the difference in smoking cessation success according to perceived pharmacist empathy. Thus, the objective of this study was to determine if patients who view their pharmacists as empathetic achieve a higher quit rate while undergoing smoking cessation counseling with a pharmacist.

Methods: Institutional Review Board (IRB) approval was obtained through Cedarville University, and pharmacists that provide smoking cessation counseling were invited to participate in the study through the American College of Clinical Pharmacy (ACCP) Ambulatory Care PRN list serve. Once the clinical sites were enrolled, one in Ohio and one in Texas, sites identified patients who were at least 6 months past their quit date, 18 years of age or older, able to speak and read English, not pregnant, and had met with the pharmacist at least two times for smoking cessation counseling. Eligible patients were asked to complete a demographic survey, the Kiersma-Chen Empathy Scale - Patient Version (KCES-PV), and a validated single-item assessment of quit status. The KCES-PV is a 15-item (7-point, Likert-type, Strongly Disagree to Strongly Agree) that measures patient perceptions of provider empathy, where higher scores indicate greater empathy. Data were analyzed in SPSS version 23.0; descriptive statistics were performed, an unpaired t-test was run to analyze the difference between provider empathy and successful smoking cessation, and a Mann-Whitney U test was used to assess the differences between clinical sites.

Results: A total of 73 patients completed surveys (N=51 Texas, N=22 Ohio). The majority of responders were women between the ages of 45 and 64 (66%) with at least a high school education (81.8%) and an annual income of less than $30,000 (95.9%). The number of Caucasian and African-American responders were equal (44.6%). Most respondents (56.1%) decreased the numbers of cigarettes they smoked on a daily basis, but only ten smokers quit. There were significant differences between the sites concerning the ability of the healthcare provider to express and comprehend the patient's feelings. In addition, differences were seen between sites regarding the belief that caring is essential to develop a relationship with the patient and whether or not a healthcare provider is influenced by the patient's feelings when determining the best treatment. There were no statistically significant differences between smoking cessation and provider empathy (p=0.523).

Conclusion: Within the study population, there was no difference in the outcomes of smoking cessation counseling according to pharmacist empathy. As a result, it was concluded that it is necessary for a provider to rely on more than just empathy to ensure smoking cessation. However, this is a small study with a low quit rate and the role of empathy may need further examination.

Submission Category: Oncology

Submission Type: Descriptive Report

Session-Board Number: 7-124

Poster Title: Students' perceptions of the impact of oncology on various areas of pharmacy

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Purpose: New oncology agents are on the rise; in 2015, 29% of new drugs released were chemotherapy agents, many of which are oral therapies. As practitioners continue to integrate oral chemotherapy agents into patients' therapy regimens, the treatment of cancer is not limited to the hospital or even the clinic setting. Thus, all pharmacists need to be prepared to provide care to oncology patients. The purpose of this study was to assess students' perceptions about how pharmacists in different practice settings are involved in the care of cancer patients and their confidence in caring for cancer patients.

Methods: Students in their third professional year of pharmacy school were given a survey before entering their 5-week oncology module to identify their preconceived perceptions and confidence. The survey was created from a review of the literature as well as discussions with pharmacists from multiple settings about the role of oncology at their site. Thus, items were created to highlight roles and responsibilities of pharmacists working in four different practice settings: managed care, community pharmacy, a hospital that does not administer chemotherapy, and a hospital that does administer chemotherapy. After establishing face and content validity through expert and student review, the final survey consisted of 17 questions on a 7 point Likert-type scale; 9 questions assessed students' confidence in answering oncology-related questions and 8 questions assessed their agreement with pharmacists' involvement in oncology patient care. Demographic information was also obtained, such as age, gender, and prior oncology-related experience. Descriptive statistics were performed in SPSS version 24.0.

Results: A total of 34 students (100% response rate) completed surveys. Only one student (3%) had past oncology experience. At least 90% of students feel somewhat to very unconfident in the following areas: recognizing drug interactions, answering questions asked by other members of the healthcare team, answering questions asked by patients and their families, and making evidence-based formulary recommendations. Students consistently agreed that pharmacists in the hospital setting and managed care setting should be equipped to answer oncology-related questions; however, some students disagreed (8.8%) that pharmacists in the community setting should be equipped. Also, 50% of students reported that they do not know what resources to utilize when searching for answers to oncology-related questions, but 94.2% believe that pharmacists play a vital role in the treatment of cancer patients regardless of their setting.

Conclusion: Students entering their oncology module lack confidence in several areas, yet they recognize the importance of pharmacists in different practice settings. Specifically, they lack confidence is answering questions asked by both patients and members of the healthcare team, and they are unsure of how to best utilize the resources available to them to answer these questions. Thus, these are important areas to address in courses.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 7-125

Poster Title: The Effects of Apigenin on Cell Proliferation and Apoptosis in Glioblastoma Multiforme

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Purpose: The purpose of this research was to determine the antiproliferative and cytotoxic properties of apigenin, a flavonoid, against glioblastoma multiforme cell lines, which are found in the most deadly types of brain tumors in humans. The use of flavonoids, which are natural compounds found in many fruits and vegetables, has been studied in the treatment of many different tumor types. Apigenin is a specific flavonoid that has previously been shown to have antitumor activity in a number of cancer cells.

Methods: In order to investigate the molecular effects of apigenin treatment on glioblastoma cell proliferation and viability, we used the trypan blue exclusion assay, MTT assay, and an LDH assay. In addition, Western blot analyses were utilized to determine the signaling pathways through which apigenin treatment exerts its effects on cell proliferation and apoptosis. Finally, hoechst-propidium iodide staining and flow cytometry were used to examine the extent of apoptosis and the cell cycle context of these effects.

Results: Our results show that apigenin reduces cell viability and proliferation in a dose and time dependent manner while increasing cytotoxicity in GBM cells. Additionally, apigenin inhibits the EGFR mediated signaling and attenuated EGFR induced cell growth. Additionally, apigenin inhibits the anti-apoptotic signaling cascade. Finally, apigenin induced cycle arrest suggesting a mismatch in the DNA repair mechanism.

Conclusion: Apigenin has demonstrated some in vitro biological effects on glioblastoma cell lines that show promises in limiting the growth, proliferation and survival of these cell lines. Future research should look to identify means through which apigenin can be administered in clinically significant concentrations to the brain. Additionally pre-clinical in vivo animal models are needed to corroborate these in vitro results.

Submission Category: Pharmacokinetics

Submission Type: Evaluative Study

Session-Board Number: 7-126

Poster Title: Analyzing the relationship between vancomycin trough distribution and body mass index

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Purpose: In the United States, the prevalence of obesity has rapidly increased in the past decade, and continues to increase. There has been much research indicating that obese individuals exhibit differences in drug distribution, including that of vancomycin. Vancomycin is a glycopeptide antibiotic that exhibits a time-dependent effect and trough levels must be monitored for efficacy and toxicity. Previous research has alluded to decreased trough vancomycin concentration in patients with higher body mass indexes. This project investigates the variation of vancomycin trough concentrations in patients with varying body mass indexes.

Methods: This is a retrospective chart review that included all patients with vancomycin trough concentration levels drawn at Riverside Methodist Hospital between January 1, 2016 and June 30, 2016. The initial search resulted in 627 trough levels. From the initial search, only steady state levels, which were drawn prior to at least the fourth dose, and the first level for each patient were included. Trough levels were excluded if dosing intervals were greater than or equal to 36 hours, or if the trough was drawn more than 2 hours off-schedule. A total of 257 troughs met criteria and were analyzed. Trough levels were then categorized according to body mass index, as per the World Health Organization classifications, and trough result (i.e subtherapeutic, therapeutic, supratherapeutic). A chi-squared test was used to determine if statistically significant differences were present between body mass indexes regarding the proportion of troughs that were above, at, and below goal.

Results: Of the 257 trough levels that met criteria, eight were from patients with a BMI of less than 18.5, seventy were between 18.5 and 25, seventy-four were between 25 and 30, forty-five were between 30 and 35, thirty-two were between 35 and 40, and twenty-eight were above 40.

Of all the BMI groups, 44% of troughs were subtherapeutic, 26.8% of troughs were therapeutic, and 29.2% were supratherapeutic while on empiric therapy. When comparing trough levels between different BMI groups, there were no significant differences when comparing therapeutic troughs to subtherapeutic ($p=0.105$) and supratherapeutic ($p=0.486$) troughs. There was a significant difference between subtherapeutic and supratherapeutic troughs ($p=0.002$).

Conclusion: The original hypothesis was that patients with larger body mass indexes would be empirically underdosed. The only significant difference found within BMI groups was between the subtherapeutic and supratherapeutic trough levels. However, this difference was not among larger body mass indexes. There was a lot of inter-patient variability that was not accounted for in the results. More reviews should be done, using more trough levels and decreasing inter-patient variability to minimize external factors.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 7-127

Poster Title: Using conjoint analysis to measure patient therapy preferences in rheumatoid arthritis and systemic lupus erythematosus

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Purpose: Treatment adherence is essential in both rheumatoid arthritis (RA) and systemic lupus erythematosus (SLE) to help slow the progression of the disease and to improve symptom control. When a patient feels in control of their health and included in treatment decisions, there is opportunity for increased medication adherence. Using patient preferences when deciding between different medications gives patients more control of their healthcare decisions with hopes of improving adherence to their medications. This study was developed to assess the relative importance of multiple attributes of disease-modifying drugs used in the treatment of RA and SLE.

Methods: The study used a near-balanced, near-orthogonal, fractional-factorial conjoint analysis design. An online survey was posted on different national patient advocacy groups' websites and online support groups for patients with RA or SLE. In order to participate in the survey patients had to be eighteen years or older, confirm that they were the patient and not a friend or family member or other caregiver, indicate that they regularly took medications for RA or SLE and provide informed consent. The survey consisted of forty questions and focused on six attributes which included 1) overall efficacy based on autoimmune disease progression stabilization; 2) specific efficacy; 3) rate of respiratory tract infections; 4) rate of serious respiratory tract infections (leading to hospitalization); 5) medication use; and 6) patient monthly out-of-pocket medication costs. In total, twenty-four hypothetical drug profiles were developed, but patients were only given one block of eight profiles at a time. There was a total of three blocks of eight shown to each patient. A rating scale (0 to 100) was used to evaluate patients' responses to the question: Based upon this product's attributes, how likely are you to

try this product to treat your RA (or SLE)? Mixed effects linear regression models were used to analyze the data. The institutional review board approved this cross-sectional survey study.

Results: In total, 78 participants responded to the survey and 68 had complete responses. Most respondents were female (97 percent), white (77 percent) and had completed College/University (66 percent). The average age of respondents was 49 years old (SD equals 14.5). Monthly out-of-pocket medication expenses was the most influential attribute with an overall relative importance of 40 percent followed by both safety attributes. When looking at monthly out-of-pocket medication expenses, the most preferred level was 75 dollars (Beta equals 14.30, 95 percent CI: 11.69 to 16.91). Respondents preferred a tablet twice daily or a subcutaneous injection twice monthly (Beta equals 3.46, 95 percent CI: 1.04 to 5.89) over an intravenous infusion each month (Beta equals negative 3.69, 95 percent CI: negative 6.53 to negative 0.85).

Conclusion: Respondents showed significant preferences when looking at different products' attributes such as monthly out-of-pocket costs, route of administration and frequency of use and serious adverse event rates. Using conjoint analysis as a preference tool was convenient and gave insight to what factors are most important to patients. Using these patient preferences may help guide discussions and facilitate shared-decision making between patients and healthcare professionals when deciding on therapy for RA or SLE.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 7-128

Poster Title: Pharmacist- and student-developed letters to national compendia to acquire off-label status

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Purpose: The treatment of many rheumatologic conditions is complicated by a lack of United States Food and Drug Administration (FDA)-approved treatments, which in turn makes it more difficult for patients to access effective and affordable medications. The Centers for Medicare and Medicaid Services fines insurers for approving payment for medications used for indications other than they were originally approved for by the FDA if off-label status has not been listed in a national compendium. To overcome the barriers to necessary medications, pharmacist- and student-prepared evidence-based letters were submitted to the editorial staff of national compendia to request off-label status publication.

Methods: In the past, letters describing a patient's case, in addition to a summary of efficacy and safety evidence for off-label use, have been shown to help patients obtain coverage for necessary medications. In order to provide a more broad impact on individual patient care decisions, evidence-based letters requesting off-label designation of certain medications were submitted to the editorial staff of national compendia, such as Lexi-Comp and Micromedex. Medications and conditions were selected based on perceived prevalence within a rheumatology clinic in Albany, New York. The listing of off-label use does not guarantee insurance coverage, but may reduce barriers to life-altering medications, as the insurers will likely not be fined if an off-label use is published in a national compendium. To date, one letter requesting the publication of an off-label listing of tadalafil for Raynaud's phenomenon was submitted to Lexi-Comp. Future publication requests include mycophenolate for use in diffuse systemic sclerosis and rituximab in systemic lupus erythematosus.

Results: In April, the first letter was submitted and in the August update of Lexi-Comp's tadalafil page, Raynaud's phenomenon was listed as an off-label use. This was the first of many successes that will pave the way for patients to access life-altering medications.

Conclusion: Patients with rare conditions may have limited access to life-altering medications due to FDA approval status and current payment structures. Pharmacist- and student-written, evidence-based letters to national compendia creates a pipeline to insurance coverage for an exponential number of patients requiring off-label use of certain medications.

Submission Category: Leadership

Submission Type: Descriptive Report

Session-Board Number: 7-129

Poster Title: Leading by example to increase student interest and involvement in professional advocacy

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Purpose: Staying relevant in today's ever-changing healthcare environment requires providers who are interested and willing to challenge the status quo. Professional advocacy is the way the recent generation of pharmacists and pharmacy providers are challenging the current state of healthcare. In order to keep up the momentum surrounding provider status, today's students, who are tomorrow's leaders, need to be actively engaged in the promotion of pharmacy practice. Students, who are actively involved in professional advocacy, can increase the interest among peers. Gaining the sustained support of pharmacists starts in professional school and continues into practice.

Methods: A few key members of the local Student Society of Health-System Pharmacists (SSHP) chapter have participated in local, regional, and national events geared towards advocacy. One student presented at the 2015 American Society of Health-System Pharmacists (ASHP) Annual Meeting in Denver, and two students presented at the 2015 ASHP Midyear Meeting in New Orleans. Those two meetings gave Northeast Ohio Medical University (NEOMED) students the opportunity to show our peers and our mentors how we help students become interested in advocating for the pharmacy profession. In addition to sharing our story with other SSHP chapters, NEOMED students were able to see how their peers were helping to pave the way towards provider status through professional advocacy. In February of 2016, a group of five students traveled to Washington, D.C. for the ASHP Student Advocacy Training. The students were able to learn a great deal about successfully advocating for one's profession, and put what was learned into practice by meeting with an aide to Ohio Senator Rob Portman. These students were able to take what they learned and share it with their peers before a larger contingent of students traveled to the Ohio Statehouse to meet with local representatives and advocate for legislation that will affect the practice of pharmacy.

Results: Between the 2014-2015 and 2016-2017 academic years, student interest and active participation in advocacy has boomed. There was a significant increase in the number of students who actively participated in the NEOMED chapter of SSHP. During the 2015-2016 school year, the NEOMED SSHP chapter hosted several events focused on advocacy in pharmacy and the pathway to provider status. Several shared faculty, who are actively involved in the fight for provider status, spoke to students about the importance of advocating for yourself and your profession. This increased interest allowed SSHP to sponsor a postcard campaign geared towards educating Ohio members of the House and Senate about the important services that pharmacists can provide and how pharmacists can help close the growing primary care provider gap.

Conclusion: A few early adopters can help bring interest to fellow peers and colleagues. Those pioneers of the movement can help actively engage fellow future practitioners. Early engagement is key to sustained interest and investment in the future of advocating for the profession of pharmacy.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Descriptive Report

Session-Board Number: 7-130

Poster Title: Evaluation of dispensing habits and the financial impact of patient-specific pharmaceutical waste in a large academic medical center

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Purpose: Unnecessary waste of bulk products often leads to increased redispenses, resulting in delayed patient care, increased workload, and increased dispensing costs. At Cleveland Clinic, almost 2,500 doses of patient specific bulk products were redispensed in March 2015. Thirteen drugs contributed greater than $1,000 each to total costs due to excessive redispenses. Over $71,000 in direct costs were incurred due to redispensed bulk products – equating to $850,000 annually. The purpose of this study was to evaluate the incidence and financial impact of inappropriate redispenses and to investigate potential factors leading to inappropriate redispenses.

Methods: Data was generated containing all March 2015 redispenses with a "bulk" dispense code. The cost of redispenses was calculated using institutional acquisition costs, as well as the number of redispenses that occurred in March 2015. The inclusion criterion for medications was a contribution of at least $1,000 in direct redispense costs during that time. To account for potential breakdowns in the distribution system, redispenses occurring within two hours of the previous dispense were excluded. One medication, insulin aspart, was excluded due to impracticality of determining appropriateness of redispenses based on sliding scale dosing regimens. Analyzed medications included clobetasol 0.05% cream, clobetasol 0.05% ointment, collagenase 250 units/g ointment, insulin detemir 100 units/mL vial, insulin glargine 100 units/ml pen, olopatadine 0.1% ophthalmic solution, fluticasone/salmeterol 100/50 mcg diskus (DPI) inhaler, fluticasone/salmeterol 250/50 mcg diskus (DPI) inhaler, fluticasone/salmeterol 500/50 mcg diskus (DPI) inhaler, fluticasone/salmeterol 45/21 mcg HFA inhaler, fluticasone/salmeterol 115/21 mcg HFA inhaler, and fluticasone/salmeterol 230/21 mcg HFA inhaler. To determine appropriateness of the redispense, a "days supply" of the medication was

calculated based on the daily dose then compared to the actual time between dispenses. The primary outcome measures were the incidence and direct costs of inappropriate redispenses. Secondary outcomes included incidence of nursing unit transfers associated with inappropriate redispenses, overall estimated costs of all redispenses, shift during which the redispense occurred, and estimated medication usage between dispenses.

Results: Twelve analyzed medications resulted in a total of 529 redispenses during March 2015. After excluding redispenses occurring within two hours of the previous dispense, 359 redispenses remained for analysis. Notably, insulin glargine accounted for 173 (48.2%) of such redispenses. The total cost of these 359 redispenses was $32,306. Of the estimated cost incurred, insulin, clobetasol, and fluticasone/salmeterol accounted for $10,692 (33.1%), $10,446 (32.3%), and $7,718 (23.9%), respectively. An overwhelming percentage of redispenses occurred during first and second shifts at 45.8% and 41.0%, respectively. Only 13.2% occurred during third shift. Excluding topical products, 220 (88.7%) of the remaining redispenses were deemed inappropriate and accounted for $17,509. After including documented returns, the net cost of inappropriate redispenses was $14,611. Insulin detemir vials on formulary contain 1,000 units; however, only 33 units on average were used before the subsequent redispense. Similarly, an average of 88 units of insulin glargine was used per 300 unit pen. Fluticasone/salmeterol DPI's and HFA inhalers were used for an average of 2.52 days and 3.03 days, respectively, before redispense. No association was found with redispenses to specific nursing units; however, patients transferred between nursing units were associated with 70.9% of inappropriate redispenses.

Conclusion: Current bulk redispensing practices are often inefficient and produce significant waste which increases cost incurred. The medications that were studied were found to have an alarmingly high rate of inappropriate redispenses, specifically in patients transferring nursing units. Inappropriate redispenses of twelve medications were estimated to account for almost $15,000 in net medication costs during March 2015. Streamlining the process of medication transfers in the event of patients transferring between nursing units would likely reduce costs associated with bulk product redispenses. Further investigation is warranted to determine the root cause of the excess pharmaceutical waste associated with nursing unit transfers .

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 7-131

Poster Title: Retrospective evaluation of empiric antibiotic selection and dosing in patients with Pseudomonas aeruginosa pneumonia

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Purpose: Appropriate empiric antibiotic selection for hospital-acquired or ventilator-associated pneumonia is a key component of treatment when Pseudomonas aeruginosa is suspected. Current guidelines recommend double coverage for patients with risk factors increasing the likelihood for P. aerugonisa infection, including those that have received intravenous antibiotics within the past 90 days. The guidelines also recommend optimized dosing strategies for broad spectrum beta-lactams. The purpose of this study was to evaluate current treatment for P. aerugonisa and determine which antibiotic combination and dosing provides the best empiric therapy at St. Elizabeth Hospital in Youngstown, Ohio.

Methods: Patients with respiratory culture positive for P. aeruginosa from 1/1/2015 – 6/29/16 were retrospectively reviewed. Susceptibility data for each culture was recorded. In each case, empiric antibiotic regimen was analyzed to determine if at least one of the selected agents was effective against P. aeruginosa based on culture and susceptibility results. Patients receiving cefepime for >2 doses had their dose reviewed via Monte Carlo simulation to determine if the prescribed regimen would theoretically succeed, based on a 90% probability target attainment of goal to maintain drug concentration above the MIC for 60 – 70% of the dosing interval.

Results: In terms of combination therapy, only 32% of those patients with positive cultures received empiric double coverage. Pipercillin/tazobactam with levofloxacin was the most commonly prescribed combination while pipercillin/tazobactam was the most common monotherapy. 36% of patients received empiric therapy that did not cover their infection based on susceptibilities. Monotherapy fluoroquinolone had a coverage rate of 25%, beta-lactam 67.7%, beta-lactam with a fluoroquinolone 77.8%, and beta-lactam with an aminoglycoside 83.3%. In addition, upon further evaluation of therapy, for those patients who received cefepime and whose infection was susceptible, only 50% achieved success on their dosing regimen based on Monte Carlo simulation.

Conclusion: The use of a beta-lactam with an aminoglycoside provided the most effective empiric coverage for P. aeruginosa while the monotherapy use of a fluoroquinolone provided the least effective. Although a large portion of infections remain susceptible to cefepime, dosing strategies utilizing package label recommendations resulted in suboptimal pharmacodynamics at higher P. aeruginosa MIC values. Based on these resistance patterns and outcomes, therapy with a beta-lactam and an aminoglycoside should strongly be considered as the therapy of choice when combination therapy is indicated. If beta-lactam monotherapy is appropriate, extended infusion dosing strategies or more frequent dosing intervals should be utilized.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 7-132

Poster Title: Evaluation of outcomes associated with the implementation of a U-500 insulin policy in an academic medical center

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Purpose: With the increasing prevalence of obesity in the United States, there has been an increased need to use U-500 insulin to achieve glycemic control, specifically when daily insulin requirements exceed 200 units. The Institute for Safe Medication Practices has identified U-500 insulin as a high risk medication, especially given the risk of dose conversion errors and the associated risk of hypoglycemia. In 2014, Akron General Medical Center implemented a policy in order to improve the safety of U-500 insulin in the inpatient setting. Our purpose was to determine how this policy affected time to first dose administration and hypoglycemic episodes.

Methods: This was a quality improvement initiative involving a retrospective chart review for patients receiving U-500 before and after implementation of a U-500 insulin policy. This policy mandated an endocrinology consult, required a pharmacist to verify the home U-500 insulin dose prior to initial dispensing, and instituted an order set specific to U-500 insulin. These requirements were in addition to the historical policy, which required that each dose be drawn up into a tuberculin syringe and verified by two pharmacists prior to dispensing. The historical group consisted of 153 accounts from January 1, 2011- December 31, 2012 and the post implementation group included 109 accounts from January 1, 2015-July 31, 2016. Data collected included: use of U-500 insulin prior to admission, admission date, date of U-500 insulin dose, whether endocrine was consulted, date of the consult (if placed), and if one or more episodes of hypoglycemia (blood glucose less than 70 milligrams per deciliter) occurred. For the years following the policy implementation (2015-2016), documentation records were reviewed to determine if a pharmacist verified the patient's home U-500 insulin dose prior to

dispensing, and whether two pharmacists verified each individual dose (two sets of initials). Fisher's exact test and Student's t-test were used to determine significance for nominal and continuous data, respectively, for data from before and after the implementation of the policy.

Results: Of the 153 accounts reviewed in the historical data, 138 (90 percent) were using U-500 insulin at home, compared to 99 (91 percent) of the 109 accounts post-policy (P equals 1.000). The mean number of days from admission to first dose was 1.4 days in the historical group versus 1.1 days in the post-policy group (P equals 0.327). Seventy-six percent of the historical accounts had an endocrine consult placed, compared to one hundred percent of the post-policy accounts (P less than 0.001). The mean number of days between the administration of the first dose and the endocrine consult being placed was 0.4 days in the historical group and 0.1 days in the post-policy group (P less than 0.001). In the historical group, 97 accounts (63 percent) had at least one episode of hypoglycemia, while this occurred in only 45 accounts (41 percent) in the post-policy group (P less than 0.001). In the documentation records for the post-policy data, 18 accounts (14 percent) had appropriately documented verification of home U-500 insulin doses by a pharmacist. Two pharmacists' initials were present for every dispense for 69 of the accounts (63 percent).

Conclusion: Implementation of an institutional policy requiring an endocrine consult to order U-500 insulin and utilizing a specific U-500 order form reduced the amount of time patients were receiving U-500 without being followed by an endocrinologist. It also resulted in fewer patients experiencing hypoglycemic episodes after the implementation of the policy. Based on these results, the current policy improves patient safety without delaying time to administration of U-500 insulin and should be continued. However, there is room for improvement in pharmacy documentation of home dose verification and verification of dispensed doses.

Submission Category: Pharmacy Law/ Regulatory/ Accreditation

Submission Type: Evaluative Study

Session-Board Number: 7-133

Poster Title: Stay out of trouble! Comply with FDA postmarketing drug safety regulations

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Purpose: Once a drug has been approved by the FDA, a sponsor must send periodic safety updates to the FDA. Surveillance plays an important role in assuring the safety of FDA regulated drugs. Sponsors may also have additional stipulations in order for their drugs to remain on the market. The postmarketing surveillance programs that are utilized include pharmacovigilance, PADE (Postmarket Adverse Drug Experience) Reporting, and REMS (Risk Evaluation and Mitigation Strategies) which monitors adverse drug events (ADEs). The purpose of this project is to identify the most common post market violations identified during surveillance inspections that occur with FDA regulated drugs.

Methods: A team of pharmacists and student pharmacist identified the need to educate industry leaders about postmarketing statutory provisions/regulations. This team collected data involving ADE, including Phase IV studies and post marketing requirements, in order to determine the most common postmarket violations that occur in the industry in an effort to improve safety. The team evaluated compliance with these provisions/regulations from sponsors in the industry from fiscal years 2012-2015. The Code of Federal Regulations (CFR), Title 21, Chapter I, Subchapter D, Parts 310, 314, and 601 define the statutory provisions/ regulations that sponsors must abide by for FDA approval. These statutory provisions and regulations require sponsors to send reports to the FDA when the sponsors are informed of an ADE. Annual reports should include summaries of significant new information, including new studies; clinical data, including published and completed unpublished clinical trials/manuscripts, safety and efficacy data in the pediatric population; and status reports of postmarketing study commitments, which must be reported until the FDA notifies that the study commitment is fulfilled, no longer feasible, or no longer provides useful information. PADE reports should

include a narrative summary and analysis; an analysis of 15-day ADEs; line-listing and Form FDA 3500A for ADEs not reported as 15-day alert reports (does not apply to postmarketing study ADEs); and actions taken due to the ADEs, including newly initiated studies.

Results: The most common postmarketing violations that occur in industry include 15-day alert reports not submitted to the FDA within 15 calendar days of initial receipt of the information, failure to develop written procedures, and incomplete or late submissions of annual and/or periodic reports sent to the FDA. Once a sponsor receives ADE information from any source, including ADEs that are serious, unexpected, or possibly study related, an initial and follow up report are required to be submitted to the FDA within 15 calendar days via electronic submission gateway and the Safety Reporting Portal. The sponsors should have written procedures that address surveillance, receipt, evaluation, and reporting in order to review the ADE information received from any source and evaluate the information. Annual reports must be provided for all the years a drug is on the market, and this report must be given within 60 days of the approval date. In the first three years post approval, periodic adverse drug experience reports must be provided to the FDA quarterly within 30 days of close of the quarter. After three years, a periodic adverse drug experience report must be provided annually within 60 days of approval.

Conclusion: In order to improve pharmacovigilance and decrease the number of postmarket violations that occur, industry must be made aware of common violations that occur with regards to FDA regulations. This knowledge can allow industry leaders to be aware of the requirements for reporting upon the receipt of an ADE and improve compliance with FDA regulations. Health-system pharmacists and student pharmacists are also aware of the importance of ADE reporting for their patients and how it impacts a drug's postmarket status. The heightened awareness promotes public health by enhancing the safety of drugs once they are approved.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 7-134

Poster Title: Knowledge and perception of student dentists towards pain and anti inflammatory drug therapy in Saudi Arabia

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Purpose: Comprehensive knowledge in medication therapy and safety is one of the important characteristics of healthcare providers. Effective and safe use of pain and anti inflammatory therapy in educational dental clinics requires a comprehensive knowledge base of the various drug agents. The purpose of this study is to assess knowledge, attitude and perception of student dentists in various dental schools in Saudi Arabia towards the use of pain and anti inflammatory drug therapy. This study might serve as a guide tool to identify common grounds for collaboration and improvement between pharmacy and dental medicine in Saudi Arabia.

Methods: In 2016, 328 student dentists enrolled in the traditional six year dental program in Saudi Arabia were invited to participate in a voluntary online survey. The brief survey consisted of 23 multiple choice questions and delivered as a secure link through email and private social media messaging services. The survey permitted only 1 attempt per user. In order to reach out and capture non-respondents, 2 follow-up reminders ten days apart were sent through the same channels of communication. The survey data was collected and analyzed using the online survey software program, Qualtrics.

Results: The response rate was 22.6 percent (74 out of 328). Approximately 77 percent of participants were third, fourth, fifth and sixth year students. Nearly 50 percent of respondents indicated that they have treated patients with pain and inflammation before, and nearly 94 percent of respondents indicated that they counsel patients to take medications as prescribed. However, 66 percent reported not sure how non-steroidal anti inflammatory drug therapy is discontinued. Approximately 70 percent of respondents prefer to approach a pharmacist with drug therapy questions, and nearly 31 percent of third, fourth, fifth and sixth year students thought acetaminophen is an anti inflammatory agent.

Conclusion: Among data reported in this survey, evidence of misunderstanding of pain and anti inflammatory pharmacotherapy has been shown. There might be a need for interprofessional collaboration between pharmacy and dental medicine in Saudi Arabia to help close gaps in knowledge. More research is needed among a larger sample of student dentists to develop better understanding of the type of collaboration effort required.

Submission Category: Oncology

Submission Type: Descriptive Report

Session-Board Number: 7-135

Poster Title: Analysis of FDA approvals of targeted anticancer combination regimens and the cost implications

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Purpose: To describe the incidence of Food and Drug Administration (FDA) approvals of targeted anticancer agents in combination with another targeted anticancer agent.

Methods: New anticancer drug approvals from February 10, 2006 to June 1, 2016 were reviewed for the top five most frequently diagnosed solid organ cancers and top five most frequently diagnosed hematologic cancers. Each approved anticancer agent was then defined as cytotoxic or targeted. Targeted anticancer agents were defined as agents that selectively target molecular pathways, as opposed to DNA, tubulin or cell division machinery. The FDA approvals for each targeted agent were determined to be approved as monotherapy or combination therapy with either other targeted therapies or traditional cytotoxic agents. The cost for the targeted-targeted combination regimens was determined based on one dose for parenteral administration and 30-days for oral administration.

Results: Overall, 16.1% of targeted agents were approved in combination with other targeted agents; 14.75% were in combination in the solid tumor and 19.2% in combination for hematologic malignancies. The median cost of combination targeted regimens in the past decade was $22,208.67 for other targeted agents and $8,565.30 for traditional cytotoxic agents.

Conclusion: As more targeted therapies enter the market, previous targeted therapies are not replaced but utilized in combination with each other. One of every six targeted agents is now approved in combination with another targeted agent. The costs of therapy continue to increase as targeted anticancer agents are utilized more frequently to provide optimum care to patients. As more targeted anticancer agents are approved in combination, health-system

pharmacists should be aware of this as a driver for rising costs of anticancer treatments and the implications to their health-system.

Submission Category: Leadership

Submission Type: Descriptive Report

Session-Board Number: 7-136

Poster Title: Influence of the Johns Hopkins Pharmacy Summer Internship Program on professional development

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Purpose: Professional development is a valuable aspect of the profession of pharmacy and helps prepare students for a future career, residency or fellowship. The Johns Hopkins Pharmacy Summer Internship program provides a range of activities and opportunities for interns to explore health-system pharmacy practice. In addition, the program fosters the professional development of its interns through active involvement in various projects and experiences. The objective of this study is to determine the value of the Johns Hopkins Pharmacy Summer Internship program on the professional development of interns from 2010-2015.

Methods: A survey was designed to assess various areas of professional development that were fostered during the internship program, including project-related skills, communication skills, commitment to improvement, professional involvement and leadership, knowledge of profession, and professional trajectory. The survey included 21 questions and was created through collaboration with the internship program directors to ensure that the questions were of value and had minimal subjectivity. The survey was e-mailed via Survey Monkey in April 2016 to those who participated in the internship program between 2010-2015. A descriptive analysis was conducted on the data compiled. The survey was submitted to the Internal Review Board and qualified as exempt research.

Results: Of the 106 interns between 2010 and 2015, 67 completed the survey. 83.6 percent of participants completed the internship program after their second year of pharmacy curriculum, 9 percent after their first year, and 7.5 percent after their third year. Overall, 82 percent of interns felt that the internship program had the highest possible value on their own professional development. Participants believed that they developed their presentation preparation and delivery skills, improved on their ability to self-reflect, and increased their awareness of health-system pharmacy careers and practices. Interns were involved in developing business proposals, completing quality improvement projects, assisting in pharmacy operations, and developing training and in-service programs. At the end of the program, preceptors provided feedback to their interns through formal evaluations, and 65.7 percent of students strongly agreed that this impacted their future development of strengths and minimizing weaknesses.

Conclusion: Although small sample size and positive result bias were limitations of this study, the overall results demonstrate that the Johns Hopkins Pharmacy Summer Internship program has a positive impact on professional development. The comprehensive experience serves as a model for other internship programs and institutions as it is a unique opportunity for students to mature professionally and develop the necessary characteristics to prepare for a successful career in pharmacy.

Submission Category: Small and Rural Pharmacy Practice

Submission Type: Descriptive Report

Session-Board Number: 7-137

Poster Title: Transitioning from high school to college: a student pharmacist's role in mental health education and suicide awareness for students

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Purpose: There is a high prevalence of mental illness in the United States, with the highest impact during the teenage and young adult years. Negative stigma associated with mental health disorders deprives those in need from getting adequate treatment. Resources are are not readily available, especially during the transition from high school to college. Pharmacy students are uniquely situated to provide an initial contact point for health-care services focused on wellness. This outreach program, targeted for high school and college students, was developed to raise awareness and provide education about the available resources and treatment options.

Methods: A literature search using MEDLINE was performed using the MeSH terms "mental health," "fears," and "students." Cohort studies and review articles resulted from the search. Other online resources were consulted, including the websites for the NIMH, AAS, and SPRC and NAMI. Based on the results, an interactive outreach program directed towards high school and college students that raised awareness about mental health was created. Specific resources were designed for high school students that provided healthy coping strategies for transitioning to college, and ways to engage in healthy mental health practices. A visual display representing the lives lost to suicide on college campuses was created. College students were encouraged to participate in an interactive stress-relieving activity and were provided a handout with resources available on campus and in the surrounding community. Evidence-based resources were created to be student-pharmacist driven as part of an interactive program. These materials provide a basis for the pharmacy profession to engage in mental health counseling

similar to counseling already provided for more classic disease/lifestyle modification recommendations such as hypertension or diabetes.

Results: Two student-pharmacists participated in the development of two outreach programs consisting of interactive presentations and educational sessions. One student focused on high school student transitions, while the other focused on college campus outreach. For the high school student outreach: materials were created to raise awareness of mental health disorders, to teach healthy stress-management and coping strategies, and to encourage treatment if necessary. The program also encouraged participants to anonymously express their concerns about transitioning to college and created a safe environment to discuss their fears. High school students were encouraged to use new techniques to create social development goals and improve self-regulation. For the college outreach, an interactive display showcasing the impact of suicide on college campuses reached over 300 students, while providing a stress management activity, and showcasing resources on campus.

Conclusion: As more focus is given towards mental health, particularly in the young adults transitioning and then living on college campuses, pharmacists can be a critical link in providing counseling and resources to help students maintain and develop appropriate mental health strategies.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 7-138

Poster Title: Efficacy of low- versus high-dose palonosetron in pediatric oncology patients receiving moderately- to highly-emetogenic chemotherapy

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Purpose: Palonosetron as a single dose of 0.25 mg was initially FDA-approved only in adults for prevention of chemotherapy-induced nausea and vomiting (CINV). Pediatric dosing at 0.02 mg/kg/dose (maximum dose of 1.5 mg) was approved later. Pharmacokinetic studies suggest children may require higher dosing than adults; however efficacy of doses above 0.25 mg has not been compared. Prior to pediatric dosing, all patients at our institution received palonosetron based on adult dosing. The primary objective of this study is to compare the efficacy of the higher pediatric dosing to the adult dose of 0.25 mg in controlling CINV.

Methods: The institutional review board approved this single-center retrospective chart review. Chemotherapy naïve in-patients less than 19 years of age who received at least one dose of palonosetron and corticosteroid prior to moderately or highly emetogenic chemotherapy between June 2013 and June 2015 were included. Patients who received a dose of 0.25 mg using a weight based dose were excluded from the study. Data collected included: age, gender, body weight, cancer diagnosis, palonosetron dose and number of doses, anti-emetic regimen, number of emetic episodes up to 24 hours post-chemotherapy, and number of re-admissions and post-discharge phone calls due to uncontrolled nausea or vomiting. Eligible patients were divided into two groups, the weight based dosing group (maximum 1.5 mg per dose) and non-weight based dosing group (0.25 mg per dose). Data was analyzed using Microsoft Excel and statistical analysis was performed with Statistical Analysis Software.

Results: A total of sixty-eight patients were screened. Eighteen patients met the inclusion criteria. Six patients were included in the non-weight based group and twelve patients in the weight-based group. The groups were well balanced in regards to age, gender, and weight

(mean weight 56.2 + 12.1 kg vs 55.8 + 18.4 kg). The average dose of palonosetron in the weight-based dosing group was 1.1 + 0.3 mg, with a range of 0.33 mg to 1.5 mg). Emesis was reported in 2 of the 6 patients in the non-weight based group and in 4 of 12 in the weight-based dosing group. The average number of rescue anti-emetics used per person was the same in both groups. The proportion of patients discharged with a prescription for dexamethasone was comparable in the two groups. Telephone encounters for nausea occurred in 2 patients in the non-weight based group and 1 patient in the weight-based group. No re-admissions due to uncontrolled CINV were reported in either group.

Conclusion: Based on this limited data, we did not find any benefit in using a higher weight-based dosing of palonosetron over the standard 0.25mg adult maximum dose for the prevention of CINV in pediatric patients receiving moderate to highly emetogenic chemotherapy. This needs to be confirmed in a prospective study with appropriate number of patients.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 7-139

Poster Title: Evaluation of insulin utilization and management of hypoglycemic events in adults across a network of six community hospitals

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Purpose: Hypoglycemia is often seen in institutional settings as a result of poor therapeutic dosing control of insulin in patients with diabetes. In the most severe cases, hypoglycemia can result in loss of consciousness, seizure and death. The primary purpose of this review was to determine how current insulin prescribing practices contributed to hypoglycemic events across a network of six community hospitals. The secondary objective of this review was to assess the adherence to the hypoglycemia protocol currently utilized at all hospitals within the health system and identify the common treatment strategies in treating hypoglycemic patients.

Methods: The Institutional Review Board (IRB) categorized this review as a quality assurance/quality improvement activity exempt from IRB oversight. This review was a retrospective cohort of hypoglycemic events, defined as a blood glucose less than 60 milligrams per deciliter (mg/dL), at all six hospitals occurring between February 1 and May 1, 2016. Patients were identified utilizing a clinical decision support tool, having met two criteria: an active insulin order and experienced a hypoglycemic event. Events for each patient were then reviewed in the electronic medical record (EMR). Baseline demographics were collected including age, sex, diabetes diagnosis, dietary status, and the type(s) of insulin ordered. Time between insulin administration and hypoglycemic event was recorded, and only those insulin administrations that caused a hypoglycemic event within their respective duration of action were included. Hypoglycemic events identified at the two largest facilities (763 beds and 120 beds, respectively) were randomized, while all events were reviewed at the four facilities under 50 beds. Adherence to the hypoglycemia protocol was determined first by the presence of

documentation; lack of documentation of administered treatment was categorized as non-adherence. If the preferred agent was not used given the patient's condition, the treatment of the event was considered non-adherent. Descriptive statistics were utilized for data analysis.

Results: A total of 250 hypoglycemic events were evaluated as part of this review. Eighty-seven of 250 events did not meet inclusion criteria and were removed from data analysis. Of 163 events considered, distribution of men versus women was equal, with a mean age of 63 years. Type 2 diabetes was present in 79.8 percent of patients, and 68.1 percent received a diabetic diet. Monotherapy long-acting insulin accounted for most events (53.4 percent). Scheduled and corrective-coverage rapid-acting insulin were causative agents in three (1.8 percent) and four (2.5 percent) events, respectively. Combination therapy, where two or more insulin orders were given, accounted for 48 of 163 events (29.4 percent). Thirty-two of 48 combinations involved corrective-coverage rapid-acting insulin as one of the contributing insulin products, with medium-intensity coverage accounting for 20 events (62.5 percent). With regard to protocol adherence, 66 of 163 (40.4 percent) events were treated appropriately. Of the remaining 97 events, 25 received a treatment other than what was directed by the protocol, and no treatment was documented for 72 (44.3 percent) events. Dextrose 50% in water (D50W) was the most common treatment, with 27 of 46 administrations (58.7 percent) appropriate.

Conclusion: Long-acting insulin was determined to be the most common insulin associated with a hypoglycemic event. Additionally, adherence to the hypoglycemia protocol was relatively poor. Recommendations include setting low-intensity as the default scale for corrective coverage orders and utilizing the clinical decision tool to identify patients at risk of hypoglycemia to provide pharmacists opportunity for prompt intervention. In addition, the health system should explore optimizing the EMR for more consistent and thorough documentation, which includes implementing hard stops and prompting nurses to take necessary steps for resolving the hypoglycemic events.

Submission Category: Leadership

Submission Type: Evaluative Study

Session-Board Number: 7-140

Poster Title: Evaluation of student leadership activities and CAPE outcomes with the implementation of a leadership curriculum

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Purpose: New pharmacy accreditation guidelines place an emphasis on leadership development in pharmacy curriculums. Professional pharmacy organizations are also addressing issues with developing leaders within the profession. The American Society of Health-system Pharmacy 2016 House of Delegates approved policy 1611 that included a statement encouraging colleges of pharmacy and state affiliates to foster student leadership development. The objective of this study was to survey students at one college of pharmacy to learn about the impact of implementing a leadership component to the curriculum.

Methods: The college of pharmacy implemented a leadership curriculum five years ago in the third professional year. The college went through a curricular change and decided to implement leadership materials earlier in the curriculum during preprofessional courses. The goal was to encourage students in the preprofessional years to start implementing a leadership plan. A survey was designed and pilot tested to evaluate leadership activities and potential of third and fourth year professional students at a college of pharmacy. The study received institutional review board approval. An informed consent was the first link in the survey. A link was sent electronically to the listserv with a reminder email one week later. The survey was open for two weeks. Data was analyzed using SPSS software (IBM, New York). Both descriptive and inferential statistics were used for analyzing the data. Alpha was set at 0.05 with a power of ninety percent. The sample size calculation for a t-test was forty-four. Exclusion criteria was any survey that was not at least ninety percent complete. The primary outcome variable was evidence of pharmacy professional leadership positions between the two classes as a result of changes in the timing of the leadership curriculum. Secondary outcome variables were survey

questions involving Center for the Advancement of Pharmacy Education (CAPE) outcomes domain 4.1 self-awareness, 4.2 leadership, and 4.4 professionalism.

Results: The response rate was seventy-two percent with an equal number returning surveys from each class. No surveys were excluded. The primary goal showed that 47.6 percent of the class prior to the change had a leadership position in a professional organization while 64 percent held a position after the curriculum change (p=0.0027). The third year class averaged 4.71 memberships in pharmacy professional organizations while the fourth year class averaged 3.28. However, campus activity involvement was the same for both classes. Sixty-seven percent of the third year class had a campus leadership position compared to fifty-nine percent in the fourth year (p=0.039). When students were asked the likelihood on a scale of 0 to 100 if they would be involved in a professional organization for the duration of their pharmacy careers, the aggregate score was 79.46 for the fourth years and 84.24 for the third years. Using the same 0 to 100 scale, the respondents were asked if they felt that the college prepared them to be a leader within the profession. The aggregate score was 83.09 for the fourth year and 81.83 for the third years. The combined aggregate score was 79.99 for community service and 83.85 for domain 4.1.

Conclusion: The data suggests that leadership development earlier in the curriculum allowed students to develop a leadership plan with active membership. This is only one year of data and longitudinal surveys will help determine if this model is successful in introducing leadership concepts. The students felt the college did a good job of meeting the CAPE outcomes. The interesting data is the students that responded that they would be a member of a professional organization for their career. A future study may involve tracking these students during their professional careers to follow their leadership development.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 7-141

Poster Title: Evaluation of clinical practice in comparison to transgender adolescent guidelines

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Purpose: US census data report an increase in the number of patients receiving and inquiring about hormone therapy to transition from their natal sex to their desired sex. This number is expected to double as acceptance spreads in society. An accurate assessment of the number of transgender individuals is difficult due to inaccurate collecting method. The World Professional Association for Transgender Health (WPATH) guidelines suggest hormonal treatment based on Tanner stages of puberty. Additionally, strong counseling and mental health initiatives are recommended to allow for family and individual therapy. This retrospective chart review will evaluate clinical practice compared to recommended guidelines.

Methods: The primary objectives were to determine adherence to national guidelines regarding pharmacologic therapies and identify when and why variations occur. The secondary objectives were to identify barriers to medical treatment and adherence to therapy. A retrospective chart review of adolescent transgender patients was conducted for patients ages 10-19 years with an ICD-10 code for either gender identity disorder or transgender assigned to a clinic or inpatient encounter between 8/1/2013 and 7/31/2016. Additionally, patients had to have been evaluated in the Team-driven Health care that Respects the Individual and Values Emotions (THRIVE) program. The data was collected via the electronic medical record system. The data points evaluated were the referral to endocrinology, evaluation by endocrinology, Tanner stage of puberty reported, hormone therapy, monitoring of hormone levels, goal of hormone treatment, individual therapy and family therapy received, insurance barriers to care, and natal sex of patient. The primary and secondary outcomes were evaluated via descriptive statistics.

Results: There were 152 patients evaluated for inclusion in this study with 122 meeting the inclusion criteria. Of those included, 88 of the patients were referred to endocrinology and 76 were evaluated by endocrinology at this time. Of those patients, 45 (36.9 percent) were receiving hormone suppression therapy, 39 (32 percent) were also receiving hormone crossover therapy, and 12 (30.8 percent) of the patients receiving hormone therapy were at goal hormone levels as recommended in the Endocrine Society Guidelines. Individual therapy was a strong recommendation of the WPATH guidelines; 103 (84.4 percent) patients were enrolled in individualized therapy. While barriers were of interest in this study,the most common documented barriers were societal and family misunderstanding. Insurance not covering their medications was specifically referenced as a barrier in 9 (7.4 percent) of the patients meeting inclusion criteria; however, overall documentation was sparse.

Conclusion: The WPATH guidelines are a way to help providers better serve this growing population. An updated set of guidelines were adopted in August 2016 to be released soon, and the updates could better allow these adolescents to have more targeted and personal health care. Strict follow up and supportive group environments could help to increase the adherence to medications and minimize mental health concerns in this growing population. Larger studies are needed to thoroughly evaluate the care of this population and the efficacy of hormone therapies in adolescents.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Descriptive Report

Session-Board Number: 7-142

Poster Title: Outpatient utilization of liraglutide at a Veterans Affairs facility

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Purpose: Liraglutide is a glucagon-like peptide 1 analog used to treat diabetes mellitus type II with overall functions such as increasing insulin secretion, increasing satiety, and decreasing glucagon production. Prescribing practices of this medication were evaluated at the Dayton Veterans Affairs facility using the national "Criteria for Use" recommendations. The medication utilization review assessed various monitoring parameters (namely weight, systolic blood pressure, serum creatinine, and hemoglobin A1c) in the patients with active prescriptions for liraglutide to gauge its efficacy in lowering hemoglobin A1c in this population.

Methods: Electronic medical records of fifty-four patients with active, outpatient prescriptions for liraglutide were retrospectively reviewed at a single medical center. To assess adherence to protocol, the following pieces of information were recorded: demographics, patient involvement in a healthy lifestyle program, contraindications for liraglutide, and concomitant and trialed anti-diabetes medications. The "Criteria for Use" recommends providers to ensure trials of other anti-diabetes medications, including metformin, before initiating liraglutide. To evaluate safety and efficacy, lab values were collected at both baseline and from the patients' most recent visits for serum creatinine, systolic blood pressure, weight, and hemoglobin A1c. It was also noted whether or not patients were receiving concomitant diuretic therapy. Hemoglobin A1c values were also collected from the first follow up visit post- initiation of liraglutide. Statistical analysis for the monitoring parameters was performed via the International Business Machines program, Statistical Package for the Social Sciences, to be analyzed for average trends of each monitoring parameter.

Results: Ninety-four percent of patients receiving liraglutide at the time of data collection were male, which is consistent with the typical Veterans Affairs population. On average, hemoglobin A1c, systolic blood pressure, and weight all trended down from baseline (lowered by 0.57 percent, 9.97 millimeters of mercury, and 4.37 kilograms respectively). Serum creatinine was the outlying monitoring parameter that trended up by 0.141 milligram per deciliter on average resulting in an 18 milliliter per minute lowering of creatinine clearance. The initial hemoglobin A1c dropped by 0.84 percent between baseline and first follow-up, indicating that hemoglobin A1c has a larger initial drop before rising slightly as therapy continues. Forty-six percent of patients had no involvement in the lifestyle modification program. Forty-six percent had an active prescription for diuretic therapy at the time of data collection. On average, four other anti-diabetes medications were trialed prior to initiating liraglutide.

Conclusion: Patients taking liraglutide, on average, had improvements in blood pressure, hemoglobin A1c, and weight. The initial decrease in hemoglobin A1c by 0.84 percent is consistent with the "Liraglutide Effect and Action in Diabetes" trials. Forty-six percent of patients were on concomitant diuretic therapy; this, combined with the declined kidney function, supports close monitoring of kidney function during therapy with liraglutide. This medication utilization evaluation supports increased use of liraglutide, and also revealed the opportunity for professional staff to further encourage patient involvement in the lifestyle modification program.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 7-143

Poster Title: Evaluation of appropriate linezolid prescribing in an outpatient cystic fibrosis setting as an institutional measure of quality

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Purpose: Antibiotics are one of the most often prescribed medications in the healthcare system. Antibiotic resistance has increasingly become a concern, as there has been little incentive for pharmaceutical companies to develop new antibiotics. For this reason, many institutions have developed antimicrobial stewardship programs restricting the use of certain medications and providing specific prescribing criteria to prevent the development of widespread antimicrobial resistance throughout a healthcare system. Due to infection with resistant organisms, cystic fibrosis (CF) patients are often in need of these restricted antimicrobials. This investigation evaluated the appropriateness of linezolid (Zyvox®) prescribing for CF patients in the outpatient setting.

Methods: This retrospective analysis assessed the appropriateness of outpatient prescribing of a restricted inpatient-use medication at a large free-standing children's hospital housing both pediatric and adult CF centers which serve over 500 CF patients. This project was performed as a measure of quality for internal use and as such was not subject to institutional review board approval. Identifiable patient information was not collected as part of the analysis. In our quality improvement protocol, outpatient prescribing of linezolid in CF patients of all ages was assessed from March through June 2016. Data collected to evaluate appropriateness of prescribing included: prescriber, date prescribed, dose, frequency, duration of treatment, available culture results and susceptibilities from the previous 365 days, concomitant medications with potential interactions, lung transplant status, CF genotype, recent history of antibiotic therapy (previous 8 weeks), and whether laboratory testing was performed as indicated based upon treatment duration. Basic patient demographics were also be collected, including any identified medication allergies. Data were evaluated using descriptive statistics. Results were analyzed and then reviewed by a specialist pharmacist at the institution.

Outcomes of this project will be used to determine whether linezolid is being prescribed appropriately or to refine antimicrobial prescribing guidelines.

Results: A total of 29 instances of linezolid prescribing that met study criteria were identified and evaluated as part of this quality improvement analysis. All occurred in adult CF patients. Based on the study design, linezolid was appropriately indicated in 90 percent of patients identified. Only three of the 29 instances did not meet the predefined criteria of appropriate prescribing chosen for this study. One of these three patients did not meet the criteria based on previous culture results; however, this was only because this study only included available antimicrobial culture results from the previous 365 days. Further research into this case showed a previous positive culture for methicillin-resistant Staphylococcus aureus, which would have placed this patient into the appropriate prescribing category. The remaining two patients in fact did not meet the appropriate medication use criteria, as defined by the institutional antimicrobial stewardship guidelines. In one of these patients, a clinical pharmacist identified the non-indicated medication use, and the prescriber changed the course of therapy as a result. No clinically significant medication interactions were identified in any of the patients evaluated, and all doses prescribed and durations of treatment were therapeutically appropriate.

Conclusion: Implementation of an antimicrobial stewardship program is an effective means of restricting the use of powerful broad-spectrum antibiotic agents and can influence outpatient prescribing where restriction is more difficult to enforce. This study demonstrated no widespread over-prescribing of linezolid in CF patients at this institution, while reinforcing the benefit of utilizing pharmacists on the patient care team. Data from this study will be used internally to validate and refine the medication use criteria for linezolid. Intermittent or ongoing audits may be considered to ensure continued appropriate prescribing practices in the CF population.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 7-144

Poster Title: Pharmacist-led implementation of a pharmacogenomic testing consult service in an adult population with autism spectrum disorders

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Purpose: The Center for Autism Services and Transition (CAST) at The Ohio State University was established in April 2014 to address the needs of adolescents and adults with Autism Spectrum Disorders (ASD) as they transition into adult primary care services. This population is often on complex medication regimens that are potentially effected by differences in drug metabolism. The pharmacogenomic (PGx) service was established by a pharmacy school faculty member with the assistance of advanced practice student pharmacists.

Methods: To date 415 patients have enrolled in the CAST program. The PGx service was designed to assist providers in selecting alternate therapy after initial therapy had failed or if the provider suspected potential medication related side effects. Data from limited published studies supported comorbidities to include seizures, depression, and attention-deficit/hyperactivity disorder (ADHD). Therefore, PGx testing targeted medications are antidepressants, antipsychotics, antiepileptics, and ADHD therapies. The consult service structure and process is outlined to include: 1) identification of potential candidates for PGx testing by the provider, clinical pharmacist, or at the patient/caregiver's request; 2) completion of the buccal swab by the clinic staff; 3) processing the sample by the designated vendor; 4) results returned to the pharmacist via secure email; 4) recommendations made to the provider; 5) patient or caregiver follow-up appointment made with the pharmacist to discuss the results and any subsequent changes.

Results: The PGx testing service was established January 2016. The structure and process outlined has been utilized by the providers and incorporated well into the patient's appointment as needed. Pharmacy result reviews and written recommendations have been well received by both the providers and patients. To date the PGx testing has been utilized mostly for patients that have failed multiple empiric therapies. Less frequently the results help to rule out poor metabolism as a potential contributing cause for medication response failure. In this population antidepressants are frequently utilized for the anxiolytic effects and the results have provided genetic information to better understand potential differences in medication metabolism for the patients.

Conclusion: The PGx testing program has been successfully implemented in an adult population with autism spectrum disorders. In the future an evaluation to examine the patient outcomes related to the PGx testing service could potentially help to better identify patients that would benefit most from testing and quantify the improved outcomes (i.e., less side effects, earlier response to therapy).

Submission Category: Leadership

Submission Type: Evaluative Study

Session-Board Number: 7-145

Poster Title: Assessing mental health and wellness in pharmacy students: results from the implementation of mental health programs in a college of pharmacy

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Purpose: Starting in 2015, The Ohio State University College of Pharmacy implemented mental health resources based off of information from a student survey about mental wellness in 2014. The services included the installation of a psychologist in the college, multiple suicide prevention trainings, education from patient speakers, and mental health awareness events. The efforts to address the student-identified problem was an active collaboration between students, faculty, staff and administrators. The purpose of this study was to characterize the mental health climate of the student body after these implementations and to compare it to the results of the 2014 survey.

Methods: The protocol for this cross-sectional study was approved by the institutional review board. Data were collected from two anonymous surveys distributed electronically. Both surveys used the same questions probing for stress, symptoms of mental health conditions, perception of mental health, utilization of counseling services, and attendance at suicide prevention trainings and patient speaker sessions. Students could select “not at all”, “some of the time”, “a lot of the time”, or “most/ all of the time” when asked about the frequency within the last four weeks in which they experienced various symptoms of anxiety, depression, and suicidality. Demographics collected were gender and year in pharmacy school. The survey, created with Qualtrics, was distributed in February 2016 to all PharmD students enrolled during the 2015-2016 academic year (n=520) to assess student perception of mental health. In this latter survey, students who identified as a P2, P3, or P4 were asked additional questions to evaluate their involvement in and utilization of mental health programs and resources initiated in the college of pharmacy since October 2014. Students who completed the survey were

entered into a drawing for one of six $25 amazon.com gift cards. Anonymous student responses were kept separate from the collection of names drawn for the prizes.

Results: There were 100 responses to the 2014 survey (the limit for SurveyMonkey) and 202 responses to the 2016 survey. When asked about feeling nervous or worrying a lot, 25% of students in the 2014 survey responded "most or all of the time", compared to 15% from the 2016 survey. For feeling desperate, 52% in 2014 and 69% in 2016 answered "not at all". In both 2014 and 2016, 1% of students endorsed in self-harm "most or all of the time" and developed a plan for suicide. P2-P4 students who received the additional set of questions did perceive a culture shift within the college of pharmacy, with 69% agreeing that over the last year they noticed an increase in mental health awareness within the college and 74% agreeing that they have become more aware of their own mental health in the past year. Nearly half (45%) attributed their increased awareness to a shift in mental health awareness within the college.

Conclusion: After the placement of multiple programs and resources, the 2016 reassessment of student mental health shows progress towards utilization of mental health resources and improved mental health awareness among PharmD students. The results show a relative increase in well-being due to fewer symptoms of anxiety and depression from 2014 to 2016. However, despite the implementation of suicide prevention trainings and the employment of a college psychologist, the rate of self-harm and suicidality remained the same from 2014 to 2016. While these results are promising, there is still room for improvement in order to optimize pharmacy student mental health and wellness.

Submission Category: Clinical Services Management

Submission Type: Evaluative Study

Session-Board Number: 7-146

Poster Title: Discharge instruction errors after pharmacy led medication reconciliation

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Purpose: The purpose of this study is to determine the frequency and nature of medication-related discharge instruction errors through the following specific aims. Primary: For congestive heart failure (CHF) and chronic obstructive pulmonary disease (COPD) patients readmitted within 30 days of discharge, determine the proportion of discharge instructions that contained errors as well as the average number of discrepancies/medication errors per patient. Secondary: Describe the severity of errors and differences in error rates for patients that had a pharmacy-led medication reconciliation performed on admission versus those that did not.

Methods: The institutional review board approved this retrospective, single-center, chart review. The study population included patients 18 years and older who were discharged from Grant Medical Center between April 1 and August 30, 2015 following an inpatient stay for chronic heart failure (CHF) or chronic obstructive pulmonary disease (COPD). Only patients that were subsequently readmitted within 30 days were included, resulting in a final sample size of 87 patients. Charts for each patient were reviewed and all errors on the discharge summary were recorded and described. Each error was given a severity score from minimal to serious, based on risk to patient. We also determined whether patients had pharmacy led medication reconciliation upon admission in order to determine its effect on medication errors at discharge.The proportion of discharge instructions that contained errors as well as the average number of medication errors per patient were calculated. We described the demographic and clinical characteristics of patients with and without discharge instructions that contained errors and compared these characteristics. Statistical significance was set at $p < 0.05$ for all tests. Severity of errors were reported using frequencies and percentages and also compared based on patients' demographic and clinical characteristics. The difference in error rates for patients

who had a pharmacy-led medication reconciliation performed on admission versus those who did not was evaluated.

Results: Overall, 64 (76.2%) patients had discharge instructions that contained errors. Among these patients, there was a total of 341 discrepancies/medication errors.The average number of discrepancies/medication errors per patient was 5.3 (SD: 4.4; median: 4.0; range: 1.0 – 22.0). Among the 64 patients with discharge instructions that contained errors, 43 (67.2%) had minimal error(s), 51 (79.7%) had moderate error(s), and 1 (1.6%) had a serious error. Among the 341 discrepancies/medication errors, 122 (35.8%) were minimal errors, 218 (63.9%) were moderate errors, and 1 (0.3%) was a serious error. Minimal errors (n=122) included inappropriate abbreviations (n=82), unclear dosing instructions (n=23), and duplicate orders (n=17). Moderate errors (n=218) included missing dosing instructions (n=182), duplicate therapy (n=31), acute medications continued upon discharge (n=2), and other (n=3). Serious errors (n=1) included warfarin without dosage instructions (n=1). Overall, medication reconciliation was completed at admission for 82 (97.6%) patients. Among patients who had medication reconciliation completed by a nurse (n=68), 54 (79.4%) had discharge instructions that contained an error(s). Among patients who had medication reconciliation completed by a pharmacy staff member (n=14), 9 (64.3%) had discharge instructions that contained an error(s). This difference was not statistically significant (p=0.377).

Conclusion: Pharmacy led medication reconciliation did not have a statistically significant effect on the quantity and severity of medication errors included on discharge instructions. Although there was no effect shown, the fact that 76.2% of patients had medication errors on their discharge instructions highlights the need that something beyond admission medication reconciliation needs to be done. This study was not powered to avoid a type 2 error since it was designed to be of a descriptive nature, so a follow-up study powered effectively would be useful to determine the clinical significance of pharmacy led medication reconciliation.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Descriptive Report

Session-Board Number: 7-147

Poster Title: Student-driven time study of the home medication verification process for observation patients in a community hospital setting

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Purpose: In light of the Centers for Medicare & Medicaid Services two-midnight rule, handling medications for self-administration by observation status patients is a challenge. Anecdotally, pharmacy staff observed issues with processing patient home medications, including a perceived longer verification time and medications being lost within the hospital. Nurses routinely forgot to provide medications to patients upon discharge and they were left behind for the pharmacy department to deal with. This study was created to measure the actual amount of time it takes to verify a patient's home medications, enter them into the hospital electronic medical record, assign and validate patient-specific barcodes.

Methods: A total of 84 home medication from patients in observation status were reviewed by 13 different pharmacists over a course of 33 days, as part of this study. The home medication verification process began by the pharmacist checking if the medication received from the hospital floor was ordered on the patient's profile. If so, the pharmacist would identify that the medication in the patient's bottle is authentic using a medication reference database, modify the administration instructions as appropriate per order, and create a medication label to be used in hospital. The pharmacist would then complete the medication verification, verify the barcode scanning on the label, physically label the vial, log their productivity, and send back any medications that were not able to be verified. The verification process was timed from the point when the pharmacist began reviewing the patient's home medications, which were to be considered for administration during their stay. The time it took to get the medications from the nurse to the pharmacy, as well as from the pharmacy back to the floor are not accounted for.

Results: While the verification time varied greatly by each medication in the study, the average time to verify a patient's medication from home was 4.6 minutes. It has been previously determined that, the verification process for a medication dispensed from the hospital via an automated medication cabinet is completed within 1 minute. Annualized for the roughly 4260 home medications that are verified at Marymount hospital per year, the data suggests that 328 hours of pharmacist time is utilized for home medication verification versus only 71 hours that would have been utilized had these medications been dispensed from pharmacy. Additionally, it was determined that while 26% of the medications in the time study were never successfully verified due to being expired, not being ordered for the patient, not being present in a medication database, or contamination of the package that they were stored in, these medications were responsible for 36% of the total pharmacist time from the study. This suggests that over the course of a year, 118 out of the 328 pharmacist hours being spent on home medication verification is for medications that will never be used.

Conclusion: The data obtained during this study demonstrates that a significantly larger amount of pharmacist time is needed in order to verify the patient's home medications compared to standard verification. Our findings, presented here, suggest that changing current practices in favor of not allowing home medications for observation status patients, could decrease pharmacist verification time by almost 80%. While it is important to consider the drug costs that would fall onto the institution when shielding the patients from the burden of medication costs not covered by Medicare and Medicaid, the cost of the inefficiencies of the current process can't be ignored.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 7-148

Poster Title: Implementation of a student-led referral service at an urban free clinic

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Purpose: Free clinics serve underserved and underinsured patients in a variety of ways. Many offer primary care medical services and pharmacy services, but not all free clinics can offer specialty services, such as laboratory draws or diagnostic imaging. To provide patients with comprehensive care, provider volunteers must often refer patients to area clinics for services not offered at their free clinic. Due to the complexity of the referral process and volunteers' unfamiliarity with services offered by each clinic, a streamlined process was needed. The purpose of this project was to implement a pharmacy student-led referral service at an urban free clinic.

Methods: Two fourth-year student pharmacists completing a longitudinal Advanced Pharmacy Practice Experience (APPE) rotation with a clinical faculty member worked to implement a new service at an urban free clinic. Services currently provided at the clinic address acute medical needs of patients and bridge care; however, the clinic does not address patients' chronic medical needs. The student pharmacists created a portfolio containing referral information for clinics to which patients at the free clinic were frequently referred for specialty services, such as diagnostic imaging. To gather the information about the clinics, the student pharmacists contacted the clinics to inquire about their processes for new patients and referring for special services. The portfolio contained pertinent information for patients, including referral forms, hours of operation, maps and photos of the location, and bus routes for nine area free clinics – more information than that traditionally available in published lists of free or reduced-cost services. The student pharmacists trained clinic staff and volunteers on what information was available in the portfolio. Clinic staff and volunteer providers were instructed to discuss relevant details and provide patients with a flyer when referring them for additional services.

Outcomes measured included the number of patients utilizing the referrals and the provider volunteer perception.

Results: One hundred twenty patients were seen during the four clinics held since implementation of the portfolio. Of the patients seen at the urban free clinic, eight were further referred to area clinics for additional services using the portfolio. Services for which patients were referred included dental services and orthopedic services. Provider volunteers, including physicians, nurses, and medical students, expressed appreciation for the accessibility and convenience of the portfolio.

Conclusion: Creating a current, comprehensive, and easily accessible portfolio of referral services improved clinic efficiency. Patients were provided more detailed and comprehensive information.

Submission Category: Pediatrics

Submission Type: Descriptive Report

Session-Board Number: 7-149

Poster Title: Adherence to HIV post-exposure prophylaxis follow-up and treatment before and after implementation of 7-day kits dispensed in a pediatric hospital emergency department

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Purpose: A 28-day course of post-exposure prophylaxis (PEP) is a preventive strategy to reduce HIV infection in youth who have experienced sexual assault. At Nationwide Children's, patients presenting to the emergency department for sexual assault receive starter kits containing a 7-day supply of tenofovir disoproxil fumarate/emtricitabine 300/200 mg and raltegravir 400 mg. Patients are asked to return to the Immunodeficiency Clinic at one week and one, three, and six months following the assault. The objective of this study was to determine if adherence to follow-up appointments and completion of PEP therapy improved following implementation of PEP 7-day kit dispensing.

Methods: Information was obtained by evaluating pharmacy records of patients who received PEP ambulatory prescriptions one year prior to implementation of 7-day kits and one year after implementation. Pharmacy records were used to determine who followed up in the Immunodeficiency Clinic at one week, one month, three months, and six months following sexual assault and who completed the entire 28 days of PEP therapy. This project is considered quality improvement by the IRB and is therefore exempt from review.

Results: Prior to kit implementation, patients would receive a one-day supply of PEP and a prescription for the remaining treatment. Forty-four percent of patients who were seen in the ED for sexual assault before kit implementation completed all 28 days of PEP therapy. Following kit implementation, 57 percent of those seen in the ED for sexual assault completed 28 days of PEP therapy. Rates of appointment follow-up increased from before implementation of the 7-day kits to after. The greatest increase was seen with the rate of completion of the one-month follow-up appointment (11.8 to 34.8 percent). Rates of no-show to all four follow-up

appointments were similar before and after kit implementation (35.3 percent vs 31.8 percent, respectively).

Conclusion: This study shows that while implementation of the 7-day kits improved rates of completion of both therapy and appointment follow-up, there remains room for improvement in rates of both. By providing education about the necessity of compliance to the medication regimen, pharmacists can play a vital role in PEP treatment and its use as a preventive measure to reduce the HIV infection in victims of sexual assault.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Evaluative Study

Session-Board Number: 7-150

Poster Title: A pharmacoeconomic analysis of sugammadex for reversal of neuromuscular blockade in pediatric patients

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Purpose: The efficacy of sugammadex for the reversal of neuromuscular blockade (NMB) has been well established in randomized controlled trials. No analysis in the United States has evaluated the cost savings of this agent relative to its reduction in time to recovery from NMB and the subsequent reduction in time spent in the perioperative area. International literature has suggested cost savings, but due to the significantly different costs of both drug and operating room (OR) time in the United States, a separate analysis is warranted.

Methods: A recent meta-analysis of pediatric trials using sugammadex (2-4 mg/kg) compared to neostigmine (30-60 mcg/kg) plus atropine (20-25 mcg/kg) found patients who received 2 mg/kg and 4 mg/kg of sugammadex had an faster mean return to a train of four (TOF) ratio of ≥ 0.9. This data was used to determine average time to reversal of NMB for sugammadex compared to neostigmine plus atropine. Per vial average wholesale price (AWP) for sugammadex, neostigmine, and atropine were obtained from First Data Bank through the hospital's wholesaler. Per minute OR costs were found in literature. A calculation of the cost difference of the medications and the difference in OR time was calculated. A sensitivity analysis was performed to determine the OR costs per minute at which OR time saving would no longer justify additional medication costs.

Results: Time to recovery to a TOF ratio of ≥ 0.9 was a mean of 7.15 and 17.32 minutes faster with sugammadex dosing of 2 mg/kg and 4 mg/kg respectively compared to use of neostigmine plus atropine for reversal of NMB. Per vial AWP was found to be $114.00 for sugammadex (200 mg/2 mL), compared to $95.90 for neostigmine (5000 mcg/10 mL) plus atropine (400 mcg/mL). This suggests that there is a cost difference of only $18.10 between the two medication

regimens. The calculated cost of sugammadex compared to the alternative regimen was $2.53 per minute more with 2 mg/kg dosing and $1.05 per minute more with 4 mg/kg dosing. Some literature has valued OR costs at $20 to $60 per minute, resulting in per minute cost savings ranging from $17.47 to $58.95. It is notable that these prices assume use of one 2 mL vial for each patient; if a patient required a dose using more than one 2 mL vial or the hospital pharmacy repackaged the drug to allow for one vial to be used for multiple patients, the actual drug cost for either sugammadex or neostigmine plus atropine could be different.

Conclusion: Sugammadex was found to be a cost effective choice for reversal of neuromuscular blockade in pediatric patients. While medication costs were slightly elevated using sugammadex compared to a combination of neostigmine and atropine, the significant decrease in time to neuromuscular blockade reversal warrants consideration of this agent if the time saving allows for a more efficient use of the perioperative area. The cost of these medications should continue to be monitored over time to determine if this change in practice remains warranted for any given practice site.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 7-151

Poster Title: Assessment of demographic predictors on viral load suppression in human immunodeficiency virus-positive patients

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Purpose: Adherence to antiretroviral therapy is essential in achieving HIV viral load suppression. A previous Nationwide Children's study identified patients with mild to moderate depression, based on self-administered patient health questionnaire-9 (PHQ-9) scores, were at higher risk of therapy non-adherence. The purpose of this study was to assess common demographics to evaluate if they correlate to differences in adherence to antiretroviral therapy for this patient subgroup and to target patients for intervention by pharmacy, social work, and peer navigators.

Methods: This is a retrospective chart review based on a previous study conducted from January 1, 2014 to December 31, 2014. Patient information was obtained by using medical records from an electronic patient database. Patients included in the study are HIV-positive patients from the Immunodeficiency Clinic (IDC) of a pediatric institution. During clinic visits, patients were requested to fill out a patient health questionnaire-9 (PHQ-9) to assess their behavioral health status. Scores of ten to fourteen correlate with mild to moderate depression. Baseline demographics identified include age, race, socioeconomic status, therapy regimen, and filling pharmacy. Viral load was used to determine adherence to therapy. A viral load of greater than 1,000 copies per milliliter was used as a marker of medication non-adherence. This project was considered quality improvement by the institutional review board (IRB) and exempt from review.

Results: Thirty-four patients who scored between ten and fourteen on their PHQ-9 were included in this study. Evaluation of patients based on race revealed 25 patients were African American, 5 patients were white, 2 patients were Hispanic, and 2 patients indicated more than

one race. Ten out of twenty-five patients identified as African American had a viral load of greater than 1,000 copies per milliliter. One out five patients identified as white had a viral load of greater than 1,000 copies per milliliter. One out of two patients identified as Hispanic or greater than one race had a detectable viral load. There was no correlation between age, socioeconomic class, filling pharmacy or therapy regimen and viral load suppression.

Conclusion: African Americans who self-reported as mild to moderate depressed were at a higher risk of medication non- adherence and have a higher probability of a detectable viral load. However, they also represented a disproportionate percentage of patients in the evaluation group. Pharmacy, social work and peer navigator intervention may be useful in helping these patients achieve optimal outcomes.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 7-152

Poster Title: Effect of removing codeine-containing medications from an inpatient formulary on outpatient prescribing practices

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Purpose: Codeine is a common opioid analgesic pro-drug metabolized by CYP2D6 to its active form, morphine. Patients with genetic polymorphisms of CYP2D6 may be ultra-rapid metabolizers of codeine, resulting in increased morphine levels that can cause life-threatening respiratory depression. In February 2013, the FDA added a Boxed Warning stating contraindication for use as post-surgical pain management for tonsillectomy and/or adenoidectomy procedures. Codeine-containing medications were subsequently removed from the hospital formulary in October 2012, and the ban took full effect in April 2013. The present audit completed in September 2016 aimed to determine the impact of the ban on outpatient prescribing practices.

Methods: This quality improvement project was conducted at a large free-standing children's hospital. Institutional review board approval was not sought due to the quality improvement designation of this project. An initial audit was performed in September 2013 which showed that the ban was effective in eliminating inpatient prescribing and dramatically decreasing outpatient prescribing of codeine-containing medications during an April 1 to August 1 audit period: 527 prescriptions in 2012 (pre-formulary removal) to 128 prescriptions in 2013 (immediate post-formulary removal period). To assess long-term prescribing changes, inpatient and outpatient EMR dispensing records were queried for codeine-containing medications between April 1 and August 1 of the years 2014-2016 to evaluate adherence to the hospital inpatient formulary ban. The database was analyzed for duplicates, and a retrospective chart review was completed to categorize the setting in which the medication was prescribed and the indication for use. Descriptive statistics were used to present the data.

Results: No inpatient orders for codeine-containing medications were issued after removal from the hospital formulary. Outpatient prescriptions for codeine-containing medications continued to decline to 91 prescriptions in the 2014 audit period, 66 prescriptions in the 2015 audit period, and 12 prescriptions in the 2016 audit period. This represents an 87% reduction over the three years. Notably, codeine-containing prescriptions written during the audit period in the rheumatology clinic decreased from 19 prescriptions in 2014 to two prescriptions in 2016. Likewise, prescriptions from the plastic surgery clinic decreased from 51 in both the 2014 and 2015 audit periods to zero written in 2016 audit period.

Conclusion: Since removal for the inpatient formulary in April 2013, outpatient prescribing of codeine-containing medications has dramatically decreased by 98%. This suggests that an inpatient formulary ban is an effective tool for driving prescribing practices in the ambulatory care setting. This reduction in codeine prescribing has a great potential for improved patient safety within a large pediatric institution. It aligns with the hospital-wide safety culture and goal of zero preventable harm. The authors encourage other pediatric institutions to consider removal of codeine-containing medications from their inpatient formularies.

Submission Category: Pediatrics

Submission Type: Descriptive Report

Session-Board Number: 7-153

Poster Title: The pharmacist's role in the pharmacogenetic approach to epilepsy treatment

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Purpose: It is estimated that one out of every 140 people worldwide has epilepsy, often presenting with a heterogeneous clinical presentation. When uncontrolled, seizures may lead to complications such as neurodevelopmental delays, injury, or even sudden unexplained death in epilepsy (SUDEP). Major advancements identifying genetic etiologies associated with epilepsy have recently been linked to preferable treatment regimen. The objective of this study is to describe yield of genetic testing leading to changes in treatment and the potential role of the pharmacist in the medication management of patients with epilepsy based on these findings.

Methods: Approval of this study was obtained by Nationwide Children's Institutional Review Board (IRB) prior to initiation. A retrospective chart review was performed on patients who were followed by a provider within Nationwide Children's Department of Neurology and had whole exome sequencing (WES) results available. Patients were excluded if they did not have a diagnosis of epilepsy. Each patient's WES results were reviewed to identify the presence of genetic markers of epilepsy and mutations in metabolic enzymes. If actionable genetic markers or abnormal metabolic enzymes were present, the patient's medication regimen was evaluated. For this study, actionable findings were defined as a genetic mutation where therapy change is clinically relevant. Actionable findings include pharmacodynamics parameters which affect the pathophysiology of the disease, or pharmacokinetic parameters which affect the metabolism of medications.

Results: This study reviewed 21 patients. Five of these patients (23.8%) had a definitive genetic marker of epilepsy. Another four patients (19%) had variants of unclear significance (VUS). Eight patients (38.1%) had actionable findings. Of those with actionable findings, six patients (75%) had therapy changes based on clinical factors.

Conclusion: Genetic findings may provide insight into initiating a more accurate treatment regimen earlier in therapy, prevent complications of epilepsy, and reduce adverse effects caused by ineffective anti-epileptic drugs. As we attempt to provide precise treatment to patients, genetic results will play a prominent role. This study describes the opportunity of a pharmacogenetic approach to the medication management of patients with epilepsy. As medication experts, pharmacists can play a prominent role when reviewing actionable genetic findings to identify favorable treatment options. Future work aims to analyze actionable findings of patients who receive genetic testing outside of WES.

Submission Category: Pediatrics

Submission Type: Descriptive Report

Session-Board Number: 7-154

Poster Title: Assessment of tablet splitting at a pediatric hospital

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Purpose: Pediatric patients often receive individualized doses which may require modification of commercially available dosage forms, such as splitting tablets. At our institution, nursing staff split tablets as necessary prior to administration. This process introduces potential for cross contamination between patients, allergic reactions if equipment is cleaned improperly, and administration errors. A recent Joint Commission survey required each patient to have an individually-labelled tablet splitter. The new policy has burdened nursing workflow and resulted in continued post-survey audit concerns. This pilot project was designed to identify tablets being split most often in an attempt to mitigate the impact on nursing staff.

Methods: This project was deemed exempt from IRB review. A report was created of all administrations at our institution involving a partial tablet from January through May 2016. Administrations were aggregated by tablet strength and evaluated on the primary measure of total number of administrations being at least 150, which equates to about one per day during the study period. All tablet strengths meeting the primary measure were assessed based on four secondary measures. Initially, the report was designed with only three secondary measures including the number of patients impacted, the estimated cost of annual waste based on AWP data from Lexi-Comp Online, and the presence of tablet scoring to ensure safe and accurate splitting. These initial measures only identified three medications for evaluation, and did not capture the heavier pill splitting workflow burden on several nursing units. Therefore, a fourth secondary measure was added post-hoc to evaluate the nursing units performing the most tablet splitting. Tablet strengths meeting at least three of the four secondary measures were individually evaluated for alternatives to nurse-driven tablet splitting.

Results: A total of 15,605 administrations, involving 265 tablet strengths and 3,142 patients, were identified. Twenty-two tablet strengths met the primary measure of at least 150 administrations in the study period and were assessed based on the secondary measures. The initial assessment only identified three medications for assessment (escitalopram oxalate 10mg, phytonadione 5mg, and clobazam 10mg). When a fourth measure was added post-hoc, an additional four medications were identified for assessment (ondansetron 4mg ODT, clonidine HCl 0.1mg, loperamide 2mg, and cyproheptadine 4mg). All 7 medications were individually evaluated and recommendations to change process included medical staff education, stocking split tablets in pharmacy, utilization of alternative commercially-available dosage forms, no process change due to lack of anticipated future need for tablet splitting, and utilization of existing compounded products.

Conclusion: Although many medications were involved in tablet splitting, a small number of tablets represented a large portion of the overall burden. A focused effort to remedy these particular 7 tablet strengths has the potential to reduce nurse tablet splitting burden by 28 percent, reduce cost of medication waste by over 80,000 U.S. dollars, and maintain Joint Commission compliance. There were a number of issues identified in this audit to be addressed in the future such as nurse splitting of hazardous and narrow therapeutic index drugs and reduced diversion potential from splitting of controlled substance tablets.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 7-155

Poster Title: Evaluation of antibiotic usage within a 95-bed community hospital

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Purpose: Antibiotic resistance is growing within the United States healthcare system, causing increased rates of morbidity and mortality. Ensuring appropriate prescribing through antibiotic stewardship is essential to combat increasing antibiotic resistance. A 95-bed community hospital in Ohio has also experienced a rise in antibiotic resistance within their hospital. Anti-infective costs were well controlled from 2012 through 2014. A spike in spending in 2015 prompted this review. The primary objective of this study is to determine the appropriateness of treatment through evaluation of antibiotic usage.

Methods: Prior to data collection and evaluation, the hospital's Medical Executive Committee (functioning in its capacity as an Institutional Review Board) reviewed information tracked through the program with the intent of quality improvement of care for all patients. Data was collected by the Management Information System Department in the hospital through data mining in the computerized physician order entry system and McKesson purchasing invoices. During a previous review, linezolid, piperacillin/tazobactam, and ertapenem were found to be 33 percent of the total anti-infective cost from April 2015 to March 2016. Therefore, days of therapy were evaluated for those antibiotics over that time period. Antibiotic utilization rates in a competitor hospital of similar size and score were also used for comparison. Over that time period, there were a total of 51 linezolid cases, 532 piperacillin/tazobactam cases, and 83 ertapenem cases. We reviewed 30 randomized charts per antibiotic to assess appropriateness of antibiotic prescribing. Each review was categorized as "appropriate" or "potentially inappropriate" based on the Infectious Diseases Society of America practice guidelines, Sanford Guide to Antimicrobial Therapy, and the hospital's antibiogram. A "potentially inappropriate"

designation indicated that the antibiotic was selected for an inappropriate indication, another antibiotic would have been equally appropriate, or there was not enough information available.

Results: The hospital's utilization rates as determined by days of therapy per 1,000 patient days for piperacillin/tazobactam were significantly higher than those of a competitor hospital (P less than 0.0001). The utilization rate for linezolid was not found to be significantly higher than the competitor hospital (P equals 0.1577). Ertapenem data for comparison was not available. Upon chart review, ertapenem had the highest potentially inappropriate prescribing pattern at 76.67 percent (n equals 23). Linezolid had 56.67 percent (n equals 17) and piperacillin/tazobactam had 53.34 percent (n equals 16) of cases categorized as potentially inappropriate. Out of the 56 cases determined to be potentially inappropriate, the 55.36 percent of those were due to the availability of an equally effective or more effective antibiotic option (n equals 31). Another common cause (25 percent) was the lack of a true patient allergy to the first-line agent (n equals 14).

Conclusion: The high percentages of potentially inappropriate indications seen in our sample of prescribed linezolid, piperacillin/tazobactam, and ertapenem as well as the statistically significant elevated antibiotic utilization rate for piperacillin/tazobactam are indicators of antibiotic over-usage within the 95-bed community hospital. This presents an opportunity for an antimicrobial stewardship committee to look for ways to improve the antibiotic prescribing patterns at this hospital. As a response to these findings, a clinical alert for each antibiotic has been integrated into the computerized physician order entry system to improve antibiotic prescribing practices.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 7-156

Poster Title: Effect of direct current cardioversion on total weekly dose of warfarin in patients with atrial fibrillation

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Purpose: Current guidelines recommend stable anticoagulation [international normalized ratio (INR) goal of 2.0-3.0 on warfarin] for three weeks pre and four weeks post-direct current cardioversion (DCCV) as patients are at increased risk of clot formation post procedure. Though guidelines do not provide recommendations for INR monitoring at specific weekly intervals, common practice is to monitor INRs more frequently to minimize risk of thrombosis. The purpose of this study was to assess if increased monitoring of INRs may be warranted through examining warfarin dosing requirements before versus after cardioversion and by evaluating outcomes within 30 days immediately post-cardioversion.

Methods: The institutional review board exempted this retrospective study. Patients included in the study were on stable total weekly dose (TWD) of warfarin, enrolled in the Pharmacy Anticoagulation Management Services (AMS), and received direct current cardioversion (DCCV) between August 2015 and August 2016. Data collection utilized existing patient data in the electronic medical record. The primary endpoint was to evaluate percent change in pre- versus post-cardioversion TWD of warfarin. The secondary endpoints were to describe the presence of any major bleeds (as defined by the International Society on Thrombosis and Haemostasis) or thromboembolic events (such as stroke, deep vein thrombosis, or pulmonary embolism) within 30 days following cardioversion, and to assess the number of anticoagulation clinic visits within 30 days following cardioversion.

Results: A total of 27 patients were evaluated for this study. There were 20 males and 7 females with an average age of 65 years old and an average CHA2DS2-VASc score of 3.6. The average percent change in TWD of warfarin was minus 3.86 percent. Five patients (18.5 percent) experienced a dose increase; 12 patients (44.4 percent) experienced a dose decrease; and 10 patients (37.1 percent) experienced no change in dose. In addition, 1 out of the 27 patients (3.7 percent) evaluated experienced a major bleed within 30 days of cardioversion; however, this was unrelated to the cardioversion or warfarin. Zero patients experienced a major cardiac event. Finally, patients visited the AMS an average of 3.2 times within 30 days after cardioversion. It was noted that 7 out of the 12 patients (58.3 percent) that experienced a decrease in dose also began taking amiodarone after cardioversion and required a decrease in warfarin TWD with close monitoring.

Conclusion: This study found no consistent trend for warfarin dose increase in atrial fibrillation patients post-cardioversion. Instead, these patients typically have been stable on the same dose or have needed a dose decrease. However, many of the results regarding dosing may have been confounded by outside variables that were not taken into account before data collection, such as patient noncompliance and the initiation of other medications that affect warfarin dosing. Also, weekly monitoring of these patients immediately after cardioversion may not be necessary as the probability of experiencing a major event within 30 days following cardioversion was very low.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 7-157

Poster Title: Retrospective analysis of antibiotic-associated irregular heartbeat

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Purpose: The purpose of this study was to determine whether antibiotics that have the potential to cause irregular heartbeat are monitored appropriately. The first aim was to assign risk scores for developing corrected-QT interval (QTc) prolongation to patients prescribed macrolides and fluoroquinolones, and then determine whether patients who met the criteria for moderate or high risk for the development of QTc prolongation were appropriately monitored. The second aim was to determine the proportion of patients across risk groups that developed arrhythmia-related adverse events, namely QTc prolongation or ventricular tachycardia (including Torsades de Pointe (TdP)), following fluoroquinolone or macrolide antibiotic use.

Methods: The institutional review board at OhioHealth approved a retrospective, single-center chart review of 90 patients 18 years and older who received systemic macrolide or fluoroquinolone antibiotics while admitted to the critical care or intermediate/step-down units at OhioHealth Grant Medical Center (GMC) during July-September, 2015 (3 months). Charts were reviewed for risk factors associated with prolonged QTc (age ≥ 68 years, female sex, taking a loop diuretic, low serum potassium, admission QTc ≥ 450 ms, acute MI, one QTc-prolonging drug, ≥ 2 QTc-prolonging drugs, sepsis, and heart failure) and points were assigned for each risk factor. The points were summed, and patients categorized to one of three risk groups: low-risk (0 to 6 points); moderate-risk (7 to 10 points) or high-risk (11 to 21 points) for the development of prolonged QTc. It was then determined whether patients who met the criteria for moderate or high-risk were appropriately monitored (defined as daily QTc monitoring). The proportion of patients that developed an adverse cardiac event (e.g., prolonged QTc, ventricular arrhythmia, TdP) following administration of a macrolide or fluoroquinolone antibiotic was determined and differences were assessed across risk groups for LOS and in-hospital mortality.

Results: Of the 90 patients reviewed, 53.3% were female and the mean age was 59.5, with a standard deviation of 14.7. Calculated risk scores for the development of prolonged QTc included low (n=40, 44.4%), moderate (n=39, 43.3%), and high (n=11, 12.2%). Overall, 5 patients had appropriate QTc monitoring. Among patients who were at moderate or high-risk for the development of prolonged QTc (n=50), 4 patients (8.0%) had appropriate QTc monitoring. Overall, 7 patients (17.9%) developed prolonged QTc, 13 patients (15.3%) developed ventricular tachycardia, and no patients developed TdP during their stay. Prolonged QTc was not reported for 46 patients due to no follow-up EKG being reported. Among patients with a follow-up EKG and no prolonged QTc upon admission (n=39), 28.6% of low-risk patients, 15.8% of moderate-risk patients, and 0.0% of high-risk patients developed prolonged QTc. Overall the medium length of hospital stay (LOS) was 8.0 days (range: 1.0-68.0). The median LOS increased as the calculated risk of prolonged QTc increased; however, there was no significant difference in LOS by calculated risk of prolonged QTc (p=0.447). Overall, 4 patients (4.5%) had in-hospital mortality. Of those 4 patients, 1(25%) had a moderate risk and 3 (75%) had a high risk of prolonged QTc.

Conclusion: Of the patients who experienced prolonged QTc, none of them were in the high-risk group, indicating that the risk score may not be the best predictor of antibiotic-associated irregular heartbeat. Due to the lack of follow-up EKGs documented, further research is required to determine the validity of risk stratification. Moderate and high-risk patients were, however, associated with longer LOS and higher in-hospital mortality. GMC could improve our efforts at monitoring and documentation of EKG in patients who are prescribed fluoroquinolone and macrolide antibiotics.

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 7-158

Poster Title: Combination inhaled corticosteroid and long acting beta-agonist use in children less than four years of age

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Purpose: The youngest age for which a combination inhaled corticosteroid and long acting beta-agonist (ICS/LABA) inhaler is FDA approved is four years old. Although not approved in children younger than four years, ICS/LABA inhalers are recommended and used per the Expert Panel Report 3 (EPR3) asthma guidelines in those with moderate or severe persistent asthma. There are limited data regarding ICS/LABA inhaler use in this population. The objective of this study was to evaluate the use of ICS/LABA inhalers in children less than 4 years of age.

Methods: This institutional review board-approved study was a retrospective chart review of asthmatic patients who were less than four years of age on an ICS/LABA. All patients who were diagnosed with asthma, less than four years of age, and subsequently initiated on an ICS/LABA inhaler were included in this study. The electronic medical record (EMR) was utilized to identify and retrieve patient charts during the designated study period of January 1, 2011 to June 30, 2016. Identified patients were followed until they reached four years of age or until June 30, 2016, whichever came first. The primary outcome of this study was to evaluate the safety of ICS/LABA inhaler use in children four years and younger. Secondary outcomes included: identification of previous inhaler use, asthma severity at initiation, duration of ICS/LABA use, age at initiation, and the number of emergency department, urgent care, and hospitalizations before and after ICS/LABA inhaler initiation. Patient demographics were also collected. Data were evaluated using descriptive statistics.

Results: A total of 50 unique patients were identified. The average age of initiation of an ICS/LABA inhaler was 2.65 years (range: 1.14 to 3.83) and a large majority of patients (66%) were initiated on fluticasone-salmeterol 115/21 mcg. Prior to starting an ICS/LABA inhaler,

most patients were previously on either fluticasone 110 mcg (62%) or beclomethasone 80 mcg (16%). Patients were on ICS/LABA therapy for an average of 1.12 years (range: 0.01 to 2.86) before reaching four years of age. Most commonly, assessment of adverse effects was not noted in the patient chart. Four patients were noted to have experienced adverse effects including: dry cough, mood swings, aggressive behavior, and elevated blood pressure. Before beginning an ICS/LABA inhaler, patients visited the emergency department (ED) an average of 7.05 times (range: 1 to 16; 2.93 visits per year) and were admitted an average of 2.73 times (range: 0 to 11; 1.11 admissions per year). After starting an ICS/LABA inhaler, patients visited the ED an average of 2.73 times (range: 0 to 17; 2.20 visits per year) and were admitted an average of 0.73 times (range: 0 to 4; 0.716 admissions per year).

Conclusion: Use of an ICS/LABA inhaler in children less than four years of age with asthma that is not properly controlled on an ICS inhaler alone appeared to be relatively safe and effective in our population. ED visits and admissions were reduced when compared to previous controller therapy. Adverse effects were difficult to assess via chart review because the holistic review of the patient was often poorly documented in the chart. The adverse effects experienced by four of the patients in the study could also be attributed to their use of concomitant medications or their other disease states.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 7-159

Poster Title: Evaluation of compliance to neuromuscular blockade protocol in the medical intensive care unit

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Purpose: Neuromuscular blockade (NMB) agents are often initiated in the medical intensive care unit (MICU) to induce skeletal muscle paralysis in an effort to facilitate mechanical ventilation. Due to their lack of sedative and analgesic properties, we must ensure patients achieve and maintain adequate sedation and analgesia prior to and throughout NMB therapy. In September 2015, Cleveland Clinic MICU implemented an evidence-based NMB protocol to equip clinicians with a standardized treatment approach to mitigate the risk of awareness and untreated pain. We seek to evaluate staff compliance to the order set and identify potential protocol deviations and areas of improvement.

Methods: This was a non-interventional, retrospective medical chart review of adult patients admitted to the MICU who had an order placed for a continuous infusion NMB between September 2015 and September 2016. We excluded those patients who were still admitted at the time of chart review or were initiated on NMB for indications other than mechanical ventilation. The primary objective is to determine the rates of protocol compliance. Specifically, we assessed the following: 1) were patients pain-free (pain score equal 0) and adequately sedated (Richmond Agitation Sedation Scale equal -5) prior to NMB initiation; 2) did sedatives and analgesics change after starting NMB; 3) was bispectral (BIS) index monitoring utilized during NMB and 4) how was NMB managed and titrated during the course of treatment?

Results: Ninety-nine patients met our inclusion criteria during the study period. Prior to NMB initiation, 27 (27.3 percent) did not attain adequate sedation and 3 (3.0 percent) were not pain-free. At the start of paralysis, 6 patients did not have an active sedation (n equal 2) or analgesic (n equal 4) order. During paralysis, majority of patients received a fixed dose sedative (61.6 percent) and analgesia (53.5 percent) infusion, with the remainder receiving a titrated infusion. Sedative and analgesia regimens during NMB therapy were changed in 32.3 percent and 23.0 percent of the patients, respectively. Nursing initiated BIS monitoring occurred in 86 (86.9 percent) patients with a median time of 0.4 hours to the first recorded score. Changes to sedatives and analgesia during NMB therapy were rarely attributed to a high BIS score (7.4 percent). For all but 12 patients, providers ordered NMB as a variable-range continuous infusion with titration to a train of four (TOF) goal, with a set goal of 2/4 in 80 (92.0 percent) patients. TOF goals were met in 57 percent of patients. The median duration of NMB therapy was 1.3 days (range: 0.04 to 10.5) with only 16 patients requiring more than 3 days of therapy.

Conclusion: This assessment of the NMB protocol illustrated a number of potential areas of improvement. These include the management of sedation and analgesia to ensure patients receive an adequate level of sedation prior to NMB initiation and to minimize the occurrence of patients undergoing paralysis without having an active sedation or analgesia order. Additional education efforts to MICU physicians, nurses, and pharmacists are necessary to emphasize the clinical importance of each step as it relates to patient care.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Case Report

Session-Board Number: 7-160

Poster Title: Gadolinium based contrast dye induced nephrotoxicity in baseline renal impairment

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Purpose: Historically, the use of gadolinium-based contrast dye such as gadopentetate dimeglumine, gadodiamide, gadoteriol, and gadoversetamide have been considered non-nephrotoxic. However, case reports have demonstrated a possible association with acute kidney injury (AKI), particularly in patients with impaired kidney function at baseline. The proposed nephrotoxic mechanism of gadolinium-based contrast dye includes hyperosmolar properties causing vasoconstriction at the corticomedullary junction of the kidney, which in turn damages the regulational capacity of the kidney. This case report focuses on the potential propagation of nephrotoxicity when gadoversetamide is used in combination with other nephrotoxic agents such as vancomycin, piperacillin-tazobactam and lisinopril. A 70 year old male with a past medical history including hypertension, stage II chronic kidney disease, and prostate cancer presented with a penetrating injury to the hand. He was diagnosed with cellulitis and empirically treated with piperacillin-tazobactam and vancomycin. Vancomycin was ordered as a loading dose of 1,500 mg followed by a maintenance dose of 1,250 mg every 12 hours with a trough goal of 10-15 mcg/mL. Vancomycin was dosed appropriately per the institution's protocol based on the patient's diagnosis, actual body weight of 77.1 kg, and creatinine clearance at baseline of 68 mL/min (serum creatinine 1.1 mg/dL). On day 1, vancomycin was administered as scheduled. The patient received 15.42 mL of gadoversetamide at 1535 prior to a magnetic resonance imaging procedure. On day 2, the first vancomycin was administered 4 hours late and the second dose was administered 9 hours after the first dose. No renal labs were drawn on day 2. The trough, which was scheduled to be drawn prior to the fourth dose, resulted as 22.6 mcg/mL. No dose adjustments were made at this time because the trough was obtained only 8 hours after the previous dose. On day 3, the first dose was given 5 hours late and the second dose was given only 6 hours after the first dose. No renal labs were drawn on day 3. On day 4, vancomycin was administered as scheduled. On day 5, renal

labs were drawn, resulting in a serum creatinine of 5.6 mg/dL and a blood urea nitrogen of 30 mg/dL. Vancomycin was held due to a dramatic rise in serum creatinine. A random vancomycin level was ordered and resulted as 103.7 mcg/mL. Vancomycin was discontinued at this time as well as other nephrotoxic medications including piperacillin-tazobactam and lisinopril. The patient was switched to clindamycin and clarithromycin and fluids were administered. Four days after vancomycin was discontinued, the patient developed acute coronary syndrome which was proposed to have been associated with AKI. During the remainder of the hospitalization, serum creatinine rose to a maximum of 7.1 mg/dL and improved to 3.5 mg/dL about two weeks later. Input from nephrology supported the proposed mechanism of gadoversetamide contributing to the development of AKI. Although the source of this patient's AKI may be multifactorial in nature, precipitation of AKI as a result of gadoversetamide cannot be ruled out. Closer monitoring of the patient's renal function may have allowed for earlier detection of AKI. Although further studies are warranted to examine the relationship of gadolinium-based contrast dye and nephrotoxicity, clinicians should be judicious in monitoring patients receiving gadolinium-based contrast dye, especially when used concomitantly with nephrotoxic medications and in patients with underlying renal dysfunction.

Methods:

Results:

Conclusion:

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 7-161

Poster Title: Utilization of insulin glargine and insulin detemir single-use syringes in a community hospital

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Purpose: Insulin glargine and insulin detemir are long-acting insulins used to treat patients with diabetes mellitus to improve glycemic control. Although they have similar efficacy in controlling basal blood glucose levels, there is a significant cost difference between the two insulins. Single-use syringes allow for cost savings by reducing waste from multi-dose vials, however dose changes and interruption in therapy can account for syringe returns and increased medication waste. The purpose of this study was to evaluate the utilization of insulin glargine and insulin detemir single-use syringes in one institution and determine a cost-effective method of distributing long-acting insulin therapy.

Methods: This medication use evaluation was a quality assurance study of all insulin glargine and insulin detemir dispenses from a central pharmacy and one decentralized pharmacy satellite at a single institution during May and June 2016. This study included single-use syringe dispenses of insulin glargine and insulin detemir for patients at least 18 years of age. The primary objective of this study was to determine the number of returned single-use syringes over a 2 month period with subgroup analyses based on medication, cartfill dispense, and time of discontinuation. Secondary objectives included cost of doses returned. A cost analysis comparing the use of patient-specific insulin pens was also completed. Dispenses were identified through a pharmacy computer-system target drug report. Data collection was performed for the quantity of syringes returned and time of order discontinuation.

Results: During May and June 2016 a total of 1744 single-use insulin syringes were dispensed (1461 insulin glargine, 283 insulin detemir) for 214 patients. 362 syringes were returned (308 insulin glargine, 54 insulin detemir). 20.76 percent of the total dispenses included in this study were returned. Insulin glargine, the more prevalent medication, had a total return quantity of

8346 units. 76.83 percent of the dispenses were prepared during cartfill dispenses at 12:30am and 12:15pm each day. The average time of dose discontinuation was at 2:16pm. The predominant reasons for dose discontinuation were dose adjustment and patient discharge.

Conclusion: Single-use syringes of insulin glargine and insulin levemir led to significant waste over a 2 month period. There can also be significant loss of productivity with continued dose changes and inconsistent utilization of the syringes dispensed. Delaying cartfill dispenses until 5:00pm may alleviate some of the waste due to dose changes or patient discharge. Narrowing the formulary to insulin glargine may allow for some additional cost savings. However, insulin pens for individual patient use were not found to be a cost-effective alternative. A larger analysis of pharmacy workflow is needed to determine an appropriate dispensing model for long-acting insulins.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 7-162

Poster Title: Identifying and measuring key quality indicators for a new specialty pharmacy: A pharmacy student's role

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Purpose: Specialty pharmacy is a rapidly growing segment of pharmacy, generating around $98 billion in revenue in 2015. Starting in January 2016, a large integrated health system piloted their own specialty pharmacy primarily focusing on hepatitis C and oral chemotherapy medications. To further build the business and align quality with the goal of specialty pharmacy accreditation, a patient satisfaction study was conducted. The design of the study was to assess patient satisfaction and medication adherence with a pharmacy student leading the evaluation.

Methods: A pharmacy student created a verbal patient satisfaction questionnaire and collected data via phone interviews. Patients provided answers on a one to four scale with one indicating the patient strongly disagrees and four indicating they strongly agree. Data collection included patients who had an original prescription filled or refilled June 1st, 2016 through August 10th, 2016. The questionnaire assessed patient perception of wait time, accuracy and condition of prescriptions, likelihood of referral to a friend and staff friendliness. Medication adherence was assessed using the Proportion of Days Covered (PDC) calculation. The PDC calculation assessed patient adherence based on the number of days that the patient was in possession of all of their medication(s). The Centers for Medicare and Medicaid Services (CMS) endorse the PDC calculation over the more commonly used Medication Possession Ratio (MPR) as the primary formula for calculating patient adherence. A pharmacy technician collected data regarding financial assistance. The amounts were further categorized based upon whether they were provided through a co-pay card or a foundation.

Results: Of the 25 patients surveyed, 96% of patients responded that they strongly agreed with statements stating that wait time, accuracy, condition of prescriptions, and staff friendliness were acceptable. For the question involving likelihood of referral to a friend, 100% of patients surveyed said they strongly agreed. In quarter two, there were 29 applicable prescriptions whose corresponding PDC equaled 96% compared to the national average of 87%. In quarter three there were 13 applicable prescriptions and the PDC equaled 100%. Financial assistance amounts for quarter two equaled $30,652. As of August 10th, financial assistance amounted to $8,411 for quarter three.

Conclusion: Quality assurance measures are essential for building a successful and accredited specialty pharmacy. Pharmacy students can assist in developing and accelerating data collection as well as calculating and interpreting the measurable results.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 7-163

Poster Title: Comparison of creatinine clearance formulas for predicting vancomycin dosing intervals

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Purpose: There are several methods that can be used to estimate glomerular filtration rate (GFR), including the Cockcroft-Gault (CG) equation; the modified CG equation using a rounded serum creatinine (Scr), ideal body weight, and adjusted body weight; the Modification of Diet in Renal Disease (MDRD) equation, and the Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) equation. No single method has been identified as the optimal method to guide medication dosing, although the CG method is most frequently cited as a guide. The purpose of this study is to determine which GFR estimate most accurately predicts vancomycin dosing requirements.

Methods: The institutional review board approved this retrospective, single-center chart review of 957 patients who were administered vancomycin during their stay at OhioHealth Grant Medical Center between March 2015 and May 2015. 297 patients met the inclusion criteria, which was 18 years of age or older, patients being treated for a suspected or documented gram positive infection, and patients with at least one valid steady-state serum vancomycin concentration. Exclusion criteria consisted of patients receiving greater than 4 grams of vancomycin per day, patients receiving other nephrotoxic drugs (e.g., aminoglycosides, amphotericin, contrast dye), end-stage renal disease, receiving continuous renal replacement therapy, estimated creatinine clearance < 16 mL/min, unstable renal function (>0.3 mg/dL difference in serum creatinine from baseline to time of kinetic study), neoplastic disorder, transplant patients, major limb amputees, paraplegia or quadriplegia, or institutional guidelines for vancomycin dosing not followed (e.g., interval ordered was not appropriate or vancomycin levels not timed appropriately) which narrowed the patient list to 58. The dosing intervals predicted by each creatinine clearance (CrCl) estimation formula were

compared to the proportion of patients for whom the predicted dosing interval selected is consistent with the actual vancomycin dosing interval requirements based on a valid kinetics study. A chi-square analysis was conducted to determine if each of the various CrCl estimation formulas were significantly different than the original dosing intervals.

Results: The original dosing interval selected resulted in correct dosing in 18 of 58 patients, or 31.03 percent. Each of the estimates resulted in correct dosing regimens as follows: Cockcroft-Gault, 16 of 58, 27.59 percent; the modified CG using a rounded serum creatinine of 0.8, 12 of 58, 20.69 percent; the modified CG using a rounded serum creatinine of 1, 11 of 58, 18.97 percent; the modified CG using Ideal body weight, 20 of 58, 34.48 percent; the modified CG using adjusted body weight of 0.3, 15 of 58, 25.86 percent; the modified CG using adjusted body weight of 0.4, 13 of 58, 22.41 percent; the Modification of Diet in Renal Disease (MDRD), 20 of 58, 34.48 percent; and the Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI), 21 of 58, 36.21 percent. A chi-square analysis was utilized to determine whether or not any of the creatinine clearance estimates were significantly superior to the original dosing interval. While some of the estimates were superior and others inferior, none of the estimates were significantly different compared to the original selected dosing interval.

Conclusion: This study shows that vancomycin dosing needs to be improved. Correct dosing is essential to treat the infection and prevent adverse reactions. Of the patients who were included in this study, only 31.03 percent of them were dosed correctly. While this study didn't result in significantly superior dosing guidelines, using the Chronic Kidney Disease Epidemiology Collaboration estimate may result in more predictable dosing intervals. Additional studies are needed to improve dosing guidelines that will result in more predictable vancomycin dosing.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Descriptive Report

Session-Board Number: 7-164

Poster Title: Pharmacist evaluation of antibiotic discharge prescriptions from a pediatric emergency department for dose optimization and error diversion

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Purpose: Pediatrics are a high-risk patient population that are more likely to be subject to medication errors as shown through an in depth literature review which revealed medication errors are up to three times more likely to occur in prescriptions written for pediatric patients, especially antibiotics and pain medications. This retrospective review was designed to analyze appropriateness of antibiotic therapy in discharge prescriptions in a pediatric emergency department. The outcomes of this study could identify and justify a pharmacist's role in the discharge process by positively impacting medication optimization, reducing prescribing errors, and ultimately improving the cost and quality of care.

Methods: This study was a retrospective chart review from March through June 2016 that evaluated all discharge prescriptions for a pediatric emergency department (ED), which was exempt from IRB approval. A 2-week sub analysis evaluated oral antibiotics during June 2016. Data collected included age, sex, weight, antibiotic prescribed, formulation, dose, frequency, duration, indication, prescriber, and credentials. Once the data was collected a board certified pediatric clinical pharmacist analyzed antibiotic prescriptions to identify any medication errors and/or opportunities to optimize therapy. Errors and therapeutic optimizations were categorized based on error and optimization type in order to identify severity of error, optimization opportunities and any prescribing trends. This data was used to analyze the potential impact of a new pharmacy service in the pediatric emergency department, one that will be designed to ensure safe and effective care for pediatric patients upon discharge.

Results: Over 17,000 discharge prescriptions were generated during this 4-month period. A sub-analysis of only oral antibiotics prescriptions during the first two weeks in June evaluated a total of 471 discharge prescriptions with 45 excluded due to discontinuation prior to discharge or duplicate prescriptions. Duplicates occurred whenever a prescription was printed and then later sent electronically to a pharmacy. This left 426 prescriptions to be included for error and dose optimization evaluation. Errors were identified in 4 percent of prescriptions (N=18) for a total of 23 medication errors which were 57 percent dose, 30 percent frequency, and 13 percent formulation errors. None of these errors had a great severity, but several were subtherapeutic. About 25% of prescriptions (N = 105) were identified for opportunities for dose optimization with a total of 118 optimizations, these included 53 percent dose, 41 percent frequency, 3 percent formulation, and 3 percent duration optimizations. About 53% of opportunities for optimization occurred in the first week compared to the second week. The most frequent occurrences were subtherapeutic or supratherapeutic dosing for skin and soft tissue infections and supratherapeutic doses for urinary tract infections.

Conclusion: This study demonstrated that approximately 1 of every 4 antibiotic prescriptions written in the pediatric ED had the opportunity for optimization that included dose, frequency, formulation, and duration. Pharmacist review of discharge prescriptions could provide better patient care and possibly prevent additional ED or primary care encounters. Optimization could also help prevent future hospitalizations due to sub therapeutic treatments. For a pharmacist to verify all discharge prescriptions from the ED, this would be a substantial cost. Future studies could evaluate justification for additional pharmacists from cost savings associated with additional healthcare encounters.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 7-165

Poster Title: Assessment of opiate utilization and cost patterns in a university-affiliated health system employee population

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Purpose: Use of opiate medications for acute and chronic pain conditions is a pressing topic today due to increasing concern about abuse, misuse, and diversion. In employer-based health plans, there is interest in identifying potential areas of intervention for pharmacists to assure appropriate and effective pain medication use. The purpose of this analysis was to describe the cost and utilization patterns of opiate-based medications in a university-affiliated employee health plan and to identify potential areas of pharmacist intervention.

Methods: Prescription claims for all opiate-related medications were obtained for all members of an employee health plan of a Midwest university-affiliated health system from 8/29/15 to 8/29/16. Medications were assigned to the following opiate subgroups: short-acting; short-acting combination; long-acting; tramadol-based; injectable/sublingual/nasal spray/patch. Prescriber specialties were determined based on the Centers of Medicare and Medicaid Services listings and categorized into twenty different specialty categories consisting of, but not limited to; dental, internal medicine, emergency medicine, family medicine. Cost data were determined, which included cost to the plan, cost to the patient, in the form of a copayment, and total cost. All data were entered and analyzed using Microsoft Access.

Results: There were 4429 total prescriptions for opiate medications filled by 1674 members. This represented 15 percent of the total health plan population; 60 percent of the opiate utilizing members were female. The total cost of opiate medications was $110,669.74, consisting of $77,901.94 plan cost and $32,767.80 patient cost. The most commonly prescribed

opiates were the short-acting combination formulations (n = 2704; 61 percent), followed by tramadol-based medications (n = 810; 18 percent) and short-acting single formulation opiates (n = 698; 16 percent). Of utilizing members, 42 percent filled more than one prescription for an opiate medication during the one-year study period and 28 percent had opiate prescriptions written by more than one prescriber; 9 percent had prescriptions by more than three providers. Opiate prescriptions were most often written by family medicine providers (n = 847 prescriptions; 19 percent). The mean total days supply for opiate medications was 41 days. However, 7.6 percent of the utilizing members had a total days supply of opiate medications of more than 180 days; for these members, the mean total days supply was 325 days in the one-year study period.

Conclusion: In a relatively small university-affiliated employee health plan, there was a substantial utilization of opiate medications, including some members with high total prescription volume and number of prescribers. While this analysis did not include diagnostic data, the pharmacy team will explore opportunities to identify therapeutic areas for medication therapy management and patient or provider education to support the appropriate use of opiates and other pain mitigation strategies.

Submission Category: Administrative Practice/ Financial Management / Human Resources

Submission Type: Descriptive Report

Session-Board Number: 7-166

Poster Title: Standardization of documentation for clinical and administrative interventions completed by pharmacists to assist in performance evaluations

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Lori Rose

Purpose: As the pharmacist's role has evolved to include more direct patient care, performance evaluations continue to lag behind, still dependent on objective factors such as medication dispensing accuracy rather than factors related to interactions with patients and healthcare providers. In a community hospital, pharmacists utilize Epic systems for documentation of interventions. These interventions are used as a measure of productivity and in performance evaluations for pharmacists. There is concern, however, for the lack of continuity in documentation. The primary objective of this study is to quantify and describe interventions documented by pharmacists to determine if standardization of documentation is required.

Methods: Pharmacists working in the in-patient medical center were provided with a survey via email to assess the variability in pharmacist documentation of interventions through Epic. This survey included basic demographic information and used four in-patient scenarios in which the pharmacists were required to list all pertinent interventions they would document in each situation. The scenarios represented real-life pharmacist-patient or pharmacist-other healthcare provider interactions that would necessitate the pharmacist to make an intervention. The responses were free text, allowing for the respondent to treat the scenario as they would in their daily work day. The survey remained open for one week, with a reminder sent out one day prior to survey closure. In addition, interventions documented via the Epic system by pharmacists between July 1, 2016 and July 7, 2016 were evaluated and categorized to determine the different types of interventions performed by pharmacists when presented with similar situations. The results of both the survey and data analysis were then used to develop a list of specific interventions applicable to patient scenarios in an effort to standardize documentation among pharmacists.

Results: Twenty-five out of forty pharmacists completed the study. In patient scenario one, there was one unique response in which one pharmacists described two interventions they would document. The remaining respondents choose a single identical intervention. For patient scenario two, there was a greater variation in response, with pharmacists choosing to document anywhere from one to four separate interventions. However, patient education/counseling and pharmacy dosing consult interventions were chosen by the majority of respondents. In the third patient scenario, interventions for profile review-extensive and patient education/counseling were selected most commonly. Ten pharmacists chose to also document one additional intervention (medication reconciliation or coordination of care). The final patient scenario found that all pharmacists chose drug therapy recommendation, but the additional interventions selected varied with a total of fifteen unique responses. The data analysis of Epic from July 1, 2016 to July 7, 2016 generated a total of 3974 interventions. There were forty-five different intervention categories documented by pharmacists and the top 10 iVents consisted of therapeutic drug monitoring, renal dose monitoring, profile review (extensive), profile review (standard), non-formulary/restricted drug, pharmacy dosing consult service, chemotherapy order review, patient counseling/education, drug therapy recommendations, and core measures.

Conclusion: The performance evaluation process is intended to encourage constructive dialogue between employee and supervisor and is used to build upon strengths while also identifying areas of improvement that will allow the employee to be more effective and efficient. While the impact pharmacists have on patient care is ultimately a subjective matter, the utilization of intervention documentation in Epic serves an important objective role in evaluating pharmacist performance. Therefore, standardization based on patient-cases would be beneficial in maintaining consistency in performance evaluations.

Submission Category: Leadership

Submission Type: Descriptive Report

Session-Board Number: 7-167

Poster Title: Med-pharm union: flipping the script on inter-professional development

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Purpose: Collaboration and communication between healthcare professionals of different disciplines has become increasingly important in providing excellent patient care and improving patient outcomes. Although inter-professional accreditation standards exist for colleges of pharmacy, students often desire more opportunities to interact with their health professional colleagues. The purpose of Med-Pharm Union is to enhance pharmacy and medical students socially, scholastically, and professionally. This project expands upon current inter-professional activities and provides pharmacy and medical students with avenues to collaborate in and out of the classroom. The ultimate goal is to aid in the development of versatile, integrative, and empowered practitioners.

Methods: Two student leaders, one from pharmacy and one from medicine, met to evaluate if formation of an inter-professional organization would be possible. After deliberation, it was decided to assemble a team of student leaders from each respective college. Student leaders were appointed based on their ambition, organizational involvement, and innovative mindsets. The inaugural board consisted of five students from both the colleges of pharmacy and medicine. Meetings were held on a monthly basis with oversight from two faculty advisors. Each meeting was aimed at identifying mechanisms to facilitate cooperation and collaboration between the students of the two disciplines. Due to the incorporation of key stakeholders from student organizations, Med-Pharm Union was able to seamlessly promote inter-professional activities.

Results: Med-Pharm Union promoted and encouraged intercollegiate participation in events hosted by existing student organizations from both the medical and pharmacy colleges. The scopes of these events ranged from social (volleyball tournament), to scholastic (partnership

pairing), to professional (organ donation challenge). Moreover, other student organizations gained from the advent of Med-Pharm Union too. Over ten events were enhanced as a direct result of Med-Pharm Union, with more on the horizon. Participation in events, along with fundraising, improved with the increased reach to students. Finally, Med-Pharm Union was well received by both student bodies, gaining official recognition from each college's student governments.

Conclusion: Med-Pharm Union has been a great addition to the University of Cincinnati Academic Health Center and is a model that can be reproduced at other academic medical centers across the country. In the future, incorporation of the colleges of nursing and allied health sciences is desired.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 7-168

Poster Title: Evaluation of the timing of a pharmacist-driven group smoking cessation program for women at a federally qualified health center

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Purpose: The Cincinnati Health Department (CHD) partners with a local non-profit Cradle Cincinnati to reduce smoking rates of pregnant women. Hamilton County ranks in the bottom 10 percent of counties for fetal demise. This project was developed to determine the interest in group smoking cessation classes with current smokers and the timing of these classes from a diverse socioeconomic and cultural patient population.

Methods: The institutional review board approved this needs assessment. Survey takers were selected from one CHD site. One hundred patients were asked to complete the survey while in the waiting area. Male and female patients over the age of 18 were selected, as were both smokers and non-smokers. Only smokers were asked what type and how much tobacco was used, their readiness to quit on a scale of 1 to 10, and what type of intervention would they prefer to use. All respondents were asked the time of day that they are most available and how often would they want the class to meet.

Results: Of the 100 people surveyed, 33 were smokers, all of which used cigarettes, one additionally e-cigarettes and one also used cigars. The median amount of use was 0.5 cigarette packs per day. The median readiness to quit was 10 out of 10. 23 smokers wanted to use medications, 14 selected one-on-one sessions, 13 selected group sessions, 12 selected phone call or text message, and 4 selected quit line. The most common time of day available was evening (49) followed by morning (23). The preferred frequency to meet was weekly (45) followed by every other week (27).

Conclusion: Based on the results of the needs assessment, the Cincinnati Health Department will be implementing an option for group smoking cessation classes. The other four options are already offered by providers at the clinics. The classes will be in the evening every week. Further studies will evaluate the effectiveness of the group classes for this patient population.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 7-169

Poster Title: Integrating pharmacy services in an accountable care organization

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Purpose: Interprofessional collaboration is becoming a commonly used model in every aspect of care to promote patient-centered care. Studies show that utilizing pharmacists improves disease management, increases patient and provider satisfaction, and advances patient outcomes. There is an anticipated shortage of primary care health care providers in the future and pharmacists can contribute by filling that void. The purpose of an Accountable Care Organization is to improve quality and diminish health care costs by developing a network of clinicians and hospitals that focus on financial and clinical outcomes. This report describes the incorporation of pharmacy services into an accountable care organization.

Methods: A number of physician networks in the United States were selected to participate in the Centers for Medicare and Medicaid Services Comprehensive Primary Care Initiative program. This was a four-year multi-payer program that offered population-based care management fees and shared savings opportunities to participating primary care practices that focus on five comprehensive primary care initiatives. Incorporation of pharmacy services into these system initiatives allowed for development of the following projects through collaboration between the University of Cincinnati and Saint Elizabeth Physicians Ambulatory Pharmacy Resource Coordinators: evaluation of provider use of high risk medications in the elderly, evaluation of medication adherence, evaluation of the management of chronic obstructive pulmonary disease exacerbations, and evaluation of the management of osteoporosis. High risk medications prescribed to the elderly were identified and an electronic intervention including therapeutic alternatives was developed to notify physicians. Improving management of chronic obstructive pulmonary disease exacerbation entailed identification of system adherence for diagnosed adults who received both a systemic corticosteroid within fourteen days and a bronchodilator within thirty days of discharge. Evaluation of adherence to

medication adherence quality measures was performed. Pharmacy collaborated with social work to administer and evaluate adherence questionnaires for eligible patients. Measurement of adherence to the osteoporosis measure entailed identification of patients presenting with a fragility fracture who received appropriate screening for osteoporosis or who had been initiated on osteoporosis medications.

Results: As a result of collaborating with other health care professionals, forty-two patients receiving health care from eighteen physicians successfully discontinued a high risk medication. The primary focus was on five high risk medications: cyclobenzaprine, glyburide, digoxin, amitriptyline, and promethazine. Based on data collected cyclobenzaprine and glyburide proved to be the easiest medications to change; therefore, future interventions will target them specifically. Sixteen out of forty-six clinical encounters for patients not meeting criteria for chronic obstructive pulmonary disease resulted in spirometry requests or medication changes. The medication adherence initiative with social work promoted adherence techniques within the workflow of seven different social workers and identified patients with potential barriers in addition to providing solutions to increase medication adherence. Eighteen patients with a fragility fracture who met the criteria for osteoporosis screening or treatment were identified. Notifications were sent to physicians to notify them of patients at risk for developing osteoporosis or osteoporotic fractures. Each initiative proved to have a positive effect on quality of care.

Conclusion: Incorporating pharmacy services into an accountable care organization has demonstrated to improve quality of care, patient satisfaction, and therapeutic outcomes. The value and utilization of pharmacists as part of an interprofessional care team is only increasing as demonstrated by the Saint Elizabeth Physicians Pharmacy Team. These initiatives successfully improved patient-centered care and continued execution will benefit patients as well as health care networks.

Submission Category: General Clinical Practice

Submission Type: Evaluative Study

Session-Board Number: 7-170

Poster Title: Impact of pharmacists' post-discharge follow-up intervention on the prevention of medication-related readmissions

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Purpose: Medication errors occurring upon hospital discharge increase the risk of re-hospitalization within 30 days. Pharmacist intervention in transitional care has the opportunity to reduce such rates. The purpose of this study was to evaluate the impact of pharmacist led post-discharge follow-up and its role in the prevention of medication-related acute care episodes (MACEs) in a community hospital setting.

Methods: This study was a retrospective analysis of post-discharge follow-up interventions specific to UC Health – West Chester Hospital during a 6-week time period. Results from this single site were part of a larger research analysis conducted by Cedars-Sinai Medical Center in Los Angeles, California. Upon hospital admission, a pharmacy led medication history and reconciliation (MH&R) was routinely conducted for patients admitted through the emergency department. Patients with a completed MH&R were identified during the study period for post-discharge follow-up. Follow-up occurred within 72 hours of hospital discharge and included pharmacist review of prior to admission medications, hospital medications and physician discharge instructions. Pharmacist identified drug related problems (DRPs), including medication errors or discrepancies, were resolved with the discharging physician and a follow-up call was arranged with the patient. Patient contact certified that new medications were acquired and initiated as instructed and education was provided as needed. Identified DRPs were retrospectively classified by severity using the modified National Coordinating Council for Medication Error Reporting and Prevention (mNCC MERP) scale. A team of pharmacists and two physicians reviewed DRPs to determine if a MACE was prevented by pharmacist follow-up along with the likelihood of hospital readmission. Outcome measures included number of identified DRPs and MACEs, DRP severity, readmission likelihood and the percentage of MACEs

prevented. Secondarily, readmission rates and patient demographics were collected and examined.

Results: A total of 121 patients were identified for post-discharge pharmacy intervention and were included in this analysis. A total of 66 patients (54.5 percent) had a post-discharge review completed, with a follow-up call completed for 53 patients (43.8 percent). During the study period, the pharmacy team identified 39 DRPs and 37 MACE cases. Of the 39 DRPs, 3 were classified as life threatening, 34 as severe and 2 as a low capacity for harm. Once reviewed by a physician, the readmission likelihood of each MACE was categorized into very likely, somewhat likely, and not likely as 25, 6, and 6, respectively. Overall, 47.2 percent of MACEs were prevented with pharmacist post-discharge follow-up.

Conclusion: Pharmacist discharge medication reconciliation and review results in identification and prevention of possibly harmful DRPs. Although intervention was conducted with a limited sample of patients, the study results suggest that pharmacist discharge services can have a potentially significant impact on the reduction of 30-day health system readmission rates.

Submission Category: Emergency Medicine/ Emergency Department/ Emergency Preparedness

Submission Type: Evaluative Study

Session-Board Number: 7-171

Poster Title: Financial impact of implementation of pharmacy technician driven medication history program in a community hospital

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Purpose: Medication errors not only have the ability to harm a patient, but they also add additional health care expense. One way to minimize medication errors is through the use of extended pharmacy services such as medication histories, however, this process does come with a cost. The purpose of this study was to compare the cost of implementation of a pharmacy technician driven medication history program to its benefits through the avoidance of medication related errors.

Methods: This study was a non-randomized, retrospective cost-benefit analysis completed at a 180 bed community hospital over a three-month period, February 2016 - April 2016. This study has been approved by an institutional review board. Patients were included for review if they had their medication history completed on admission by a member of the medication reconciliation team, which included both pharmacists and technicians. Patients with incomplete data records during the study time period were excluded. Items not classified as medication were also excluded. As a part of the standard of care at our institution, interventions were documented manually for reporting purposes. Interventions were then evaluated retrospectively to determine the cost avoidance of a potential adverse drug event (ADE). Medication histories completed by another health care professional, then re-reviewed by the pharmacy medication reconciliation team, were analyzed. This was done by multiplying a preassigned probability of adverse advent, based on drug class, by the cost of an ADE. The summation of all products were then compared to the cost of running the program to determine if the implementation of the program renders a positive cost benefit ratio. Additional data collected included patient demographics, type of medication modification, time

to complete a mediation history, number of allergies clarified, and medication list status (e.g. complete, incomplete).

Results: A total of 1,294 medication histories were completed during the study period with 6,302 modifications made to the medication lists and 1,240 allergies clarified. Of those medication histories, 399 (30.8%) were completed by another healthcare professional then re-reviewed by the pharmacy team prior to the patient's admission. The medication modifications made in this group totaled 1,065, of which 906 were included in the cost-benefit analysis. The results of the cost-benefit analysis demonstrated a ratio > 1, thus proving to be a valuable process during the study time period.

Conclusion: Implementation of a pharmacy technician driven medication history program was found to be a valuable process after undergoing a cost-benefit analysis. Even after review by another healthcare professional, over thirty percent of medication lists need modification which put patients at an increased risk of ADE's. Further review of standard medication history processes is warranted.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 7-172

Poster Title: Investigating depression, suicidal risk, and seizure disorder with varenicline and bupropion: a retrospective FDA Adverse Event Reporting System database study

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Purpose: Counseling and smoking cessation medications can double the chance a smoker who tries to quit will succeed. In 2006, after varenicline (Chantix) was approved, providers and patients began reporting adverse events, including depression and suicidal risk, to the FDA Adverse Event Reporting System (AERS) database. Rare occurrences of seizures were also reported in patients who had no prior history or who had a seizure disorder which was controlled. The purpose of this project was to analyze the percent total of reported adverse events and compare annual trends from the FDA AERS database between varenicline and bupropion.

Methods: Using a descriptive retrospective study design, the FDA AERS data from 1997 to 2016 was extracted to analyze and compare the percent of depression, suicidal risk, and seizures reported among patients taking varenicline, bupropion, and nicotine replacement products (gum, lozenge, patch). Nicotine replacement products served as the comparison group due to infrequent reports for these adverse events in the published literature after decades of both prescription and over-the-counter availability.

Results: A total of 294,024 adverse events were reported to the FDA AERS database including 145,163 for varenicline, 59,891 for nicotine replacement products, and 88,970 for bupropion. Varenicline had the highest percent of depression (5.33%), suicidal ideation (2.50%), and suicide attempt (1.92%) reported, compared to bupropion (1.24%, 0.68%, and 0.29%) and nicotine replacement products (0.68%, 0.29%, and 0.08%), respectively. However, bupropion had the highest percent of seizures reported (0.04%) followed by nicotine replacement products (0.03%) and varenicline (0.02%).

Conclusion: Varenicline had the highest percent total of reported adverse events for depression and suicidal risks compared to bupropion and nicotine replacement products. These findings are in contrast to those in recent published literature. Interestingly, the percent of reported seizures with varenicline was lower but the overall number of events was higher. This was due, in part, to the much higher overall total adverse events reported with varenicline therapy. Interpretation of these findings must take into account certain limitations related to database mining research. Further pharmacoepidemiologic studies are warranted.

Submission Category: Infectious Diseases

Submission Type: Evaluative Study

Session-Board Number: 7-173

Poster Title: Utilizing the FDA Adverse Event Reporting System database to investigate musculoskeletal adverse events which are more prone with a fluoroquinolone

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Purpose: Antimicrobial stewardship of fluoroquinolones is crucial as resistance patterns emerge and their toxicity profile becomes more defined. In May 2016, the FDA advised restricting fluoroquinolone use for certain uncomplicated infections due to reports of disabling side effects that can involve the tendons, muscles, joints, and central nervous system. These serious side effects outweigh the benefits for patients with uncomplicated infections. The purpose of this study was to describe annual trends from the FDA Adverse Event Reporting System (AERS) database associated with each fluoroquinolone.

Methods: Using a descriptive retrospective study design, adverse event data from 1997 to 2016 was extracted from the FDA AERS database to analyze the percent total of reported adverse for tendonitis, tendon rupture, joint swelling, and hallucinations reported among patients taking ciprofloxacin (Cipro), gemifloxacin (Factive), levofloxacin (Levaquin), moxifloxacin (Avelox), and ofloxacin (Floxin).

Results: A total of 294,024 adverse events were identified including 258,451 for ciprofloxacin; 2,489 for gemifloxacin; 317,560 for levofloxacin; 123,231 for moxifloxacin; 16,582 for ofloxacin. Levofloxacin had the highest percent of reported tendonitis (0.49%) and tendon rupture (0.47%), compared to ciprofloxacin (0.26% and 0.16%), gemifloxacin (0.12% and 0.20%), moxifloxacin (0.22% and 0.17%), and ofloxacin (0.40% and 0.15%), respectively. Levofloxacin had a gradual increase in reported cases of tendonitis, tendon rupture, joint swelling, and arthralgia from 1998 – 2012, but the adverse events dropped suddenly in 2013 (tendonitis: 264 to 79; tendon rupture: 255 to 74; joint swelling: 110 to 24; arthralgia: 349 to 97). Additionally,

the highest reported cases of hallucinations was for ciprofloxacin (n = 275) and levofloxacin (n = 279) compared to gemifloxacin (n = 14), moxifloxacin (n = 188), and ofloxacin (n = 16).

Conclusion: Fluoroquinolones are widely used, in part, due to their broad spectrum of antibacterial activity. Levofloxacin had the highest percent total of reported adverse events for tendonitis and tendon rupture compared to ciprofloxacin, gemifloxacin, moxifloxacin, and ofloxacin using the FDA AERS database. In 2013, the total amount of adverse events for tendonitis, tendon rupture, joint swelling, and arthralgia did decrease for levofloxacin. This may have been due to the addition of a FDA warning regarding an increase in incidence of musculoskeletal disorders and/or more judicious use of fluoroquinolones based on resistance patterns and changing clinical guidelines.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 7-174

Poster Title: Determining resident physicians concerns in selecting an anti-depressant medication using best-worst scaling surveys

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Purpose: The goal of this project was to explore factors most and least concerning to resident physicians when selecting an anti-depressant medication for their patients. The ultimate goal is to integrate patient surveys from the same practice and use these data to create a shared decision making tool to give the patient a part in medication selection based on their specific concerns.

Methods: A Best Worst Scaling (BWS) survey was conducted to assess the relative importance of 11 anti-depressant therapy attributes, each comprised of two levels, to medical residents in a family practice center. BWS is a type of stated-preference choice model commonly used to assess individuals' priorities. Attributes explored include medication costs, the ability to continue therapy in older age, and side effects such as the ability of the medications to cause weight gain, insomnia, somnolence, sexual dysfunction, nausea, diarrhea, constipation, drowsiness, hypertension, and the presence of a discontinuation syndrome. Resident physicians in family medicine and psychiatry programs were asked to evaluate 12 sets of 6 attributes and select the least and most concerning attribute in each set. The number of times an attribute level was selected as the most concerning and the least concerning was summed across the 12 sets. The mean score was estimated by dividing the most concerning minus the least concerning divided by the number of times an attribute level appeared in the 12 sets. This project was exempted from IRB approval.

Results: Twenty-one resident physician surveys were collected and analyzed. Residents in the family practice program represented 80% of respondents and family/psychiatric medicine represented the remaining 20%. Half of the respondents were first year residents, 20% were second year residents, and 30% were third year residents. Attributes were examined using count analysis to assess the ones that were the most and least concerning to resident physicians when selecting an antidepressant medication. The most concerning attributes were "Medication causes weight gain in 1 of 4 patients" (+0.72) and "Medication causes sexual dysfunction in both men and women" (+0.62) while the least concerning were "Medication will need to be changed or discontinued when you turn 60 years of age" (-0.65) and "Medication can be continued when you are older" (-0.52).

Conclusion: This study demonstrates how BWS surveys can be utilized as a tool for practitioners to accurately elicit what they perceive is the most and least concerning attributes in selecting an antidepressant medication. BWS surveys eliminate the bias found in regular "high-low" surveys and accurately ranks all the items, not just the extremes. Finally, these data can be incorporated with patient surveys to identify gaps in understanding and importance of attributes that can be bridged through medication counseling by a healthcare provider such as a pharmacist.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 7-175

Poster Title: Optimizing unfractionated heparin dosing for acute coronary syndrome in obese adults

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Purpose: The 2014 American Heart Association/American College of Cardiology Guideline for the Management of Patients With Non–ST-Elevation Acute Coronary Syndromes recommended initial unfractionated heparin dosing of 60 IU/kg (maximum 4000 IU) with initial infusion of 12 IU/kg per hour (maximum 1000 IU/h) . This recommendation often times is not sufficient to achieve therapeutic aPTT or Anti-Xa levels in obese patients. The purpose of the current abstract is to utilize retrospective analysis to determine if a more aggressive initial dosing regimen is warranted for acute coronary syndrome anticoagulation in the obese population based on required heparin doses over a 6 month period.

Methods: The study has been IRB approved. Data collection occurred at a community medical center. An Epic orders report was ran for unfractionated heparin ordered over a six month time period. Data consolidation was performed, accepting only orders with a patient weight greater than 85 kilograms, combining duplicate orders, and combining duplicate patients during the same inpatient stay. Retrospective analysis utilizing Epic medication orders, care provider notes, and chart review was used to determine the indications for the unfractionated heparin orders. Indications that were accepted for acute coronary syndrome include "acute coronary syndrome", "unstable angina", "myocardial infarction", and "chest pain".
Retrospective chart review was performed utilizing chart review and medications orders in order to collect patient weight, patient age, time of first unfractionated dose given, time to first therapeutic Anti-Xa level, final unfractionated heparin dose required to achieve therapeutic Anti-Xa level, final rate of unfractionated heparin, bolus doses, and number of supra-therapeutic Anti-Xa levels with adverse drug events reported.
Utilizing this data, statistical analyses were performed to determine average dosages needed to achieve therapeutic Anti-Xa levels for patients while taking adverse drug events into

consideration. Subset analyses separating patients based on a weight of 125 kilograms as well as based on an age of 70 years old.

Results: The Epic orders report was ran between November 12, 2015 and May 11, 2016, returning 14,192 results. Following data consolidation, 544 patients were analyzed for an acute coronary syndrome indication with 78 patients and orders meeting criteria for analysis and being included in the data set. Of these 78 patients, 11 were greater than 125 Kilograms and 6 were greater than 70 years old.
The average time to therapeutic Anti-Xa levels was 14:08:15 (plus/minus 8:30:36). The average final dose of unfractionated heparin required to reach therapeutic Anti-Xa levels was 13.203 (plus/minus 2.58) units / Kilogram / hour. These results indicate that it takes larger heparin doses on average and longer time periods using standard heparin dosing recommendations to reach therapeutic Anti-Xa levels in the obese population. The total number of patients requiring greater than 12 units / Kilogram / hour was 53 (68 percent).
While higher doses were required in a large proportion of the study population, the percentage of supra-therapeutic Ant-Xa levels was low at only 19.23 percent and the number of bleeding incidents reported was only 2 with neither of them being major bleeding.

Conclusion: Patients being treated for acute coronary syndrome with unfractionated heparin who are considered obese, on average, required higher doses than the current recommended American Heart Association/American College of Cardiology maximum doses. While therapeutic doses are variable, higher doses do not seem to be associated with a significant increase in bleeding incidents. Initiating heparin at higher doses may lead to quicker achievement of therapeutic Anti-Xa levels while not substantially increasing the risk of bleeding to the patient.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Case Report

Session-Board Number: 7-176

Poster Title: Alcohol Use Disorder Pharmacotherapy: A Case Report

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Purpose: Hyponatremia is a rare, yet potentially dangerous side effect, which can be seen with use of any antidepressant. Current evidence has shown that selective serotonin reuptake inhibitors (SSRIs) and venlafaxine, a serotonin-norepinephrine reuptake inhibitor (SNRI), have a higher relative risk for development, especially when combined with cofactors, such as age and concomitant medications, which can increase risk. Hyponatremia, defined as a serum sodium level below 135 mEq/L, is the most common electrolyte disorder seen in clinical practice and can result in patient hospitalization and be life-threatening. This surveillance program was designed to identify patients from an integrated multidisciplinary program of assertive community treatment (IMPACT) who may be at risk for antidepressant-induced hyponatremia. A literature review was undertaken to identify case reports of hyponatremia with antidepressant therapy. A retrospective chart review was then performed to identify patients for hyponatremia with inclusion criteria of adults 18 years or older from an IMPACT population who were currently receiving antidepressants. Lab work was then obtained with serum sodium values to identify those patients with antidepressant-induced hyponatremia noted as a serum sodium level of less than 135 mEq/L. Type of antidepressant and date of most recent lab draw were evaluated. Descriptive statistics are used with non-linear statistics applied to categorical variables as appropriate. Data were collected from 66 charts. 38 charts (56%) qualified for review. Six SSRIs (citalopram, escitalopram, fluoxetine, sertraline, fluvoxamine, and paroxetine) along with duloxetine, bupropion, trazodone, mirtazapine, and buspirone were used. Nineteen patients (50%) were on one of the six SSRIs. A total of thirteen patients are on more than one antidepressant. Hyponatremia was identified for two patients. Both were on two or more antidepressant medications with one being trazodone. The lack of timely lab draws appeared problematic. Eight patients had no lab values located in their electronic medical records and seven patients had either an antidepressant dosage increase or an additional antidepressant medication added to their medication regimen but had no lab draws after initiation. When trends in lab values were available, six patients had a downward trend in their serum sodium levels. Antidepressant-induced hyponatremia was not identified as problematic. However, the

lack of timely and recent lab draws could be the cause of this conclusion. For the six patients identified as potentially at risk, patient-specific follow-up will be instituted with additional monitoring, if needed. The need for lab work for the eight patients missing data will be reviewed as will the lack of data for the seven patients with changes in their antidepressant regimens. Data will be reviewed in one year.

Methods:

Results:

Conclusion:

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 7-177

Poster Title: Comparison of amikacin pharmacokinetics in neonates and infants with and without congenital heart disease

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Purpose: There are no studies evaluating use of amikacin in neonates and infants with congenital heart disease (CHD). The purpose was to compare amikacin pharmacokinetics and acute kidney injury (AKI) in neonates and infants with and without CHD.

Methods: This was a descriptive, retrospective study of neonates and infants who received amikacin from January 1, 2013 through June 30, 2016. The study was institutional review board approved and the data was taken from the institution's electronic medical record (EMR). CHD infants were classified as cyanotic or acyanotic. Controls were matched in a 2:1 fashion according to postmenstrual age (PMA). Data collection included demographics, amikacin regimen, renal function, and pharmacokinetic parameters. The primary objective was to compare the volume of distribution (Vd) and clearance (CL) in neonates and infants with CHD versus controls. Secondary objectives included comparison of elimination rate (Ke), half-life (t1/2) of amikacin, and incidence of AKI secondary to amikacin between groups. AKI was defined as a reduction in urine output less than 0.5 ml/kg/hr for greater than 8 hours, an absolute increase in serum creatinine (SCr) by 0.3 mg/dL, or an increase in SCr greater than 50% from baseline. Between-group analysis were performed using Chi-square or Fisher's exact analysis for categorical variables and Student's t-test or Wilcoxin-Mann-Whitney test for continuous variables, as appropriate with a p-value less than 0.05.

Results: Thirty-two CHD and sixty-four controls were included. There was no difference in the PMA between the CHD and controls, 34.1+4.7 versus 34.2+4.8 weeks (p=0.84). There was no difference in the Vd (0.46+0.10 versus 0.45+0.12 L/kg, p=0.58) or CL (0.047+0.014 versus 0.045+0.014 L/kg/hour, p=0.39) between the CHD and controls. A greater incidence of AKI was noted in the CHD group, but this was not significantly different, 5 (15.6%) versus 5 (7.8%) (p=0.29).

Conclusion: Based on preliminary results, there is no difference in pharmacokinetic parameters noted between groups. There was a greater percentage of neonates and infants with CHD with AKI. Due to the small sample size, a larger study is needed to ascertain if pharmacokinetic differences exist in those infants with and without CHD.

Submission Category: Ambulatory Care

Submission Type: Evaluative Study

Session-Board Number: 7-178

Poster Title: Initiating lumacaftor/ivacaftor therapy in a cystic fibrosis center

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Purpose: Lumacaftor/ivacaftor, a novel therapy for cystic fibrosis patients 12 and older that are delF508 homozygous, became available in July 2015 with only short term studies completed at the time of approval. The goals of this study are to determine the safety and efficacy of lumacaftor/ivacaftor therapy; determine the nature and prevalence of adverse effects reported; and determine the number of patients requiring dose adjustment or discontinuation in a single cystic fibrosis care center.

Methods: This is a retrospective chart review of patients at the Tulsa Cystic Fibrosis Center who were eligible for therapy between July 2015 and July 2016. Pulmonary exacerbations, FEV1, and BMI will be collected for 1 year prior to starting lumacaftor/ivacaftor and for months 3, 6, 9, and 12 after. Frequency of adverse effects, dose adjustments, liver function testing, and medication discontinuation will also be recorded.

Results: Thirty-seven patients were eligible to receive therapy with lumacaftor/ivacaftor. Of these 37 patients, 23 have started therapy and 4 have been excluded. Reasons for not starting therapy include lack of interest, loss to follow up, and awaiting transplant. Of the 23 patients that have started therapy, 16 (70%) reported adverse effects including: dyspnea, heartburn, nausea/vomiting, elevated INR, menstrual irregularities, sedation, constipation, and diarrhea. Of these adverse effects, dyspnea (26%) and diarrhea (17%) were most common. Due to adverse effects, the initial starting dose was decreased for patients beginning in October of 2015. Five patients (22%) discontinued therapy, two of which have since restarted. Six patients (28%) have been hospitalized and nine (39%) have required oral antibiotics for exacerbations since starting therapy. At 3 and 6 months, no patients have had significant elevations in AST,

ALT, or bilirubin. Data will continue to be collected to assess lung function, BMI, and exacerbations before and after therapy.

Conclusion: Adverse effects have been common and have prompted the center to create a dose titration schedule for new patients. Many eligible patients are not receiving lumacaftor/ivacaftor after 12 months of availability, which will continue to be further explored. Data collection will continue to assess efficacy and safety.

Submission Category: Pediatrics

Submission Type: Descriptive Report

Session-Board Number: 7-179

Poster Title: Identification of detectable trough concentrations in critically-ill infants and children without cystic fibrosis receiving nebulized tobramycin

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Purpose: Tobramycin is the most commonly administered inhaled antibiotic in non-cystic fibrosis (CF) patients. Several reports have noted patients with detectable trough concentrations and acute kidney injury (AKI). The purpose was to describe the incidence and clinical characteristics of critically-ill infants and children with detectable concentrations receiving inhaled tobramycin.

Methods: This retrospective, case series included children < 18 years receiving inhaled tobramycin between January 1, 2010-June 30, 2016. Patients with CF, concomitant IV tobramycin, or no serum tobramycin concentrations were excluded. Baseline demographics, inhaled tobramycin regimen, and renal function data including serum creatinine (SCr), estimated glomerular filtration rate (eGFR), and urine output (UOP) were collected to assess renal function at baseline and throughout the duration of inhaled tobramycin. The primary objective was to determine the incidence of detectable tobramycin trough concentrations ≥ 0.5 mcg/mL. Secondary objectives included identifying the number of patients with AKI according to the pediatric-modified Risk, Injury, Failure, Loss and End-stage kidney disease (RIFLE) criteria and identifying potential risk factors for detectable trough concentrations. Descriptive and inferential statistics were performed.

Results: Twenty-two were included for analysis. Ten (45.5%) had detectable concentrations, with a mean concentration of 1.1 mcg/mL (IQR 0.5-2.0). There was a numerical difference in the age (years) between the non-detectable versus detectable groups, 1.65 (IQR 0.8-6.3) vs 0.8 (0.6-

1.8), p=0.45. Patients in the detectable group received a higher mg/kg dose than non-detectable group, 67.5 mg/kg (9.7-37.3) vs 24.5 (8.4-40.6), p=1.0. Most patients (81.8%) received every 12 hour dosing. A greater percentage of children in the non-detectable group versus detectable group were on the mechanical ventilator, 12 (100%) vs 8 (80%), p=0.20. There was a numerical difference in the number of infants with a tracheostomy tube in the detectable versus non-detectable group, 8 (80.0%) vs 7 (58.3%), p=0.38. There was no significant difference in the children with detectable versus non-detectable troughs who developed AKI, 3 (30.0%) versus 1 (8.3%), p=NS.

Conclusion: Almost half of patients that had concentrations obtained had a detectable concentration. The majority of these were younger in age with a higher mg/kg dose, though this was not statistically significant. A higher but not significant difference in AKI was noted in patients with detectable concentrations. Clinicians should monitor serum trough concentrations in critically-ill children receiving inhaled tobramycin.

Submission Category: Oncology

Submission Type: Case Report

Session-Board Number: 7-180

Poster Title: A rare Trichosporon and Alternaria coinfection in a neutropenic bone marrow transplant patient

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Purpose: This case describes the management of an immunocompromised patient infected by rare fungal opportunistic pathogens, Trichosporon and Alternaria species. The patient is a 36 year-old male with acute myeloid leukemia (AML) presenting for an allogeneic, matched unrelated donor, fully myeloablative hematopoietic cell transplantation (HCT). Prior to HCT, he had failed three induction chemotherapy regimens for his AML and after the fourth induction became eligible for HCT; however, he continued to be pancytopenic since diagnosis, approximately four months. During his previous chemotherapy, there was a suspicion of a fungal pneumonia. A chest computerized tomography (CT) scan showed left upper lobe pneumonia with consolidation and central necrosis; however, bronchial alveolar lavage (BAL) showed no growth and beta-D glucan and aspergillus antigen were negative. He was placed on voriconazole, but treatment was complicated by hallucinations. Antifungal therapy was switched to posaconazole; however he developed mild transaminitis after two weeks of treatment and since the patient was being admitted for HCT it was decided to change therapy to micafungin for the duration of HCT to minimize hepatic toxicity. The patient developed a persistent neutropenic fever starting on day -1 of HCT, necessitating his placement on broad spectrum antibiotics. He had a CT scan showing new nodule lung lesions and micafungin was changed to liposomal amphotericin B. Blood cultures grew out yeast. The patient continued to be febrile despite the change in antifungal agent and a BAL was performed. The BAL grew out yeast (not Cryptococcus) and Alternaria species. Concurrently the patient developed sinusoidal obstructive syndrome (SOS) causing the medical team to be cautious about using liver active medications such as triazole antifungals. Fluconazole was added to liposomal amphotericin B once the yeast species was identified as Trichosporon beigelli. Blood cultures remained positive

for 9 days and he cleared the Trichosporon beigelli the same day his white count started to recover and three days after adding fluconazole to the antimicrobial regimen.
Trichosporon are yeast-like opportunistic pathogens that are known to cause superficial and bloodstream infections in immunocompromised patients. Trichosporon are resistant to echinocandins and amphotericin B, but can be sensitive to triazoles. Previous case reports list voriconazole as the preferred triazole in trichosporonemias. Alternaria are dematiaceous hyphomycetes that very rarely cause pneumonia. Alternaria species have limited susceptibility to fluconazole and variable susceptibility to amphotericin B, voriconazole and posaconazole. This patient's presentation differs from other documented Trichosporon infections as the treatment course was complicated by Alternaria and his inability to take voriconazole, posaconazole or isavuconazole due to previous intolerance of voriconazole and his current hepatic insufficiency. In this patient the fluconazole was continued for four weeks from his first negative culture to treat the trichosporonemia. The liposomal amphotericin B was continued for four weeks after he had engrafted to treat Alternaria fungal pneumonia. The patient's liver function returned to normal following resolution of the SOS, allowing posaconazole or isavuconazole to be an option for further suppression of his fungal coinfection while he remains on immunosuppression.
The management of fungal infections in immunocompromised patients is clinically significant to pharmacists working in the oncology setting.

Methods:

Results:

Conclusion:

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Case Report

Session-Board Number: 7-181

Poster Title: Effects of medication switch from paliperidone 1-month to 3-month formulations in patients with schizophrenia

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Purpose: Three patients enrolled in an Assertive Community Treatment (ACT) program were switched from paliperidone palmitate 1-month (PP1M) to the 3-month (PP3M) formulation after a history of psychiatric stability while receiving PP1M. Each patient elected a trial of PP3M due to fewer injections annually.

Patient 1 had been stable on PP1M injections for four years before switching to PP3M. During weekly scheduled visits, the patient reported no new or worsened side effects and believed this formulation had equal symptom control. Clinicians agreed with the patient's assessment of effectiveness. While taking PP1M, twice daily oral benztropine (0.5 mg every morning and 1 mg every evening) was required to manage tremors and self-reported oculogyric crisis. Two months after the medication transition, the patient chose to reduce the dose of benztropine to 0.5 mg taken as needed due to fewer perceived extrapyramidal effects.

Patient 2 received PP1M injections for nine months prior to PP3M transition. Before this, the patient's prominent paranoid symptoms necessitated oral antipsychotic supplementation with the long-acting injectable (LAI). Oral olanzapine continued after the medication transition. The first two weeks following transition, the patient experienced heightened paranoia and worsened negative symptoms. These slowly resolved to baseline over the course of therapy. Patient 2 continues to receive PP3M.

Patient 3 had well-controlled symptoms while on PP1M for several months before transitioning to PP3M. Prior to taking LAI antipsychotics, the patient's auditory hallucinations presented as 'the Man'. Over weeks 4-8 of the PP3M injection timeframe, Patient 3 began experiencing command auditory hallucinations advocating harm to others, particularly one family member. The patient began hiding in his bedroom and sleeping excessively throughout the day. Symptoms slowly improved, but the family requested a return to PP1M with the next scheduled

PP3M injection. Since resuming the PP1M formulation, the patient and family have denied auditory hallucinations and reported better communication skills.
This case series illustrates a wide range of outcomes after switching antipsychotic formulations in patients with severe schizophrenia. Patient 1 preferred PP3M and encountered no negative consequences. Patient 2 reported moderate breakthrough symptoms, resolving after two weeks. Patient 3 experienced significant relapsed symptoms.
Clinicians considering converting psychiatrically stable patients, with a diagnosis of schizophrenia, from the PP1M to the PP3M formulations are encouraged to increase monitoring and consider individual patient characteristics. While clinical trials provided adequate data to support use of PP3M, strict exclusion criteria limited disease severity in the studied patient populations. In ACT programs or other teams treating patients with diagnoses of severe or treatment-resistant schizophrenia, these clinical trials may not be applicable. More research is needed to establish treatment guidelines and optimize utilization of PP3M in patients with severe or treatment-resistant schizophrenia.

Methods:

Results:

Conclusion:

Submission Category: Pediatrics

Submission Type: Evaluative Study

Session-Board Number: 7-182

Poster Title: Assessment of Sedative and Analgesic Regimens During Bedside Bevacizumab Intravitreal Injection in Preterm Infants with Retinopathy of Prematurity.

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Purpose: Bevacizumab intravitreal injection is an option for retinopathy of prematurity (ROP). However, there is a paucity of data regarding sedation during this procedure. The purpose of this study was to describe the sedative and analgesic regimens for a bedside intravitreal bevacizumab injection procedure.

Methods: This retrospective case series included infants receiving intravitreal bevacizumab injection for ROP between January 2012 to May 2016. Infants were excluded if bevacizumab was administered under general anesthesia in the operating room. Demographic data were collected, including feeding status and mode of respiratory support prior to procedure. Sedative and analgesic regimens were collected. Vital signs were collected prior to and during procedural sedation. Additional data included requirement for termination or delay of procedure, need for intervention (i.e., atropine, naloxone) during the sedation period, and time needed to return to baseline feeding and respiratory status. The primary objective was to describe the agents and doses of sedatives and analgesics utilized. The secondary objectives included identification of the number of patients requiring dose increases or decreases of sedatives and analgesics. In addition the number of patients with procedure success were identified, defined as completion of procedure without any interruptions or interventions required for cardiopulmonary adverse (CPA) events. CPA events were defined as bradycardia (heart rate < 60 beats per minute), decrease in oxygen saturation less than 85%, and hypotension [mean arterial pressure (MAP) < 30 in infants < 37 weeks postmenstrual age (PMA) and MAP < 45 in infants at > 37 weeks PMA] . Descriptive statistics were employed.

Results: Fifteen were included with a median PMA of 35.0 weeks (range, 32.1-39.6) and weight of 1.89 kg (range, 1.27-3.14). Eight (53.3%) were intubated for the procedure. In those patients, extubation occurred at a median of 33.5 hours (range, 7.2-175) after procedure completion. Fourteen (93.3%) were initiated on fentanyl infusions at a median dose of 2 mcg/kg/hr (range 1-4), and twelve (80.0%) received concomitant midazolam infusions at a median of 0.06 mg/kg/hr (range 0.03-0.2). All patients received a median of one dose of vecuronium (range 1-3) at 0.1 mg/kg prior to the procedure. Only one patient (6.7%) required an increase in their fentanyl and midazolam infusion. The median time to resume baseline feeds was 28.0 hours (range, 3.5-69.0). Five patients (33.3%) experienced one CPA event. Only one patient (6.7%) had a delay in the procedure due to CPA effects, and one patient (6.7%) required naloxone. Despite this, the procedure completed in all patients. However, based on the study definition, procedure success was achieved in 13 patients (86.7%).

Conclusion: The majority of patients received fentanyl and midazolam infusions with a dose of vecuronium just prior to the procedure. All patients completed the procedure. Approximately one-third of patients experienced a CPA event. Thirteen (86.7%) met the criteria for procedure success without CPA events requiring delay or intervention. Due to the heterogeneity in dosing, the results of this case series suggest the need for a standardized sedation protocol for bedside intravitreal bevacizumab injection procedure in neonates.

Submission Category: Cardiology/ Anticoagulation

Submission Type: Evaluative Study

Session-Board Number: 7-183

Poster Title: Treatment patterns and outcomes among inpatient cases of acute pericarditis

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Purpose: Landmark studies regarding the use of pharmacotherapy for the treatment of acute pericarditis are mostly comprised of European patients with idiopathic (viral) pericarditis. Currently, there is no literature available that assesses how landmark studies have influenced prescribing patterns and outcomes, particularly in the U.S.. Furthermore, it is currently unknown if pharmacotherapy may be of benefit in other forms of pericarditis. The purpose of this study was to assess prescribing patterns of pharmacotherapy within hospitalized patients treated for acute pericarditis, and to ascertain how pharmacotherapy is associated with recurrence of pericarditis, surgical interventions, or cardiac tamponade.

Methods: This study was a retrospective cohort analysis of an electronic medical record from an academic medical center spanning a time frame of January 2005 to December 2015. Medical chart abstraction was conducted based upon the following inclusion criteria: ≥18 years of age and presence of pericarditis. Presence of pericarditis was determined based on the criteria of two of the following: hallmark pleuritic chest pain, pericardial friction rub, diffuse ST segment elevation and/or PR segment depression on ECG, or new or worsening pericardial effusion; and/or a diagnosis of any pericarditis included in the medical chart. Patients were selected from the medical record using ICD-9 codes relevant to pericardial diseases. Logistic regression analyses were conducted to assess the association of a prescription for colchicine, aspirin, or an NSAID and a composite outcome of recurrence of pericarditis, surgical interventions, or cardiac tamponade. Independent predictor variables included: age, sex, comorbidities, medication use, presence of trauma, year, and diagnosis of idiopathic pericarditis. Approval by the Investigational Review Board (IRB) granted this study as exempt.

Results: Overall, 79 patients were included across the 10-year time-frame. The mean age was 43.0(+/-16.8), with 72.2% being female. The average height was 66.2(+/- 4.4) inches, weight 85.6(+/- 28.9) kg, and BMI 30.4(+/-10.3) kg/m2. Use of aspirin was reported in 34.2% of patients and NSAID use in 50.6%. Idiopathic pericarditis accounted for 54.4% of patients, while trauma-induced pericarditis occurred in 10.1%. Co-morbid conditions were present in 88.6% of patients. The composite outcome occurred in 74.7% of patients. Logistic regression analysis indicated that recurrence of pericarditis, surgery, or cardiac tamponade, was associated with a 78.2% lower adjusted odds of prescribing colchicine, aspirin, or an NSAID ($p = 0.009$), Additionally, cases involving recurrence of pericarditis, surgical intervention, or cardiac tamponade decreased by 32.1% per year ($p = 0.007$) and were associated with an 88.3% lower odds of NSAID prescribing ($p = 0.008$) and an over 10-fold higher odds of trauma-induced pericarditis ($p = 0.034$); no association was observed with either colchicine ($p = 0.119$) or aspirin ($p = 0.852$).

Conclusion: NSAID use was associated with a decrease in the composite outcome of recurrence of pericarditis, surgical intervention, and cardiac tamponade. This decrease in association was independent of several factors, including a diagnosis of idiopathic pericarditis. Recurrence of pericarditis, surgery, or cardiac tamponade, was associated with a lower odds of prescribing colchicine, aspirin, or an NSAID.

Submission Category: Pediatrics

Submission Type: Descriptive Report

Session-Board Number: 7-184

Poster Title: Evaluation of discharge medications in pediatric patients: A pilot study

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Purpose: Numerous studies have documented the risk of medication errors in the inpatient setting for pediatric patients. Recent data have also suggested that children may also be at risk for prescribing errors when discharged from the hospital. To date, no studies have qualified and quantified discharge prescriptions in hospitalized children. The objective was to characterize discharge prescriptions in children.

Methods: This was a descriptive, IRB-approved, retrospective pilot study in children < 18 years. Patients were included if they received >1 discharge prescription during January, April, July, and October 2012. Patients were excluded for missing data. Baseline demographics and medications prescribed at discharge were collected. The primary objective was to identify the mean number of discharge prescriptions. The secondary objective was to determine which drug classes are most commonly prescribed and the complexity of the prescriptions (e.g., dosage form, number of doses per day, need for extemporaneous preparation). Univariate analyses, including measures of central tendency and variability, were collected for data analysis. All analyses were performed using SAS v9.3.

Results: A total of 852 patients met the inclusion criteria. The majority (52.2%) were male, with a mean age of 6.2+5.6 years. Most patients (42.2%) were admitted and discharged from the General Pediatric Medical Service. The primary payer source was Medicaid (66.7%). The total hospital length of stay was a median of 3 days (range 1-185). Final results to be presented.

Conclusion: N/A

Submission Category: Infectious Diseases

Submission Type: Case Report

Session-Board Number: 7-185

Poster Title: Intrathecal administration of daptomycin for Enterococcus gallinarum meningitis: a case report

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Purpose: This case report describes the unsuccessful use of intrathecal daptomycin for the management of a central nervous system infection secondary to Enterococcus gallinarum. The patient was a 12 year old Hispanic female who weighed 62.7 kilograms. She was allergic to cefepime (rash) and sulfa antibiotics (hives). Prior to the index hospitalization, she was diagnosed with severe aplastic anemia. Workup of her anemia lead to a diagnosis of primary hemophagocytic lymphohistiocytosis (HLH) with macrophage activation syndrome (MAS), confirmed by a STX11 gene mutation. The patient's HLH/MAS was poorly controlled with dexamethasone, etoposide, and alemtuzumab. Her hospital course was complicated by bacteremias and fungemias due to immunosuppression, progression of HLH/MAS, and need for central venous access. Despite complications, the patient underwent hematopoietic stem cell transplant (HSCT) when clinically stable, approximately 3 months into her hospitalization. On HSCT day 3, peripheral blood cultures revealed E. gallinarum with intermediate resistance to vancomycin; port cultures of E. gallinarum revealed resistance to ampicillin and gentamicin, Enterococcus faecium resistant to ampicillin and gentamicin, and multidrug resistant Klebsiella oxytoca susceptible only to tigecycline.
On day 4 post-HSCT, she was receiving intravenous daptomycin 10 milligram per kilogram per day and meropenem, along with micafungin, pentamidine, and acyclovir for infection prophylaxis. She began developing headaches and significant mental decline. An extraventricular drain (EVD) was placed for hydrocephalus. The cerebrospinal fluid (CSF) from the EVD grew Gram positive cocci in chains, and daptomycin was increased to 12 milligram per kilogram per day in combination with vancomycin to target E. faecium.
On day 5, the patient had increased intracranial pressure and underwent craniotomy for evacuation of a subdural hematoma and empyema with placement of additional drains. The

CSF culture from the previous day revealed E. gallinarum resistant to ampicillin and penicillin, intermediate resistance to vancomycin, and sensitive to linezolid and daptomycin (minimum inhibitory concentration [MIC] of 2 microgram per milliliter). Daptomycin, vancomycin, and meropenem were discontinued; linezolid and imipenem-cilastatin were started. Overnight she experienced a seizure and further mental status decline. On day 6, imipenem-cilastatin was replaced with meropenem due to seizures. The following day, meropenem was stopped, and piperacillin-tazobactam started for enhanced enterococcal coverage.

On day 9, the patient experienced a left-sided focal seizure and was obtunded with no gag or cough reflex. The following day meropenem was started, and piperacillin-tazobactam was discontinued. Over the next 2 weeks, she continued to decline neurologically. On day 10, CSF revealed E. gallinarum susceptible to daptomycin (MIC 4 microgram per milliliter) and linezolid. A lumbar puncture was performed on day 14 with no growth; however, on day 20 the patient underwent EVD exchange and septostomy. Cultures subsequently revealed E. gallinarum resistant to linezolid. On day 21, the patient could open her eyes to stimulation and blink but was unable to track with her eyes. Daily intrathecal daptomycin 10 mg in 5 milliliters of normal saline was initiated.

On day 22, the patient's absolute neutrophil count (ANC) was detectable for the first time. However her neurologic status remained poor; linezolid was discontinued. Two hours following the second dose of intrathecal daptomycin, the CSF Gram stain from her EVD demonstrated Gram positive cocci. On day 25, intrathecal daptomycin was changed to every 48 hours based on previous case reports. On day 28, piperacillin-tazobactam was discontinued due to ANC recovery. On day 31, the patient was hypothermic and rigoring with worsening cerebritis, and the family withdrew care. Despite intrathecal administration of daptomycin, the patient's CSF cultures remained positive for E. gallinarum at death on day 36. Contrary to previous case reports, administration of intrathecal daptomycin did not achieve microbiological cure or improve neurologic status for this patient.

Methods:

Results:

Conclusion:

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 7-186

Poster Title: Oregon Medicaid policy evaluation: Safety edit for Attention Deficit Hyperactivity Disorder medications

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Purpose: This policy evaluation assessed the safety edit policy implemented in October 2014 in the Oregon Medicaid program for Attention Deficit Hyperactivity Disorder (ADHD) medications. Specifically, this study evaluates whether implementation of the safety edit has helped to improve prescribing of ADHD medications according to best practice standards. This is defined by the proportion of patients prescribed medications within the recommended age ranges, dose ranges, and with an appropriate indication. Additionally, due to the potential for cardiovascular adverse events and high abuse potential, this study also evaluated the proportion of patients receiving these medications with known precautions or contraindications.

Methods: Patients were included in this analysis if they had a paid fee for service (FFS) prescription drug claim for an ADHD medication or a denied FFS drug claim for an ADHD medication without pre-specified Explanation of Benefit (EOB) codes. To evaluate prescriptions based on best prescribing standards, a pre- and post- observational cohort was constructed to evaluate the policy. Patients with a paid or denied index prescription ADHD drug claim from July 2013 through June 2014 were defined as the control group. Patients with a paid or denied claim from October 2014 through September 2015 were defined as the study group. Using only FFS claims, the first ADHD medication paid or denied claim per patient during the study period was designated the index event (IE). Patients were excluded if they had Medicare Part D coverage as indicated by benefit packages, or if they had a prior claim within 90 days and had less than 75% days of combined FFS or coordinated care organization eligibility from 11 months prior to the

index month to 3 months after the index month (total of 15 months). Patient demographics, diagnosis, medication requested, final claim disposition, and potential contraindications to therapy were documented.

Results: There were 1,992 claims in the control group and 3,065 claims in the study group. Mean age increased from 16.4 years in the control group to 21.0 years in the study group. Index event paid claims for patients outside of the normal age ranges decreased from 152 to 9 after implementation of the safety edit. Fewer children under the age of 6 years old had paid claims (5.7% vs. 0.6%) but increased utilization in adults aged 18 years or older was observed (28% vs 45%) in the study group. More than half of the patients over the age of 18 years in the study group (54%) had a diagnosis that is considered to be a contraindication or precaution to using these medications. Additionally, 33.4% of adults in the study group had a history of substance or alcohol abuse/dependence. Overall, 72.8% of all denied claims had no prior authorization sent. No differences were observed in all-cause ED visits or hospitalizations between the control and study groups (15.1% and 16.9%, respectively). No differences in ED visits or hospitalizations due to contraindications were found between the control and study groups (1.3% and 1.5%, respectively).

Conclusion: Since implementation of the safety edit, prescribing according to best practice standards has improved. Increased utilization by adults is something that should be explored in further depth, as evidence is limited for treating adult ADHD. The high percentage of patients with a history of substance or alcohol abuse or dependence is also concerning. A consideration should be made to amend the current safety edit to require adults with a history of alcohol or substance abuse or dependence in the previous 12 months to have a mental health specialist consultation. Further research will help determine additional beneficial amendments to the policy.

Submission Category: Practice Research/ Outcomes Research/ Pharmacoeconomics

Submission Type: Descriptive Report

Session-Board Number: 7-187

Poster Title: Early integration of students in complex chronic care management in an institutional setting enhances preparedness and interest for post-graduate training

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Purpose: Pharmacy students are integrated into a patient-centric model at an ambulatory heart failure clinic in the Veterans Affairs Portland Health Care System to advance their clinical and communication skills. This survey assessed the impact of early exposure to a longitudinal clinical experience on students' preparedness and interest in post-graduate training opportunities.

Methods: An IRB-approved online survey assessed the impact of this patient-centric model on student preparedness and interest in post-graduate training opportunities. The survey focused on two domains: clinical knowledge and attitudinal outcomes. Frequencies and percentages were used to summarize the data. Open-ended comment boxes were analyzed for themes that informed the overall project and will support program improvements. The Director of Assessment and Faculty Development managed the raw data set and provided de-identified data to the evaluation team.

Results: Twenty-four students have participated in this longitudinal experience. Of these, 12 participants were sent the survey and all returned it completed. Seventy-five percent participated for at least three quarter-terms with 67 percent spending more than six hours per week in related responsibilities. Prior to this clinical opportunity, 33 percent planned to pursue residencies. After completing this experience, 42 percent shifted their interest to pursue a residency and 25 percent remained committed to their original residency plan. Overwhelmingly, participants believed this opportunity made them a highly competitive

candidate and reported discussing this unique experience during career-related interviews. At the end of this clinical experiential opportunity, 92 percent reported high levels of confidence to evaluate and present complex patient cases; evaluate and resolve therapy regimen problems; provide direct patient care; and communicate with patients, family members, and other healthcare providers. All participants indicated continued application of many of these valuable skills in their careers.

Conclusion: Results suggest early integration of students in chronic care management benefits students, specifically in the areas of confidence and residency plans. Based on the cohort we followed, this longitudinal experience helped to strengthen clinical and communication skills, enhanced clinical preparedness, and increased interest in post-graduate training. Subsequent studies of the effects of this experience will include the other 12 students that were not originally invited to participate as well as all future students engaged in the experience. Also, an expanded focus of the impact of the experience on residency plans and subsequent success will be added to the survey.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 7-188

Poster Title: Evaluation of vancomycin management in obese patients at a single academic medical center

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Purpose: Vancomycin is commonly used as empiric therapy for suspected gram-positive infections in the hospital setting. However, inappropriate dosing and monitoring of vancomycin can lead to various adverse effects such as acute kidney injury. Oregon Health and Science University implemented a pharmacy-managed dosing protocol for vancomycin, but this protocol has not been validated in obese patients. The purpose of this study was to evaluate the pharmacy-managed dosing protocol in obese patients.

Methods: This medication use evaluation was reviewed by the institutional review board and assigned a determination of "Not Human Research." A report generated by the electronic health record system identified vancomycin orders administered at Oregon Health and Science University between September 1, 2015 and December 2, 2015. Patients aged 18 years or older who received pharmacy-managed vancomycin therapy for an indication other than surgical prophylaxis, and had an active vancomycin order for greater than or equal to 24 hours were included in the study. Obesity was defined as a body mass index (BMI) of greater than 30 kg/m2. Primary data collected included patient demographics, vancomycin dose and frequency initiated, trough goal determined per pharmacy protocol, initial trough level, and positive culture for methicillin-resistant Staphylococcus aureus (MRSA) or methicillin-resistant coagulase-negative staphylococci (MRCoNS). Other data collected included baseline renal insufficiency as documented per primary team progress notes, serum creatinine on each day of vancomycin therapy, intensive care unit admission, subsequent trough levels, and concurrent antibiotic therapy. Data were managed and analyzed using Microsoft Excel.

Results: A total of 104 patients were included in this study: 33 obese and 71 non-obese. The mean BMI was 37.5 kg/m2 and 23.2 kg/m2 in the obese and non-obese groups, respectively (P less than 0.01). Patients with documented renal insufficiency at order initiation included 48.5 percent of obese patients and 22.5 percent of non-obese patients (P less than 0.01). Obese patients had a longer length of stay compared to non-obese patients (12 days versus 7 days). The mean initial vancomycin dose was 11.44 mg/kg for obese patients and 15.15 mg/kg for non-obese patients (P less than 0.01). Four (12.1 percent) obese patients had a positive culture for MRSA, compared to 12 (16.9 percent) non-obese patients (P equals 0.77). Four (12.1 percent) obese patients had a positive MRCoNS culture compared to 4 (5.6 percent) non-obese patients (P equals 0.26). There was no statistically significant difference in initial vancomycin trough level between obese and non-obese patients (15.5 mcg/mL and 12.7 mcg/mL, respectively; P equals 0.11). Ten (30.3 percent) obese patients and 16 (22.5 percent) non-obese patients met the trough goal determined by pharmacy at the initial trough (P equals 0.54). Median duration of therapy was 3 days in both groups.

Conclusion: In obese patients, vancomycin was initiated at a lower dose compared to non-obese patients. This may be attributed to the higher frequency of documented renal insufficiency in the obese patient group. Despite this, mean initial trough level and median duration of vancomycin therapy were not statistically different between groups. The results of this medication use evaluation suggest that obese patients are being dosed appropriately compared to non-obese patients. A larger sample size is needed to further determine optimal dosing in this population.

Submission Category: Geriatrics

Submission Type: Evaluative Study

Session-Board Number: 7-189

Poster Title: Association of medication measures with disabilities and their ability to predict disability in a nationally representative sample of older adults.

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Purpose: Functional decline, leading to disabilities in activities of daily living, mobility, and cognition, in adults over 65 (older adults) is common. Several medications have been associated with these disabilities; benzodiazepines and anticholinergic being the most associated with disability. However, associations may not be useful in predicting the likelihood of a future disability in someone taking a medication. The goal of this study is to utilize the Medical Expenditure Panel Survey to determine the associations between medication usage and development of disabilities in activities in daily living, mobility, and cognition and compare those associations with their ability to predict disabilities.

Methods: This study utilizes the Medical Expenditure Panel Survey, a household survey of demographics, health, and health expenditures from nationally representative households in the US started in 1996. The population of this study included 10,408 participants who were 65 years or older, enrolled in the survey from 2006 to 2011, and surveyed for two years. Any participant over 85 was given the age of 85 in the survey to protect their identity. The surveys include self-reported data on participants' health, medical encounters, and medication usage, which is then corroborated by their health care providers and pharmacies. Predictors utilized in this study were individual medications classes, any medication on the 2012 Beer's Criteria List, excluding those based on a medical condition, drug burden index, medication regimen complexity index, count of medications used, polypharmacy, and extreme polypharmacy. Outcomes in this study was the development of a disability in a basic or instrumental activity of daily living, mobility as defined by difficulty walking 3 blocks, or self-reporting difficulty with cognitive problems. Any participant with a disability at baseline was not included in the analysis. To determine the association between each medication measure and disability, a

logistic regression model adjusted for age, sex, race, and comorbidities to control for confounding was used. Sensitivity, specificity, and the c-statistic were calculated to assess the predictive quality of these medication measures.

Results: Of the 10,472 participants; 741 (7.1 percent) had an activity of daily living impairment at the baseline visit and 899 (8.6 percent) developed a disability during the follow-up period, 2,258 (27 percent) had a mobility disability at baseline, and 1,185 (12 percent) developed a disability during the follow-up period, and 1,305 (12 percent) reported cognitive limitations at baseline and 1,060 (10 percent) reported developing a cognitive limitation during the follow-up period. The following measures were consistently associated with disabilities in activity of daily living, mobility, and self-reported cognitive limitations: use of any psychotropic, count of medications, drug burden index, opioid use, use of any antidepressant, use of a medication with anticholinergic properties, polypharmacy, sedative use, use of an anticonvulsant, Beer's medication, extreme polypharmacy, antipsychotic use, antiplatelet use, second-line antihypertensive use, pulmonary medication use, SSRI antidepressant use, insulin use, and vasodilator use.
Few medication measures were predictive with sensitivities greater than 10 percent or specificity greater than 80 percent. For activities of daily living and self-reported cognitive limitations those measures were any psychoactive medication, polypharmacy, Beer's medications, and second line antihypertensives. For mobility impairment the medication measurements were psychoactive medications, and polypharmacy.

Conclusion: This study further confirms that many medication measures are associated with declines in activities of daily living, mobility, and self-reported cognition. Unfortunately, the medication measures, on their own, do a poor job in predicting the likelihood of future disabilities, both in terms of sensitivity and specificity. Despite the lack of clear predictive power the associations and sensitivities presented here may have some utility to clinicians in terms of medication choice and utilization. Currently, we are further developing predictive models of disability using demographics, health and medication information.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Descriptive Report

Session-Board Number: 7-190

Poster Title: Evaluation of adherence to guidelines for amiodarone monitoring

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Purpose: National guidelines outline the need for specific monitoring of patients receiving the antiarrhythmic amiodarone due to potential toxicities. Recent data suggests compliance with monitoring is low. We evaluated the frequency of patients receiving guideline-concordant monitoring for amiodarone at our institution.

Methods: The electronic health record system was queried on September 1, 2016 to identify patients with an active amiodarone prescription. Data collected through chart review includes: demographics, indication, comorbidities, dose and duration of amiodarone, side effects and laboratory values. Baseline monitoring was appropriate if a liver function test (LFT), thyroid function test (TFT), chest x-ray (CXR), pulmonary function test (PFT), electrocardiography and ophthalmologic exam (if indicated) was performed. Follow-up monitoring was appropriate if LFTs and TFTs were performed every 6 months, a CXR was performed annually, and an ophthalmologic exam was completed if indicated. The frequency of appropriate monitoring, potential drug interactions and adverse events were summarized. The Institutional Review Board approved this quality improvement project.

Results: To date, we reviewed 35 out of 158 patients (22 percent) for appropriate monitoring. One patient was excluded due to discontinuation of amiodarone. Amiodarone was initiated outside of our institution in 21 (62 percent) patients. Among those initiated at our institution, all baseline tests were performed in 1 out of 13 (8 percent) patients. Baseline pulmonary function test were the least frequently acquired (12.5 percent). Among all included patients

receiving amiodarone therapy for at least 1 year, ongoing monitoring was appropriately administered for 8 out of 19 (42 percent) patients.

Conclusion: Our preliminary results indicate the majority of patients did not receive the recommended follow-up monitoring. Since the majority of patients were initiated on amiodarone outside of our institution, we were unable to adequately evaluate baseline monitoring. Strategies to enhance adherence to guideline-directed monitoring are needed to avoid known amiodarone-associated adverse events.

Submission Category: Ambulatory Care

Submission Type: Descriptive Report

Session-Board Number: 7-191

Poster Title: Interdisciplinary outreach: Improving access to health care in underserved communities

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Purpose: Underserved communities have difficulty accessing healthcare due to barriers such as language and financial obstacles. In 2008, the Interprofessional Community Health and Education Exchange program was established to interface with underserved communities to address health concerns and disease prevention in Portland, Oregon. This report describes student pharmacists' efforts in bridging healthcare gaps to improve community health and wellness.

Methods: Multidisciplinary teams comprising of pharmacy, medical, dental, nursing, physician assistant, and public health students provided basic care to undocumented workers, homeless individuals, and refugees—mainly from Latin American and Southeast Asia. Interpreters were utilized for non-English speakers. Outreach locations were dispersed throughout the Portland metro area at community centers selected based on ease of accessibility by the targeted populations including Transition Projects Incorporated and Asian Health and Services Center. Groups conducted client interviews and provided health screenings, medication review, and education under the supervision of faculty volunteers. In 2016, student pharmacists offered reading glasses to qualified clients after evaluating their vision using a near vision Snellen chart and partnered with Operation Diabetes to implement blood glucose screenings. Referrals to local underserved clinics, a traveling eye clinic, and a dental van were made for more advanced care. Post-visit satisfaction surveys from clients were collected.

Results: Approximately 50 clients were seen in the winter and spring quarters of 2016. Of those, 21 clients utilized blood glucose screenings and 13 clients qualified for reading glasses. Seventeen clients completed the satisfaction survey. Eighty-two percent would “always” recommend the program to others; 94 percent “always” received explanations for health improvement; and 71 percent felt they “always” received counseling on medications and access to local resources. Through interprofessional interactions and client interviews, student pharmacists learned about additional resources such as using food stamps at farmer’s market and locations of English-learning centers to impart upon future clients.

Conclusion: Student pharmacists were able to add valuable services to the outreach program. The newer services aided clients with limited access to vision care and gave clients an opportunity to check their glucose levels. Furthermore, the program allowed student pharmacists to learn from other health disciplines and to incorporate knowledge imparted from other health professions into their own practice.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 7-192

Poster Title: Appropriate use of acid suppressive agents in hospitalized pediatric patients at a single-center

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Purpose: Over the past decade, multiple studies have shown adverse effects of acid suppressive use in children. Simultaneously, these agents have demonstrated little to no benefit for gastroesophageal reflux in infants. In response to these findings, the American Academy of Pediatrics Choosing Wisely campaign recommends avoiding the use of acid blockers for effortless and painless gastroesophageal reflux in infants. The purpose of this study was to evaluate the indications of acid blockers dispensed at Doernbecher Children's Hospital and to determine if hospitalized pediatric patients are treated according to this American Academy of Pediatrics recommendation.

Methods: This medication use evaluation was reviewed and assigned a determination of "Not Human Research" by Oregon Health and Science University; oversight by the Institution Review Board is not necessitated. A report generated by the electronic health record system at Doernbecher Children's Hospital yielded 2,372 acid suppressive agents used between November 1, 2014 and October 31, 2015. A random sample of 50 charts was retrospectively evaluated from the 3 pediatric units with the highest utilization of histamine 2 receptor antagonists and proton pump inhibitors during the most recent 3 month period. Primary data collected from the electronic health record included patient demographics, indication for acid blocker, if the order was written upon admission, and if the order was a continuation of home therapy. The indication for the medication was identified via progress notes written by the primary medical team or from available past medical health records. Other variables that were extracted included history of prematurity, tube feedings, tracheostomy, corticosteroid use, and antiepileptic drug use. A cost analysis was performed to assess potential savings for the hospital.

Results: Of the 50 patients included, 70 percent received histamine 2 receptor antagonists and 30 percent received proton pump inhibitors. Average age was 7.6 years and ranged from under 1 month to 17 years. The majority of acid blocker use corresponded to a documented indication including gastroesophageal reflux, dyspepsia, and stress ulcer prophylaxis. An indication was not documented in 44 percent of the charts reviewed. Of records that did not have a documented indication, 9 were newly initiated and not written on admission during the hospital stay, suggesting that 18 percent of patients had no documented reason to be on acid suppressive therapy. The annual cost of using acid suppressive agents at Doernbecher Children's Hospital was 415,000 dollars, yielding a potential annual savings of 75,000 dollars if usage was limited to accepted indications or continuation of home therapy.

Conclusion: Nearly one fifth of inpatients at Doernbecher Children's Hospital are prescribed acid blockers without a documented indication. These results demonstrate that there is opportunity to reduce unnecessary use or to improve the documentation for the indication of acid suppressive agents. Initial steps include prescriber education of appropriate use and removal of acid blockers from order sets. Furthermore, the hospital may incur potential savings by ensuring prescribing practices are in alignment with the Choosing Wisely campaign. The findings of this study prompt further evaluation on the appropriate use of acid blockers at other institutions.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 7-193

Poster Title: Evaluation of double growth factor mobilization

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Purpose: Hematopoietic stem cell transplants are an integral part of some cancer treatment strategies. Initial mobilization efforts are not always successful and there is little evidence supporting subsequent mobilization strategies. The purpose of this study was to evaluate the efficacy and safety of the double growth factor protocol used at Oregon Health & Science University. This protocol includes filgrastim 20 mcg/kg/day, typically administered in divided doses, and sargramostim 250 mcg/m2/day. Efficacy was defined as the successful mobilization and collection of peripheral stem cells for autologous transplant. Safety included the incidence of adverse events indicative of filgrastim and sargramostim.

Methods: This was an observational retrospective chart review. Eligible records were reviewed from the EPIC electronic health record. Records were identified based on utilization of double growth factor. Patients could also potentially receive plerixafor as part of the mobilization protocol if they were eligible. Patients included were 18 years of age or older, were eligible for an autologous hematopoietic stem cell transplant, and had a confirmed cancer diagnosis. They had to have failed a previous peripheral stem cell mobilization with an alternative mobilization care plan. Patients were excluded if they were under 18, if they were undergoing an initial stem cell mobilization, or if they had a non-cancer diagnosis/indication. Twenty-three patients were identified as receiving treatment between October 2010 and June 2016. Data collected included cancer diagnosis, collection target, the number of stem cells collected, whether the target was met, and if the collection resulted in a transplant. Potential adverse events included bone pain, chest pain, diarrhea, nausea and vomiting, peripheral edema, pruritus, rash, tachycardia, splenomegaly, and vitreous hemorrhage. Identified adverse events were graded using the Common Terminology Criteria for Adverse Events Version 4.0. Oregon Health & Science Universities Institutional Review Board approved this study.

Results: Of the 23 patients identified who received double growth factors for stem cell mobilization, 13 (56.5 percent) met or exceeded their target collection goal. A total of 19 (82.6 percent) patients successfully received bone marrow transplants. Of the 23 patients, 22 were diagnosed with hematological malignancies, with multiple myeloma being the most common diagnosis. Plerixafor was administered to 20 (87 percent) patients prior to collection. Bone pain was the most commonly reported adverse event in patients with 6 (26.1 percent) experiencing grade 1; 4 (17.4 percent) experiencing grade 2; and 3 (13 percent) experiencing grade 3 pain. Other adverse events included chest pain, diarrhea, fever, nausea, vomiting, and tachycardia. The majority diarrhea occurrences were attributed to plerixafor, however 2 patients who did not receive plerixafor also reported diarrhea. One patient reported baseline splenomegaly prior to mobilization, however there was no worsening reported during or after growth factor administration.

Conclusion: Double growth factor using filgrastim 20 mcg/kg/day and sargramostim 250 mcg/m2/day resulted in successful stem cell mobilization and collection in patients who previously failed. Limitations include size of the study population and clinical complexity of the underlying disease states. Resultantly, it is difficult to draw conclusions on safety and adverse events. The use of plerixafor in some was another limitation that likely impacted efficacy and adverse events. Further studies are warranted comparing sargramostim with filgrastim 10 mcg/kg/day to filgrastim 20 mcg/kg/day. It would also be useful to compare the addition of plerixafor to no plerixafor with double growth factor mobilization.

Submission Category: Quality Assurance/ Medication Safety

Submission Type: Evaluative Study

Session-Board Number: 7-194

Poster Title: Documentation of medication decisions on discharge from acute care to hospice

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Purpose: Hospice provides end-of-life palliative care to terminally ill patients who have a life expectancy of 6 months or less. The decision to transition to hospice and forgo further curative therapy is difficult and often made jointly between patients, family members, and providers. Approximately 40% of hospice admissions are referred from an acute care setting. However, no consensus exists on how medications should be managed during this transition. We quantified the documentation and rationale of medication decisions for patients discharged from acute care to hospice.

Methods: This was a retrospective cohort study of adult (≥18 years) patients discharged directly from Oregon Health & Science University (OHSU) Hospital to hospice between 1/1/2010 and 3/31/2016. Prior to commencement, the OHSU Institutional Review Board approved this study and granted a waiver of informed consent. Data were collected from an electronic repository of medical record data and a manual review of a consecutive sample of 100 discharge summaries from patients' medical records. Data from the discharge summary review were entered directly into a Research Electronic Data Capture (REDCap) created specifically for this project. These data included the frequency of documentation of medication decisions; the rationale for medication decisions; medication indications; and medication discussions involving patient, family member, palliative care, or other provider. Medication decisions were classified as 1) continuation of medications with changes in dose, route, or frequency, 2) continuation of medications with no changes in dose, route, or frequency, 3) discontinuation of medications, or 4) newly started medications. The rationale for medication decisions was derived using clinical discernment of the patient's hospital course, as detailed in

the provider's documentation on the discharge summary. Medication indications and medication discussions with patient, family member, palliative care, or other provider were documented as explicitly stated in the discharge summary.

Results: Among 1,499 discharges to hospice, the mean (standard deviation) number of medications patients were receiving was 7.2 (4.8). The number of medications increased by 0.34 medications/year over the study period, $P < 0.001$. Upon review of 96 discharge summaries (4 were excluded due to missing data), 1,466 medication decisions were identified (mean=15.3 decisions per discharge summary), of which, 441 (30%) were to continue medications without changes, 103 (7%) were to continue medications with changes, 458 (31%) were to start new medications, and 464 (32%) were to discontinue existing medications. Only 38% of medication decisions had a documented rationale in the patient's discharge summary. Discussions pertaining to medication decisions were documented 33% of the time. Of the 1,466 number of medications reviewed, only 39% had a documented indication on the discharge summary. Among medications initiated or changed, morphine was the most frequently initiated medication (7%) and aspirin was the most frequently discontinued medication (5%).

Conclusion: Medication changes are common on discharge from acute care to hospice. However, documentation of the indication, rationale and discussions pertaining to these changes are frequently missing or incomplete. Patients transitioning to hospice often have complicated medical histories, and proper documentation can be crucial to optimizing this transition. Furthermore, communicating the rationale for medication decisions may help to decrease pill burden, drug interactions, and medication-associated adverse effects. Ongoing refinement in health system documentation may lead to improved transitions from acute care settings to hospice. More research is needed to determine how to best care for these patients.

Submission Category: General Clinical Practice

Submission Type: Descriptive Report

Session-Board Number: 7-195

Poster Title: Assessment of patients with tobacco use disorder and chronic obstructive pulmonary disease within an inpatient family medicine service: Potential targets for intervention

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Purpose: Literature suggests a high level of guideline adherence to the recommended pharmacologic treatment for chronic obstructive pulmonary disease (COPD) in the hospital. Adherence to non-pharmacological interventions is much lower, with only a quarter of patients being offered smoking cessation services. The most successful intervention is counseling beginning in the hospital and continuing after discharge. The purpose of this analysis was to describe the population of patients who have COPD and use tobacco within Oregon Health and Science University (OHSU) Family Medicine. This information will allow clinicians to elucidate disparities and identify those with the greatest need of smoking cessation services.

Methods: This study is a retrospective chart review to describe inpatient family medicine patients with concurrent tobacco use and chronic obstructive pulmonary disease. OHSU family medicine currently has an OHSU pharmacy faculty available at all times. Data was collected from an EPIC database search for patients who were admitted to the hospital from July 1 2015 to August 2 2016. Inclusion criteria included adults ages 18 years or older on the OHSU family medicine service with a diagnosis of COPD and tobacco use disorder. The search returned 150 eligible patients. A chart review was completed of the patient's problem list and medical history, social history, notes, medication review, and inpatient consultations. Data collection was performed for the following fields in the aforementioned areas of the chart: age at dataset, gender, race, ethnicity, insurance tobacco use disorder ICD 10 code, type of tobacco, packs/day, years of use, pack years, current smoking status, smokeless tobacco use, counseling offered, smoking cessation medication, psychiatric comorbidity, coronary artery disease, and allergies.

Results: The average age of the patient population was 62.8 years old. Females comprised only 34% of the patients. The documented race of the population in the review was almost exclusively Caucasian. Approximately one quarter of the patients had Medicaid listed as their insurance (24%), while Medicare made up an additional one third (33%). The remaining patients had either private pay or veterans association as insurance. Cigarettes were almost exclusively used, with a small amount of patients noted to also be using e-cigarettes, cigars, or chew. Patients used a range of 0.1 to 5 packs per day, with a pack year history range from 5 to 230. Approximately 61% of patient charts had documentation of an offer for smoking cessation counseling services while inpatient, and 39% of patients being had documentation of services being offered outpatient. While inpatient, the most common nicotine replacement therapy included nicotine patches either alone or in combination with nicotine lozenges or gum. The most common outpatient regimens included patches, lozenges, gum, and varenicline. Psychiatric comorbidities were documented in approximately half of the patients, with the most common diagnoses being depression and anxiety. Approximately one third of the patients (33%) had a diagnosis of coronary artery disease.

Conclusion: The patient population found in this review is primarily older, Caucasian males. The suboptimal rate of smoking cessation counseling offered presents a crucial opportunity for improvement in the care of these patients. There were several barriers identified. Consolidating available ICD codes for tobacco use, providing an updatable timeline of tobacco use, and including a pre-built section for documentation of offering smoking cessation services are potential solutions to increasing smoking cessation services to patients. There continues to be a need for improved smoking cessation services that start prior to patients discharging from the hospital.

Submission Category: Oncology

Submission Type: Evaluative Study

Session-Board Number: 7-196

Poster Title: Off-label versus on-label prescribing of oral oncology agents in patients with soft tissue sarcoma

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Purpose: Soft tissue sarcoma (STS) is a rare cancer for which there are few Food and Drug Administration approved medications. As a result, off-label prescribing of targeted oral oncology agents has been explored in the treatment of STS. Off-label medications often are denied by insurance companies and the process to ensure that patients receive these medications at an affordable cost can be lengthy. The purpose of this study is to capture this burden by comparing the mean time it takes for patients to receive on-label versus off-label treatment for their STS.

Methods: The institutional review board approved this retrospective chart review. STS patients age 18 and older who received a new prescription for an oral oncology agent at the Oregon Health & Science University Center for Health and Healing between March 2014 and February 2016 were included in the study. Patients were identified for analysis if they received a prescription for soft tissue sarcoma from one of three sarcoma providers. Patients with no insurance, pregnant women or women planning to become pregnant, decisionally impaired adults, prisoners, and patients with a delay of receipt of medications for reasons other than authorization were excluded. Patients were placed into one of two groups: formulary if they were prescribed an oral oncology agent for an on-label indication or non-formulary for off-label use. Statistical Analysis Software (version 9.4) was used for statistical analysis. Descriptive statistics were reported using mean and standard deviations or percentages. For categorical data, Chi-square or Fisher's exact tests were used. Paired t-tests were utilized for continuous data. A p-value of less than 0.05 was considered statistically significant. The primary objective was to compare the effect of off-label to on-label prescribing of oral oncology agents on time to

receipt of medication. The secondary objective was to compare patient copays for on-label versus off-label prescribing for a 30 day supply of oral chemotherapy agent(s).

Results: The average time for receipt of medication (mean plus and/or minus standard deviation) for the non-formulary group (N equals 26) was 21.69 plus and/or minus 26.52 days compared to the formulary group (N equals 29), which was 10.86 plus and/or minus 9.51 days. At the pre-specified alpha of 0.05, mean difference between the groups was not found to be statistically significant (p-value equals 0.058, t-test with unequal variances, Satterthwaite approximation). Sample data suggest the mean time for receipt of medication is 10.8 (95 percent confidence interval: 0.4 to 22.0) days lower for those in the formulary group. The patient cost was 21.19 plus and/or minus 56.68 dollars for the non-formulary group (N equals 19) compared to 192.6 plus and/or minus 586.5 dollars for the formulary group (N equals 18), but it was not statistically significant (p-value equals 0.247). Copay could not be determined for all patients.
3 patients with prescriptions for off-label therapy were excluded from the analysis because they died before receiving the medication. One patient was prescribed sorafenib for stage 4 gastrointestinal stromal tumor, another patient was prescribed afatinib for a primary undifferentiated sarcoma, and the last patient with stage 4 leiomyosarcoma had prescriptions for everolimus and pazopanib.

Conclusion: The mean time to receipt of medication was not statistically significantly different between on- and off-label prescriptions in STS patients; however, there was a trend toward longer time to receipt of medications for off-label prescriptions. Patient cost also was not statistically significant between study groups, however off-label prescriptions tended to have a lower cost. The significance of these findings should be further evaluated in a separate and larger study.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 7-197

Poster Title: Four-Factor Prothrombin Complex Concentrate (PCC) use in the VA Portland Health Care System (VAPORHCS)

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Purpose: Prothrombin Complex Concentrate (PCC) has been shown to be an effective treatment for life threatening hemorrhagic conditions. However, it is also associated with an increased risk of thromboembolic events and has a high acquisition cost. The Portland, Oregon VA has both a local and national Clinical Recommendations for Use (CRU) to guide therapy. We will analyze the use of PCC in order to better understand how this product is currently being utilized. Additionally, we will collect information to assess the frequency at which PCC orders are prepared but not administered to determine the cost effectiveness of our current distribution system.

Methods: After review-board approval, we performed a retrospective chart review of all patients prescribed PCC during October 2014 to May 2016. We collected data regarding baseline demographics and labs: age, sex, weight, hemoglobin/hematocrit, body-mass-index, INR at time of event, serum creatinine, severity of bleed according to TIMI category and GUSTO category, location of administration, and documented contraindication to blood products. To evaluate the indication for use, the following data were collected: PCC indication, consult by neurosurgery, consult by hematology/oncology, CT of head, surgery within 24 hours of PCC administration, type of surgery, use of anticoagulants at time of event, indication for anticoagulation, and documented rational for use of PCC instead of FFP. To categorize the interventions, we collected the following: vitamin K dose and time of administration, PCC dose and time of administration, and any repeat PCC dose and time. To evaluate our cost-avoidance outcomes, we compiled the number of doses prepared and the number of doses administered.

Results: Our search revealed 17 patients prescribed Four-factor PCC during our timeframe. Of these, 12 received the drug. Five of the 12 were scanned into the barcode medication administration (BCMA) system before administration. One was documented in anesthesia records. The remaining six cases were administered in the ED or OR/PACU and not documented in BCMA.

Five out of the 12 administered doses were for ICH. Two were for GI bleeds. Three were post-operative and prior to a second emergency procedure. Finally, two were used intra-operatively.

Eight of the 12 patients were on warfarin at the time. The 4 cases that were not on warfarin included: two intra-operative uses, one Jehovah's Witness with surgical complications, and one GI bleed in a patient with liver disease.

Of the five Kcentra doses that were not administered, three were prepared by pharmacy as documented in IV records. These three doses have a total acquisition cost of $6790.

Only two out of 12 uses of 4-Factor PCC completely met all requirements established in the local CRU. Eight out of 12 cases met all the requirements of the national recommendations for use.

Conclusion: The Portland VA criteria for use is too narrow and excludes many cases in which Kcentra was deemed necessary by the providers involved. We recommend updating the local Portland CRU to better accompany the national recommendations and provide clarification on what constitutes: life-threatening major bleeding, failure of standard measures for bleeding cessations, and restricted indications for patients not on warfarin.

Finally, to reduce wasted doses, we propose distributing the drug in the manufacture's bottles to be mixed at the patient's bedside by a pharmacist. This way, the drug is available when needed but will not be wasted if deemed unnecessary.

Submission Category: Drug-Use Evaluation/ Drug Information

Submission Type: Evaluative Study

Session-Board Number: 7-198

Poster Title: Evaluation of methylnaltrexone use in a critical access hospital in western Oregon

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Purpose: Methylnaltrexone is a peripherally acting mu-opioid receptor agonist indicated for the use of refractory constipation associated with opioid use. Inappropriate use of this medication decreases the benefit to cost ratio for patients and health systems and also exposes patients to unnecessary risk. The purpose of this evaluation was to determine the extent of methylnaltrexone misuse, begin to establish an interdisciplinary consensus for proper medication utilization, and encourage the standardization of our medication-use process.

Methods: Methylnaltrexone administrations between January 1st and July 10th of 2016 were evaluated using an appropriate use criteria, which we developed a priori. The electronic medical record for each administration was used to review the following: medication administration history, medication reconciliation, hospital diagnoses, input/output timing, diagnostic imaging impressions, methylnaltrexone and other GI agent administration timing, care department, and methylnaltrexone dose. Collected data was then used to determine if each administration met the appropriate use criteria. Evaluated data was then compiled and analyzed for use.

Results: A total of 81 drug administrations were evaluated for appropriate methylnaltrexone utilization. Of these 24 administrations (30%) were designated as appropriate medication use, whereas 57 administrations (70%) were identified as inappropriate. Fifteen different physicians were accountable for the prescribing of methylnaltrexone during the time frame evaluated. Approximately 60% of the administrations designated as inappropriate were due to patients without a history of prior laxative use, thus constipation was not considered refractory. Therapy was maintained in 51% of the inappropriate use group even after the desired therapeutic effect (producing a bowel movement) was achieved. Methylnaltrexone was administered to 35% of

the inappropriate use group regardless of patient's having regular bowel movements prior to medication administration. Incorrect dosing frequency was attributed to 5% of administrations in the inappropriate category. Confirmed gastrointestinal obstruction occurred in 4% of inappropriate use administrations. Patients who were not taking or given opioids prior to medication administration equated to 2% of the total inappropriate use classification.

Conclusion: Based on the findings from this evaluation it can be concluded that methylnaltrexone was frequently used in a manner inconsistent with our proper use criteria. The most common reasons for inappropriate use involved drug administrations in which conventional laxative therapies had been underutilized and/or methylnaltrexone therapy continued despite frequent bowel movements. These findings warrant interdisciplinary validation of our proper use criteria followed by further evaluation of methylnaltrexone use in other hospitals. The ultimate goal being development of interdisciplinary measures for proper medication utilization and a standardized administration algorithm, which will reduce healthcare costs as well as unnecessary patient risks.

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Poster Title: Prediction of human hepatic clearance of trans-cinnamaldehyde using in vitro metabolism data from human liver microsomes

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Purpose: Cinnamaldehyde (CA), a major component of cinnamon oil, is used in perfume and food manufacturing, but may have adjuvant medical uses for HbA1c reduction [1] and anti-platelet aggregation [2]. Previously, we observed that cinnamaldehyde inhibits cytochrome P450 2A6, the major pathway for nicotine metabolism, and may serve as an approach to decrease cigarette consumption [3]. Although human exposure to cinnamaldehyde is common, pharmacokinetic studies in humans have not been published. The purpose of this study is to begin addressing this knowledge gap by using in vitro systems to predict in vivo pharmacokinetic parameters (e.g., hepatic clearance and half-life) for cinnamaldehyde.

Methods: CA (10 µM) was incubated with human liver microsomes (HLM; 0.5 mg/mL), potassium phosphate buffer (100 mM; pH at 7.4), and nicotinamide adenine dinucleotide phosphate (NADPH; 1 mM) at 37 degree Celsius. Aliquots at 2-minute increments were terminated in tubes containing acetonitrile. Samples were centrifuged and the supernatant was analyzed by high performance liquid chromatography. Analytes were separated using a Kinetex C18 column and a mobile phase (25 percent acetonitrile and 75 percent water) at a flow rate of 1 mL per minute (oven temperature at 33 degree Celsius). CA was detected with photodiode array and fluorescence detectors. Experiments were conducted in triplicate over three different days.
In vitro degradation rate (kdeg) was determined from graphing CA percent remaining as a function of time. The in vitro half-life (T1/2) was related to kdeg by: T1/2 = -0.693/kdeg. In vivo intrinsic clearance (CL'int) was predicted by utilizing the in vitro T1/2 and scaling up with an estimate of 45 mg microsomal protein per gram of human liver and 20 grams of liver per kg human body weight: in vivo CL'int = (0.693/T1/2)•(mL incubation/mg microsomes)•(45 mg microsomal protein/gram liver)•(20 gram liver/kilogram body weight).

Hepatic clearance (CLh) was estimated by Qh • fu • CL'int/ Qh + fu • CL'int where Qh is the hepatic blood flow (21 mL/min/kg), and fraction unbound (fu) in human blood is 1.

Results: CA levels in the presence of HLM and NADPH degraded quickly after a 4-minute incubation period. CA levels were undetectable at 6 minutes in some trials, and completely undetectable by 8 minutes, so data from three time points (0, 2, and 4 minutes) were used to determine kdeg (20.311 percent per minute), yielding a half-life (T1/2) of 2.27 minutes. The values of in vivo intrinsic clearance (CL'int) and hepatic clearance were 553.85 plus or minus 21.52 ml/min/kg and 20.23 plus or minus 0.03 ml/min/kg, respectively. Controls to evaluate CA stability in the absence of metabolism showed that levels in buffer remained consistent as a function of time with coefficient variations (CV) of 11 percent for CA peak area. CA levels with NADPH also remained consistent as a function of time with CV ranging between 15 to 17 percent. CA levels in the presence of HLM decreased 2147 count per minute.

Conclusion: The predicted in vivo intrinsic clearance and hepatic clearance, assuming a fraction unbound of 1, indicates that CA would be expected to be cleared rapidly upon oral administration. The rapid metabolic clearance of CA likely contributes to the generally positive safety profile for CA following oral administration. Incubations of CA with buffer, CA with NADPH, and CA with HLM were performed to determine the effect of these components on CA levels. Results for CA with HLM showed a decrease in peak area, indicating that nonenzymatic degradation also makes a small contribution to overall CA clearance.