

ASHP 2013 Summer Meeting Professional Poster Abstract

1-M

Category: Quality Assurance / Medication Safety

Poster Type: Descriptive Report

Title: Creating and sustaining standardized medication safety practices across a multi hospital health system

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Purpose: With a thirteen hospital health system, there is great opportunity to share best safety practices and to learn from one another's medication events. The goal of our corporate medication safety program is to create and maintain standardization of best practices across the continuum of patient care. The key elements in our success have been collaboration, timely communication and support.

Methods: The journey to creating and sustaining standardized medication safety practices began with the creation of facility based medication safety teams that meet regularly. These teams discuss reported medication events that both reach patients and do not. They review the ISMP Safety Alerts to proactively assess risk and discuss safety initiatives from a global perspective. Multi disciplinary in nature, these teams also include front line staff for direct feedback and ideas. The thirteen facility medication safety teams report to one corporate safety committee (MASCOT) quarterly lead by a physician and the Medication Safety and System Innovations Manager. The MASCOT meeting is a time to share lessons learned as well as create standardized practices based on internal data and the ISMP Quarterly Action Agendas. Each year we develop goals and possibly sub committees to obtain these goals. MASCOT then reports to the corporate First Do No Harm Executive meeting and the corporate P&T. In addition to these committees, newly published medication safety information and immediate concerns are shared in real time by the Medication Safety and System Innovations Manager.

ASHP 2013 Summer Meeting Professional Poster Abstract

2-M

Category: Quality Assurance / Medication Safety

Poster Type: Descriptive Report

Title: Closing the gap: revising sterility testing policies and procedures based on the United States Pharmacopeia (USP) 797 guidelines and a near miss

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Purpose: In hospital pharmacy, compounded sterile preparations (CSPs) are often made in large quantities in anticipation of fulfilling orders for the individual needs of patients. Knowledge and compliance of proper sterility standards outlined in United States Pharmacopeia Standards 797 and 71 (USP 797 and USP 71) is paramount for pharmacy personnel to safely prepare CSPs to prevent harm, including death, to their patients. Due to a national shortage, a batch of sodium bicarbonate syringes was prepared in the pharmacy clean room. Although the USP 797 guidelines did not recommend sterility testing the batch in question since the beyond use date assigned was 9 days, this batch was sterility tested. The tests came back positive, but the syringes had been released for use prior to receipt of the results of sterility testing. The Infection Control and Prevention Department was notified of the potential contamination in the batch of sodium bicarbonate syringes. An action plan including revising the policies and procedures of batch processing of sterile products was developed.

Methods: An initial meeting between Pharmacy, Infection Control and Prevention, and the Microbiology Laboratory identified gaps in the existing policies and procedures. The first meeting was an investigation of the incident and an education between the above departments on USP 797, infection prevention and microbiology. In addition, another set of the sodium bicarbonate syringes were sterility tested, but none had any bacterial growth. The action plan developed consisted of tasks for pharmacy, engineering and microbiology. Pharmacy's responsibilities included amending existing policies to insure notification of Infection Control and Risk Management in specified situations, reeducating IV Room staff on proper

garbing, traffic control, talking, and aseptic technique during production and while obtaining sterility test samples. The responsibility of the engineering department was to correct identified temperature fluctuation issues. The responsibility of the microbiology lab was to assure the proper media and incubation guidelines were followed based on USP 797 and USP 71 standards.

Results: The evaluation of the existing procedure of communication of positive sterility results after notification to pharmacy identified that there was no written standard for dissemination of information. An amendment to the current policies was added that included notifying Infection Control, Risk Management and Pharmacy Management if any products that tested positive reached patients. These are products that may get sterility tested, but do not surpass the USP 797 recommendations of beyond use dating so they are released without quarantining. For products that surpass the BUD limitations of USP 797 guidelines, there is a quarantine period. In this scenario the notification protocol is to communicate positive sterility results to Infection Control and Pharmacy Management, but not Risk Management. Pharmacy will then consult with Infection Control to investigate possible causes.

Conclusion: Hospital Pharmacy Departments should collaborate with their Infection Preventionist colleagues to identify activity that fall under the purview of USP 797. On site observations of personnel practices are imperative to insure proficiency and competency of the individuals responsible for sterile preparations. Definition of formal policies and procedures is needed to safely prepare and recall sterile products for patient use. Clear communication and swift response to positive sterility test results is critically important to mitigate patient harm. The stunning evidence of breaches in infection control practices at a Massachusetts compounding that led to a widespread outbreak of fungal meningitis underscores the grave importance of strict compliance with USP 797.

ASHP 2013 Summer Meeting Professional Poster Abstract

3-M

Category: Quality Assurance / Medication Safety

Poster Type: Evaluative Study Report

Title: Clinical Pharmacist Impact in a Medical Team on Discharge Process and Resolving Medication-related Discrepancies at Discharge

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Purpose: Accurate and effective medication reconciliation on discharge, along with medication counseling, is vital for patient safety. Veterans Affairs Medical Centers utilize computerized patient record system (CPRS) which improves medication use safety. However, the barriers to the system include underutilization due to inadequate system training and integrating it into the work flow. In addition, limited collaboration among physicians, pharmacists and/or nurses and rushed discharge processes are other barriers resulting in medication discrepancies. The purpose of the study was to determine if a pharmacist can improve the discharge process by collaborating with medicine team physicians and resolve medication discrepancies at discharge. The discrepancies in the intervention team were compared with a control team without a pharmacist on board.

Methods: The study was done on medicine floors for 3 months. The study group included a non-intervention team without pharmacist (control group) and an intervention team with pharmacist (intervention group). In both teams, initial data collection consisted of printed computerized outpatient medication list on admission and discharge days for all patients. The list assisted in identifying medication discrepancies at admission and discharge by capturing all medication information including inpatient, outpatient, and non-veteran affairs obtained medications. In the intervention team, the pharmacist reviewed all admissions and discharges and participated in rounds on most days, including weekends and holidays as needed. The pharmacist also interviewed patients on admission to obtain

medication history. The pharmacist and the team physicians were in constant communication and collaborated on the discharge process. In the intervention team, the pharmacist assisted with medication reconciliation on discharge including ordering discharge medications for complex patients and counseling patients prior to discharge. The pharmacist reviewed all discharges in the team, resolved discrepancies, if any, within 72 hours of discharge and also contacted patients after discharge on an as-needed basis. In the control group, after the patients are discharged, discharge medication instructions prepared by team physicians were printed retrospectively. The list was compared with the admission medication reconciliation list and the progress notes and discrepancies, if any, were noted. Univariate chi-squares and t-tests were used to compare differences between groups for demographic and outcome variables.

Results: There was no difference between intervention and control based on race, age (66.7 SD=14.3 vs. 65.9 SD=12.6, $p=0.57$), gender (Males=94.4% (n=125) vs. 93.3% (n=136), $p=.68$), or duration of days in the hospital (5.4 SD=4.8 vs. 5.7 SD=5.6, $p=.59$). There were between-group differences with the intervention group taking more medications at admission than the control group (9.7 SD=5.1 vs. 8.5 SD=4.3, $p=0.03$). The intervention group showed significantly fewer medication errors at discharge than the control group (0.72 SD=1.5 vs. 1.5 SD=2.3, $p=0.001$). The numbers of medication discrepancies identified in the control and intervention teams were 200 and 104 respectively at the time of discharge. Out of 104, 89 discrepancies in the intervention team were fixed by the pharmacist within 72 hours of discharge. The numbers of discharges without medication discrepancies in the control and intervention teams were 47 and 97 respectively. The pharmacist fixed discrepancies for 39 additional discharges in the intervention team either before discharge or within 72 hours of discharge. Thus, 136 (93.8%) discharges in the intervention team did not have discrepancies or discrepancies fixed compared to 47 (35.1%) in the control team. The pharmacist was able to identify twenty medication-related system errors in physician and pharmacy practices during the discharge process which mandates need for process improvement.

Conclusion: Integrating clinical pharmacist services during discharge process demonstrated substantial improvement in the discharge process. Clinical pharmacist intercepted medication errors by reviewing all orders, correcting deficiencies and preventing medication errors that probably would have remained undetected. Clinical pharmacist presence was well received by the team physicians.

ASHP 2013 Summer Meeting Professional Poster Abstract

4-M

Category: Quality Assurance / Medication Safety

Poster Type: Research-in-Progress

Title: Utilizing workflow mapping to improve outpatient chemotherapy preparation turnaround time

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Purpose: The preparation of hazardous intravenous medications within an oncology satellite pharmacy requires enhanced safety and special handling practices which can result in prolonged preparation turnaround times. Compliance with these safety precautions along with the demands for just-in-time dispensing creates stressors on employees and potentially medication errors within this pharmacy practice environment. The objective of this prospective, observational study is to characterize the impact of workflow and product placement changes in a freestanding, cancer hospital infusion/inpatient pharmacy, with theoretical modeling to improve process efficiencies for outpatient chemotherapy infusion preparation turnaround time in the Adult Outpatient Infusion Clinic.

Methods: A two-week workflow and product placement analysis was conducted in the University of North Carolina Hospitals Cancer Hospital Infusion/Inpatient Pharmacy. A chemotherapy preparation time motion analysis worksheet was developed to determine the baseline turnaround time for outpatient chemotherapy preparations for the Adult Outpatient Infusion Clinic. The preparation worksheet was affixed to all folders for patients receiving treatment in the clinic during normal business hours. The first time measurement occurred when the chemotherapy order was generated and displayed in the pharmacy order queue. Other time measurements were recorded at key transition points along the preparation pathway including: folder entry into pass-through, folder entry into clean room and placement on preparation table, admixture technician chemotherapy infusion preparation start, admixture technician chemotherapy preparation end, pharmacist product verification start, pharmacist product verification end, and product delivery to infusion chair for the patient. Four-hundred

seventy-two preparations were collected. These preparations are currently being analyzed to understand current workflow practices. Theoretical modeling of changes to workflow and the placement of chemotherapy products and materials within the inpatient/infusion clean room should identify opportunities to optimize the outpatient chemotherapy infusion preparation time, in order to reduce patient wait times and improve patient satisfaction and quality of care.

ASHP 2013 Summer Meeting Professional Poster Abstract

5-M

Category: Quality Assurance / Medication Safety

Poster Type: Descriptive Report

Title: Utilizing a trigger report to track adverse drug event rates: a pilot project

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Purpose: Past adverse drug reaction (ADR) reporting at our institution (329-bed urban teaching hospital) identified suspected ADRs retrospectively via a report from Health Information Management Services department utilizing external cause of injury codes. This report included possible ADR, poisoning and overdose events. Pharmacy staff reviewed patients electronic medical records to screen and document ADRs. The labor intensive process did not guarantee all ADRs were captured, making calculation of monthly rates impossible. The purpose of this project was to develop an ADR reporting system that allows for rate calculation and tracking through time for more effective monitoring of these safety events.

Methods: A literature search for alternative ADR reporting strategies revealed The Institute for Healthcare Improvement Adverse Drug Event Trigger Tool which includes 24 unique triggers (specific events such as medication orders or abnormal laboratory values) to assist with identifying potential adverse drug events (medication errors and adverse drug reactions) during a patient admission. The trigger tool was presented at the Medication Safety Subcommittee (MSSC) meeting in August 2011 where it was decided to implement a pilot project involving the trigger of International Normalized Ratio (INR) greater than 4.5. A data collection form was developed and a customized trigger report was created within TheraDoc, a clinical surveillance software system that fires a patient specific alert whenever the desired criterion is met (in this case a patient specific lab result of INR greater than 4.5). Pharmacy staff reviewed electronic medical records to determine patient outcomes as a result of the trigger. Data was collected, analyzed, and reported for January December 2012. Rates for the events were calculated using the number of warfarin doses dispensed per month as the denominator.

Results: Quarterly reports presented to the MSSC for 2012 included the following data per month: number of triggers, number of total bleed events, event severity, number of bleeds that occurred in-house, number of bleeds that caused admission, number of bleeds discovered on admission, and common factors contributing to the increased INRs. Monthly event rates were reported as total number of triggers per 1,000 warfarin doses dispensed (range of 18.3 to 43.4) and number of in-house triggers associated with a bleed per 1,000 warfarin doses dispensed (range of 0 to 4.9). Fluctuations in the monthly event rates corresponded with higher patient census periods and limitations within our anticoagulation monitoring program. Common factors contributing to the increased INRs included age over 65, renal insufficiency, heart failure, and drug-drug interactions with warfarin.

Conclusion: Utilization of trigger reports assists with identifying adverse drug events and allows for calculation of a monthly event rate which may be followed through time to track potential failures in safety processes.

ASHP 2013 Summer Meeting Professional Poster Abstract

6-M

Category: Quality Assurance / Medication Safety

Poster Type: Descriptive Report

Title: Code Cart Medication Trays: Using novel resources to test and improve design

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Purpose: Code cart medication distribution is a complex and problem prone medication system. Time pressures and environmental factors may increase the potential for drug selection error. This poster describes our medical center's efforts to re-design and test code cart medication system improvements using industrial engineering students and an outside plastics manufacturer.

Methods: Using students from the local university industrial engineering program and a local plastic tray manufacturer we built a design prototype for a new code cart tray. We observed the use of the systems and measured the number of wrong drug selection errors and the time to select code cart medication. We also measured user satisfaction with both systems.

Results: Our results showed that use of our current auxillary labels and upright vial storage lead to an increased rate of selection error. The new prototype design of reorienting the vials reduced number of drug selection errors, reduced the time to select medications and improved user satisfaction with the system.

Conclusion: Using available local resources in a novel way, we were able to test proposed improvements of code cart medication trays. Building outside relationships with design professionals can help pharmacies improve medication use systems and help health systems increase the presence of industrial design professionals in health care.

ASHP 2013 Summer Meeting Professional Poster Abstract

7-M

Category: Quality Assurance / Medication Safety

Poster Type: Descriptive Report

Title: Implementation and sustainment of lean concepts in a pharmacy supply area

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Purpose: At the Veterans Affairs San Diego Healthcare System, the pharmacy supply area impacts the safety and efficacy of the inpatient pharmacy service, as it is the central hub responsible for the storage of all non-intravenous medications, and its staff replenishes various forms of automation throughout the hospital. As new items are being constantly added and newer processes have been retrofitted to our current setup, Toyotas production system concepts, known more commonly as LEAN or 6S, were applied to modernize our setting, identify and eliminate various wastes, standardize workflow, and ultimately improve medication safety.

Methods: A systematic review of our processes indicated that approximately 20% of the automated dispensing cabinets (ADCs) pockets had the incorrect drug or wrong expiration date entered. The project encompassed the pharmacy supply area and ADCs located throughout the healthcare system, affecting various steps of the medication-use process. Pharmacists led a collaborated effort with representatives from Systems Redesign and Patient Safety. Ground rules were identified by the team prior to starting the project. Staff were allocated time to work on projects, and executive leadership was in full support of the project. Any work requests on our behalf to other departments were given high priority status to ensure timely completion of the project. Project implementation was planned to be completed over six weeks beginning in July 2012. Environment of Care (EOC) rounds were scheduled on an intermittent basis to ensure sustainment of LEAN concepts and to identify any potential problem areas. A whiteboard located in the project area notified all parties of the projects current status. Staff members were given training prior to initiation, and project principles were reinforced daily.

Results: Approximately 26% of medications were eliminated, \$235,546 credit received, and 310 linear feet of shelf space were cleared. Inventory utilization was tied to par levels, and visual management was improved with labeled sections and bin size utilization. High alert and look-alike/sound-alike medications were clearly distinguished. For certain medications, concentrations were standardized, and concentrated solutions were removed. Flammable and corrosive medications were moved to an isolated and protected location. Oral chemotherapy medications were moved to the chemotherapy satellite. Emergency response items were placed by the main entrance for ease of access. Patient event reports were reviewed to determine the impact on the medication use process, noting a decrease in the amount of events. The layout reorganization decreased staff movement, increasing productivity and consequently expediting medication delivery. Utilization of the EOC rounds demonstrated additional opportunities to utilize automation to improve area performance.

Conclusion: The structural and process changes have increased the safety and productivity of the department. The successful implementation has initiated discussions on how these concepts can be applied to other areas throughout the facility.

ASHP 2013 Summer Meeting Professional Poster Abstract

8-M

Category: Quality Assurance / Medication Safety

Poster Type: Descriptive Report

Title: Safe handling of hazardous medication at the Alaska Native Medical Center

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Purpose: To evaluate and implement a strategy for evaluating risk, storing and labeling hazardous medications.

Methods: One hundred and fifty-seven medications on the 2010 NIOSH list were reviewed and compared to over 2,000 medications on the Alaska Native Medical Center (ANMC) formulary to create a list of hazardous formulary medications. A risk assessment was developed for each of the medications by reviewing package inserts, medication safety data sheets, and practice setting for medication use. Each medication was categorized into groups by risk and use in practice. The risk assessment and pharmacy procedure were approved by the Safety Committee, the Hazardous Waste Committee, and the Pharmacy and Therapeutics Committee at ANMC. The hazardous medications were segregated from non-hazardous medications within the pharmacy. The hazardous medications were stored in color coded bins to increase awareness and reduce the risk of exposure in the event of a leakage or spill. Red bins were used for hazardous medications and yellow bins for chemotherapy.

Results: One hundred and twenty medications were identified as hazardous medications at ANMC. Three categories were developed to determine preparation location. Category A requires parenteral hazardous medications to always be prepared in a negative pressure hood. Category B recommends the medication to be prepared in a negative pressure hood unless an emergency situation requires otherwise. Category C is for oral or topical hazardous medications that do not require preparation in a hood.

Conclusion: Increased awareness of hazardous medications in the workplace, provided clear standards for handling medications identified as hazardous, and subsequently decreased healthcare worker exposure to hazardous medications.

ASHP 2013 Summer Meeting Professional Poster Abstract

9-M

Category: Quality Assurance / Medication Safety

Poster Type: Research-in-Progress

Title: What is the impact of consumer health literacy on the potential for unintentional overdose with acetaminophen?: patients perspectives

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Purpose: Separate research has been published on either patient health literacy or acetaminophen overdoses (intentional and unintentional); however, few studies have been conducted evaluating both areas together. The Food and Drug Administration has recognized acetaminophen overdose as a problem, and are taking steps to decrease its prevalence. This study assesses literacy problems focused on acetaminophen. Objectives of the study include: (1) identify patients health literacy regarding acetaminophen-containing products, (2) determine strategies patients find most effective in educating or alerting them about the risks of acetaminophen-containing products, and (3) define who consumers think is responsible for safe acetaminophen-containing product use.

Methods: Patients were recruited through direct patient contact at select community pharmacies, hospitals, and health-care clinics. Study enrollment was voluntary. Informed consent was offered and the participants were asked a demographic and Rapid Estimate of Adult Literacy in Medicine- Revised (REALM-R) questionnaire as well as several acetaminophen-related questions. Patient health literacy and perceptions data was collected, analyzed and interpreted. Data collection took place from October 2012 through February 2013. This study was approved as exempt by Purdue University's institutional review board (IRB).

Results: Data collection and interpretation was in process upon the submission of this abstract. To date, 19 patients have been analyzed. 89.5% of patients were considered adequately health literate, 57.9%

agree that a combination of efforts to educate or alert consumers are necessary to address, and 57.9% of patients agree that both patients and a combination of the suggested responsible parties should be held accountable for decreasing unintentional overdoses.

Conclusion: Regardless of patients sociodemographics, specifically, higher education and/or health literacy level, patients are not adequately educated regarding risks of acetaminophen-containing products, leading to potential unintentional overdoses. These safety concerns need to be addressed and managed, empowering the patient to take ownership of their health.

10-M

Category: Quality Assurance / Medication Safety

Poster Type: Research-in-Progress

Title: Methotrexate monitoring and leucovorin use in brain tumor patients at Abbott Northwestern Hospital

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Purpose: Methotrexate (MTX), a folate antagonist, has a broad range of antitumor activity, however the effects of MTX on folate metabolism are not selective to malignant cells. Leucovorin (LCV), a reduced folate, is given following high-dose MTX to minimize toxicity. The order sets at Abbott Northwestern Hospital (ANW) that include MTX for brain tumor patients are not standardized based on dose, duration, or route of LCV rescue therapy. The purpose of this study is to evaluate the feasibility of standardized LCV dosing in brain tumor order sets by assessing the safety and efficacy of high-dose, intravenous LCV (brain tumor patients) compared to low-dose, oral LCV in patients receiving MTX therapy for other oncologic indications.

Methods: Given the retrospective quality assurance nature of this analysis, it will be exempt from institutional review board approval. The hospital's electronic medical record system will be used to identify patients who have received high dose MTX and LCV rescue therapy. The records of twenty-five brain tumor patients and twenty-five patients receiving treatment for other oncologic indications will be evaluated. Information to be collected will include: order set number, MTX dose, MTX levels, LCV administrations (dose, route, frequency), baseline and daily serum creatinine, urine pH readings, and number of sodium bicarbonate bolus doses administered. Once collected, the data will be analyzed for safety and efficacy of the two approaches to LCV rescue therapy. Pending these results, standardization of LCV dosing across all ANW order sets that include high dose MTX therapy may be considered with the goal of preventing MTX toxicity using LCV at the lowest effective dose.

ASHP 2013 Summer Meeting Professional Poster Abstract

11-M

Category: Quality Assurance / Medication Safety

Poster Type: Descriptive Report

Title: Wrong-Patient Medication Errors: An Analysis of Event Reports in Pennsylvania and Strategies for Prevention

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Purpose: Patient misidentification has been a long-standing problem that has permeated all aspects of healthcare and led to errors ranging from wrong-site surgeries to discharging infants to the wrong families to ordering incompatible blood. While there are some organizations, such as the Joint Commission, who have suggested certain risk-reduction strategies, few studies have been performed that have analyzed wrong-patient medication errors in particular. This study aims to analyze event reports from Pennsylvania healthcare facilities to identify trends that inform the type of safeguards that should be implemented throughout the medication-use process to prevent such errors.

Methods: Medication error event reports from July 1, 2011, through December 31, 2011, that were categorized as wrong patient were queried from the Pennsylvania Patient Safety Authority's Pennsylvania Patient Safety Reporting System (PA-PSRS) database. All fields of the event reports, including harm score and care area, were self-reported; however, the medication name fields were adjusted during analysis to match information in the event description, if available. The event description fields were analyzed in detail to classify the events by node, related processes, possible causes, and contributing factors. Various trends were quantified using descriptive statistics.

Results: During the aforementioned reporting period, the Authority received 826 distinct medication error event reports from Pennsylvania healthcare facilities that were categorized as wrong-patient events. However, based on the event descriptions, 13 reports (1.6% of total reports) did not actually involve wrong-patient errors and were excluded from the analysis. Of the remaining 813 reports, most errors occurred during transcribing (38.3%, n = 311) and administration (43.4%, n = 353) and least during

dispensing (5.2%, n = 42) and prescribing (12.1%, n = 98). Anti-infectives, insulin, and anticoagulants were the most common types of medications associated with wrong-patient events. While multiple factors may have contributed to each event, the most common were two patients being prescribed the same medication, improper verification of patient identification, and similar room numbers.

Conclusion: The reports of wrong-patient events submitted to the Authority reveal the complex nature of wrong-patient medication errors. While often thought to occur only during administration, these types of errors were identified in all phases of the medication-use process. Therefore, implementing safety strategies at all nodes can help to ensure that the correct patient receives the correct medication. Important risk reduction strategies include ensuring proper storage of medications and patient-specific documents, utilizing healthcare technology fully, limiting verbal orders, and improving patient verification throughout the medication-use process.

ASHP 2013 Summer Meeting Professional Poster Abstract

12-M

Category: Quality Assurance / Medication Safety

Poster Type: Evaluative Study Report

Title: Evaluation of medication-related hypoglycemic events in non-intensive care unit patients

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Purpose: Glycemic control in the inpatient setting has received increasing attention in recent years, with the demonstration that appropriate blood glucose control prevents adverse events in both intensive care unit and non-intensive care unit settings. Studies suggest that benefits of tight glycemic control may be at least partially offset by the increased risk of hypoglycemia. It remains unknown whether the risks associated with hypoglycemia found in critically ill patients can be generalized to non-intensive care unit settings. The purpose of this study is to evaluate medication-related hypoglycemic events in non-intensive care unit patients. The rationale is to evaluate and determine whether the oral antidiabetic medication or the timing of the insulin regimen contributed to the hypoglycemic event.

Methods: The institutional review board approved a prospective, open-label, observational study of 100 patients. The patients included within the study were identified from a daily report Monday through Friday generated from the institutional computer system. Inclusion criteria consisted of blood glucose less than 70 mg/dl, and age greater than or equal to 18 years of age. Exclusion criteria consisted of critical care patients, admission diagnosis of diabetic ketoacidosis, and pregnant patients. Each patient was evaluated for usage of an oral antidiabetic medication, scheduled insulin, and/or sliding scale insulin. The timing and dosage amount was noted for the insulin regimen. Diet status and procedures were also evaluated as potential causes. Each event was classified into the following categories: nothing by mouth status, recent procedures, bedtime sliding scale correction, scheduled insulin, daytime sliding scale correction, unable to determine, and scheduled oral antidiabetic medications.

Results: Patient demographics consisted of: average age of 69 years, 57 percent female, 84 percent type 2 diabetes, and an average HbA1c 7.5 percent. Insulin regimens consisted of 44 percent basal, 1 percent

prandial, 18 percent basal and prandial. Seventy-eight percent of patients received sliding scale insulin. Sliding scale insulin options included 53 percent insulin lispro and 47 percent insulin regular with varying ranges of dosing intensity. Reasons determined for the 132 hypoglycemic events for the 100 patients included: nothing by mouth 8 percent, procedure 4 percent, bedtime sliding scale correction 9 percent, scheduled insulin 33 percent, daytime sliding scale correction 24 percent, unable to determine 4 percent, and scheduled oral antidiabetic medication 18 percent.

Conclusion: The sliding scale regimen was the predominant reason for the hypoglycemic events. Further investigation of the sliding scale options including insulin types utilized and dosing intensity with the potential removal of bedtime coverage will be conducted.

13-M

Category: Quality Assurance / Medication Safety

Poster Type: Descriptive Report

Title: Preventing harm through real-time adverse drug event surveillance and causative factor collection

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Purpose: Adverse drug events (ADEs) are common and are associated with increased morbidity and mortality, prolonged hospitalizations, and higher costs of care. Most current ADE surveillance processes utilize self-reporting or random samples. Also, existing methods to collect causative factors are arduous. The goals of this project were to design and implement an automated, comprehensive ADE surveillance system, utilize data to identify causes, and implement custom intervention strategies across the health care system based on trends.

Methods: BJC Healthcare is a system comprised of 13 hospitals in St. Louis, MO and surrounding areas, ranging from academic, community, and pediatric, urban and rural facilities. In order to design a valid, comprehensive, and reproducible method for capturing ADE harm, the team adapted the current Institute for Healthcare Improvement (IHI) Trigger Tool to our enterprise clinical decision support system. The key triggers were toxic drug levels, antidote orders, and dangerous lab values. Each automatically generated trigger was independently reviewed for harm and causality by a local reviewer at the time of the alert followed by central review of the electronic medical record after patient discharge. Disagreements were adjudicated by an independent pharmacist. The alert also provided the reviewer with pertinent clinical factors, drug orders, and lab values. To assure consistency, standard harm definitions for each trigger were established and integrated into each alert. In addition, all reviewers were systematically trained and tested for competency. To identify and collect causative factors, the team reviewed pharmacist notes and surveyed experts to compile a set of frequently identified actionable causes of harm and added them as selections on the alert review form.

Results: Approximately 150 pharmacists and 25 nurses and certified diabetic educators were trained to complete the trigger reviews. Results were utilized to elevate awareness of top causes of ADEs in the hospital system- severe hypoglycemia (glucose level <40 mg/DL) and oversedation. Two system-wide task forces were formed to develop data dashboards to distribute to hospital leaders. In addition, data analysis allowed the identification of hospitals with low ADE rates and best practice successes, which

could then be shared and implemented in hospitals with higher rates. The innovative collection of causative factors allowed the team to design prevention strategies customized for each hospital. To track interventions and sustain improvements, quality dashboards, causative factors, and best-practice recommendations were displayed on an interactive Share Point site. The overall annual rate of ADEs decreased from the 2009 baseline of 3.09 events per 1,000 patient days to 1.83 in 2012, a 41% decrease. This was predominantly due to the reduction in severe hypoglycemia during that same time period from 2.44 to 1.31 events per 1,000 patient days.

Conclusion: A novel, professionally staffed, automated ADE surveillance system, designed to identify events and collect causative factors, can successfully be implemented at a diverse healthcare system. The data collected can be used to efficiently foster changes in practice, leading to significantly reduced harm.

ASHP 2013 Summer Meeting Professional Poster Abstract

14-M

Category: Quality Assurance / Medication Safety

Poster Type: Descriptive Report

Title: Evaluation of the pharmacist role in the detection of transcription errors in a Lebanese hospital

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Purpose: Medication errors in the hospital setting have been one of the leading causes that compromise patient safety, prolong hospital stay, and increase hospitalization cost. This problem has been a major challenge for the hospital pharmacist. In the absence of computerized data entry orders, the pharmacist is responsible for documenting and correcting transcription errors through daily auditing of all physician prescriptions before dispensing. The objective of this study is to evaluate and assess the diverse types of errors that may arise from transcription at a Lebanese institution and suggest an appropriate solution for that.

Methods: A direct observational method was used in this study to detect the percentage of the different types and causes of transcription errors over a period of 8 months extending from May till December, 2012. Error was defined as any deviation in transcribing medication orders through the implementation of procedures that included inaccuracy in: drug selection, dosing, schedule, dosage forms, duration, and medication writing. A pharmacist was assigned to audit all physician orders which has been accomplished through attendance of the daily rounds, validation of all medication orders, and revision of all prepared medications before dispensing. The severity of errors was classified into two categories whereby category A indicated an error that did not reach the patient, and category B indicated an error that reached the patient but did not cause any harm.

Results: A total of 111 medication orders resulted in 89 transcription errors (80%), which required revision. Errors were derived from multiple floors at the medical center including internal medicine,

surgery department, obstetrics and gynecology unit, and pediatrics. Analysis of the reviewed medication errors showed that the types of errors were classified into the following: 28% wrong medication, 7% improper dose, 5% omission of the dose, 49% inappropriate dosing schedule, 5% wrong dosage form, and 6% extended therapy treatment despite a discontinuation order by the physician. Upon investigation, the causes of errors happened to be due to 65% inaccurate transcription of orders, 20% lack of knowledge, and 5% dose miscalculation. As for the severity of errors, they were divided into the above indicated categories with the following percentages: category A scored 79% and category B scored 21%.

Conclusion: Recognition of the incidence and causes of medication errors that may occur in the different processes of the drug distribution system is crucial. This allows for an effective change to enhance the treatment quality and ensure maximum patient safety. Based upon the above findings, the pharmacist plays a vital role in preventing treatment mistakes/failure through proper communication with other health care professionals. Pharmacists can minimize medication errors that arise from transcriptions through continuous audit, error documentation and implementation of quality improvement plans. Eventually, standards for proper drug prescriptions have been developed and distributed to all services at the hospital. Continuous educations for all health-care professionals and encouragement of the adoption of the computerized orders have been implemented.

ASHP 2013 Summer Meeting Professional Poster Abstract

15-M

Category: Automation / Informatics

Poster Type: Descriptive Report

Title: Barcode scanning in non-sterile compounding

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Purpose: Compounding patient-specific medications has been a pharmacy responsibility for many years. Most hospital pharmacies compound only a small percentage of total doses, the most common being sterile parenteral doses, oral liquids and patient-specific oral syringes for pediatric patients. There is increased potential for error whenever a medication is removed from the manufacturer's original package, manipulated and re-introduced into another container. In addition to safety concerns, there are issues with process standardization, labeling and documentation. In most pharmacies the lot number and expiration of ingredients used in compounding are manually recorded in a logbook along with the initials of the persons compounding and verifying the product. This manual documentation is unsuitable for retrieval in the event of a recall or other issue involving one of the ingredients. The lot number and beyond use date are also hand written on the label of the finished product causing legibility issues. Additionally, pharmacy-compounded products may not have readable barcodes for the nurse to scan during administration.

Methods: Our pharmacy installed a barcode medication preparation (BCMP) system in the IV room to improve the safety of compounded sterile products in 2010. We recently adapted this system to help ensure accuracy of two non-sterile compounding processes, oral liquid syringe preparation and bulk liquid compounding. The system incorporates scanning of ingredient barcodes and image capture of amounts and volumes. We configured the system to force entry of ingredient lot numbers and expiration dates during the compounding process. Technicians and pharmacists were trained how to use the system for preparation, labeling and verification of the products. The system alerts technicians when to prepare doses and alerts pharmacists when a dose is ready to verify. All documentation is archived

for reporting and retrieval, including ingredients scanned, amounts and volumes, and lot number and expiration dates.

Results: In five months using the system for oral liquid syringe preparation, a total of 19 errors have been intercepted, 0.9% of doses processed. Nine of these errors involved the wrong drug, eight the wrong concentration and two the wrong amount. This is nearly the same as the 1% intercepted error rate that we experience for compounded sterile products. The second use of BCMP, bulk liquid preparation, has been live for 3 months. Two errors have been intercepted out of 140 batches (1.4%). One was the wrong ingredient, one the wrong volume of an ingredient.

Conclusion: The potential for errors during non-sterile compounding is similar to sterile compounding. Technicians frequently prepare these products without direct pharmacist supervision. Pharmacist check ingredients and amounts after product completion. Completed products are usually homogenous mixtures making it difficult or impossible to detect errors visually. Incorporation of barcode scanning and image capture into the non-sterile compounding process helps ensure the correct ingredients and amounts are used before the product is prepared. The system also electronically captures lot number and expiration dates of ingredients used. This information is stored electronically and easily retrieved if needed. Our pharmacy now barcode scans all compounded doses, sterile and non-sterile, during preparation. BCMP should be standard practice in sterile compounding and provides added assurance and improved documentation for non-sterile compounding as well.

ASHP 2013 Summer Meeting Professional Poster Abstract

16-M

Category: Automation / Informatics

Poster Type: Evaluative Study Report

Title: Prevention of drug name confusion errors with indication alerts during computerized physician order entry (CPOE)

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Purpose: Confusion between similar drug names is a common and persistent cause of medication errors, many of which lead to serious and even fatal harm. In fact, hospitals must meet a standard for the safe use of look-alike/sound-alike (LA/SA) medications for Joint Commission accreditation. The use of clinical decision support systems (CDSS) during computerized physician order entry (CPOE) may help reduce medication selection errors at the time of order entry. The aim of this study is to determine if computerized alerts for problem list maintenance can prevent drug name confusion errors by reminding prescribers of the indications for the drugs they are ordering.

Methods: The institutional review board approved this retrospective chart review. Previously, the health system implemented computerized alerts within its electronic medical record (EMR), which activate when prescribers order a medication that is used for an indication that is not documented in the patient's problem list. This alert prompts the prescriber to cancel the order, ignore the alert, or add an indication to the problem list. We created a database consisting of all alerts that were triggered between 2006 and 2012. In order to identify potential drug name confusion errors, we designed detection algorithms to find instances in which an indication alert was triggered, but the order was cancelled and the same clinician ordered a similar-sounding medication within 10 minutes for the same patient. All pairs of drug names beginning with the same 2 or 3 letters were evaluated. Two experienced clinicians (MD or PharmD) performed chart review of these cases, blinded to each other's review, to

determine if the first, cancelled order had an appropriate indication documented in the EMR, and if the second order suggested an interception of a potential medication error. If reviewers did not agree that the sequence represented an intercepted error, the case was excluded. The primary outcome was the proportion of indication alerts that resulted in interception of a drug name confusion error. The secondary outcome was to describe the most common drug name confusions.

Results: A total of 127,142 indication alerts were analyzed. Of these, 2,410 (1.9%) alerts led to "abandoned orders," or the cancellation of the original order without a subsequent order for another drug. There were 50 instances in which the alert led to the ordering of a different, similar-sounding drug, therefore averting a possible drug name confusion error. We identified 21 unique pairs of similar-sounding drugs, with the most commonly confused pairs being metoprolol/metoclopramide (32%), nitroprusside/nitroglycerin (12%) and propranolol/propofol (10%). The inpatient setting represented roughly two-thirds of these instances and the ambulatory setting represented the remaining third. Over half (58%) of these drug pairs included high-alert medications such as metoprolol, nitroprusside, and propranolol. This analysis found that the indication alerts intercepted 0.4 drug name confusion errors per 1000 alerts.

Conclusion: Although several proposed solutions exist to prevent errors with LA/SA medications (e.g., use of tall-man lettering, use of CPOE, avoidance of verbal orders), some errors still occur. We demonstrated that indication alerts during CPOE intercepted approximately 0.4 errors per 1000 orders, involving a number of high-alert medications. These results represent an added benefit of CPOE-based indication alerts beyond their role in improving problem list maintenance. Although we did not evaluate the reduction in actual patient harm in this analysis, we believe the use of a CDSS during order entry may help reduce this risk.

ASHP 2013 Summer Meeting Professional Poster Abstract

17-M

Category: Automation / Informatics

Poster Type: Research-in-Progress

Title: Targeted best practice alerts for selected black box warnings

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Purpose: Medication errors can occur at any point during the medication management process. Implementing clinical decision support systems are one way of reducing errors. These support systems can be designed to alert practitioners as to the proper dosages of medications, drug allergies, drug-drug interactions, and a variety of other prescribing issues. Unfortunately, many of these systems overwhelm practitioners with insignificant alerts and may not be set up to detect more important interactions. One way to counteract this issue is to design specialized best practice alerts (BPAs) for more important warnings. This can allow for the suppression of less important alerts and only notify practitioners to the alerts that they should be most concerned with, such as those associated with a black box warning (BBW). Drugs that have been linked to serious injury or death may be required to have a BBW as per the FDA.

Methods: The proposed method was presented and approved by the institutions Pharmacy and Therapeutics Committee as a Quality Improvement Project. Lexi-Comp was used to identify University of Virginia Health System formulary medications that have a BBW. All of these medications were reviewed to determine if a BPA can be created for the warning. One month of current warning data was collected. These data were compared to the medications to determine if any alert are currently in place for the BBW. The list of medications was then ranked based on a rubric. The rubric consisted of the following information: number of orders per month, current alert firing rate (if an alert exists), current override rate (if an alert exists), ease of BPA build, ability to translate the warning into a BPA, projected maintenance, whether or not the warning is a contraindication, and builder discretionary value. The completed list of medications will be presented to the hospitals Clinical Decision Support Committee for approval and build. Initially, the BPAs will be hidden from the end users. Data will be collected during

this time to determine expected firing rate and practitioner awareness to the warning when no alert appears. After this initial phase is complete, the alerts will be set to fire to the end users. The data will then be compared to that from the initial phase to determine the effectiveness of the BPA. If proven effective, more alerts will be created for other BBWs. Also, a review of the current alerts in our system will be reviewed to determine if less significant alerts can be suppressed.

ASHP 2013 Summer Meeting Professional Poster Abstract

18-M

Category: Automation / Informatics

Poster Type: Descriptive Report

Title: Automating medication management processes for safer patient care

Primary Author: Adeline Saliba, Corniche Hospital in affiliation with Johns Hopkins Medicine, Pharmacy Department, PO Box 3788, Abu Dhabi, United Arab Emirates; Email: adelinesaliba@hotmail.com

Purpose: In 2009, the Institute of Medicine report estimated 98,000 deaths per year resulting from medical errors, of which seven percent occurred from medication-related incidents. Given the intricacy of healthcare systems, redesigning care delivery through workflow efficiencies, encouraging implementation of health informatics and reforming healthcare professional education are crucial to optimizing quality of care and patient safety. Our hospital adopted innovative technologies to enhance medication management processes and better serve its patients. This quality improvement project focused on the following objectives: 1) Risk assessment of our existing drug systems to identify opportunities for improvement 2) Prioritization of these initiatives through a failure modes and effects analysis 3) Implementation of risk reduction strategies, in line with international best standards of practice, aimed at incorporating safety nets into our system designs so that individuals involved in these complex processes are able to make safe choices.

Methods: A gap analysis, conducted in 2011, identified strengths and weaknesses of the entire medication management and use system. A multidisciplinary team collaboratively addressed the areas requiring enhancement, so that implemented solutions were suitable for all stakeholders. Additionally, numerous self-assessment techniques (Institute for Safe Medication Practices ISMP medication safety self-assessment for hospitals), diverse audit results from Joint Commission International and relevant regulators, as well as data compiled from the hospitals anonymous electronic incident reporting tool justified this project as being of high importance for enhanced patient safety. Findings from these diverse tools provided guidance as to what and how to prioritize such initiatives. Amongst the weaknesses identified were the lack of devices available to assist with medication preparation, suboptimal use of computerized physician order entry (CPOE) system and unavailability of automation for safe drug distribution and administration. These issues were prioritized through a failure mode and effects analysis (FMEA) conducted for the entire medication management system.

Results: Strategic planning was undertaken to not only revamp the physical infrastructure from which pharmaceutical services were provided through, but also to exceed required best practices to a level that is transformational and strongly contributing to patient safety. This was achieved through: 1) Elimination of unnecessary processes and streamlining of workflow efficiencies to ensure checks and balances are in place for diverse steps in medication management, primarily through automation. This allowed for consistency of practices and standardization across the entire organization. 2) Integrated automated solutions, supported by clinical decision support. Highlighted innovative technologies of this project include: a) Barcoding of all medications and distribution to automated dispensing cabinets (ADCs) integrated with computerized prescriber order entry (CPOE) allowing for stricter access to medications and enhanced inventory management. b) Positive Patient Identification (PPID) whereby a patient's wristband and medication barcode label are scanned prior to administration for further validation of the 5 rights: the right drug, in the right dose, by the right route gets to the right patient, at the right time. From the time of implementation in May 2012, barcoded medication administration compliance rate has consistently increased from 91.25 percent, reaching the target of 95 percent in September 2012 (95.70 percent) and maintaining it ever since. These initiatives have allowed for safer patient care, improved productivity and enhanced nursing satisfaction regarding pharmaceutical services. Additionally, our facility successfully achieved HIMSS analytics stage 6, a status awarded to about 8 percent of US hospitals and very few international healthcare organizations.

Conclusion: To successfully accomplish this hospital-wide project required solid teamwork efforts and valued communication between clinical and administrative staff. It was also crucial to align people and processes, with the right technology, to warrant appropriate, safe and efficient handling of medications. Throughout the implementation, lessons learned were shared with all employees through the hospital's medication safety newsletter.

ASHP 2013 Summer Meeting Professional Poster Abstract

19-M

Category: Automation / Informatics

Poster Type: Evaluative Study Report

Title: Improving the accuracy of pharmacist-led electronic medication reconciliation

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Purpose: A multitude of factors- systems, technical and socio technical in nature, contribute to the absence of an accurate medication history source. Inaccuracies in medication histories of patients can have far-reaching effects on patient safety. No previous study has assessed the potential benefit of using pharmacy claims data in conjunction with medication history extracted from inpatient and outpatient electronic health records (EHRs). Also, no previous study has assessed how accurate this information is to what the patient is actually taking. The goal of this study is both to determine the accuracy of the electronic medication history data obtained from EHRs with pharmacy claims databases and also describe the discrepancies that exist between data sources.

Methods: Clinical pharmacists obtained gold standard medication history data on 178 patients admitted to the general medicine units of 2 large academic hospitals in Boston, Massachusetts. This medication history data derived from all possible sources- using the pre-admission medication list as the starting point, patient interviews, pharmacy calls and assessing pill bottles brought in by the patient, was referred to as the Gold Standard Pre-Admission Medications List (GS-PAML). This list was compared to the second source of electronic medication history information, called the PAML, developed from EHRs (ambulatory and list of medications from patients last admission). A third source of medication history information was from pharmacy claims obtained for two of the large health insurance plans in Massachusetts. A retrospective analysis of the 3 medication history sources: GS-PAML, PAML, and claims data was conducted to identify and categorize discrepancies. We also identified discrepancies in the various components of a medication order, including dose, route, and frequency. McNemars test was

used to assess significant differences between paired proportions of medication entries from each of the three sources.

Results: Fifteen patients had medication history information for all three sources and had 191 GS-PAML medication entries. When comparing the PAML to the GS-PAML, only 52.1% (88) of the gold standard medications were correctly reflected in the PAML. Claims data only reflected 43.2% (71) of the medication entries correctly. Overall, there was no significant difference in the proportion of medications correctly reflecting the GS-PAML in either the PAML or the pharmacy claims data. There was a significant difference in the proportion of gold standard medications correctly reflected in the combination of the PAML and claims data compared to the PAML or claims data separately ($p < 0.0001$).

Conclusion: The combination of the PAML and claims data has the potential to alleviate possible omission of medications that could potentially result in adverse drug events. Overall, the addition of pharmacy claims data can bring value to identifying a more accurate medication list for the patient and improve the accuracy of medication reconciliation.

ASHP 2013 Summer Meeting Professional Poster Abstract

20-M

Category: Automation / Informatics

Poster Type: Descriptive Report

Title: Ambulatory adaptation of an inpatient pharmacy intervention documentation tool

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Purpose: Continuity between outpatient encounters and across the acute and ambulatory phases of care can be a challenge despite the use of a comprehensive electronic medical record (EMR). Tools are available in commercial EMR systems to assist with pharmacy intervention documentation for the inpatient setting. However, usefulness of these tools is limited in ambulatory settings due to the use of multiple patient encounters to provide longitudinal care. Standalone software applications also exist for continuity of care documentation; however, the lack of integration with the EMR presents a challenge for universal access to the information and creates another application and process for pharmacists to learn. The purpose of this project was to use a singular tool to establish a consistent workflow and continuity between inpatient and outpatient pharmacy intervention documentation.

Methods: The most recent (2012) version of the Epic EMR (Epic Systems Corporation) included an update to the pharmacy intervention tool (i-Vents). This update allows specific intervention subtypes to either close or remain open at patient discharge. By creating subtypes of i-Vents that remain open past discharge, the tool was adapted for use as a means of maintaining continuity between inpatient and outpatient encounters, as well as for communication between serial outpatient encounters. A user focus group was created to optimize the utility of the i-Vent tool. A crosswalk was created between the legacy pharmacy intervention and communication tool (Quantifi, Wolters Kluwer Health) to identify which i-Vent subtypes would be created, and which would remain open past discharge. Data were collected on

i-Vent volumes, associated medications, and subtypes utilized. The data were analyzed and compared to the pharmacist focus group feedback a final list of i-Vents subtypes was created.

Results: Modifications were made to the Epic EMR to facilitate the usefulness of i-Vents for ambulatory pharmacists. An i-Vent column was added to the pharmacists view of the ambulatory clinics schedule to display the number of open i-Vents per each patient. A pharmacy-specific report, visible from within the schedule activity, was created to display a summary of open i-Vents. With the implementation of new i-Vent functionality, outpatient pharmacists are able to document information for follow up in future encounters. Inpatient pharmacists are also able to provide information to outpatient pharmacists by using the i-Vent tool.

Conclusion: The use of a comprehensive EMR allows continuity between inpatient and outpatient encounters. The modification of a built-in inpatient pharmacist intervention tool allowed communication and continuity between both encounter types.

21-M

Category: Automation / Informatics

Poster Type: Descriptive Report

Title: Using computerized prescriber order entry to limit overrides from automated dispensing cabinets

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Purpose: The use of total override functions on automated dispensing cabinets (ADC) is often deemed necessary in areas without pharmacy review of orders. The emergency department (ED) in our facility was an area that used total override, allowing nurses access to every medication in the machine independent of patient orders. With the implementation of computerized prescriber order entry (CPOE), an opportunity was identified to remove the ADC from complete override in order to gain greater control of medications through the activation of auto-verification for select medications in this licensed independent practitioner area. This is an assessment of CPOE implementation and the conversion of ADC to limited override.

Methods: The ED at Indiana University Health Methodist Hospital sees approximately 300 patients per day. Prior to CPOE implementation, the ADC inventory for each area of the ED was reviewed to anticipate medications that would need to remain available through override. Auto-verification logic was implemented to allow for certain medications to be entered and appear on the ADC profile for the patient without pharmacist verification. Nursing and physician education was completed regarding which standard medications would remain available on override, as well as to gather input of additions to the override list. In addition, most items that were in ADCs that the nurses were previously add-mixing were now being prepared by pharmacy. December 2012 through February 2013 data is assessed.

Results: Six ADC machines were removed from total override on the same day as CPOE implementation in the ED. In the first three months after CPOE initiation, 2700 average orders were entered by the ED staff on a weekly basis. Approximately 1485 (55% of orders) entered for the ED qualify for auto-verification, and the rest were reviewed by a pharmacist prior to administration. Looking only at orders that are verified by a pharmacist, approximately 90% of orders were verified in less than 15 minutes, with an average verification time of 2.9 +/- 5.5 minutes. The timely order verification has allowed the ADCs to remain in a limited override status with no effects on ED throughput and length of stay.

Conclusion: It is best-practice to have ADCs with limited overrides. This insures proactive order review by a pharmacists, increased medication safety, and increased medication security. Using CPOE and auto-verification allows for efficient order processing. In a large urban emergency department, it is possible to remove the machines from total override and continue to provide excellent and timely patient care.

ASHP 2013 Summer Meeting Professional Poster Abstract

22-M

Category: Automation / Informatics

Poster Type: Descriptive Report

Title: Evaluation of automated dispensing cabinet optimization at a tertiary academic medical center

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Purpose: Automated dispensing cabinet (ADC) use within hospitals is designed to replace or partially replace medication cabinets or carts to allow for a more decentralized model of medication distribution. Automated dispensing cabinet use improves inventory management, streamlines patient billing, and increases care giver and patient satisfaction. Strategies for maintaining an optimized ADC inventory are not well described in the literature. This project was designed to improve medication delivery by decreasing the burden of dispensing patient specific medications from a centralized inpatient pharmacy while decreasing overall inventory cost on unit specific ADCs.

Methods: This single center descriptive analysis evaluated ADC inventory optimization in a mixed medical surgical population. Two time periods were evaluated: a before (pre) inventory optimization and after (post) inventory optimization. Both time periods were two months in duration with a two week washout period. A clinical pharmacist worked in conjunction with two certified pharmacy technicians to evaluate ADC inventory and centrally dispensed medications. Data collected included: inventory cost on ADC, medications removed from or added to ADC, patient specific medications sent from central pharmacy, and the rate of medication stock outs on ADC.

Results: Post inventory optimization cost on ADC was reduced from 11963.05 to 6562.79 dollars (45 percent) and total cabinet inventory was increased from 526 items to 567 (7 percent). These results followed the removal of 52 items, 42 multiple strength deletions, as well as the addition of 104 items. The total number of patient specific medication units dispensed from central pharmacy decreased from 6489 to 4408 (32 percent). The number of medication stock outs increased from 1.52 per day to 1.56 per day over this same period.

Conclusion: Optimization of ADCs reduced the quantity of patient specific medications dispensed from central pharmacy while reducing the total inventory cost on the cabinet.

ASHP 2013 Summer Meeting Professional Poster Abstract

23-M

Category: Automation / Informatics

Poster Type: Evaluative Study Report

Title: Comparison of two mobile computing devices to improve clinical pharmacists' workflow

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Purpose: Several information technologies have increased productivity and efficiency of clinical pharmacists during work activities. The objective of this study was to evaluate two clinical mobile computing devices and assess their impact on the activities of clinical pharmacists on inpatient services in a tertiary care hospital with an established electronic medical record and computerized physician order entry.

Methods: This open-label cross-over study evaluated the use of two electronic devices by clinical pharmacists during the course of their work day. The devices evaluated were an iPad tablet and a Hewlett-Packard Elitebook 2730p tablet computer. Ten clinical pharmacists used each of the devices and documented their utility daily. The evaluation period was three weeks for each device. Following a one week run-in period to become proficient with the device, the pharmacists used the devices and collected data. Data collected includes pre-rounding time (in minutes), device access for drug information (number of times), and device use for patient counseling (number of times). A post-study survey was completed by all participants on each device to further assess utility of each device. One of the questions asked for a direct comparison of the two devices and another asked about the ability to eliminate paper materials during daily rounds. Other questions included rating the ease of use while rounding, ease of learning to use the device, as well as battery life, speed of the device, and lightness of each device.

Results: Ten clinical pharmacists completed the study; however eight participants completed the cross-over and their data are represented. All survey questions were answered with the Likert scale strongly agree, agree, neither, disagree, or strongly disagree. When asked if the iPad was more helpful than the tablet computer in improving their efficiency or workflow, 88% answered either strongly agree or agree. When asked if the iPad was satisfactory overall, 60% rated it as strongly agree and the remaining 40% rated it as agree. When asked if the iPad was easy to learn to use, 90% of participants rated it as either strongly agree or agree. When asked if the input keyboard was manageable to use, the results were variable, with 10% rating it as disagree, 20% as neither, 10% as strongly agree and 60% as agree. When asked if the screen size and speed if the iPad was adequate, all rated it as agree or strongly agree. Battery life, lightness of the device and ease of use during rounds was deemed adequate for the iPad by all participants. When asked if the tablet computer was satisfactory overall, 71% of participants rated it as either agree or strongly agree, while 29% rated it as disagree. When asked if the tablet computer was easy to learn to use, 88% rated the tablet computer as strongly agree or agree, but only 50% of participants noted the battery life was satisfactory for rounding activities. Time (minutes) spent pre-rounding was not different between the two devices (iPad = 166 \pm 95, tablet computer = 262.5 \pm 97, paired t-test, $p=0.0875$), although this may be a type II error due to the small sample size. Participants reported that they were able to decrease, but not completely eliminate paper materials.

Conclusion: Both the iPad and the tablet computer were considered satisfactory to this group of clinical pharmacists. Time spent pre-rounding did not differ for the two devices, but this may be a type II error due to small sample size. Most participants preferred the iPad to the tablet computer. Most were not able to eliminate paper materials during rounding.

ASHP 2013 Summer Meeting Professional Poster Abstract

24-M

Category: Automation / Informatics

Poster Type: Descriptive Report

Title: Informatics impact of drug shortages

Primary Author: Charles Burometto, The Johns Hopkins Hospital, 600 North Wolfe Street Carnegie 180, Baltimore, MD 21287; Email: cburome1@jhmi.edu

Purpose: The impact of drug shortages in informatics has been substantial. The avoidance of errors in the entering and processing of medication orders is of paramount importance to the institution. Given the short turnaround time often associated with drug shortages and the numerous systems that need to be updated this can be a daunting task. The pharmacy departments approach to coping with the computer system changes necessitated due to drug shortages will be reviewed.

Methods: An informatics pharmacist reviewed the systems changes during the last 12 months and assigned the various changes into different categories. The review looked at the change request tickets opened as a result of a drug shortage as well as the number of individual changes that were required. To ease the burden of operational and systems changes the pharmacy department holds a weekly drug shortage meeting to review those drugs currently known to be in short supply and to recommend appropriate system modifications. This meeting is attended by operations managers, clinical pharmacists, pharmacy purchasers, and an informatics pharmacist. Once the change requests are written up they are reviewed by a member from the IT department to minimize the unintended consequences of the system modification. The systems most impacted by these types of changes are the order entry system, the dispensing system, and the automated dispensing cabinets. Other systems that are also impacted are the robot, the ED order entry system, and the anesthesia documentation system.

Results: During the 12 month period from 3/1/12 2/28/13 there were 50 drug shortages reported that required modification of one or more computer systems. A total of 128 systems changes were made as a result of the 50 shortages. Of the 50 shortages, all but 6 required a faster than normal turn around in the computer systems. The normal time for typical systems changes is typically up to 14 days. Some of the shortages were so severe they required an immediate change to computer systems. A total of 9 different categories of systems changes were identified at our institution. These ranged from as simple to placing a warning message in the order entry system to as advanced as recoding the logic that fires

for certain orders. There have been instances when even though we anticipated a shortage, and tried to be proactive with the systems changes, an unforeseen event happens which could alter the final changes that get implemented in the computer systems. At times we have involved the P&T committee in some of our decisions.

Conclusion: By taking a systematic approach to the change control process we have been able to communicate the shortages to the prescribers at the point of placing orders instead of them being notified after the fact and caught off guard. Whenever possible we try to be proactive and provide alternatives to the prescribers at the point of order entry. Even though some of the modifications needed to be re-worked, the impact to prescribers has been minimal. There have not been any instances where an order set failed to be placed because the status of a blocked order within that order set did not get changed from required to not required.

ASHP 2013 Summer Meeting Professional Poster Abstract

25-M

Category: I.V. Therapy / Infusion Devices

Poster Type: Evaluative Study Report

Title: Using Data from Syringe Pumps to Improve the Pediatric Drug library

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Purpose: The use of smart infusion pump technology has helped to reduce infusion pump errors by using a customizable drug library. Dose range limits in the drug library can alert the user if a medication dose is outside established institutional limits. Medication administration data stored in the smart syringe pumps is known as continuous quality improvement (CQI) data. The primary objective of this project is to analyze this CQI data to improve the quality of dose range alerts.

Methods: In December 2011, all 320 syringe pumps currently in use in the Johns Hopkins Children Center were updated with a the new drug library. During this process, the CQI data stored in each syringe pump was downloaded into a computer. Syringe pumps where the data could not be downloaded or the drug library version was outdated were excluded. Downloaded data included the serial number of each pump to avoid duplication. The CQI data was then used to identify the drugs associated with highest number of dose range override alerts.

Results: Out of 320 syringe pumps, 248 pumps were included in the final analysis. A total of 1,727 alerts were identified during the study period. Of the 1,727 alerts, dose range alerts accounted for 866 (51%). Of these 866 dose range alerts 704 (79%) were soft limits, 108 (12%) were hard limits and 74 (8%) were aborts. Soft limits were overridden 91% of the time when they were encountered, with 7 medications accounting for 50% of those overrides.

Conclusion: Adjusting the dose range limits of seven medications within the pediatric drug library can potentially eliminate 50% of the current dose range overrides. This could very well improve the quality of the dose range alerts within the pediatric drug library by reducing clinically unhelpful alerts.

ASHP 2013 Summer Meeting Professional Poster Abstract

26-M

Category: Small and Rural Pharmacy Practice

Poster Type: Descriptive Report

Title: Impact of Computerized Provider Order Entry (CPOE) on the Medication Error Process in a Small Rural Hospital

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Purpose: To compare the medication errors reported before and after implementation of computerized provider order entry (CPOE). This review includes the impact of CPOE on the number of medication errors, including severity, error type, breakdown point, drug class, the clinical staff involved in these errors, and the phases of the medication use system involved (i.e., prescribing, administration, and dispensing).

Methods: All medication error reports (mers) reported in the last 6 months of 2011 were compared with the mers for the last 6 months of 2012. Primarily, mers are filled out by pharmacy and nursing with some input from the medical staff and other departments. Each month, all mers are reviewed by a pharmacist and a registered nurse (RN) for the number of medication errors, severity, error type, breakdown point, drug class, the clinical staff involved, and the phases of the medication use system involved (i.e., prescribing, administration, and dispensing). A summary of each category is presented to the monthly Physician and Therapeutics (P&T) meeting for review and discussion.

Results: In the last 6 months of 2011, there were 186 mers with a severity status of no patient harm. Error types included: 124 errors of omission, 16 wrong dose, 15 unauthorized/wrong drug, 11 others (single occurrences/non-predefined types), 6 extra doses, 5 wrong time, 4 wrong preparation, 2 wrong patients, 1 wrong rate, 1 wrong route, 1 wrong dosage form. Breakdown points included: 69 charting errors, 51 medication administration problems, 44 physician order problems, 10 transcribed incorrectly, 4 communication problems, 4 wrong medication dispensed, 3 labeling errors, 1 illegible handwriting. No mers were associated with the following breakdown points: not transcribed, medications unavailable,

intravenous pump/device related, other dispensed. The drug classes included 66 other (single non-predefined) drugs, 43 anti-infectives, 29 narcotic/barbiturates, 14 analgesics, 9 cardiovascular, 9 large volume parenterals, 6 diuretics, 4 psychotherapeutic agents, 2 anticoagulants, 2 steroids, and 2 hypoglycemics. The clinical staff involved were 134 RNs, 36 licensed practical nurses (LPNs), 16 house staff physicians, 15 attending physicians, 4 pharmacists, and 0 student nurses. In the medication use system, there were 122 errors in the administration phase, 63 prescribing errors, and 1 dispensing error. Pharmacy completed 149 mers, while nursing reported 37 mers. For the last 6 months of 2012 there were 189 mers, all having a severity status of no patient harm. Under error types, there were 93 errors of omission, 28 wrong dose, 24 unauthorized/wrong drug, 15 wrong time, 9 extra doses, 6 wrong patients, 5 wrong route, 5 wrong preparation, 5 others, 1 wrong dosage form, and 0 wrong rate. Breakdown points included: 81 charting errors, 68 medication administration problems, 31 physician order problems, 4 other dispensed, 2 transcribed wrong, 2 wrong medication dispensed, 1 communication problems. No mers were associated with the following breakdown points; not transcribed, medications unavailable, labeling errors, intravenous pump/device related, and illegible handwriting. The drug classes included: 79 other drugs, 33 anti-infectives, 20 narcotic/barbiturates, 18 hypoglycemics, 16 anticoagulants, 6 cardiovascular, 6 analgesics, 5 steroids, 4 psychotherapeutic agents, 2 diuretics, and 0 large volume parenterals. The clinical staff involved were 134 RNs, 48 LPNs, 9 pharmacists, 6 house staff physicians, 5 attending physicians, and 1 student nurse. In the medication use system, there were 108 errors in the administration phase, 75 prescribing errors, and 6 dispensing errors. Pharmacy reported 117 mers, nursing 68, and respiratory therapy 4. The number of medication errors increased slightly post CPOE, but the severity did not change. Errors of omission and physician order problems decreased by 25% and 29.5%, respectively. Unauthorized/wrong drug errors, charting errors, and medication administration problems increased by 60%, 17%, and 33.3%, respectively. Medication errors involving anti-infectives decreased by 33.3% whereas those involving anticoagulants increased by 700%. There was no change in the clinical staff involved for RNs, and there was a 33.3% increase in LPN involvement. Prescribing errors increased by 19%, medication administration errors decreased by 11.4%, and dispensing errors increased by 500%. Mers filled out by nursing increased by 183%, mers filled out by pharmacy decreased by 21.4%, and respiratory therapy had a 400% increase.

Conclusion: CPOE implementation affected medication errors differently within the first 6 months. Some of the changes in medication errors may have been attributable to a learning curve necessitated by CPOE implementation. One area of increase was the unauthorized/wrong drug errors increasing by 60%. This error occurred in several cases due to verbal orders being administered prior to the order being placed and verified on the electronic medical record. Errors involving anticoagulants increasing by 700% was likely due to the pharmacy having an easier observation of medications that were not charted. The 500% increase in dispensing errors may have occurred due to the increased visibility in the CPOE system which highlights dispensing errors occurring during non-pharmacy hours. Some of the pharmacy involvement in dispensing errors may have been due to increased pressure on the pharmacist to verify CPOE orders while maintaining all other aspects of a routine day. The increase in mers reported by nursing might be due to greater transparency in the CPOE system whereas the decrease in pharmacy reported mers was probably due to improved charting in the emergency department. Mers reported by respiratory therapy most likely were due to improved visibility in the CPOE system. The chief nursing

officer is reviewing each mer with all those involved as a learning tool to try to avoid future medication errors. Pharmacy has implemented a best practices pharmacy binder on each nursing desk which has improved communication with nurses and will hopefully decrease medication errors. Also, efforts to decrease interruptions in the medication administration phase hopefully will be beneficial.

ASHP 2013 Summer Meeting Professional Poster Abstract

27-M

Category: Small and Rural Pharmacy Practice

Poster Type: Research-in-Progress

Title: Implementation of a pharmacy driven antibiotic stewardship in a critical access hospital

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Purpose: Antibiotic stewardship programs (ASPs) have been shown to improve patient care by reducing inappropriate antibiotic use, antibiotic resistance, and hospital-acquired infections. Guidelines recommend an infectious diseases (ID) physician and ID trained pharmacist as core members of an ASP; however, several hospitals struggle to obtain the funding for these resources. The purpose of this study is to evaluate the effectiveness of a pharmacist driven ASP in a 25 bed critical access hospital using a remote ID trained pharmacist.

Methods: Prior to commencement, this study will be submitted to the Institutional Review Board for approval. A pharmacy resident at the critical access hospital will review all patients on the medical/surgical and intensive care units with an active antibiotic order daily. The pharmacy resident will then participate in rounds via telephone with an ID trained pharmacist or ID pharmacy resident from another hospital within the healthcare system. The pharmacy resident at the critical access hospital will communicate antibiotic recommendations to the hospitalist daily. The following data will be collected: number and type of recommendations made, number of recommendations accepted, antibiotic consumption in terms of days of therapy per 1000 patient days, and antibiotic cost per patient day. All data will be recorded without patient identifiers and maintained confidentiality. The team will be composed of a pharmacy resident, an ID pharmacy resident, and an ID trained pharmacist.

ASHP 2013 Summer Meeting Professional Poster Abstract

28-M

Category: Administrative practice / Financial Management / Human Resources

Poster Type: Research-in-Progress

Title: Pharmacy-initiated transitions of care services: an opportunity to impact patient satisfaction

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Purpose: UNC Hospitals has created a patient-focused transition of care program named Carolina Care at Home (CC@H). A multidisciplinary team serves discharging patients, including a pharmacy transition specialist (TS). The TS coordinates discharges and the patient needs relevant to their discharge medications and self-care management products. The program is designed to re-engineer the fragmented discharge process which literature suggests results in higher mortality, increased re-admissions, and cost. Improved patient satisfaction has also correlated to higher quality of care. Patient satisfaction as an indicator in the evaluation of pharmacy transitional services has not been studied to date.

Methods: This study was submitted and reviewed by the UNC Office of Human Research Ethics which determined that the study did not require IRB approval. Carolina Care at Home (CC@H) pharmacy services have been launched in a stepwise deployment through the medical center. For purposes of this study, baseline scores for twelve medical services (e.g., Press Ganey) and eight hospital locations (e.g., HCAHPS) will be compared to corresponding scores following the launch of CC@H pharmacy services for the same medical services and locations. Data points will be provided per month. For Press Ganey scores, questions for patient discharge and home medication education will be evaluated for the discharging medical service. The mean score, standard deviation, and number of surveys will be provided for the medical service. For HCAHPS, two pharmacy-related questions will be evaluated for the hospital location. The responses will be provided in a 5-point scale or Yes/No format. Patients eligible for inclusion will be those age 18 years or older and successfully discharged from the study site. All subjects

will receive usual care by a service-based pharmacist, medication counseling by a nurse prior to discharge, and other standard of care services on an inpatient medical team.

ASHP 2013 Summer Meeting Professional Poster Abstract

29-M

Category: Administrative practice / Financial Management / Human Resources

Poster Type: Research-in-Progress

Title: United States drug shortages: a systems thinking and feedback loop analysis

Primary Author: Adrian Scioli, Walden University, Graduate School of Management and Technology, Minneapolis, WI; Email: scioli2@aol.com

Purpose: Drug shortages and manufacturer's delays in the United States continue to challenge the ability of medical providers to achieve positive clinical outcomes. The objective of this study is to develop a deep understanding of underlying systems theory and feedback loops operating in the complexity of the United States pharmaceutical distribution channel. The data analysis gathered from this study is intended to inform healthcare managers and administrators of the feedback loops and subtleties making up the United States pharmaceutical supply channel. The information gathered may help healthcare leadership make more substantive and informed decisions affecting clinical outcomes and economic prosperity.

Methods: Prior to commencement of this study, the researcher will submit a request to the Institutional Review Board for approval. The researcher will conduct interviews with clinical and administrative managers of medium and large healthcare systems in the Eastern region of the United States. The researcher will utilize purposeful sampling to achieve topic saturation and obtain a thorough and diverse understanding of the perceptions of the population. The researcher will use semi-structured and open-ended questions directed at the organizational responses to drug shortages and manufacturer delays. The questions are designed to capture the perceptions of operational characteristics as interactions with feedback loops in the complex adaptive system. Interviews are coded according to the data analysis techniques prescribed in qualitative case study research constructs. The first employ will be deductive coding to identify key words or concepts from the interviews and then overlay the themes with the conceptual framework of the study. Using the themes and key concepts, the researcher may construct visual representations such as frequency charts, similarity matrices, cluster analysis, and content analysis. The resulting data analysis may be used to construct best practices and or key performance indicators for management use enabling a more informed organizational approach.

ASHP 2013 Summer Meeting Professional Poster Abstract

30-M

Category: Administrative practice / Financial Management / Human Resources

Poster Type: Descriptive Report

Title: Automatic substitution of biologics: legal, scientific, and professional considerations

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Purpose: Biosimilars offer opportunities for potentially reducing cost and increasing access to off-patent biologic medicines. Unlike generic small-molecule drugs, there are two types of biosimilars: 1) products that are biosimilar to their reference product, and 2) products that are both biosimilar to, and interchangeable with, their reference product. The automatic substitution of interchangeable biosimilars poses a variety of challenges for pharmacists. For example, pharmacy practice laws regarding automatic substitution of interchangeable biologics may differ from state to state. Here we compare and contrast the substitution of generic small-molecule drugs with the substitution of biologics, review the legal framework governing substitution, examine the science of biologic medicines, and discuss practical issues related to automatic substitution that pharmacists may confront in their daily practice.

Methods: We reviewed federal laws regarding substitution of small-molecule drugs, examined the evolving landscape of laws regarding biosimilars, and reviewed state pharmacy practice laws that regulate a pharmacist's ability to automatically substitute generic small-molecule drugs for branded products and interchangeable biosimilar agents for their reference products. We also looked at pharmacovigilance requirements and examined practical considerations, such as the need to notify patients and physicians when a product is substituted.

Results: Most pharmacists are familiar with the regulatory framework for the approval of generic small-molecule drugs, established by the Drug Price Competition and Patent Term Restoration Act of 1984 (the Hatch-Waxman Act). An abbreviated licensure pathway for biologics, similarly relying on an

approved reference product, was set forth in the Biologics Price Competition and Innovation (BPCI) Act of 2009, which requires submission of information sufficient to demonstrate that a biologic is highly similar to its reference product in terms of safety, purity, and potency. A more rigorous standard is set for interchangeability, requiring that: 1) the biological product [biosimilar] can be expected to produce the same clinical result as the reference product in any given patient, and 2) for a biological product that is administered more than once to an individual, the risk in terms of safety or diminished efficacy of alternating or switching between use of the biological product and the reference product is not greater than the risk of using the reference product without such alternation or switch. The draft FDA guidances on biosimilar product development do not address the issue of interchangeability in any detail. No biosimilars are currently approved in the US. Pharmacy practice is regulated by individual states, and the majority of states look to the FDA's list of Approved Drug Products with Therapeutic Equivalence Evaluations (the Orange Book) to determine whether generic substitution is appropriate. No publication equivalent to the Orange Book currently exists for biologics, biosimilars, and interchangeable biologic agents. It is anticipated that individual states will adopt the interchangeable designation used by the FDA to help inform biosimilar substitution practices. The potential substitution of interchangeable biologics at the pharmacy level has important implications for pharmacovigilance. If a patient is switched between products, it may not be possible to attribute adverse events or loss of efficacy to a single product. Attribution may be particularly problematic in cases where immune reactions develop slowly. As for small-molecule drugs, biologic product selection by pharmacists and patients may be influenced by differences in formulation, excipients, administration, storage, ease of use, reliability of supply, and cost.

Conclusion: Biosimilars are not generic biologics; they differ from small-molecule generic drugs in the way they are produced, their size, their complexity, their potential to elicit immune responses, and their more stringent requirements for pharmacovigilance. As biosimilars become available, pharmacists have an opportunity to play an important role in engaging patients and ensuring that medical records accurately capture which biologic a patient receives.

ASHP 2013 Summer Meeting Professional Poster Abstract

31-M

Category: Administrative practice / Financial Management / Human Resources

Poster Type: Research-in-Progress

Title: Evaluation of non-pharmacist perception regarding internal communication effectiveness in a large academic medical center department of pharmacy

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Purpose: Employee communication is a major focus of our department. Annual Employee Opinion Surveys (EOS) conducted in the organization have demonstrated that communication within the department of pharmacy can be improved. The purpose of this research was to conduct focus groups with non-pharmacist employees to understand their perceptions on current internal communication methods with the goal of developing best practices for the department.

Methods: Non-pharmacist perceptions on internal communication were evaluated through focus group methodology. Each focus groups was designed as a structured meeting of 6 to 9 informants, 1 facilitator, and 1 recorder. Employees were selected for participation through a two-step process. The first step was to to have focus groups with employees representing different work locations, shifts worked, and years of work. Employees having a pharmacist license or supervisory capacity were excluded. The second step was to ensure that participants were strictly volunteering. While the study was exempted from IRB approval by the University of North Carolina Office of Human Research Ethics participants were allowed to withdraw at any time. The focus group agenda was structured around four domains: defining internal communication, current and new methods of internal communication, and assessing communication skills of leadership and self. Focus groups were audio-recorded which informants were made aware of before agreeing to participate.

Results: While analysis is still pending a total of four focus groups have been conducted and 28 employees participated.

ASHP 2013 Summer Meeting Professional Poster Abstract

32-M

Category: Administrative practice / Financial Management / Human Resources

Poster Type: Descriptive Report

Title: Management of medication shortages in a multi-hospital health system

Primary Author: Atiya McNeal, Forsyth Medical Center, Novant Health, 3333 Silas Creek Parkway, Winston-Salem, NC 27103; Email: amcneal@novanthealth.org

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Purpose: To describe one approach to collecting, analyzing and communicating information related to drug shortages within a 13-facility hospital system.

Methods: A facility-based weekly meeting is used to assess each shortage, prioritize shortages and determine action plans. Members of the meeting were charged with communicating with other disciplines, making operational changes, and collaborating with other facilities. This meeting is followed by a corporate conference call to coordinate stock throughout the organization and uniformly implement clinical and operational changes. All information about shortages is maintained in a database that includes data for each medication on anticipated release dates, historic usage, supply on hand, and track management efforts. Finally a weekly communication is sent containing information on shortages that is pertinent to front-line staff.

Results: This approach to managing drug shortages, though time intensive, has resulted in a decreased incidence of having a medication completely unavailable, reduced reliance on outside compounding, reduced the use of secondary drug wholesalers, and improved staff engagement.

Conclusion: A comprehensive and multidisciplinary approach to managing drug shortages improves the organizations ability to provide patient care.

ASHP 2013 Summer Meeting Professional Poster Abstract

33-M

Category: Administrative practice / Financial Management / Human Resources

Poster Type: Descriptive Report

Title: Clinical and economic impact of a data mining computer application at CHRISTUS Spohn

Primary Author: George Udeani, Christus Spohn-Shoreline, Department of Pharmacy 600 Elizabeth Street, Corpus Christi, TX 74804; Email: george.udeani@christushealth.org

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Purpose: In March of 2012, CHRISTUS Health acquired an electronic clinical surveillance system, to support its patient safety, and infection prevention efforts in 23 hospitals in Texas, Louisiana and Arkansas. CHRISTUS hospitals currently use this clinical intelligence platform, to collect real-time data from areas, such as ADT (admission, discharge, and transfer), pharmacy, laboratory, surgery, and radiology. Such data has been used to help clinicians identify changes in patients conditions, while alerting them in real-time of potential risks needed to be addressed. In addition to the clinical platform, and infection control application, CHRISTUS Health acquired the pharmacy application to assist in areas such as rounding, antibiotic stewardship, anticoagulation, and adverse drug reaction monitoring. While CHRISTUS Health acquired the infection control component, for all the above hospitals, it decided it was going to pilot the pharmacy component, in six of its hospitals, in the CHRISTUS Spohn region. CHRISTUS Spohn is made of up of six hospitals in South Texas, licensed for approximately 1000 beds. The average daily census is 603 with 44,000 discharges per year. Previously, CHRISTUS Spohn used its mainframe computer system to document interventions at its institutions, as well as for pharmacovigilance. This mainframe computer system lacks the ability to compute financial data, associated with interventions. Experience from this data mining application is presented here.

Methods: From August 1, 2012 through February 28, 2013, CHRISTUS Spohn pharmacists used this data mining application, to round on patients, obtain real-time information on drug therapy, and record interventions and also monitor intervention results. These interventions were in the following areas: antimicrobial stewardship, therapeutic drug monitoring, intravenous to oral therapy conversion,

anticoagulation monitoring, drug dosing in renally compromised patients, and adverse drug event monitoring. This data mining application, computed costs savings, number of interventions made, and time spent making these interventions. The average hourly pharmacist salary rate estimated to be fifty-five dollars per hour was used to calculate total dollar cost for time spent on interventions.

Results: We realized 524,250.00 dollars in cost savings during the six months of using this application. There were a total of 4347 interventions made by our pharmacists during this period. A total of 1017.9 hours were used to achieve the above interventions and financial benefit. The average time per intervention was 13.1 minutes. Pharmacists salaries for these hours were calculated to be 55,984.5 dollars. We calculated the return on investment (ROI) over this 6-month period, to be 468,265.5 dollars.

Conclusion: This data demonstrates that a real-time data mining software can be used to optimize patient care, with minimal human resources, and significant cost savings.

ASHP 2013 Summer Meeting Professional Poster Abstract

34-M

Category: Administrative practice / Financial Management / Human Resources

Poster Type: Research-in-Progress

Title: Implementation of a pharmacy technician technology assisted medication validation program

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Purpose: The use of barcode scanning technology within the pharmacy provides additional safety measures surrounding medication distribution. Numerous states have implemented a technology assisted validation system within the pharmacy, permitting a senior technician to confirm another technician's work shifting the pharmacist's focus to clinical decisions rather than medication distribution. Currently, the University of Virginia Health System utilizes technology throughout the medication distribution process, but has not yet implemented a technology assisted validation program. This project will allow for development of a validation process within the University of Virginia Health System pharmacy to optimize the job functions and expand the roles of both pharmacists and pharmacy technicians.

Methods: This project will not require approval by the Institutional Review Board. This process will be divided into three stages consisting of program development, program implementation, and program maintenance. The first stage, program development, will involve selection of pharmacist technicians to become validators, development of a technician training program, modification of distributive workflow within the pharmacy, and gathering of baseline data surrounding pharmacist accuracy rates when validating medication barcodes. In the second stage, program implementation, the newly developed process will be piloted in the central pharmacy and data will be gathered regarding technician accuracy rates when validating medication barcodes. The final stage will consist of technician validator audits where a minimum accuracy rate of 99.8 percent must be maintained. This final stage will also assess maintenance of the technology assisted validation process for the future. Safety measures to be evaluated include pharmacist and technician accuracy and error identification rates. Efficacy of provided

education and program structure will also be assessed via a survey administered to technician validators.

ASHP 2013 Summer Meeting Professional Poster Abstract

35-M

Category: Administrative practice / Financial Management / Human Resources

Poster Type: Research-in-Progress

Title: Using Lean Thinking to Reduce Waste in Continuous Renal Replacement Therapy in a Large Academic Medical Center

Primary Author: C. Brett Benfield, University of Michigan College of Pharmacy, 117 N Division St, Ann Arbor, MI 48104; Email: cbbenf@umich.edu

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Purpose: The University of Michigan Health System (UMHS) is a large Academic Medical Center, which provides Continuous Renal Replacement Therapy (CRRT) on a number of patients annually. It has been identified that the process used by UMHS to procure, prepare, and administer CRRT has significant opportunities for improvement related to the standardization of process and reduction of waste. The use of Lean Thinking will help to identify the waste created in the current process while fostering an environment of continuous improvement for the future. Lean Thinking will additionally promote strategies for waste reduction while maintaining high standards of patient care.

Methods: Through the utilization of Lean Thinking, an interdisciplinary team led by the project investigator, has developed a Value Stream Map to identify the areas of waste associated with the current CRRT medication use process. With the areas of waste identified, an A3 was created to aide in devising strategies for improving the process. These strategies were prioritized based on feasibility, sustainability, and impact on the waste in the process. Preliminary data has been collected surrounding the doses dispensed, doses wasted, and time associated with ordering, distribution, and administration of therapy. Surveys have been developed for distribution to assess staff satisfaction pre- and post-intervention to ensure that the new future state process has not resulted in unforeseen consequences or waste associated with the implementation of interventions. Prior to commencement of the study, it was submitted to the Institutional Review Board and approved.

ASHP 2013 Summer Meeting Professional Poster Abstract

36-M

Category: Administrative practice / Financial Management / Human Resources

Poster Type: Descriptive Report

Title: The development of a clinical pharmacist productivity monitoring system

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Purpose: The accurate measurement of inpatient pharmacy productivity has been a long-standing point of debate and confusion. To date, measuring pharmacy productivity has focused on either hospital-wide metrics such as admissions or easily measurable metrics such as doses dispensed. Such metrics are limited because they are either too broad to accurately predict pharmacy workload or too narrow to account for the breadth and depth of clinical pharmacy services provided by a department. The Pharmacy Practice Model Initiatives focus on the advancement of the pharmacists role has rendered the measurement and monitoring of clinical pharmacy workload essential to justify and expand services.

Methods: A focus group of clinical specialist pharmacists and pharmacy administrators was organized to select a workload driver: a metric that best correlates with clinical pharmacists variable workload. Multiple drivers including admissions, patient days, order verifications, and clinical pharmacist interventions were evaluated. Patient days was selected as the most appropriate metric because it aligned closely with the daily responsibilities of clinical specialist pharmacists (e.g., rounding, profile review) and allowed for analysis of patient admissions and discharges. Detailed patient day information was obtained from the hospital finance department and analyzed, including patient location, date of admission, date of discharge, and final diagnosis-related group (DRG) assignment. To account for patient variability in resource requirement, daily patient DRGs were weighted using the Pharmacy Intensity Score (PIS) workbook (Action OI, Thompson-Reuters, New York, NY). Admission and discharge days were assigned a higher adjustment factor to account for additional pharmacist resources devoted to those parts of a patients hospital stay. The value of the admission and discharge adjustment factors were determined as part of a previously conducted medication reconciliation project.

Results: The weighted daily DRG calculation and the additional weight for admission and discharge were applied to each patient day. The compiled data were then compared to historical worked hours of clinical specialist pharmacists to determine the number of hours associated with each weighted patient day. This calculated hours-per-patient day was applied to actual adjusted patient days to determine clinical specialist pharmacist productivity for each two-week pay period. When the productivity model was applied over the four-month study period, the results showed less than nine percent variability between pay periods.

Conclusion: The development of a clinical specialist pharmacist productivity model has allowed for the monitoring of variable workload and assessment of the current staffing model. Additional benefits of implementing this model include the potential to utilize flexible staffing by day of the week, improved justification of existing clinical services, and identification of service areas requiring expansion of clinical services. Detailed patient location information provided insight regarding appropriateness of clinical specialist coverage by service area and resulted in the reallocation of one pharmacist to a more workload-intense area that was previously not covered by a clinical specialist pharmacist. Future directions include the incorporation of other clinical specialist pharmacist activities through intervention tracking and refinement of the adjustment calculation as improvements are made to the PIS or more robust medication complexity data becomes available.

ASHP 2013 Summer Meeting Professional Poster Abstract

37-M

Category: Ambulatory Care

Poster Type: Research-in-Progress

Title: Public health impact of community-based cardiovascular risk screenings conducted by North Dakota State University pharmacy students and faculty

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Purpose: According to the Centers for Disease Control (CDC), heart disease is the leading cause of mortality in the United States, responsible for one out of every four deaths and is a significant contributor to health care spending. The National Heart, Lung and Blood Institute (NHLBI) is currently developing a practice guideline which addresses Cardiovascular Risk Reduction in Adults, however, known cardiovascular risk factors have been previously published in the JNC 7 guidelines. Improving access to patient care, early identification of cardiovascular risk factors, and patient education are roles pharmacists can play to increase the quality of patient care. The objective of this research is to determine the public health impact pharmacy students and faculty can have on identifying patients who are at risk of cardiovascular disease and referring them to their primary health care provider based on screening results.

Methods: This research proposal was approved by the Institutional Review Board and a grant was received from the National Association of Chain Drug Stores (NACDS). Pharmacy students and faculty will conduct cardiovascular risk screening events at local grocery stores and/or shopping centers. Screenings will include a blood pressure measurement and completion of a screening tool specifically designed for this project. The following participant data will be collected: patient age, gender, cardiovascular health history, blood pressure, total cholesterol, aspirin use, tobacco use, BMI, physical activity level, influenza/pneumococcal vaccine history, date health care provider last seen, and date pharmacist last seen. All data will be recorded without patient identifiers in order to maintain

confidentiality. Following the screening, patient education will be provided on cardiovascular disease and risk factors. A copy of the completed screening tool will be provided to participants and referrals will be made based on screening results. At the end of the screening process, participants will be asked, using a 5-point Likert scale, how likely they are to share this information with their health care provider at their next appointment.

ASHP 2013 Summer Meeting Professional Poster Abstract

39-M

Category: Ambulatory Care

Poster Type: Evaluative Study Report

Title: Implementation of a multidisciplinary cardiovascular risk reduction clinic in an internal medicine practice

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Purpose: Cardiovascular disease (CVD), the leading cause of death in the United States, is a major national health concern. Despite the widespread impact, CVD remains difficult to control, likely due to the complexity of managing the multi-faceted components of the disease. The purpose of this project is to pilot a model for a multidisciplinary cardiovascular clinic within an academic, hospital-based internal medicine practice.

Methods: We conducted a case-control study to assess the impact of a multidisciplinary approach on managing major risk factors for CVD. At each office appointment, a physician with special training in CVD examined patients. In addition, patients had the opportunity to meet with a pharmacist to evaluate medications, a dietician to review patient specific diets, and an exercise physiologist to discuss patient appropriate exercise strategies. Case patients who participated in the multidisciplinary clinic were matched with control patients based on gender, age, and coronary artery disease risk factors. Control patients received usual care and had access to all resources. Data were collected from the electronic medical record. The following were analyzed at entry, 3 months, and 6 months of patients' participation: blood pressure, hemoglobin A1c, body mass index, and Framingham Risk Score. The percentage of patients obtaining goal blood pressure was assessed. Finally, a patient survey (likert scale with 1= much worse, 5= much better) was completed to assess participants' satisfaction with the multidisciplinary

clinic. The University of Pittsburgh's Institutional Review Board approved this study. Patients provided informed consent prior to enrollment.

Results: Twenty-six patients were enrolled in the multidisciplinary clinic and were compared to 41 control patients. A non-statistically significant improvement in both the mean systolic (137.6 mmHg at entry, 135.2 mmHg at 3 months, and 133.3 mmHg at 6 months) and mean diastolic (78.4 mmHg at entry, 78.2 mmHg at 3 months, and 77.0 mmHg at 6 months) blood pressure readings was observed. The control group experienced a non-statistically significant worsening of both the mean systolic and mean diastolic blood pressure readings. At study conclusion, a non-statistically significant greater number of patients in the multidisciplinary clinic obtained systolic blood pressure control compared to those in the control group (72% vs. 59%). There also was a decreasing trend in the Framingham Risk Scores in the multidisciplinary clinic (12.81% to 12.69%) compared to an increasing trend in the control group (12.54% to 12.85%). Patients completed 18 satisfaction surveys. A mean score of 4.53 was rated for overall experience with the multidisciplinary clinic and a mean score of 4.65 was rated for thoroughness of care received. Similar satisfaction scores were also rated for the impact of the pharmacist, dietician, and exercise physiologist.

Conclusion: A trend of improved blood pressure control was observed in patients enrolled in the multidisciplinary clinic. A minor improvement in the Framingham Risk Score was also observed in this group. A potential confounding variable of the results was enrolling established (compared to new) clinic patients in the multidisciplinary model. Patient survey responses indicated satisfaction with all factors. These results support the potential improvement of cardiovascular disease and patient acceptance with establishing a multidisciplinary cardiovascular clinic within an academic, hospital-based internal medicine practice.

ASHP 2013 Summer Meeting Professional Poster Abstract

40-M

Category: Ambulatory Care

Poster Type: Descriptive Report

Title: Assessment of the pharmacists' knowledge about relevant drug-food interactions in the Lebanese community pharmacy practice

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Purpose: Food and drug interactions are one of the leading causes of treatment failure and are often not taken into consideration during patient counseling. The reason for that can be the lack of complete knowledge and education about the importance of drug-food interactions and their impact on the course of therapy. This project was designed to assess and evaluate the overall awareness and knowledge of the Lebanese community pharmacists, and raise the issue about the need to enhance knowledge concerning drug-food interactions in order to ensure the effectiveness of the treatment.

Methods: To determine the knowledge of the Lebanese pharmacists concerning the drug-food interactions in the community setting, a questionnaire regarding this issue was validated. The survey is composed of a set of twelve multiple choice questions and required an average of fifteen minutes to be completed. The candidates were all practitioners in the field of community pharmacy. The participants were asked to choose one or more drugs with which a specified food supplement interacts with. Also, they were inquired whether some of the food types is an enzyme inhibitor or inducer. They were also presented with a set of drug-food interactions, and were requested to select the most relevant ones. Their answers were recorded and transformed into percentages reflecting the correct responses to the questions presented in the questionnaire, to determine their impact on the effectiveness of the prescribed medication.

Results: Survey data was analyzed based on 52 participants. The analyses of data showed that 55.77% of the pharmacists considered grapefruit juice an enzymatic inhibitor, whereby it interacts with the following drugs: simvastatin (61.54%), diuretics (17.31%), non steroidal anti-inflammatory drugs

(NSAIDs) (15.38%), cyclosporine (71.15%), and calcium channel blockers (26.92%). As for garlic, 36.54% stated that its an enzymatic inhibitor, whereby 48.08% admitted that it interacts with vitamin K antagonists. As for tetracycline, 98.08% indicated that milk should not be given concomitantly with it and 44.23% defined correctly the cheese effect. 51.92% indicated that soft drinks are beneficial for the ketoconazole absorption and 46.43% suggested that furosemide should not be administered after meals. Alcohol has been indicated to interact with the following drugs: metronidazole (88.46%), antihistamines (51.92%), benzodiazepines (82.69%), antidepressants (80.77%), oral antidiuretics (57.69%), antibiotics (57.14%), NSAIDs (28.57%), histamine-2-receptor antagonists (23.08%), and diuretics (7.69%). As for licorice, 75% stated that it has a hypertensive effect, 42.31% considered it has an antispasmodic effect, and 15.38% said it causes gastric irritation. Pharmacists considered the following interactions as the most relevant: milk-tetracycline (38.46%), alcohol-metronidazole (23.08%), vitamin K antagonists-green leaves (11.54%), grapefruit juice-drugs (3.85%), alcohol-drugs (3.85%), alcohol-antibiotics (3.85%), alendronate-milk (3.85%), warfarin-garlic (3.85%), alcohol-antidepressants (1.92%), proton pump inhibitors-iron (1.92%), alcohol-benzodiazepines (1.92%), sildenafil-fatty food (1.92%), and fluoroquinolones-dairy products (1.92%).

Conclusion: Given the results of the study, most participants have had varying responses concerning the interactions that may occur between specific food supplements and multiple drugs. Based on our sample, most community pharmacists seem to have insufficient information about those important interactions. This highlights the need for enhancing the knowledge of the Lebanese community pharmacists about drug-food interactions through educational sessions, in order to increase their awareness and ensure adequate patient counseling, which is translated into effective and safe drug therapy.

ASHP 2013 Summer Meeting Professional Poster Abstract

41-M

Category: Ambulatory Care

Poster Type: Descriptive Report

Title: Telepharmacy visits improve meter dose inhaler technique in a critical access hospital rural area

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Purpose: The North Dakota Telepharmacy Project (NDTP), administered by North Dakota State University College of Pharmacy, Nursing, and Allied Sciences, has demonstrated that pharmacy services can be restored and retained in rural communities through the use of standardized, HIPAA-compliant video conferencing technology. As an extension to this program, the NDTP implemented a pilot study where a certified asthma educator/pharmacist, working with local providers, delivers asthma care to patients in rural Dickey County via telepharmacy in order to determine patients ability to achieve and maintain asthma control.

Methods: In this prospective cohort pilot study, patients are referred by area health providers and seen within their local telepharmacy where staff obtain informed consent, screen for the presence of asthma via spirometry, acquire validated surveys and assess inhaler technique with the use of the In-check dial. Over one year, the asthma educator/pharmacist meets with patients monthly for the first 3 months to address educational needs and every 3 months thereafter for maintenance. The first visit assesses control, maximizes patient understanding of asthma, and provides tools to maintain control by the teach-back method for inhaler technique, peak flow meter and asthma diary use. All patients during the first visit receive an AeroChamber to optimize meter dose inhaler technique. The second visit re-evaluates asthma control, inhaler technique and with patient input a written asthma action plan is created. The third visit reviews control, inhaler technique and focuses on trigger minimization. When therapeutic changes are identified the asthma educator/pharmacist communicates recommendations to

the patients primary care provider. Each visit lasts 30 minutes. Study protocol and informed consent were approved by the North Dakota State University Institutional Review Board. Pearson Chi Square with p value of less than 0.05 indicated statistical significance.

Results: The study began January 2012. Rural Dickey County was chosen due to its higher prevalence of patients reported current asthma of 8.9% compared to the state average of 7.1%. Thirty-seven individuals have been screened with 19 qualifying for study inclusion. To date, 6 have completed the study and range from 9 to 78 years of age, with 66% female. Adherence to medications was high with 100% filling controller medications, which were an inhaled corticosteroid, inhaled corticosteroid/long acting beta two agonist, or a leukotriene modifier, as prescribed. Among those that have completed the study, 56% demonstrated poor meter dose inhaler technique within the first three education visits with flow rates via the In-check dial exceeding the optimal range of 25-60L/minute. When education visits were compared to the 6, 9, and 12 month maintenance visits period, poor meter dose inhaler technique decreased to 28% (p=0.02).

Conclusion: The combined effects of rural economics, difficulties recruiting providers, and declining reimbursement, limit current access to health care services in North Dakota. One way to address this access to care issue is through the use of telepharmacy. Through participation in the pilot study, patients meter dose inhaler technique improved and was sustained through virtual visits with a certified asthma educator/pharmacist through the use of telepharmacy. This has the potential to impact patients with asthma control as most reliever medications, albuterol, levalbuterol and pirbuterol, and many controller medications, beclomethasone, ciclesonide, flunisolide, and fluticasone, are delivered by meter dose inhalers.

ASHP 2013 Summer Meeting Professional Poster Abstract

42-M

Category: Ambulatory Care

Poster Type: Research-in-Progress

Title: Framework for Pharmacy Practice Model Initiative (PPMI) in Pharmacy Schools

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Purpose: The objective of this poster is to educate pharmacists and pharmacy students about the PPMI initiative and how its being explored in the pharmacy school setting. Additionally, pending IRB approval, patient satisfaction of the pharmaceutical services provided will be assessed.

Methods: During a summer internship and third-year elective, students oversee the medication profiles and care of patients with three chronic disease states: diabetes, dyslipidemia, and hypertension. Under the guidance of a family physician, students learn about their chosen disease state independently and come as experts on drug management during clinical sessions. Patient interviews and assessments are conducted and students are assigned patients depending on the reason for their visit. Along with the physician, students work as a team to address all of the patients disease states. Students explain lab values, goals for therapy, and proper medication usage. Pending IRB approval, students will administer surveys to the patients assessing their satisfaction with the services and education provided during their visits. Using a previously validated questionnaire, they will ask the patient to rate the students communications skills, medication knowledge, and their overall impression of their interactions using a Likert scale. The survey was used to assess patients satisfaction with pharmaceutical service in a previous study will be provided in both English and Spanish. Once the surveys are collected, an average for each question will be determined to gauge where the students were weak and to provide insight into how to strengthen the model.

ASHP 2013 Summer Meeting Professional Poster Abstract

43-M

Category: Ambulatory Care

Poster Type: Descriptive Report

Title: Role of a clinical pharmacist at a community based grassroots human immunodeficiency virus (HIV) organization

Primary Author: William Kuykendall, Roseman University of Health Sciences, 11 Sunset Way, Henderson, NV 89014; Email: kkuykendall@roseman.edu

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Purpose: The significance of adherence is a key principle in successful highly active antiretroviral therapy (HAART) for HIV-infected patients with the current treatment guidelines providing various strategies, including recommending patients go to a pharmacist based adherence clinic, to improve upon antiretroviral therapy (ART) compliance. Pharmacist medication therapy management (MTM) was identified as a need of ActionRED which is a local grassroots community HIV organization in Southern Nevada. This project was designed to improve the health of all individuals in the community served through ActionRED while educating on potential barriers and identifying types of nonadherence to ART.

Methods: The LEAD for LIFE program was created as a monthly adherence education counseling session at ActionRED where HIV-infected patients would meet with a clinical pharmacist specialist for one on one communication. The program first began in August 2012. The purpose of the program is to identify potential barriers to adherence before starting ART, assess patients adherence at every visit (if they are already on ART), and identify types of nonadherence as well as reasons for patients to be nonadherent. The program is offered twice a month, one night for the Spanish speaking clientele at ActionRED and the other night for English speakers. Patients are asked to fill out a questionnaire prior to their session with a clinical pharmacist specialist. The questionnaire asks key points about their HIV medication as well as a modified version of the ASK-20 survey, which is a validated tool to identify patient-specific barriers to medication adherence that focus in on a range of barriers including; lifestyle, attitudes and beliefs, help from others, talking with healthcare team, and taking medicines. The response to the questionnaire is then used for quick conversation-building regarding ART adherence.

Results: Virologic failure is less likely to occur in patients who adhere to more than 95% of their prescribed doses than in those who are less adherent. Two clinical pharmacists and two pharmacy technicians participate in LEAD for LIFE on a monthly basis. On average, 18 HIV-infected participants attend these sessions each month. A total of 55 patients are enrolled in this program over a span of six months since the beginning of LEAD for LIFE. 22 patients attend the Spanish-speaking session and 33 patients attend the English-speaking session. Nine travel pill containers and 28 monthly-fill pill boxes were given to patients to help improve adherence.

Conclusion: Programs like LEAD for LIFE help with the successful treatment in HIV infected patients. The clinical pharmacists role can help identify patient factors associated with nonadherence, identify potential and actual medication-related problems, and be a resource for drug-information that patients can go to for questions that arise about medication therapy.

ASHP 2013 Summer Meeting Professional Poster Abstract

44-M

Category: Ambulatory Care

Poster Type: Research-in-Progress

Title: Implementing documentation for pneumococcal vaccinations in an internal medicine resident clinic

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Purpose: Pneumococcal vaccination is widely recommended in select adult patient populations (i.e. immunocompromising conditions). In June 2012, the ACIP recommended use of 13-valent pneumococcal conjugate vaccine (PCV13) for these patients. This recommendation appears in the January 28, 2013 release of the immunization schedule (MMWR Vol. 62). Historically, 23-valent pneumococcal polysaccharide vaccine (PPSV23) was solely recommended for this age group. Per the Centers for Disease Control and Prevention's National Health Interview Survey, far too few U.S. adults are getting vaccinated against diseases other than influenza. At this time, overall rates of adult immunizations still falls below targets set by Healthy People 2020. The overall objective of this implementation is to guide practitioners to increase vaccination rates in respective patient populations in internal medicine resident clinics.

Methods: A pneumococcal vaccination documentation form was created by a pharmacy student and a faculty advisor. In its preparation, ACIP/CDC recommendations were consulted (MMWR / January 28, 2013 / Vol. 62). The documentation form provides a stepwise approach to determine criteria for pneumococcal recommendations. The intent is for healthcare providers to utilize this form during each visit to increase immunization rates by identifying patient-specific criteria for subsequent recommendations.

Results: The pneumococcal vaccination documentation form provides checklists for respective chronic or immunocompromising conditions (i.e. asplenia, HIV, chronic renal failure, leukemia, malignancy, solid

organ transplant, etc.). It will also list contraindications to ensure patient safety in our recommendations.

Conclusion: This standardized pneumococcal vaccination documentation form will provide a customary way of guiding practitioners in determining eligibility for recommendations for vaccination. The implementation of the vaccination documentation form will also assist with quality assurance of the vaccination recommendations during each visit in the future.

ASHP 2013 Summer Meeting Professional Poster Abstract

45-M

Category: Ambulatory Care

Poster Type: Research-in-Progress

Title: Impact of clinical pharmacy technicians in primary care at the San Diego Veterans Affairs Healthcare System

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Purpose: Prior studies have shown that incorporating clinical pharmacy technicians in various clinical settings have increased pharmacist clinical activities. Previous studies have described the impact of clinical pharmacy technicians on a more subjective level, stating that technicians are able to allow pharmacists to increase time spent on clinical duties and to expand their influence in disease state management. Hence, we sought to examine the effect clinical pharmacy technicians have on pharmacist workload and time to HgbA1c & LDL goals when they are integrated into primary care as part of the Patient Aligned Care Team (PACT) model. To the best of our knowledge, the findings from this study will be the first to use objective data to determine the impact of clinical pharmacy technician integration into primary care.

Methods: This study has been submitted to and approved by the Institutional Review Board, Medication Safety Committee, and Pharmacy Research Committee. The San Diego Veterans Affairs electronic medical record system will be used to identify patients who are enrolled in PACT pharmacy clinics located at the main facility (in La Jolla) and at one of the Community Based Outpatient Clinic (CBOC) in Oceanside. The patient enrollment period will be during a four-month time period, starting when the clinical pharmacy technicians were first implemented in August 2012 and followed for at least 2 follow-up visits. Patients younger than 18 years old will be excluded from this study. The following data will be collected: patient age, gender, ethnicity, reason for consult to clinic, concurrent chronic diseases, number of medications, number of missed appointments, HbA1c, LDL. All data will be recorded without patient identifiers and maintained confidentially. Each PACT pharmacist's workload (number of patients

seen/month) will be measured prior to clinical pharmacy technician implementation and then again after implementation. These two values will be compared using a paired t-test or wilcoxon rank sum. In addition, an average time to A1c and LDL goal will be calculated for patients enrolled after implementation of the clinical pharmacy technicians and then compared to a previous study which measured time to goal prior to implementation of the clinical pharmacy technicians using a paired t-test or wilcoxon rank sum. Based on the previous study, a sample size of at least 117 patients is needed to see a 22% decrease in time to goal to determine if time to goal can be decreased by utilizing a clinical pharmacy technician in primary care.

ASHP 2013 Summer Meeting Professional Poster Abstract

46-M

Category: Ambulatory Care

Poster Type: Descriptive Report

Title: Evaluation of hemorrhoid management in Lebanese community pharmacies

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Purpose: Hemorrhoid is a widely common condition and loads of products are found as over the counter medications in the Lebanese community pharmacies. Patients knowledge on the use of such medications, causes and the clinical description of hemorrhoids, non-pharmacologic and pharmacologic options, and the possibility of wrong management of the condition is the objective of this study

Methods: : A survey was developed and validated to assess the public knowledge of hemorrhoids, the clinical description of this condition, its causes, and the use of different agents and dosage forms in the community pharmacies in Lebanon. Detailed demographics and history, possible causes, eventual consequences, non-pharmacologic including surgical procedures and pharmacologic options indicating the categories of different products(single agents, combinations or herbal)and dosage forms(suppositories, ointments or tablets) have been identified and included in the survey. Pharmacy students were asked as part of their patient counseling to fill this form with patients coming into the pharmacies to have a hemorrhoid remedy. The survey is composed of eighteen multiple choice questions and required an average of fifteen minutes to be filled

Results: Survey data was analyzed based on 3406 responses (45.7% male, 54.3% female). The age of respondents varied between 15 and 85 years old. 54.7% of respondents had an average socio-economic status and 55.3% had a sitting work condition. When asked about history of hemorrhoids, 42.5% of the population has been suffering from this condition for a period of time and 57.5% reported acute hemorrhoids.41.6% of the patients reported family history of this condition. Concerning the type of

hemorrhoids, 41.4% described internal condition compared to 58.57% who reported external hemorrhoids. The causes ranged from constipation 57.1%, lack of exercise 36.4%, spicy food 32.3%, sitting for long periods of time 31.3% to obesity, diarrhea, constipation, malignancy, IBS/IBD and rectal surgeries. The clinical description of hemorrhoids was as follows: 49.9 % experience nonstop pain, 61.7% bleeding, 69.7% itching, 85.2% experiencing continuous discomfort and 49.2 reported leakage of feces. As for lifestyle habits, 47.8% have followed a fiber diet, 36.38% use warm baths, 33.8% wear cotton underwear, 33.0% are on regular OTC fiber supplements, 20.4% have tried hydration and fluids, others use ice, rest, avoid irritating toilet tissue and soap and all agreed on the importance of high hygiene measures. It has been noted that 25.5% of the patients have had a hemorrhoid surgical treatment, hemorrhoidectomy being the major procedure, 14.5% followed by laser therapy and cryotherapy. Moreover, 53.9% have reported that hemorrhoids have prolapsed after surgery. Regarding the pharmacological therapy, 24.5% of the patients were on policresulen suppositories, and 30.0% on policresulen ointment. 24.9% were on tablets of diosmin and hesperidin. All in all 53.1% of patients were on suppositories, 52.1% on ointments and 35.46% taking tablets. Finally, 9.8 % were on an herbal combination suppositories and ointment (lupines albus, vateria indica, menthe piperita, aloe vera). 39.2% of respondents reported taking also a stool softener and/or a pain killer for their condition. 40.3% of patients were informed by their physician about hemorrhoids and only 21.9% by the pharmacist

Conclusion: Based on the survey results, most participants needed counseling about the appropriate pharmacologic and non-pharmacologic management of hemorrhoids, and could benefit from such guidance in increasing their awareness related to different products, safe daily use, and possible combinations and non-pharmacologic and surgical options. This project has served as a good opportunity for pharmacy students to raise public attention on hemorrhoids management and pointed the community need for an awareness campaign on this subject

ASHP 2013 Summer Meeting Professional Poster Abstract

47-M

Category: Ambulatory Care

Poster Type: Descriptive Report

Title: Evaluation of sleep disturbances and coping strategies in Lebanese pharmacy students

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Purpose: Pharmacy students often experience sleep disturbances, probably the most common physical complaint, which can have negative academic, emotional, or health outcomes. It has many sources, ranging from the heavy curriculum and the varying class times, to the practice hours and work schedules, without forgetting personal situations, busy social lives and the environmental factors. An evaluation of sleep patterns of students, their causes, sleep supplements/prescription drugs use, and providing management techniques is the purpose of this study

Methods: To determine the incidence and factors controlling sleep disturbances in pharmacy students at various years of studying, a questionnaire on personal data and sleep problems inducing factors was validated. Students were asked to fill a questionnaire about their general condition and causes of sleep disturbances. Different categories of sleep hygiene, supplements and prescription drugs have been identified and included in the survey to assess their use among the students who need to cope with sleep. The survey is composed of thirty multiple choice questions and required an average of ten minutes to be filled

Results: Survey data was analyzed based on 400 responses (24.25% male, 75.75% female). The age of candidates varied between 18 and 25 years old and 73.7% of participants were not in a relationship. The data revealed that 60.0% of students drink a minimum of one cup of coffee per day, 11.0% consume energy drinks and 4.0% drink alcohol. 60% of respondents watch TV and 30.0% read a book before

sleeping. The data showed that: 60.5% of students get too little sleep at night, less than 6 hours including time spent awake in bed, 37.5% wake up during night, 71.5% worry about academic and life issues in bed, 31.5% experience muscular tension and 50.75% are disturbed by light or noise. Moreover, 25.2% of the students grind their teeth and 33.5% have intense vivid dreams or nightmares during sleep. 80% of the female students have their sleep affected by the menstrual cycle. 37.2% of participants wake up in the morning with a headache. Concerning the actions taken, 34.5% of students said that a day nap worsens their night sleep, 27.0% are cutting off coffee, tea, cola beverages and energy drinks, 31.2% are exercising during the afternoon and 19.0% are having a sleeping schedule. On the other hand, 20.2% of the students experiencing poor sleep are taking an OTC as an aid, and 3.2% are taking a prescription drug

Conclusion: Based on the survey results, most participants have had varying levels of sleep disturbances. The prevalence of these problems among pharmacy students should be acknowledged and tends to affect their academic performance and aspects of health. More awareness seminars at the different university schools and specially pharmacy division are needed to expose the sleep hygiene concepts that help improving the quality and quantity of sleep among the students. This project served as a good opportunity for pharmacy students to share their experience with sleep problems and possible remedies

ASHP 2013 Summer Meeting Professional Poster Abstract

48-M

Category: Clinical Service Management

Poster Type: Research-in-Progress

Title: Effect of pharmacist counseling on high risk medications during an inpatient hospital stay

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Purpose: There are multiple factors that affect patients in a negative way during their hospital discharge. Patients are often preoccupied with information regarding transportation, the recuperation process, or discharge instructions. These distractions cause patients to often disregard important medication information that may have a direct impact on their outcome. The objective of this study is to determine if counseling patients on high risk medications during their inpatient hospitalization has an impact on readmission rates and knowledge about key medication points after discharge. By providing counseling during their stay rather than just at discharge, patients have time to comprehend the drug information and have any questions answered.

Methods: This study will identify adult patients, using an electronic medical record, that have high risk medications started or changed during their inpatient stay. When a new medication is started or a change in home regimen occurs, a pharmacist will proceed to counsel the patient using a specific script and answer any related questions. A teach back method will occur and only 3-5 important medication points will be addressed to ensure that patients comprehend the material. This pilot project will take place for a six week period of time. The patients included will be located on two different units that specialize in cardiology and general medicine. The high risk medications included are warfarin, enoxaparin, insulin, oral hypoglycemic agents and diuretics. The patients included will be compared to a similar patient population that did not receive this additional counseling. The study will analyze thirty day readmission rates, knowledge of the medication teaching points 48-72 hours post discharge as

assessed by a phone call, and the amount of added documentation in the electronic medical record. This study has been approved by an Investigational Review Board.

ASHP 2013 Summer Meeting Professional Poster Abstract

49-M

Category: Clinical Service Management

Poster Type: Evaluative Study Report

Title: Application of an interdisciplinary protocol to successfully convert enterally incompatible drugs with enteral nutrition from the intravenous or inappropriate enteral route to an appropriate enteral administration time in critical care tube fed patients a

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Purpose: Intravenous to oral step-down of medications has been a cost-effective, convenient and safe way to administer medications to hospitalized patients. Additionally, it has the potential to reduce length of stays, administration times, infusion reactions and infections. However, there are oral medications that are physically incompatible with tube feed formulas to allow for such an enteral step-down in therapy. The purpose of this study was to determine during 6 quarterly review periods between 2010 and 2011 whether an interdisciplinary protocol with tube-free intervals can allow conversion of enterally incompatible drugs given intravenously or enterally concurrent with continuous tube-feeds to an appropriate enteral administration.

Methods: The pharmacy and therapeutics committee and the nutrition-pharmacy committee approved the implementation of an interdisciplinary protocol allowing physically incompatible oral drugs with enteral nutrition (i.e. fluoroquinolones, levothyroxine) to be administered enterally at 10am during a 4 hour tube feed-free interval of 8am to 12 noon for single daily drug administrations and at 10pm during a 4 hour tube feed-free interval between 8pm and 12 midnight for every 12 hour drug administrations. Eligible patients included critical care unit (ICU) patients receiving continuous tube feed formulas (TF) with enteral tube administered medications for at least 2 days while also receiving a physically incompatible drug that was concurrently given intravenously or enterally. All approved enteral

conversions of incompatible drugs were rewritten with hard-coded instructions to withhold the tube feeds for the specified 4 hours and administer the drug enterally at 10 am plus or minus 10pm. The nutritionist was instructed to increase the tube-feed rate to compensate for each 4 hour tube-free interval when the tube feeds were withheld. The covering nurse was informed about the drug conversion to the approved enteral administration and adjustment in the tube feed rate. The primary outcome was the percent of physically incompatible drugs successfully converted to the appropriate enteral formulation and time per quarter. The secondary outcome was the cost savings based on a 7 day review of the total number of enteral drug conversions per quarter and the cost savings of the total conversions for each enteral drug for the entire study.

Results: During the study period there were between 34 to 73 patients per quarter on continuous TF in the ICU or an average of 59 TF patients per quarter. This constituted an average of 26 percent of the total ICU population. The number of conversions of incompatible protocol drugs was between 7 and 19 per quarter or an average of 12 per quarter. The primary outcome of successful enteral conversions was 100 percent for 5 of the 6 quarters and 81 percent for one quarter. The secondary outcome demonstrated cost savings of all enteral drug conversion between \$777 and \$1500 per quarter or an average of \$975 per quarter. Also, the total cost saving of each of the enteral drug conversions for levothyroxine, voriconazole, fluoroquinolones, digoxin and phenytoin reviewed for the entire study was \$3376, \$1512, \$134, \$67 and \$26, respectively.

Conclusion: Use of an interdisciplinary protocol with 4 hour tube feed-free intervals is a feasible method to successfully convert patients from an intravenous route or from an inappropriate enteral administration to an appropriate administration time for drugs physically incompatible with enteral formulas. This protocol can improve patient care by assuring optimal bioavailability and therapeutic efficacy as well as cost savings for drugs commonly used in practice.

ASHP 2013 Summer Meeting Professional Poster Abstract

50-M

Category: Leadership

Poster Type: Descriptive Report

Title: Implementation and evaluation of a leadership journal club in a professional organization for pharmacy students

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Purpose: The American Society of Health-System Pharmacists (ASHP) has identified a gap in pharmacy leadership development. As one way of addressing this gap, ASHPs New Practitioners Forum developed materials for establishing a leadership journal club for pharmacists. The Faculty Advisors of a Student Society of Health-System Pharmacy (SSHP) noted a lack of leadership training in the organization and found no published information on a leadership journal club for pharmacy students. Thus, the purpose of this project was to implement and evaluate a leadership journal club in a professional organization for pharmacy students.

Methods: To design the leadership journal club, the Faculty Advisors and President-Elect of a SSHP referred to an article published in the American Journal of Health-System Pharmacy. Six leadership concept areas (managerial development, resident-specific learning, defining leadership, leadership development, compassionate leading, and creating change) were identified; thus, six one-hour sessions were planned. Though the article recommended the same facilitator for all sessions, it was decided to have one to two Officer-Elects serve as facilitators for each session. A minimum of three articles with discussion questions for each concept area were available on the ASHP website, so Officer-Elects serving as facilitators were asked to select one article in their assigned concept area and use the discussion questions as a guide. To evaluate the Officer-Elects perceptions of the leadership journal club, a questionnaire was developed and approved by the Institutional Review Board. It involved 13 items assessed with a five-point Likert scale (three items addressed the objectives suggested by ASHPs New

Practitioners Forum, four addressed the structure of the leadership journal club, and six addressed the leadership journal club in general) and four open-ended questions.

Results: All 11 SSHP Officer-Elects participated in the leadership journal club. Sessions were held during the fourth and sixth quarters of the didactic portion of the three-year curriculum from February through October of 2012. Attendance was 100 percent at four sessions, 82 percent at one, and 73 percent at one. All Officer-Elects completed the questionnaire. A majority (greater than 50 percent) agreed or strongly agreed with each Likert-scale item. The highest percentage (100 percent) agreed or strongly agreed with each objective from ASHPs New Practitioners Forum: upon completion of the leadership journal club, I can 1) define leadership in the profession of pharmacy, 2) describe key concepts in effective pharmacy leadership, and 3) formulate strategies to improve my leadership skills. The lowest percentage (63 percent) agreed or strongly agreed with one of the general items: I enjoyed participating in the leadership journal club. From the open-ended questions regarding what was most valuable, the most common comment involved enjoying discussions with peers and advisors. From the questions regarding what was least valuable, the most common comments involved concerns about the relevance of articles to current practice and the amount of time that was required.

Conclusion: Implementation of a leadership journal club in a professional organization was relatively simple and evaluated positively by pharmacy students. It will be continued, but more current articles will be selected and the series will be completed within a shorter period of time for the next offering. The journal club format was one way of enhancing leadership development for pharmacy students and may be used successfully in professional organizations.

ASHP 2013 Summer Meeting Professional Poster Abstract

51-M

Category: Leadership

Poster Type: Descriptive Report

Title: Evaluation of a student-led tobacco cessation curriculum: a pilot study

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Purpose: Continued education and training is useful for filling the knowledge gap for tobacco cessation interventions and improving confidence among pharmacy students. We propose a pilot study for a new training model: pharmacy students who received didactic and clinical hands-on training served as the trainers for other pharmacy students. Our purpose is to present and evaluate the efficacy of this new model for training pharmacy students to actively participate in tobacco cessation interventions.

Methods: This is an evaluation of a student-teaching-student training model that was implemented in preparation of starting a new tobacco cessation clinic as part of the University of California, San Diego (UCSD) Student-Run Free Clinics. Fourth-year pharmacy students, who previously rotated through the Veterans Affairs (VA) National Tobacco Cessation Clinical Resource Center (TCCRC), served as instructors. Trainees were second- and third-year students involved in the start-up of the clinic. A three-hour training session was developed under the supervision of the TCCRC director. Two hours were spent on evidenced-based interventions focusing on two core arms of tobacco treatment: behavioral treatment and medications. The last hour was spent on role-playing various case scenarios. Trainers first provided a demonstration of an initial treatment session, trainees followed by role-playing cases, and lastly clinical pearls were reviewed. To assess the efficacy of the training model, pre- and post-training surveys were administered. Surveys evaluated students' self-rated abilities for cessation counseling (5 A's: Ask, Advise, Assess, Assist, Arrange) and self-efficacy (i.e. confidence). The 5 A's were scored based on a five-point scale (1 equaled poor, 2 equaled fair, 3 equaled good, 4 equaled very good, 5 equaled excellent). Self-efficacy was also scored using a five-point scale (1 equaled not at all confident, 2 equaled

not very confident, 3 equaled moderately confident, 4 equaled very confident, 5 equaled extremely). Descriptive analysis was performed to evaluate changes in self-assessment scores. A paired t-test was performed to evaluate pre- and post-survey scores on the 5 A's. An unpaired t-test was used to evaluate pre- and post-survey scores for self-assessed overall ability, confidence, and future implementation. Results were reported as means plus/minus standard deviation.

Results: A total of seven pharmacy students (5 second years and 2 third years) were trained and completed linkable pre- and post- surveys. Self-rated scores increased significantly from 2.57 plus/minus 0.53 to 3.86 plus/minus 0.38 for Ask; 2.00 plus/minus 0.82 to 3.43 plus/minus 0.53 for Advise; 1.86 plus/minus 0.90 to 3.57 plus/minus 0.79 for Assess; 2.00 plus/minus 1.15 to 3.43 plus/minus 0.98 for Assist; and 2.00 plus/minus 1.53 to 3.43 plus/minus 0.53 for Arrange (p-value less than 0.05). Self-efficacy measures also showed similar significant increases pre- to post-training: 1.86 plus/minus 0.69 to 3.00 plus/minus 0.63 for overall ability to use counseling skills and 1.86 plus/minus 0.69 to 3.14 plus/minus 0.38 for overall confidence (p-value less than 0.05).

Conclusion: Smoking remains the leading cause of preventable death in the US and poses a huge public health problem. It is crucial that healthcare students and professionals receive robust training to provide effective behavioral and pharmacological interventions to increase tobacco cessation success rates. This pilot study suggests that supervised student-teaching-student tobacco cessation training model showed improvement in the 5 A's and self-efficacy ratings in providing patient counseling. Using trained pharmacy students with didactic and clinical experiences to lead intensive evidence-based training is a promising and novel approach.

ASHP 2013 Summer Meeting Professional Poster Abstract

52-M

Category: Leadership

Poster Type: Descriptive Report

Title: Understanding the Affordable Care Act: the role of the hospital and community pharmacist

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Purpose: The Affordable Care Act (ACA) was passed by Congress and then signed into law by the President on March 23, 2010. The ACA created many opportunities to improve the quality of health care. An estimated 30 to 35 million new patients, many of whom are low income with low health literacy rates, will enter the health care system over the next six years. Given the projected shortage of physicians, hospital and community pharmacists are ideally situated to provide ambulatory care and management of chronic diseases. The aim of this study is to explore the role of the hospital and community pharmacist with respect to health care reform.

Methods: A literature search was conducted to access articles published from 2009 to 2013 using electronic databases such as PubMed, pharmacy association websites, the Center for Medicare and Medicaid Services website, the Kaiser Family Foundation website, and corporate health related websites such as CVS Caremark. Key words utilized for the search included, affordable care act, pharmacy, health care reform, accountable care organization, and patient centered medical home.

Results: Findings revealed that pharmacists can and should play a definitive role in health care reform. A major focus in health care reform supports the development of accountable care organizations (ACOs). An ACO is a group of health care providers and suppliers of services (hospitals, doctors, nurses, and pharmacists) that work together to coordinate care for their patients with a goal to improve quality and decrease costs. Nearly two thirds of pharmacy managed care organizations representing nearly fifty percent of the United States population are projected to implement an ACO model of care. The ACO model provides financial incentives to clinical care coordinators that meet specific health quality measures. These health quality measures focus heavily on preventive services and management of

chronic diseases. Studies show that hospital and community pharmacists have the skill set and knowledge to provide clinical care coordination services to meet twenty two health quality measures related to management of diabetes, cardiovascular disease, dyslipidemia, asthma, chronic obstructive pulmonary disease, and vaccinations. Hospital and community pharmacists currently provide medication therapy management (MTM) services such as drug utilization review, vaccination coordination, and patient counseling that is not electronically captured by managed care networks. A unique opportunity exists to play an important role on the health care teams formed through ACOs. Through proper planning and collaboration pharmacists can integrate MTM services into ACO models.

Conclusion: Integration of hospital and community pharmacies within the ACO model of care is a key to successful implementation of health care reform. Hospital and community pharmacists have an existing footprint within communities providing easy access patients. Specifically, low income patients can be easily targeted as an effective way to both improve patient health while reducing costs. Suggestions on how to expand the role of the hospital and community pharmacist within ACOs include integration of services provided via pharmacist access to a patients electronic health record, patient laboratory data and physician medical notes. Pharmacists can also use electronic access to coordinate care and transmit data from MTM services back to the physician. Additionally, integration may be accomplished through installation of walk-in ambulatory clinics staffed by a pharmacist and co-located with a community pharmacy. While patients may enter and exit managed care networks to find the best care for the right price, their relationship with their pharmacist should remain constant. Successful coordination of health care is becoming increasingly recognized as a goal that requires a team effort.

ASHP 2013 Summer Meeting Professional Poster Abstract

53-M

Category: Pediatrics

Poster Type: Descriptive Report

Title: Interventions of student pharmacists incorporated into a general pediatric outpatient clinic.

Primary Author: Lea Eiland, Auburn University Harrison School of Pharmacy, 301 Governors Dr. SE Pediatrics, Huntsville, AL 35801

Purpose: The provision of providing pharmacy services in a general pediatric outpatient clinic is not well described in the literature. The aim of this analysis is to describe the clinical interventions provided by student pharmacists in a general pediatric outpatient clinic. Student pharmacists' interventions were evaluated for the first seven months of the service.

Methods: An established pediatric clinical pharmacist transitioned from an inpatient to outpatient service consisting of four pediatricians in an academic, medical clinic. After two months of developing a service, student pharmacists were introduced to the practice site. Two to three student pharmacists participated in 5 week clerkship blocks in the clinic for seven consecutive months. Services were provided for 3 half-days and 1 full day each week. Each student was assigned to one pediatrician weekly to assist in seeing their patients. The pharmacist alternated clinic sessions with each student to model, observe, and see patients with the student. Students completed chart reviews prior to patient appointments and conducted medication assessment histories, patient/caregiver education, and medication counseling during patient visits. The first two students on the clerkship also developed multiple one-page patient education handouts and were requested by the pediatricians to create disease monitoring guideline information sheets for specific disease states. Clinical interventions were documented in a commercially-available, online documentation system. At 1, 3, and 6 months after students were incorporated into the clinic, the pediatricians were asked for feedback on the students' activities and to recommend changes to the structure of the students' time in clinic.

Results: Over the analysis period, 1,433 interventions were documented by eleven students with a cost-avoidance of \$69,766. Student pharmacists conducted 869 chart reviews, obtained 281 patient/caregiver medication histories, counseled 115 patients/caregivers, and clarified allergies of 47 patients. An average of 18 patients (range 14-24) were worked up weekly by each student. Eleven patient educational handouts related to ten different disease states and two disease monitoring

guidelines were developed. Handouts were provided to patients on average 2-3 times per week. Students responded to 40 drug information questions from the pediatricians. Each of the four pediatricians provided positive feedback regarding working with the student pharmacists.

Conclusion: The incorporation of student pharmacists into a pediatric outpatient clinic has been positive. Student pharmacists were able to make numerous interventions of various types resulting in measureable cost-avoidance.

ASHP 2013 Summer Meeting Professional Poster Abstract

54-M

Category: Pediatrics

Poster Type: Descriptive Report

Title: Pharmacist conducted medication reconciliation upon admission to a children's hospital

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Purpose: Medication reconciliation during patient care transitions plays an important role in reducing medication errors. This prospective study was designed to determine the effect of a pharmacist-led medication reconciliation process in an underserved pediatric population.

Methods: A pediatric pharmacist prospectively interviewed patients and their parents within 48 hours of admission. Home medication information was obtained using a standardized set of questions. The pharmacist conducting the interviews had no prior knowledge of the patients home medications. After completion of the interview, the pharmacist accessed the patient's electronic medical record (EMR). This unique EMR is used by on-site providers to issue prescriptions. Prescriptions obtained by the patient from off-site providers can also be recorded into the EMR as a reported medication. The pharmacist recorded discrepancies between the information gained during the interview and the information in the EMR. Recorded discrepancies included drug name, dose, frequency, and route. Medication omissions and additions were also recorded. Medication information from both the EMR and the pharmacist interview were then compared to the current inpatient orders. Discrepancies and omissions were recorded. The physician was then contacted by the pharmacist to resolve any discrepancies, and to determine if the discrepancies were intentional or unintentional. The time required for pharmacist-led medication reconciliation was also recorded. This study was approved by the IRB prior to initiation, and informed consent and assent (if applicable) were obtained prior to the interview.

Results: Preliminary analysis of twenty-nine patients revealed an average of four discrepancies per patient between the EMR and the pharmacist-collected information. The most common discrepancy was medication dose. Pharmacist-conducted interview gained an average of two additional medications per patient, which were not recorded in the EMR. Patients who had at least four home medications were more likely to have a medication omitted upon admission ($p=0.003$, Pearsons Correlation $r=0.529$). Unintentional omission of a home medication during admission occurred in 20% of the patients. Recommendations to continue home medications while admitted were widely accepted by the physicians. An average of 15 minutes per patient was required for the pharmacist to complete the interview, reconciliation process, and discussion with the physician.

Conclusion: Review of the hospitals EMR revealed inaccurate or incomplete home medication information for 28 of the 29 patients. Pharmacist-led medication reconciliation assisted in the discovery of additional home medications, not previously recorded in the EMR. Reporting four or more home medications was identified as a risk factor for medications to be omitted upon admission. Pharmacist-led medication reconciliation was proven to be an efficient and effective process for ensuring our underserved pediatric patients were continued on appropriate home medications upon admission.

ASHP 2013 Summer Meeting Professional Poster Abstract

55-M

Category: Pediatrics

Poster Type: Research-in-Progress

Title: Drug abuse education in teenagers: opportunity for pharmacy students

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Purpose: Drug abuse education is common in junior high and high school, but illicit drug abuse is increasing in teenagers. The objective of this study is to establish a high school education session regarding the abuse of over-the-counter and prescription medications.

Methods: Institutional Board Review is not required for this study since it is descriptive and does not involve collection of patient information. While many pharmacy schools support efforts to educate young children on the dangers of poisons and taking caregivers medications, less effort is aimed at educating teenagers regarding the increasing abuse of over-the-counter and prescription medications and the dangers such practices can have on their lives. For this reason, the student chapter of the Pediatric Pharmacy Advocacy Group (PPAG) of Northeast Ohio Medical University (NEOMED) will present information regarding abuse of over-the-counter and prescription medications in teenagers to the BIOMED STEM + M School on the NEOMED campus in May 2013. Pharmacy students at NEOMED have a unique opportunity to share this information with these high school students. The BIOMED STEM + M School is a partnering high school with NEOMED that focuses on science, technology, engineering, mathematics, and medicine in order to help high school students gain the skills they need through critical thinking and complex problem solving. Information to be presented to the high school students include the growing problem of drug abuse in teenagers, effects of drug abuse, over-the-counter drug abuse in teenagers, role of Pharm parties, and prevention strategies. Students will further be provided with contact information to students and the faculty advisor of the student chapter of PPAG at NEOMED in order to ask questions. Based on this initial presentations reception among the BIOMED STEM + M School, the student chapter of PPAG hopes to make this an annual event with the potential to conduct pre- and post-education assessments in the future.

ASHP 2013 Summer Meeting Professional Poster Abstract

1-T

Category: Cardiology / Anticoagulation

Poster Type: Descriptive Report

Title: Elevated international normalized ratio associated with concomitant warfarin and megestrol acetate

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Purpose: The cases of two patients who experienced elevated International Normalized Ratio(INR) values after megestrol acetate was added to their warfarin regimen are presented.

Methods: A 62-year-old woman with a history of hypertension was treated in an ambulatory care anticoagulation clinic for deep vein thrombosis. Her INR values were normal (target: 2~3) during therapy with warfarin 30mg weekly and amlodipine 5 mg daily. Her INR values began to increase after starting megestrol acetate 400mg daily for her cachexia treatment and weight gain. After 15 days of initiation of megestrol acetate, her INR value was increased to 8.94. She complained of repeated epistaxis. She denied use of alcohol and tobacco, changes in dietary vitamin K intake, missed or extra doses of warfarin, any other medication changes and acute illness and diarrhea. Warfarin was withheld for 3 days and then her INR value decreased to 2.52. Warfarin was restarted with the weekly dose decreased by 27% (22mg weekly). The patient continued to take megestrol acetate, and all INR values were within the therapeutic range. A 57-year-old woman with a history of hypertension and endometrial cancer was treated with warfarin for anticoagulation subsequent to deep vein thrombosis. Her INR value was relatively stable (2.2-2.7) before added megestrol acetate 800mg for endometrial cancer treatment. After the initiation of megestrol acetate, the patients INR value increased to 4.86, with no concurrent

changes in warfarin dosage, other medications, or diet. She didn't have any other bleeding sign. After withholding two doses of warfarin and decreasing warfarin dosage by 30% (14mg weekly), her INR value was in the therapeutic range.

Results:

Conclusion: Due to the significant INR elevations observed in two cases, we recommend that healthcare professionals consider megestrol acetate as an agent that has a potential interaction with warfarin. If megestrol acetate must be used for patients who are already stabilized on warfarin therapy, we recommend frequent INR monitoring to help detect this potential interaction. And warfarin dose reduction is required as needed.

ASHP 2013 Summer Meeting Professional Poster Abstract

2-T

Category: Cardiology / Anticoagulation

Poster Type: Research-in-Progress

Title: Standardization of warfarin reversal protocol in Allina Health

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Purpose: There is currently no standardized system-wide protocol for warfarin reversal in Allina. The variability of reversal practices may lead to inappropriate or misuse of reversal agents, resulting in unfavorable clinical outcomes and unnecessary expense. Abbott Northwestern Hospital (ANW) is the only site in Allina that currently uses pharmacy to dose consult service when vitamin K or prothrombin complex concentrate (PCC) is ordered. Pharmacists use vitamin K and PCC protocols to assist with dosing. The first objective is to analyze the differences in practice among Allina hospitals and to evaluate opportunities for standardization. The second objective is to evaluate ANW's vitamin K protocol performance when compared to physician-dosed vitamin K and to evaluate the feasibility of protocol use at other Allina sites.

Methods: The first objective will be assessed through a gap analysis evaluating current electronic order sets for reversal agents, products availability, and laboratory resources at each site. The second objective will be accomplished by retrospective chart review using the electronic medical record system. A total of 50 patients who received vitamin K between December, 2012 and February, 2013 will be reviewed. Among those patients, 25 of them whose vitamin K were dosed by physicians and the others were dosed by pharmacists. The following data will be collected: indications for warfarin reversal, vitamin K regimen, international normalized ratio (INR) or chromogenic factor X (CFX) prior to and after administration of vitamin K, need for a second dose of vitamin K or other reversal agents, and time required to overcome warfarin resistance after vitamin K administration. This study is considered as a quality initiative per the hospital IRB and is exempt from IRB review.

ASHP 2013 Summer Meeting Professional Poster Abstract

3-T

Category: Cardiology / Anticoagulation

Poster Type: Evaluative Study Report

Title: Dabigatran laboratory assay and dosing protocol: medication use evaluation

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Purpose: Abbott Northwestern Hospital (ANW) is one of a few facilities in the country to utilize an assay for monitoring dabigatran (Pradaxa), an oral direct thrombin inhibitor approved for the prevention of stroke in nonvalvular atrial fibrillation. The chromogenic anti-IIa assay correlates anti-IIa activity to dabigatran plasma concentrations. Based on a preliminary analysis of dabigatran assay results, a dosing protocol was developed as an option to adjust dabigatran doses based on dabigatran levels, age, weight and renal impairment. The purpose of this medication use evaluation was to analyze the utilization of dabigatran levels at this facility and validate the dosing protocol.

Methods: A retrospective electronic medical record chart review at ANW was performed. Dabigatran levels obtained from October 2011 to December 2012 were included in this analysis. Dabigatran levels were excluded if they were ordered by an outside hospital or if the subjects medical record had incomplete baseline data. Dosing regimens were analyzed to determine if they matched package insert dosing recommendations and/or ANW dosing protocol recommendations. Only known or extrapolated trough levels were analyzed to determine if they fell within goal range of 45-95 ng/mL. Additionally, bleeding and thrombotic complications potentially related to dabigatran therapy were obtained through ICD-9 codes. This medication use evaluation was approved through the ANW institutional review board.

Results: 119 dabigatran levels from 60 subjects were included in this medication use evaluation. The median age was 74 years (32-93 years) and the median serum creatinine was 1.08 mg/dL (0.42-2.97 mg/dL). The dabigatran protocol was utilized in 57 of the 119 levels. From ICD-9 codes, three complications potentially related to dabigatran therapy were identified: two incidences of

gastrointestinal bleeding and one ischemic stroke. Of the 119 dabigatran levels, 57 were known or extrapolated troughs. Pharmacy documented recommendations on 49 of the troughs, and 44 (89.7%) of those recommendations were accepted. 27 of the 57 troughs (47.4%) were below the goal range for dabigatran levels, and 18 (66.7%) of all low troughs were collected from subjects who received dabigatran doses that matched ANW protocol recommendations. Additionally, 11 (39.3%) of troughs for subjects aged greater than or equal to 75 and 7 (28%) of troughs for subjects with estimated creatinine clearance between 30-50 ml/min were below goal range and received dabigatran doses that matched ANW protocol recommendations. Although this occurred less frequently, 2 (3.5%) of all trough levels were higher than goal range in subjects that received dabigatran doses matching ANW protocol recommendations. 11 (79%) of high troughs were collected from subjects who received higher than the ANW protocol recommended doses for dabigatran.

Conclusion: Dabigatran levels analyzed in this study were unpredictable based on corresponding dabigatran doses, age, and renal function. A higher percentage of trough levels collected from patients with dabigatran doses matching the ANW dosing protocol were outside the therapeutic range than within goal range. Based on this data, it was determined that routine monitoring of dabigatran levels is not helpful for dosing dabigatran. From the results of this medication use evaluation, dabigatran dosing at ANW will be adjusted based on the package insert, although the laboratory assay will be available for pertinent clinical situations.

ASHP 2013 Summer Meeting Professional Poster Abstract

4-T

Category: Cardiology / Anticoagulation

Poster Type: Evaluative Study Report

Title: Characteristics associated with dabigatran versus warfarin use among patients with non-valvular atrial fibrillation in a large managed care organization

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Purpose: Dabigatran is one of the three novel oral anticoagulants (OACs) recently approved in the United States for stroke prevention in non-valvular atrial fibrillation (NVAf) patients. These new agents offer alternatives to warfarin therapy, which is associated with variable patient response and requires frequent patient monitoring. The purpose of this study is to examine patient demographic, clinical characteristics and healthcare delivery factors associated with the use of dabigatran versus warfarin in NVAf patients.

Methods: Medical and pharmacy claims data from the HealthCore Integrated Research Database were utilized. Patients aged at least 18 years with at least 2 medical claims with an ICD-9-CM diagnosis code for AF (ICD-9-CM code 427.31) were identified during the intake period (10/1/2009 - 10/31/2011). Patients with baseline valvular heart disease or hyperthyroidism were excluded. Patients were classified into dabigatran and warfarin cohorts based on OAC prescription claims: dabigatran cohort patients were required to have at least 2 dabigatran claims, and warfarin cohort patients were required to have at least 2 warfarin and no dabigatran claims during the intake period. Eligible patients were required to have continuous health plan enrollment for 12 months preceding and at least 6 months after the date of the first OAC prescription claim (index date), and had no warfarin claims preceding the index date. Multivariate logistic regression analysis using backward elimination was performed to identify key variables associated with the use of dabigatran versus warfarin. Predictor variables included age,

gender, prescriber specialty, insurance plan type, pre-index patient out-of-pocket (OP) prescription payments, CHADS2 stroke risk factors, ATRIA bleeding risk score, Elixhauser comorbidity index [ECI], baseline medication use, and health plan geographic region.

Results: Data from 815 dabigatran and 1,590 warfarin patients were analyzed. Dabigatran cohort patients were younger (median age: 63 versus 72 years, $p < 0.001$), more likely to be male (73% versus 65%, $p < 0.001$), more likely to have their index OAC prescribed by a cardiologist (51% versus 33%, $p < 0.001$), had fewer comorbidities (median ECI: 3.0 versus 4.0, $p < 0.001$), lower CHADS2 scores (median 1.0 versus 2.0, $p < 0.001$), lower ATRIA bleeding risk scores (median score 1.0 versus 3.0, $p < 0.001$), and more likely to have used anti-arrhythmic medications (35% versus 22%, $p < 0.001$) than warfarin cohort. Mean out-of-pocket pharmacy payments during pre-index period was higher for dabigatran than warfarin cohort [mean (SD) = \$870 (\$2,135) versus \$655 (\$735), $p < 0.001$]. Multivariate analysis showed that patients who were over 65 years of age were less likely to receive dabigatran [adjusted odds ratio (OR) ranged from 0.40 to 0.59, $p < 0.001$ for age groups over 65 years] than patients younger than 55 years old. Patients who had lower ATRIA bleeding risk score [adjusted OR (95% CI) = 0.91 (0.86-0.96)], hypertension [adjusted OR (95% CI) = 1.32 (1.04-1.69)] and prior ischemic stroke [adjusted OR (95% CI) = 1.42 (1.06-1.90)] were more likely to receive dabigatran but patients who had history of congestive heart failure were less likely to receive dabigatran [adjusted OR (95% CI) = 0.76 (0.59-0.97)]. Cardiologists [adjusted OR (95% CI) = 3.59 (2.68-4.81)] and other specialists [adjusted OR (95% CI) = 2.22 (1.65-2.97)] were more likely to prescribe dabigatran than primary care physicians. Patients with preferred provider organization insurance were more likely to receive dabigatran than patients with health maintenance organization insurance [adjusted OR (95% CI) = 1.47 (1.10-1.96)]. Compared to patient in West region plans, patients in Midwest plans were less likely [adjusted OR (95% CI) = 0.43 (0.34-0.56)] to receive dabigatran. Patients with higher pre-index OP pharmacy costs were more likely to receive dabigatran ($p < 0.001$).

Conclusion: In addition to clinical characteristics, patient demographics, health insurance coverage, prior prescription drug payment, and access to specialty care were important determinants of receiving novel oral anticoagulant therapy. Future research is needed to examine potential health disparity issues and their effect on quality of anticoagulation care.

ASHP 2013 Summer Meeting Professional Poster Abstract

5-T

Category: Cardiology / Anticoagulation

Poster Type: Evaluative Study Report

Title: Risk of Recurrent Venous Thromboembolism Among Patients Treated with Warfarin: A Retrospective Electronic Health Record Database Study

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Purpose: Guidelines for treatment of venous thromboembolism (VTE) recommend, for patients treated with warfarin, targeting an international normalized ratio (INR) level of 2.3. This study examines INR levels during warfarin use for VTE and the risk of recurrent VTE following an initial VTE event.

Methods: A retrospective cohort study was conducted using the MedMining electronic health record database from Pennsylvania. Data were obtained for adults diagnosed with a first VTE between January 31, 2004 and December 31, 2011 who received warfarin following diagnosis and had at least 2 INR levels available. INR levels during warfarin use were tracked during follow-up and categorized as below therapeutic range (<2), in range (2.3), and above range (>3), with time in each category estimated using the Rosendaal linear interpolation method. Instances of recurrent VTE were noted from all follow-up time available for each patient, which could range from 1 day to 8 years. The incidence of recurrent VTE was calculated and the association with time-varying INR levels estimated using Cox proportional hazards models for VTE overall and separately for, deep vein thrombosis (DVT) and pulmonary embolism (PE).

Results: Of 1,753 qualifying patients, 867 had DVT and 886 had PE. Mean age was 58+/- 17 years, and 50.7% were female. Warfarin treatment after a first event lasted a median of 308 days, during which a median of 12 INR levels were recorded. The average total duration of follow-up per patient was 2.4

years. The median time to first INR level within therapeutic range was 7 days after the initial VTE diagnosis. Across all follow-up time from the day after warfarin initiation to the last INR level available, patients spent a median of 104 days with INR within the therapeutic range, 85 days below that range, and 8 days with INR >3. VTE recurrences were observed in 134 (7.6%) patients, at a rate of 3.2 (95% confidence interval [CI], 0.79.1) events per 100 person-years. The risk of VTE recurrence was greater during time spent with INR <2 than with INR in the therapeutic range, with a hazard ratio of 3.37 (95% CI, 2.165.27). Low platelet counts also predicted greater risk of VTE recurrence (hazard ratio, 2.13; 95% CI, 1.243.67). Separate models for DVT and PE as initial and recurrent events showed similar INR patterns.

Conclusion: INR levels were below the therapeutic range during an estimated 43% of study time. INR levels below therapeutic range were associated with a more than 3-fold increased risk of VTE recurrence. This study illustrates the challenges of maintaining INR levels within therapeutic range during warfarin therapy following an initial VTE.

ASHP 2013 Summer Meeting Professional Poster Abstract

6-T

Category: Chronic / Managed Care

Poster Type: Evaluative Study Report

Title: Health related quality of life and work absenteeism among time-release and immediate release users of antidepressants

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Purpose: Time-release antidepressants have been found to be at least as efficacious as their immediate-release counterparts with better tolerability profiles that in turn improve patients adherence and hopefully result in favorable treatment outcomes for patients suffering from depression and anxiety. The purpose of this study is to compare the rate of work absenteeism; the health related quality of life scores, as well as the number of patients with uncontrolled depression or anxiety between those who utilized time-release formulations of venlafaxine, bupropion, and paroxetine and those who utilized their immediate-release counterparts.

Methods: Using the Medical Expenditures Panel Survey (MEPS) data files for 2007 to 2010, five hundred and eight (n=508) patients met the following inclusion criteria: (i) between 16 and 65 years of age; (ii) taking the same antidepressant medication for at least one year, (iii) have been diagnosed with one or more of the following medical conditions: (a) episodic mood disorders; (b) anxiety or dissociative and somatoform disorders; (c) depressive disorders that are not elsewhere classified; (iv) have a current job and answered the question regarding the missed work related to one of the aforementioned medical conditions; (v) have summary scores for both the physical and the mental components of the Short Form Health Survey version two (SF-12v2); (vi) answered the Patient Health Questionnaire (PHQ-2) questions. The following demographics and patient characteristics variables were included in the analysis: age, gender, race, educational level, insurance status, household income, and Charlson Comorbidity Index (CCI) score. Multivariate logistic regression analyses were conducted to see if the utilization of the time-release formulations of the previously mentioned antidepressants is a significant

predictor of the health related quality of life scores, work absenteeism, and depression or anxiety control.

Results: 215 patients were on immediate-release formulations of venlafaxine, bupropion, and paroxetine and 293 patients were on the time-release formulations. Patients taking time-release formulations had higher odds of missing work than those on the immediate release formulations; however, this was not statistically significant after adjusting for age, gender, households income, comorbidity, and level of education (Odds ratio equals 1.238, 95 percent CI, 0.746 to 2.054). With regard to the health related quality of life, patients taking time-release formulations had higher odds of having higher than the mean score of the physical component summary (Odds ratio equals 1.221, 95 percent CI, 0.838 to 1.779), but lower than the mean score of the mental component summary (Odds ratio equals 0.923, 95 percent CI, 0.641 to 1.330), however this was not statistically significant either. Patients on time-release formulations had lower odds of having clinical significant depression based on the Patient Health Questionnaire (Odds ratio equals 0.935, 95 percent CI, 0.587 to 1.489) but this also was not statistically significant.

Conclusion: Although evidence has shown better tolerability and medication adherence with time-release formulations of venlafaxine, bupropion, paroxetine; strong evidence is lacking regarding the superiority of these time-release formulations over their immediate release counterparts in improving the quality of life or reducing the work absenteeism in patients with depression and anxiety. Head-to-head randomized clinical trial with a large sample size is needed to see if the time-release formulations of the antidepressants have any impact on work absenteeism or quality of life.

ASHP 2013 Summer Meeting Professional Poster Abstract

7-T

Category: Drug Information

Poster Type: Descriptive Report

Title: Survey on consumers' perception of over-the-counter drugs in Japan

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Purpose: In recent years, prescription drugs have greatly been switched to over-the-counter ones for self-medication in many developed countries. The Ministry of Health and Welfare in Japan is also promoting self-medication by OTC drugs to reduce national medical expenditure increased by the aging population. New issues such as side effects, drug abuse with self-medication are also emerging. In this study, we conducted a research on Japanese consumers' perception of OTC drugs and their real situation of OTC drugs utilization in order to promote the appropriate usage of OTC drugs.

Methods: We conducted a questionnaire survey of general consumers who belonged to Japanese companies, not pharmaceutical companies. Consumers were asked the image, usage, and demand for OTC drugs as well as respondents' characteristics. The survey consisted of multiple-choice questions, statements requiring a response using a five-point scale (1 to 5 points corresponding to agreement level to disagreement one). Data was analyzed by IBM SPSS Statistics version 20.0. Chi-square tests and Mann-Whitney's U test were used to assess their differences by gender, age, and education in medical-related field or not. P values less than 0.05 were considered to be statistically significant.

Results: Total of 356 respondents completed the survey. Almost three quarters, 78.4 percent, of the respondents were male. The majority (86.5 percent) didn't graduate from medical-related field. Most respondents (94.1 percent) agreed that OTC drugs were convenient. 81.1 percent of the respondents agreed, agreed in part, or agreed depending on drugs that medication counseling by pharmacist was

necessary. Nevertheless, almost all respondents placed importance on efficacy or price more than pharmacist's advice when purchasing OTC drugs. About one half respondents (49.3 percent) always or usually read the package inserts. 71.7 percent of the older respondents (over 50 years old) read it and 45.9 percent of the younger did so (P equals 0.001). Furthermore, older respondents (45.6 percent of them) were more likely to have the demands of the package inserts which was easily understood than the younger respondents (26.4 percent) did (P equals 0.007). 58.5 percent of the respondents expected to reduce the prices, and 45.3 percent of them expected to consult a pharmacist more easily and conveniently. 43.8 percent of the respondents expected pharmacists to choose an appropriate drug for each consumer.

Conclusion: Our survey showed that majority of the respondents needed medication counseling. More respondents, however, placed importance on efficacy or price more than pharmacist's advice when purchasing OTC drugs. In addition, consumers needed the package inserts which was more easily understood. Therefore, pharmacists should have a better understanding on consumers' needs for OTC drugs and provide accurate drug information of good quality. In Japan, there is lack of information about OTC drugs for medical professionals. Taking into consideration that OTC drugs will become prevalent, it is also necessary to provide more detailed OTC drug information to them.

ASHP 2013 Summer Meeting Professional Poster Abstract

8-T

Category: Drug Information

Poster Type: Descriptive Report

Title: Patients' drug compliance at home healthcare

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Purpose: On account of public needs to heal oneself home and shortage of hospital beds due to demographic aging, home healthcare has been promoted in Japan. Since drug compliance is essential for an effective and safe pharmaceutical care home, a home-visit by pharmacists is conducted if necessary. We investigated the real situation of patients' compliance at home healthcare and explored factors influencing patients' drug compliance.

Methods: From 2011 to 2012, we conducted a survey on characteristic of patients and a questionnaire on patients' drug-taking behavior (medication administrator (the person who is instructed by pharmacists and being in charge of drug administration; patient self, or another person (family member, etc.)), approach for keeping good compliance, knowledge of prescription drug, how often they forget to take medicine, compliance modification by themselves, slippage in timing of taking medicine) in home care (study 1). The questionnaire aimed at medication administrator. A further survey on remained drugs was conducted in order to consider the rate of taking medicine on a part of the subjects in the study 1 (study 2). Pill count was conducted to examine the number of drugs remained. The rate of taking medicine was defined as the average of the taken pills rate of each drug (the number of pills taken divided by the number of pills that should have been taken). Only oral medicines which routinely prescribed for each patient were the target of the study excluding the ones to be taken only once.

Results: 34 cases were identified in study 1. The percentage of conducting compliance modification was significantly higher in cases that a patient was a medication administrator than in cases that a medication administrator was their family members (P equals 0.046). The percentage of intentionally slippage in timing of taking medicine was about 20 percent regardless of who the medication administrator was. A pill count could be conducted in 14 patients for study 2. 6 of 14 patients had remained drugs. The rate of taking medicine among the 6 patients was 0.78 plus/minus 0.18 (mean plus/minus S.D.). The rate of taking medicine was significantly higher in cases that medication administrators were their family members than in cases that those were patient themselves (P equals 0.03). In 5 cases (35.7 percent) of medication administrators thought they took or dosed medicines more orderly than they really did. Patients who were medication administrators were more likely to think so.

Conclusion: In our study, the issue like slippage in timing of taking medicine was revealed in home healthcare where patients or their family members were in charge of drug administration. In cases that patients are medication administrators, patient education on compliance modification and a direct check of remained drugs in addition to confirmation by hearing are specifically important.

ASHP 2013 Summer Meeting Professional Poster Abstract

9-T

Category: Drug Information

Poster Type: Evaluative Study Report

Title: Anti-influenza drug use during pregnancy

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Purpose: Pregnant women are at aggregated risk for influenza infection. An early anti-influenza drug (; AID) therapy is beneficial, but in Japan, only limited information is available regarding safety and effectiveness of the drugs during pregnancy in their drug labelings. For that reason attitudes of health professionals toward AID use during pregnancy are diverse. Therefore we investigated anti-influenza drug use during pregnancy in current real clinical practice in Japan to evaluate the outcome of anti-influenza drug use during pregnancy.

Methods: A retrospective study was conducted using medical record. AID exposed group was compared with control group. The institutional review board approved this study. The subjects of the study were the women who completed their pregnancy at St. Luke's hospital from 1 October 2008 to 31 January 2012. Of the women, the exposed group consisted of the women who took at least one of the AIDs (oseltamivir, zanamivir, peramivir, laninamivir, and amantadine) during pregnancy, the control group consisted of the women who didn't. gThe women completing their pregnancyh included the women who experienced delivery, spontaneous abortion and stillbirth. The name of AID taken, purpose of AID taken (cure or prophylactic), gestational week when taking AID, influenza infection, type of influenza, hospitalization due to influenza (the exposed group only), age at delivery, delivery gestational week, infant's body weight, premature delivery, spontaneous abortion, stillbirth and congenital malformation were extracted from medical record. The women who experienced spontaneous abortion and stillbirth

were not included at statistical analysis of low birth weight infant and premature birth. Statistical analysis was conducted by each AID group.

Results: Exposed group was identified with 37 women. Control group was identified with 3563 women. 36 women took oseltamivir (26 women for cure and 10 women for prophylactic). A woman took zanamivir for prophylactic. Peramivir, laninamivir, amantadine were not used. A statistical analysis was conducted on the Oseltamivir exposed group and control group. An average of maternal age in oseltamivir exposed group was 33.4 plus minus 4.9 compared with 34.4 plus minus 4.3 in the control group (P equal 0.390). There were no cases of spontaneous abortion and stillbirth in exposed group. No significant difference existed regarding the case of premature delivery between the groups, 4(11.1 percent) premature deliveries were observed in the oseltamivir exposed group and 244(7.0 percent) in the control group (P equal 0.243). No significant difference existed regarding the case of low birth weight infants (less than 2500g) between the groups, 2(5.6 percent) low birth weight infants were observed in the oseltamivir exposed group and 357(10.2 percent) in the control group (P equal 0.277). No significant difference existed regarding the case of congenital malformation between the groups, 1(2.8 percent) congenital malformation was observed in the oseltamivir exposed group and 67(1.9 percent) in the control group (P equal 0.500).

Conclusion: There were no significant differences regarding the case of low birth weight infants, premature birth, and congenital malformations between the oseltamivir exposed group and the control group. However, sample size is small, further research is needed to expand data collection.

ASHP 2013 Summer Meeting Professional Poster Abstract

10-T

Category: Drug Information

Poster Type: Evaluative Study Report

Title: Ethnographic study of pharmacy and therapeutics committee decision making

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Purpose: One of the main responsibilities of the pharmacy and therapeutics (P&T) committee is to manage the formulary system which affects drug utilization within an organization. Despite the influence the P&T committee has on formulary management, little is known about the decision making process and there is no standardized approach for the addition of new drugs to a formulary system. The purpose of this study was to evaluate P&T committee minutes to identify common themes discussed in these meetings during deliberations for proposed formulary additions.

Methods: This study was approved by the institutional review boards at 1 academic medical center and 1 public teaching hospital. All P&T committee meetings in the year 2010 were recorded from each site. The recordings were then transcribed with the names of all members of the P&T committee removed. The transcriptions were analyzed by a pharmacist with specialty training in drug information and the findings were subsequently reviewed by a faculty member in the school of pharmacy. Prior to analyzing the transcripts, expected themes were identified based on previous literature (e.g. cost-effectiveness, safety, and efficacy). While analyzing the transcripts, additional unanticipated themes were documented. After all themes were identified, the transcripts were evaluated to determine the number of themes discussed for each medication prior to making a decision regarding formulary addition. Specific quotations from the meetings were recorded to help illustrate each theme.

Results: A total of 17 medications were identified for formulary addition during the study period (11 medications at 1 site and 6 medications at the other site). Cost-effectiveness was the most common theme discussed with 15 of the 17 discussions making statements regarding cost of the medication. One site discussed cost-effectiveness, safety, and efficacy for all 11 formulary additions; however, the other site only discussed cost for 4 out of 6 medications, safety for 4 out of 6 medications, and efficacy for 3 out of 6 medications. U.S. Food and Drug Administration approval was discussed in 9 instances. A total of 3 medications were added to formulary with certain restrictions; however there was no discussion regarding implementation of the restrictions. Other common themes include: ease of administration, abuse potential, expert-opinion affecting approval, and frequency of non-formulary requests for the medication. Additionally, 4 medications had minimal discussions surrounding their approval and the P&T committee discussions seemed to occur for formality reasons. No conflicts of interest were identified among committee members.

Conclusion: This study identified common themes discussed during P&T committee formulary addition deliberations. Cost-effectiveness, safety, and efficacy were the most common themes identified; however, there were inconsistencies among the 2 sites which demonstrate the lack of a standardized approach to formulary decision making. The P&T committee plays an important role in ensuring that medication use is safe, effective, and cost-effective for patients. Awareness of the discussions of the P&T committee will help improve the formulary decision making process and determine challenges and areas for improvement.

ASHP 2013 Summer Meeting Professional Poster Abstract

11-T

Category: Drug-Use Evaluation

Poster Type: Evaluative Study Report

Title: Usage of darbepoetin alfa in a tertiary care hospital in the United Arab Emirates (UAE)

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Purpose: Chemotherapy-induced anemia is commonly observed in the treatment of solid tumors. In addition to causing symptoms, the presence of anemia has been linked to an adverse prognosis in several malignancies. Treatment options for chemotherapy-induced anemia include blood transfusions, iron supplementation and recombinant erythropoietin stimulating agents (ESAs). Darbepoetin alfa (DA) is an erythropoiesis-stimulating agent. It is an expensive medication that is widely used for oncology patients at Tawam Hospital. The objective of the study was to evaluate the use of DA in the outpatient setting in accordance with the National Cancer Center Network (NCCN) guidelines. As per the NCCN Guidelines, ESAs are not indicated for patients receiving myelosuppressive chemotherapy when the anticipated outcome is cure. In addition, ESAs are not indicated for use in patients receiving hormonal agents, therapeutic biologic products, or radiotherapy unless receiving concomitant myelosuppressive chemotherapy.

Methods: A retrospective observational chart review for oncology patients receiving DA in the outpatient setting was performed over a 6 month period from October 2011 to March 2012. This study was approved by the institutional review board. Patient demographics, chemotherapy protocols as well as the indication and the pattern of use of DA were documented. A literature review was done on the use of DA in cancer patients with a focus on its potential benefits and adverse events that were associated with its use in this population.

Results: The medical charts of 70 oncology patients were reviewed. Fifty nine patients (84 percent) were females. Thirty five percent of the patients had breast cancer, followed by colorectal cancer in 20

percent of the patients. The intent of treatment was palliative in 81 percent of the patients, and in 19 percent the intent was cure. In two cases, the patients were prescribed DA few months post last dose of chemotherapy. Of those who were on palliative treatment four were maintained on targeted and/or hormonal therapy. Blood transfusions were required in only 6 patients, and therefore the use of DA was successful in preventing blood transfusions in 91 percent of our patients. Baseline iron panel studies were not performed in any of our patients, and oral iron supplements were received in 84 percent. In the other 15 percent of patients, no iron supplements were given concurrently with DA. DA was prescribed using fixed dose regimen, and none of our patients dosed based on body weight. Darbepoetin alfa was well tolerated in most cases, and no adverse events have been reported.

Conclusion: In most cases DA usage was in line with the NCCN guidelines. However, baseline iron panel studies should be performed in all patients and iron supplementation should be prescribed accordingly. Given the substantial cost of DA, it is important to reinforce its appropriate use as per guidelines. In addition, our study showed that DA was successful in preventing blood transfusions in the majority of our patients.

ASHP 2013 Summer Meeting Professional Poster Abstract

12-T

Category: Drug-Use Evaluation

Poster Type: Evaluative Study Report

Title: Drug use evaluation of Morphine sulfate in intravenous Patient-Controlled Analgesia for cancer care

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Purpose: Patient-Controlled Analgesia (PCA) is a method of continuously infusing narcotic analgesics while a patient can self-administer the analgesic under severe acute pain; therefore, establishing the appropriate dosage and monitoring the patients are important in managing pain and controlling complications. Guidelines were established and Drug use evaluations were performed on 70 hospitalized patients who had received morphine sulfate IV PCA for the purpose of relieving chronic cancer pain in the division of Hematology-oncology at Samsung Medical Center from January to June 2011.

Methods: Retrospectively, electronic medical records were examined, and the evaluation standard was based on the criteria presented by the American Society of Health-System Pharmacists and was supplemented and corrected through recent literature and hospital circumstances. Justification of use, critical indicators, complications, outcome measure were included.

Results: Study results showed that 33 (47.1%) out of 70 cases of initial dosage of continuous infusion were appropriate. One-time dosing for continuous infusion dosage was evaluated at the beginning of PCA and each time there was an adjustment, and 130 (42.3%) cases out of a total of 307 was appropriate. Objective evaluation was possible in 48 (15.6%) cases where the before and after pain could be expressed in numerical scale. Also when the dosage of PCA was kept constant, the daily pain

evaluation category was appropriate in 606 (96.5%) out of 628 cases. The monitoring of complications and evaluation of pain were satisfactory but the records to objectify them were somewhat lacking.

Conclusion: By establishing guidelines and evaluating appropriateness of use as in this study, instead of starting with high dosage, we suggest a method of adjusting the dosage gradually while minimizing complications by presenting a recommended dosage range. Therefore, for effective adjustment of chronic cancer pain; sharing of guidelines and continuous feedback from medical staffs and faithful recording of pain are necessary, then the development of a manual for PCA dosage will be possible in the future.

ASHP 2013 Summer Meeting Professional Poster Abstract

13-T

Category: Drug-Use Evaluation

Poster Type: Evaluative Study Report

Title: Pharmacoeconomic comparison of iron sucrose intravenous piggyback (IVPB) vs. iron sucrose intravenous push (IVP)

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Purpose: Iron sucrose (Venofer) is an intravenous iron formulation indicated for the treatment of iron deficiency anemia in adult and pediatric patients 2 years and older with chronic kidney disease. Iron sucrose may be administered as a slow intravenous injection (IV push, IVP) over 2 to 5 minutes, or as an IV infusion (IV piggyback, IVPB) over 15 minutes. IVP administration of iron sucrose has been associated with considerable time and cost savings versus IVPB infusion. The purpose of this analysis was to compare the direct hospital cost of administering iron sucrose IVPB vs. IVP.

Methods: A comparison of iron sucrose via IVPB or IVP from September 2011 to September 2012 was performed at Centennial Hills Hospital which has a 177 bed capacity. The following costs were evaluated: vials, IV supplies, preparation costs, delivery costs, and administration costs. The hospitals report generator system was utilized to collect the total number of doses dispensed. The total cost for three different pack-sizes of vials was calculated by multiplying the number of vials dispensed by the cost per vial. The cost of IV bags and tubing were calculated by multiplying the estimated number of IVPB dispensed by the average cost per IV bag or tubing. Total preparation costs equated to the sum of the preparation costs, in time, incurred by the pharmacy technician and pharmacist to prepare and verify the total doses. Cost per employee is estimated as hourly rate including benefits broken into an hourly cost. Average delivery costs were calculated by multiplying the time it takes for a pharmacy technician to deliver the doses to the automated dispensing cabinet by cost of the employee. Average administration costs, in time, were calculated by multiplying the average administration time of the total IV iron sucrose doses by cost per nurse.

Results: A comparison of iron sucrose via IVPB or IVP from September 2011 to September 2012 was performed at Centennial Hills Hospital which has a 177 bed capacity. The following costs were evaluated: vials, IV supplies, preparation costs, delivery costs, and administration costs. The hospital's report generator system was utilized to collect the total number of doses dispensed. The total cost for three different pack-sizes of vials was calculated by multiplying the number of vials dispensed by the cost per vial. The cost of IV bags and tubing were calculated by multiplying the estimated number of IVPB dispensed by the average cost per IV bag or tubing. Total preparation costs equated to the sum of the preparation costs, in time, incurred by the pharmacy technician and pharmacist to prepare and verify the total doses. Cost per employee is estimated as hourly rate including benefits broken into an hourly cost. Average delivery costs were calculated by multiplying the time it takes for a pharmacy technician to deliver the doses to the automated dispensing cabinet by cost of the employee. Average administration costs, in time, were calculated by multiplying the average administration time of the total IV iron sucrose doses by cost per nurse.

Conclusion: Considering time savings and increased efficiency of work flow, administration of iron sucrose via IVP demonstrated reasonable annual cost savings vs. administration via IVPB. Further analyses are warranted regarding the overall cost savings associated with iron sucrose IVP administration.

ASHP 2013 Summer Meeting Professional Poster Abstract

14-T

Category: Drug-Use Evaluation

Poster Type: Evaluative Study Report

Title: Reduction in the volume of water required for ingesting orally disintegrating tablets

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Purpose: Orally disintegrating tablets (ODTs) disintegrate immediately in the mouth, and thus patients can consume them with little or without any water. This characteristic of ODTs is beneficial for patients who have difficulty swallowing conventional tablets (CTs). Furthermore, ingestion of ODTs without water may be beneficial for patients with diseases in which water intake is restricted, including patients with an overactive bladder who have lower urinary tract symptoms and are thought to experience discomfort and inconvenience with water intake. Our aim was to determine the amount of water required by healthy subjects to ingest ODTs and CTs.

Methods: CTs and ODTs, which did not include any active pharmaceutical ingredients, were prepared by direct compression method using a single-station tableting machine. To evaluate the intra-assay precision, we randomly divided 26 healthy volunteers (age, 22.1[1.2] years; mean [standard deviation, SD]) into 3 groups and performed a randomized crossover trial to assess the amount of water required for ingestion of CTs and ODTs. All volunteers were asked to drink water while consuming CTs, while in the case of ODTs, they were asked to drink water after the ODT disintegrated in their oral cavity. Volunteers freely filled the cup with water from the 500-mL bottle and then drank the volume of water required to consume each tablet. The amount of water was measured using the weight of the cup and bottle. To assess the influence of diameter of tablets, the amounts of water and scores of ease of intake of CTs and ODTs with diameters of 6.0, 8.0, and 10.0 mm were measured using the same methods and

visual analogue scale (VAS), respectively. All protocols of clinical trials were approved by the Ethics Committee of the University of Shizuoka.

Results: To validate our method, we measured the amounts of water required for ingesting CTs and ODTs in the 3 groups. No significant difference was observed in the amount of water required for ingesting CTs and ODTs among the 3 groups, which indicated the reproducibility of our method for measuring water intake. The amount of water required for ingesting ODTs was significantly lesser than that required for ingesting CTs (17.2 [15.2] mL vs 40.0 [22.9] mL). The amount of water required for ingesting a CT with a 10.0-mm diameter (43.6 mL) was higher than that required for other CTs (31.9 and 29.2 mL for CTs 6.0 and 8.0 mm in diameter, respectively). On the other hand, no differences were observed in the amount of water required for ingesting ODTs of different diameters (13.7-16.3 mL). The VAS score for ease of intake for CTs was significantly lower than that of ODTs of 10.0-mm diameter.

Conclusion: This study showed that the amount of water required for ingesting ODTs is lower than that required for ingesting CTs. In addition, the amount of water required and ease of intake for ODTs did not increase with the increase in the diameter of the tablets. Our results suggest that ODTs may be beneficial to patients who have difficulty swallowing and in whom restricted water intake is recommended.

ASHP 2013 Summer Meeting Professional Poster Abstract

15-T

Category: Drug-Use Evaluation

Poster Type: Evaluative Study Report

Title: Clinical disintegration time of orally disintegrating tablets clinically available in Japan in healthy volunteers

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Purpose: Orally disintegrating tablets (ODTs) have excellent disintegration and can therefore be taken with little or no water. Moreover, they have been proven to be easily consumable. Disintegration time is an important quality attribute of ODTs, and evaluation of disintegration time is perceived as a key step in formulation development, manufacturing, and clinical practice. Therefore, an appropriate method is required to evaluate the disintegration time of ODTs. In this study, we evaluated the clinical disintegration time of 17 ODTs that are currently available for clinical use, and attempted to clarify its correlation with the in vitro disintegration time of ODTs.

Methods: The clinical disintegration time (disintegration time in the oral cavity) was measured for 17 ODT products. Healthy volunteers (n = 9-10; age range, 21-28 years) who had provided written informed consent participated in this study. The study protocols were approved by the Ethics Committee of the University of Shizuoka. In a randomized single-blind trial, each tablet was placed on the tongues of the participants, and disintegrated in their oral cavities. The clinical disintegration time of each ODT was measured by the investigator with a stopwatch. The residue in the oral cavity was removed and rinsed from the mouth with water after the test. In vitro disintegration time of 26 ODTs was measured by Tricorptester (Okada Seiko Co., Ltd., Tokyo, Japan). Artificial saliva, warmed to 37°C and dripped from a height of 80 mm at a flow rate of 6.0 mL/min, was used as the test solution.

Results: To validate the method for measuring the clinical disintegration time of ODTs, the subjects were randomly assigned to 3 groups and the clinical disintegration times of 2 ODTs were measured. No

significant difference was observed in the clinical disintegration time of each ODT among the 3 groups, which indicated the reproducibility of our method for measuring clinical disintegration time. The clinical disintegration time of 17 ODT products was between 17.6 s and 33.8 s in the clinical trial conducted with healthy adult volunteers. In addition, the in vitro disintegration time of the 26 clinically used ODT products ranged between 4.40 s and 30.4 s. There was a significant positive correlation between in vitro and clinical disintegration times ($r = 0.79$; $P < 0.001$).

Conclusion: This study demonstrates that all the tested products, which are clinically available in Japan, exhibit good disintegration and that the disintegration time varies by the product. In addition, the in vitro disintegration time of ODTs measured by Tricorptester is a good reflection of the disintegration time in the oral cavity.

ASHP 2013 Summer Meeting Professional Poster Abstract

16-T

Category: General Clinical Practice

Poster Type: Research-in-Progress

Title: Levetiracetam as adjunctive therapy for acute alcohol withdrawal syndrome in hospitalized patients

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Purpose: Benzodiazepines are often considered the standard of care for managing symptoms of acute alcohol withdrawal syndrome. While effective for many patients, use of benzodiazepines can often result in adverse effects, such as sedation, cognitive impairment, and dependence. Many alternative agents have been evaluated for use in this patient population, including anticonvulsants. Due to its tolerability, low abuse potential, and hypothesized action on areas of the brain involved with alcohol dependence, levetiracetam has been one agent of interest in recent studies. The purpose of this study was to evaluate the impact of levetiracetam on the average daily dose of symptom-triggered benzodiazepines compared to those treated with only the standard of care (lorazepam, thiamine, and a multivitamin). It was hypothesized that the use of adjunctive levetiracetam would reduce the average daily dose of lorazepam required by hospitalized patients experiencing alcohol withdrawal syndrome.

Methods: The Institutional Review Board approved this observational, retrospective cohort review. Hospitalized patients eighteen and older who were experiencing alcohol withdrawal were included in the analysis. Patients were identified using the electronic medical record if they had received orders from the hospital's detoxification order set. This order set includes symptom-triggered lorazepam, thiamine, and a multivitamin. As of fall 2011, providers also had the option to order an adjunctive agent of either levetiracetam or carbamazepine. It was up to the provider's discretion if he or she chose to order an adjunctive agent and the selection of the agent. Two hundred and fifty patients were included

in this chart review: 125 that received the standard of care prior to the implementation of the revised order set and 125 that received adjunctive levetiracetam in addition to the standard of care. Those that received adjunctive carbamazepine were not included in this review as there was an insufficient number of patients in that cohort to provide meaningful data. The primary outcome was average daily benzodiazepine (lorazepam) use. Secondary outcome measures included average daily Clinical Institute Withdrawal Assessment for Alcohol Scale scores, length of intensive care unit stay, duration of hospitalization, occurrence of seizures, days requiring ventilator support, discontinuation rates of the adjunctive medication, and adverse effects. Additional collected data included: age, sex, ethnicity, history of previous detoxification attempts, seizure history, smoking status, relevant comorbidities, and other pertinent medications administered.

ASHP 2013 Summer Meeting Professional Poster Abstract

17-T

Category: General Clinical Practice

Title: Development of electronic monitoring tools for pharmacy-to-dose medication consults at a large quaternary care community hospital

Poster Type: Research-in-Progress

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Purpose: Pharmacists spend a significant amount of time documenting consults on paper monitoring forms and duplicating the information in electronic consult notes. When Epic went live at Allina Health in 2005, limitations in functionality of pharmacy clinical monitoring existed, leading to the persistence of paper monitoring forms for medication consults (i.e. anticoagulants, pharmacokinetics, etc.). Paper-based monitoring forms can lead to consults being occasionally missed or continued after discontinuation unnecessarily due to the lack of real-time update capabilities. The roles and responsibilities of pharmacists continue to grow as Allina Health's care model continues to mature towards integrated team-based care and a strong focus on care transitions necessitating that workflows are streamlined where ever possible.

Methods: Prior to commencement, this study will be submitted to the Institutional Review Board for approval. Mapping of current anticoagulation and antibiotic kinetic pharmacy-to-dose consult processes will be performed to assess for duplications in pharmacist work and potential for saved time. Time studies will be conducted to assess how long new and follow-up pharmacy-to-dose consults take on average with the current processes in order to provide a baseline for comparison post-implementation. Clinical pharmacists will also be surveyed to assess necessary components for inclusion on the Epic accordions and pharmacy navigators for the anticoagulation and antibiotic kinetics pharmacy-to-dose consults. Medication error reports will be reviewed to identify the frequency of missed and/or lapses in care secondary to breakdowns in the current, paper-based processes. Information obtained will be

submitted to the Epic workgroup within Allina Health for the construction of the accordions, pharmacy navigators, and the patient list column to assess daily status of pharmacy-to-dose consults.

ASHP 2013 Summer Meeting Professional Poster Abstract

18-T

Category: Herbals / Alternative Medicines

Poster Type: Descriptive Report

Title: Evaluation of the professional behaviors and attitudes of Lebanese community pharmacists with respect to vitamins and minerals

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Purpose: Vitamins and minerals are increasingly sold in Lebanese community pharmacies in the recent years. They are generally used without prescriptions by the general population. It has been documented that some of these marketed products contain heavy metals above the recommended daily allowance. In the absence of adequate regulation, pharmacists have a great role and responsibility in ensuring the safety of using such supplements. We conducted this study to evaluate the Lebanese community pharmacists professional behaviors and attitudes towards vitamins and minerals.

Methods: We conducted a cross-sectional descriptive study. Community pharmacies from different geographical locations were randomly selected and one registered pharmacist from each pharmacy was asked to participate in this study. A questionnaire was designed to address several areas of interest and required an average of eighteen minutes to be filled. Direct assessment questions were used to gather information about pharmacists counseling behaviors and approach to vitamins and minerals. Perceived knowledge of the therapeutic use, recommended therapeutic allowance, and interactions of fifteen selected vitamins and minerals was also evaluated. To assess the actual knowledge, pharmacists were asked twelve multiple choice questions. To evaluate their dispensing practice, pharmacists were requested to state the most common vitamin and mineral dispensed as well as five clinical conditions where they would prescribe and dispense such a supplement. In addition, their opinion on regulation and preference of information sources were obtained. After the completion of the survey the correct answers were given to the participants to educate them on these supplements.

Results: Two hundred seventy four pharmacists completed the survey. Only 20.4% had previous training on minerals and vitamins. The majority (88.3%) of pharmacists agreed that these supplements can be beneficial to the health of patients. However, 39.1% saw that they can replace a healthy diet. Less than half of the pharmacists (46.4%) stated that they possess enough background information, while 88.7% agreed that they need continuing education sessions on these supplements, mostly regarding interactions. 40.9% believed that these marketed products could contain toxic unlabelled ingredients; and when asked about the need for increased regulation, only 6.9% disagreed. 63.5% of the pharmacists would recommend a vitamin and mineral supplement even without a prescription. Most of the pharmacists displayed positive counseling behavior, commonly with regards to administration (81.4%), interactions (75.9%), and side effects (72.3%). A less positive behavior was noted in rechecking the dose regimen, recognizing the symptoms of deficiencies, and following up the patient. In addition, 89.4% confirmed referring to a source of information, having the internet as the preferred source (56.2%). Pharmacists perceived their knowledge to be mostly adequate in the therapeutic use of iron (81.4%), vitamin D (80.3%) and calcium (78.8%); yet a minority of pharmacists perceived an adequate knowledge in the dosing (22.6%), interactions (21.2%) and use (26.6%) of chromium.

Conclusion: Given the results of this study, pharmacists appear to have a positive attitude and counseling behavior towards vitamins and minerals. However, they lack background information related to the dosage and drug interactions. This highlights the need for developing specific continuing education modules related to vitamin and mineral supplementation, through educational sessions or scientific annual meetings as an attempt to inform the pharmacists about these products to ultimately improve patient care. Finally, this project has served as a good opportunity to educate the participating pharmacists and served as a tool for the school of pharmacy to include curricular changes that elaborate more on this topic.

ASHP 2013 Summer Meeting Professional Poster Abstract

19-T

Category: Herbals / Alternative Medicines

Poster Type: Descriptive Report

Title: Level of awareness of the Lebanese pharmacists on the knowledge and proper dispensing of prebiotics and probiotics

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Purpose: The practice of dispensing prebiotics and probiotics is still ambiguous among Lebanese pharmacists. This can be due to insufficient knowledge about these products, their relatively new availability on the market, or the absence of continuing education for the Lebanese pharmacists. This project was designed to assess and evaluate the overall awareness and knowledge of the Lebanese community pharmacists towards probiotics and prebiotics, and at the same time educate them about those products.

Methods: To determine the knowledge of Lebanese community pharmacists concerning prebiotics and probiotics, a questionnaire on this matter was validated. The survey is composed of thirteen multiple choice questions and required an average of ten minutes to be filled. The candidates were all practitioners in the field of community pharmacy from randomly selected geographical locations. They were asked to fill the questionnaire whereby they were inquired about the classification, sources, and mechanism of action of those products. They were also asked to indicate the reason behind dispensing prebiotics and probiotics to the patients and their preferences in dispensing natural versus synthetic supplements. Their answers were recorded and transformed into percentages reflecting the correct responses to the questions presented in the questionnaire. After the completion of the survey, a pre-printed copy of the correct answers was given to the participants to educate them on those products.

Results: Survey data was analyzed based on 71 participants. The data revealed that 96% stated that prebiotics and probiotics are dietary supplements, 93% stated that probiotics are live organisms, while 77% stated that prebiotics are components of food. When asked about the mechanism of action, 73% stated the correct answer. Among the participants, 89% stated that both products produce a synergistic effect to other treatment regimens. As for the source, 55% stated that they are not only live bacteria and 59% stated that aged cheese can be a probiotics source. Moreover, 21% of the practitioners do not prefer supplements over natural sources, knowing that 12% knew that probiotics come from dairy products, pickles, and legumes, while 8% knew that prebiotics come from wine, fresh vegetables and fruits, whole grain, dark chocolate, wheat, oatmeal, and honey ($p\text{-value}<0.05$). As for the reason behind consuming probiotics and prebiotics, the participants responses were varied, with a cumulative result pointing out to 32% choosing gastrointestinal health and down till 10% for weight loss and children allergies, including diarrhea prevention, vaginal and urinary tract infections, and skin beauty in between ($p\text{-vlaue}<0.05$).

Conclusion: Based on the survey results, most participants have had varying responses concerning probiotics and prebiotics. Based on our sample, most community pharmacists seem to have general knowledge about those products related to their classification, mechanism of action, and effects. The pharmacists unawareness was mostly concentrated on the sources of those products in our everyday diet and their indication for usage. The insufficiency in their knowledge should be recognized since it affects their dispensing and counseling practices. Eventually, attempts should be taken into action by having multiple educational sessions or promotional seminars directed to educate them about those products. Finally, this project has served as a good opportunity to educate the pharmacists through the distribution of pre-printed answers, since those products have potential applications in many areas of health.

ASHP 2013 Summer Meeting Professional Poster Abstract

20-T

Category: Infectious Diseases

Poster Type: Evaluative Study Report

Title: Predictability of vancomycin trough concentrations using a standardized protocol at a community teaching hospital

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Purpose: Although vancomycin has been available for decades, there is still no standardized approach to dose vancomycin and current methods have not been successful in predicting vancomycin concentrations. In November 2012, a vancomycin dosing protocol was developed by the Antimicrobial Stewardship Program and approved for use by Department of Pharmacy. The purpose of this study was to evaluate the ability of a standardized dosing protocol in predicting vancomycin trough concentrations.

Methods: A retrospective chart review was performed to evaluate the new vancomycin dosing protocol. Patient data, including demographics, renal function, pharmacokinetic parameters, vancomycin dosing and concentration sampling, source of infection, and microbiology, were extracted from electronic medical records. Patients were included in the study if: 1) treated with vancomycin between December 1, 2012 and January 24, 2013, 2) initial pharmacokinetic parameters were calculated, and 3) at least one vancomycin trough was obtained. Patients were excluded if: 1) no trough concentrations were obtained, 2) doses were missed, 3) the protocol was not followed, 4) inconsistencies existed between chart data and dosing, or 5) records were incomplete. Predicted trough concentrations were calculated using population-specific parameters. Statistical analyses were performed to assess the association between measured and predicted vancomycin concentrations.

Results: Evaluable patients (n=32) represented an elderly population (62 [53-76] years) with majority of patients being obese (20/32 [63%]). The most common indications for use of vancomycin were SSTIs (21/32 [66%]) and pneumonia (5/32 [16%]). Overall, the predicted vancomycin concentration was shown to overestimate measured concentration (14.6 (13-16) vs. 12.5 (10.4-16.9), p=NS). The newly implemented protocol had a success rate of 53% (17/32) in predicting the measured vancomycin trough concentration. Successful prediction was defined by whether or not the measured trough level concentration was within the predetermined therapeutic range (either 10-15 mg/L or 15-20mg/L). Interestingly, in obese patients, significant association was found between predicted vs. measured vancomycin concentrations (14 (82) vs. 7 (47), p=0.03).

Conclusion: The newly implemented protocol was reliable in predicting measured concentrations in patients that were obese and/or had skin and soft tissue infections. The predictability success rate of the protocol was comparable if not better than previous studies. The lack of loading dose in more critically ill patients may influence the measured vancomycin trough concentration. Further analyses to assess the different risk factors, which may influence the %, predicted vs. measured concentration. This protocol may be used at other institutions to improve the likelihood of attaining target vancomycin trough concentrations.

ASHP 2013 Summer Meeting Professional Poster Abstract

21-T

Category: Infectious Diseases

Poster Type: Evaluative Study Report

Title: Quantitation of ceftriaxone use to acquisition of extended spectrum beta-lactamase (ESBL) producing enterobacteriaceae

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Purpose: Ceftriaxone use has been associated with acquisition of extended spectrum of beta-lactamases (ESBL)-producing enterobacteriaceae. However, none of these studies to date have looked at the quantitation of ceftriaxone use in relation to the acquisition of ESBL strains. Hence this study aims to evaluate the relationship between the dose and duration of ceftriaxone use to subsequent acquisition of ESBL-producing enterobacteriaceae in clinical cultures.

Methods: This was a retrospective review of patients receiving ceftriaxone 2grams per day from April to June 2011 in a tertiary acute care hospital in Singapore. Prior to data collection, the study was approved by the Domain Specific Review Board (DSRB) and the hospitals institution review board (IRB). Inclusion criteria included those with subsequent clinical cultures positive for enterobacteriaceae within 6 months following the first dose of ceftriaxone. We excluded patients who were on 1gram of ceftriaxone due to the small number; prior colonisers of ESBL-producing enterobacteriaceae in the 6 months before ceftriaxone use; patients who had Gram positive and non- enterobacteriaceae cultures as well as patients without clinical cultures within 6 months after ceftriaxone use. Data collection included basic demographics such as age and gender; prior antimicrobial use, clinical culture results, ESBL status, the number of doses and duration of ceftriaxone use. These data were collected from our hospital's computerized Pharmacy database and electronic integrated system containing patients medical records. ESBL rates were stratified to total dosage and duration of ceftriaxone use. Statistical analysis was carried out using Statistical product and service solutions (SPSS) version 20.

Results: There were 906 patients receiving ceftriaxone 2grams per day from April to June 2011. Of these, 55 patients had no prior ESBL-producing strain and had subsequent clinical cultures with enterobacteriaceae following ceftriaxone use in the study period. Escherichia coli (51 percent) and Klebsiella pneumoniae (38 percent) were the most common strains of enterobacteriaceae isolated. Twenty-eight out of the 55 patients who had clinical cultures positive for enterobacteriaceae acquired ESBL. ESBL rates stratified to total ceftriaxone use of less than 10 grams, 10 to 20 grams, more than 20 grams were 47 percent, 63 percent and 33 percent respectively ($P = 0.251$). ESBL rates in groups who used ceftriaxone for less than 3 days, 4 to 7 days and more than 7 days were 54 percent, 45 percent and 55 percent respectively ($P = 0.803$). The mean dose of ceftriaxone used in patients who acquired ESBL was 9.46 grams and in patients who acquired non-ESBL enterobacteriaceae was 10.15 grams and there was no statistical difference ($P = 0.737$). The mean duration of ceftriaxone used in patients who acquired ESBL enterobacteriaceae and those who acquired non-ESBL strains was 4.9 and 5.1 days respectively ($P = 0.835$)

Conclusion: There is no dose or duration dependency of ceftriaxone use to subsequent isolation of ESBL-producing enterobacteriaceae in clinical cultures. The use of ceftriaxone regardless of dose and duration may predispose patients to acquire ESBL enterobacteriaceae. Therefore, clinicians should consider this risk when prescribing ceftriaxone or explore other alternatives to avoid increasing ESBL acquisition.

ASHP 2013 Summer Meeting Professional Poster Abstract

23-T

Category: Infectious Diseases

Poster Type: Descriptive Report

Title: Interest in HPV vaccination following survey of rural Arkansas male knowledge and attitudes about human papillomavirus and genital warts

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Purpose: Due to the significant incidence of cervical cancer in White County, Arkansas, a group of research students at Harding University College of Pharmacy undertook a program to determine the educational awareness of community leaders, health care providers and specifically the young men and women ages 18-26 living in the county. Population surveys were conducted to better understand current knowledge of human papillomavirus (HPV) infections, vaccines, cervical cancer, and genital warts. Survey results from young men living in the county are reported.

Methods: A Harding University College of Pharmacy student research group developed and conducted a survey of males between the ages of 18 and 26 residing in White County, Arkansas as a subsequent study to one previously reported for young women of the same age group. The survey consisted of twenty-four questions that covered HPV awareness, vaccine information, willingness to receive a vaccination, and patient demographics. Surveys were administered at several locations including barbershops, community college campus, and local bookstores or video game rental stores. The targeted male population were known to frequent these locations. Survey results were analyzed with multi variable analysis and other statistical analysis.

Results: Eighty-five surveys were completed. Fifty-five percent of the participants were unaware of the role HPV infection plays in cervical cancer and genital warts. Although 86% of the participants thought

HPV vaccination would be effective in preventing genital warts in men, 61% of the participants were not willing to be vaccinated. Of the 61% participants who objected, 56% were interested in vaccination if HPV vaccine was given at no cost. Forty-four percent of participants who were unwilling to be vaccinated had limited knowledge about HPV and/or the HPV vaccine. Forty-five percent of participants had some college level education and the majority of participants household incomes were less than \$25,000. Vaccine cost was the most significant predictor of willingness to be vaccinated among lower income males in White County.

Conclusion: In White County, Arkansas there is a need for an increase in awareness of HPV and its prevention by vaccination. Public programs may be necessary to vaccinate under served populations. This teams strategy to increase HPV awareness and its prevention, by developing educational tools, using different media resources such as informative articles in local magazines, newspapers, radio advertisement, and creating educational programs for local healthcare providers and the community. Additionally, the research team plans on collaborating with White County Public Health officials in an effort to improve HPV vaccination rates. The overarching goal for the project is to create a positive impact on community health in White County, Arkansas.

ASHP 2013 Summer Meeting Professional Poster Abstract

24-T

Category: Nutrition Support

Poster Type: Evaluative Study Report

Title: Lebanese pharmacy students' attitude toward their body weight

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Purpose: Surveys have demonstrated a marked increase in obesity in both men and women across all age and ethnic groups. In fact, there is an increasing concern about overweight and obesity in young people. However, weight-loss goals set by many individuals are unrealistic, and individuals seeking to lose weight will sometimes turn to inappropriate, potentially dangerous, methods to induce weight loss such as laxatives and diuretics. The purpose of this study is to assess body weight concerns in Lebanese pharmacy students.

Methods: This prospective study was conducted in a Lebanese school of pharmacy. Male and female pharmacy students aged 18 years and above were asked to fill a survey. The survey assessed students' body weight, height, and BMI. Moreover, students were assessed for their perspective toward their actual weight, as well as, the need and ways to modify this weight. Students who don't know their body weight or height were excluded. 450 students were screened over a period of 4 months, where 400 students have met the eligibility criteria and were observed. The primary outcome measures were assessment of the percentage of Lebanese pharmacy students who are really overweight, obese, or morbidly obese, based on their BMI; and the percentage of those students who think themselves to be overweight, obese, or very obese. Secondary outcomes included evaluation of the opinion of the study population toward losing weight and ways to lose this weight. Data are expressed as frequencies, and evaluation of primary and secondary outcomes utilized analysis of chi-square.

Results: Most students were found to have a normal body weight (64.5 percent), versus 10.25 percent underweight, 20 percent overweight, 3.75 percent obese, and 1.5 percent very obese. Similarly most of

the students considered themselves to have a normal body weight (54.75 percent), versus 10.75 percent underweight, 29.5 percent overweight, 4.25 percent obese, and 0.75 percent very obese. Despite these results, only 33.2 percent of the students were satisfied with their weight, where 56.8 percent were having intentions to lose weight, versus 10 percent were willing to gain weight. Furthermore, only 30 percent of the students considered that a balanced diet is the ultimate way to lose weight, versus 40 percent for physical exercise, 10 percent for use of weight loss herbal products, 5 percent for use of weight loss drug products, 3 percent for use of diuretics, 2 percent for use of laxatives, 3 percent to apply fruits only diet, 4.8 percent to apply vegetables only diet, 2 percent to apply protein only diet, and 0.2 percent to have a complete food restriction.

Conclusion: More than half of pharmacy students have a good body weight; yet, the majority of them are not satisfied with their weight. Hence, pharmacy students should be further educated to set realistic goals for their weight, as well as, understand appropriate ways to achieve and maintain a good body weight.

ASHP 2013 Summer Meeting Professional Poster Abstract

25-T

Category: Nutrition Support

Poster Type: Evaluative Study Report

Title: Energy drinks knowledge, consumption, and associated conditions in the Lebanese community

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Purpose: Energy drinks consumption has continued to gain in popularity since years, and more products are offered to the market. Recent analyses have highlighted the risk with over consumption of these energy drinks. Population knowledge on the use of such beverages and its associated factors are the objectives of this study conducted in the Lebanese community.

Methods: A survey was developed and validated to assess the public knowledge on the use of energy drinks, the associated conditions, its consequences, and the side effects of different energy drinks in the community in Lebanon. Different aspects related to the consumption of the ingredients of these products have been identified from the literature and included in the survey, most importantly the risk of gastro-intestinal upset. Pharmacy students were asked, as part of their health awareness community work, to fill this form with persons visiting their booth. The survey is composed of thirteen multiple choice questions and required an average of ten minutes to be filled.

Results: Survey data was analyzed based on 368 responses (45.4 percent male and 54.6 percent female). The age of respondents varied between 17 and 65 years old, with 82.6 percent between 18 and 31 years old. 138 participants do not drink energy drink, however, the survey was filled in order to know the knowledge they have about these products and the reasons they do not consume them. Out of this category, 70 persons (50.7 percent) had gastric problems ranging from gastro-esophageal reflux to peptic ulcer disease, and 50 patients (71.4 percent) were on regular oral medications. When asked about the knowledge of energy drinks content, 51.1 percent had no idea about the combination of

ingredients of these beverages, and 56.6 percent of participants were not aware of any disadvantage of energy drinks. Concerning the consumption, the majority, 120 out of the 230 users (52.2 percent), drinks 1 to 3 servings per week, and 27.8 percent are daily consumers. 73.0 percent of users do feel energetic after the consumption of these beverages. It has been noted that 21.3 percent of consumers take it for energy, 13.0 percent before physical activity, 28.3 percent for the pleasant flavor, and the rest varied between night work and projects. Moreover, 24.8 percent of users experienced anxiety, 34.8 percent headache, 22.6 percent stomach upset and diarrhea, and 17.8 percent palpitation. Finally, the effect of energy drinks on the users appetite was diverse; 68.3 percent had increased appetite compared to 20.4 percent who had it decreased, without forgetting the last portion, 11.3 percent who affirmed no effect of such products on their eating habits.

Conclusion: Based on the survey results, most participants needed awareness about the consumption of energy drinks, and could benefit from such guidance in increasing their knowledge related to different products and potential health hazards, despite the variation in the reason for choosing such drinks. This project has served as a good opportunity for pharmacy students to raise public attention on the over consumption of energy drinks, and pointed the community need for an awareness campaign on this subject.

ASHP 2013 Summer Meeting Professional Poster Abstract

26-T

Category: Oncology

Poster Type: Descriptive Report

Title: Best practices for use of sipuleucel-T in major cancer centers

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Purpose: Sipuleucel-T is a personalized autologous cellular immunotherapy that is manufactured using the patients own leukocytes; it is approved for use with asymptomatic or minimally symptomatic metastatic castration-resistant prostate cancer (mCRPC). As the first approved cellular immunotherapy in prostate cancer, it is important to identify and communicate best practices in the processes for handling and utilizing this agent. The pharmacy department has responsibility for managing the use of this product, so it will be important to educate pharmacists regarding the need to optimize processes associated with sipuleucel-T use.

Methods: In order to communicate real-world experiences with sipuleucel-T in the management of mCRPC, existing medication use processes were reviewed and assessed for changes that may need to be implemented to optimize sipuleucel-T use. This analysis will include reports of multidisciplinary experiences and an overview of currently used sipuleucel-T processes.

Results: Process flows have been developed at several institutions that effectively address various aspects associated with sipuleucel-T administration, including specialized patient education, prior authorization for reimbursement, pre-screening of patients for venous access, safe handling of the product, and scheduling and logistical concerns. Several best practices have been established, including development of specific order sets for prescribing, coordination with apheresis centers, involvement of a coordinator to handle aspects of reimbursement and billing, monitoring procedures for product safe handling, and implementation of education/training programs within the pharmacy department.

Conclusion: The oncology pharmacist plays a critical role in the development and management of the internal processes needed for utilization and monitoring of sipuleucel-T and other immunotherapies within the institution.

ASHP 2013 Summer Meeting Professional Poster Abstract

27-T

Category: Oncology

Poster Type: Research-in-Progress

Title: Improving patient care and medication safety: standardizing antiemetics in chemotherapy regimens/order sets in a large health care system

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Purpose: The National Comprehensive Cancer Network (NCCN), American Society of Clinical Oncologists (ASCO) and Multinational Association of Supportive Care in Cancer (MASCC) each publish anti-emetic and supportive care guidelines for patients who are undergoing chemotherapy treatment. These guidelines serve as a resource for evidence-based anti-emetic decisions. Anti-emetic therapy is based on the emetogenic potential of the chemotherapy agents used in the regimen. The standardization of chemotherapy order sets provides a consistent approach to treatment, as well as nausea and vomiting prevention. These practices encourage improved patient safety and provide potential for increased efficacy. Standardization is also supported through ASHPs Guidelines on Preventing Medication Errors with Antineoplastic Agents. The purpose of this study is to evaluate the impact of anti-emetic standardization on select chemotherapy order sets within a large health care system.

Methods: Prior to commencement, this study will be submitted to the Institutional Review Board for approval. The health systems electronic medical record will be utilized to identify patients for inclusion who are receiving inpatient chemotherapy from pre-determined order sets. Order sets for inclusion have been determined based on utilization data. Data will be collected from the four metro area hospitals within the health care system. Fifty encounters will be assessed pre-order set implementation, and approximately fifty encounters will be assessed after the order set changes occur. These encounters will be compared to identify if there was a decreased use of as needed (prn) antiemetics, decreased incidence of nausea complaints, decreased incidence of vomiting, and decreased length of stay with the standardized anti-emetic therapy.

ASHP 2013 Summer Meeting Professional Poster Abstract

28-T

Category: Operating Room Pharmacy

Poster Type: Evaluative Study Report

Title: Liposomal bupivacaine and postoperative pain treatment evaluation in colon rectal surgery

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Purpose: Pain management is a vital component in optimizing patient care, especially for post-surgical patients. Uncontrolled pain may prolong hospital stays, delay recovery and mobility of patient; thus, leading to unwanted adverse events and increased costs of patient care. It is the responsibility of health-care providers to assess pain and utilize the most effective and cost effective resources to treat pain. Liposomal bupivacaine is a local anesthetic administered using local infiltration at the close of a case for pain relief. The unique formulation of bupivacaine encapsulated by multivesicular liposomes, allowing a slow release of bupivacaine and extended duration of action of 72 hours. Studies have shown it to be an effective resource to provide pain relief with opioid sparing properties and limited adverse event profile. The advanced planning of pain treatment starting in the preoperative phase of care and in the operating room using non traditional pharmacological agents may provide optimal pain control. Optimal pain control would result in fewer opioids, reduced opioid caused adverse reactions and an overall greater patient satisfaction. This study will evaluate the effects of liposomal bupivacaine and non-opioid medications in comparison to conventional therapies implemented in colon rectal surgery. It is hypothesized that patients who receive liposomal bupivacaine will have optimal pain control, require lower total doses of opioids, leading to decreased lengths of stay and overall costs.

Methods: In this retrospective study, a comparison will be made between liposomal bupivacaine and standard therapy for patients undergoing colon rectal surgery. Data has been collected from charts of patients 18 years of age or older at Ochsner Medical Center. Patients receiving colon-rectal surgery between March 2011- April 2013 are included.

Results: At this point, 267 patients in the liposomal bupivacaine and 122 patients in the conventional therapy group have been collected. Data is currently still being collected in the liposomal bupivacaine group. Time to first opioid was longer in the liposomal bupivacaine group (362 hours vs 283 hours) in comparison to the conventional therapy group. The length of stay was shorter in the liposomal bupivacaine group (6.8 days vs 8.9 days). Postoperative opioid doses evaluated at the 12,24,36,48,60 and 72 hour time periods resulted with more opioid usage observed in the liposomal bupivacaine group (94 vs 40 at 72 hour).

Conclusion: Currently, the liposomal bupivacaine group resulted in a shorter length of stay and longer time to first opioid dosage. However, results did not display a positive difference in total opioid usage in the liposomal bupivacaine group. It appears a smaller amount of side effects were experienced in the liposomal bupivacaine group. Total patient costs including pharmacy costs are currently being collected to provide a complete evaluation.

ASHP 2013 Summer Meeting Professional Poster Abstract

29-T

Category: Operating Room Pharmacy

Poster Type: Descriptive Report

Title: Effect of operating room (OR) satellite pharmacist implemented antibiotic optimization program on surgical care improvement project (SCIP) metrics

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Purpose: The Surgical Care Improvement Project (SCIP) was initiated in 2001 to improve patient outcomes and reduce surgical complications. Pharmacists play a crucial role in monitoring SCIP initiatives, in particular the appropriate prophylactic antibiotic selection and ensuring antibiotics are discontinued within 24 hours after the surgery end time (SCIP-Inf 2&3). Historically, since 2009, SCIP compliance with antibiotic selection and discontinuation has been greater than 97% at our institution. The purpose of this project was to determine the impact of an OR satellite pharmacist implemented antibiotic optimization program consistent with SCIP recommendations.

Methods: In 2009, a pharmacist was embedded in an OR satellite pharmacy. A pocket card was developed by pharmacy to help increase compliance with appropriate selection of antibiotics compliant with national guidelines and SCIP recommendations. It was approved by the Infectious Disease and Surgical physician groups. Other pharmacist interventions included dose optimization based on the weight, clarification of drug allergies to assess the appropriateness of antibiotic selection, and ensuring antibiotics were discontinued within 24 hours. Pharmacists evaluated all surgical patients receiving antibiotics through reports and communicated with physicians to clarify discrepancies with SCIP initiatives. This was accomplished through direct communication with the provider, and providing alternative selections in the form of notes. Data was collected prospectively.

Results: Pharmacist initiated antibiotic optimization prevented fourteen potential SCIP fallouts. Out of 810 patients, zero cases failed to meet SCIP criteria for antibiotic selection. Out of 774 cases for antibiotic discontinuation within 24 hours, only 11 cases did not meet SCIP criteria. Interventions

included, modifying dose times based on the surgery end time, amending duration to less than 24 hours versus physician entered duration of therapy, and documenting reasons for extended antibiotic utilization.

Conclusion: Pharmacist involvement has prevented SCIP fallouts related to antibiotic selection and discontinuation after surgery. Overall compliance has improved over the last four years since pharmacy involvement. Overall, through pharmacist education, providing a SCIP antibiotic selection card based on surgery type, and pharmacist initiated provider communication; SCIP compliance with appropriate antibiotic selection has reached 100% and discontinuation within 24 hours has remained above 98%.

ASHP 2013 Summer Meeting Professional Poster Abstract

30-T

Category: Pharmacy Technicians

Poster Type: Descriptive Report

Title: Pharmacy Technician Continuing Education: Results of Quality Assurance Process

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Purpose: In 2008, the Accreditation Council for Pharmacy Education (ACPE) modified the Definition of Continuing Education for the Profession of Pharmacy (referred to as the Definition) to be inclusive of pharmacy technicians. As part of the implementation of the Definition, ACPE also commenced a quality assurance procedure in order to ascertain if the educational needs of pharmacy technicians are being met by the continuing education provided by continuing pharmacy education (CPE) providers. The Definition includes specific tasks and responsibilities designated for pharmacy technicians as provided by the Pharmacy Technician Certification Board (PTCB) blueprint for the Pharmacy Technician Certification Exam (PTCE).

Methods: ACPE commissioned the quality assurance procedure from January 2008 to August 2011. During this period of time, ACPE queried its internal database, Provider Web Tool (PWT), for CPE activities designated for pharmacy technicians. The PWT is a central repository where all CPE activities being conducted by all accredited ACPE CPE providers are entered. Furthermore, all pharmacy technician specific activities are designated by a T suffix at the end of the universal activity number (UAN). Therefore, on a quarterly basis randomly selected pharmacy technician educational activities were queried for appropriate content in accord with the Definition. As each accredited CPE provider may have multiple activities entered in the PWT, only one to two activities were randomly chosen per provider per quarter for inclusion in the quality assurance procedure.

Results: Through the duration of the quality assurance procedure, a total of 3,120 pharmacy technician designated educational offerings were queried. It was found that 75.3% (n=2,348) were deemed

appropriate for pharmacy technicians per the Definition, and 24.7% (n=772) were inappropriate. Of those deemed inappropriate for pharmacy technician education, 41% (n=1,409) were classified as disease state management or drug therapy topics. Many of these topics were related to oncology, nutrition, or other specialized areas for pharmacy technicians who were considered advanced pharmacy technicians at their workplace. In addition, educational activities in the general pharmacy area were found to be 14.4% (n=165) non-compliant, followed by 30.6% (n=16) of HIV/AIDS designated activities. In addition, 197 of a total of 214 accredited CPE providers were cited for non-compliance. Lastly, letters of notifications were sent to CPE providers that were non-compliant with the Definition. Of those sent, only 76 responses were received back to ACPE.

Conclusion: Based on our results, more clinical oriented CPE activities were found to be non-compliant with the Definition. As per our findings, one reason why this occurred is because many times CPE objectives for a pharmacist level of knowledge and skill were also designated for pharmacy technicians. Additionally, each institution may vary in its expectations and requirements of the clinical knowledge and skill of a pharmacy technician. In order to gauge what the level of expectation and involvement of a pharmacy technician should be (and thereby determine their educational needs), a detailed assessment of the educational foundation for pharmacy technicians is necessary, as well potential revision in the Definition to reflect the practice and duties of specialized pharmacy technicians.

ASHP 2013 Summer Meeting Professional Poster Abstract

31-T

Category: Practice Research / Outcomes Research / Pharmacoeconomics

Poster Type: Research-in-Progress

Title: Impact of Pharmacist Educational In-service on Psychotropic Medication Polypharmacy at a State Supported Living Center

Primary Author: Abimbola Farinde, Clear Lake Regional Medical Center, 500 Medical Center, Houston, TX 77598; Email: aofpharm420@hotmail.com

Purpose: Individuals with intellectual impairments, developmental delays, mental health issues, and related conditions who reside in state supported living centers, there is the potential to be placed many psychotropic medications to manage aggression, agitation, mood, or behavioral disturbances that may arise. The presence of polypharmacy can develop as a result of multiple providers prescribing without proper communication causing duplication of therapies. Pharmacists have the unique opportunity to identify and resolve cases of psychotropic polypharmacy by providing continuing educational in-service on appropriate psychotropic medication prescribing thus helping to decrease the prevalence of psychotropic polypharmacy.

Methods: 1. Evaluate the prevalence of the prescribing psychotropic polypharmacy medications at state supported living center among psychiatrists resulting from clinical pharmacist educational inservice on the appropriateness of medication prescribing. 2. Prospectively review individualized patient charts of selected facility residents to assess frequency of psychotropic medication polypharmacy among psychiatrists pre and post clinical pharmacist educational in-service. 3. Determine whether the involvement of a clinical pharmacist on a psychotropic polypharmacy review committee is associated with the improvement of mental health care and utilization of psychotropic medications at state supported living facility.

Results:

Conclusion: The study will report the number of psychotropic polypharmacy pre and post educational in-service that was given to address behavioral and mental health problems. In addition, the study report the frequency of psychotropic medication polypharmacy and associated cost-saving that are identified during the six month observation phase.

ASHP 2013 Summer Meeting Professional Poster Abstract

32-T

Category: Practice Research / Outcomes Research / Pharmacoeconomics

Poster Type: Research-in-Progress

Title: Comparison of lidocaine, buffered lidocaine, and bacteriostatic normal saline for local anesthesia prior to peripheral intravenous catheterization

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Purpose: It is common for health systems to utilize local injectable anesthetics for reducing patient discomfort felt upon receiving a peripheral intravenous catheter (PIC). Lidocaine, buffered lidocaine, and bacteriostatic normal saline are the most widely used agents. Numerous community hospitals prefer using buffered lidocaine; however this medication can be problematic for hospital pharmacies for several reasons, including short expiration dating, increased compounding time, and the unreliability posed by drug shortages. The issue is further complicated as an established practice guideline is lacking and practices vary between and within institutions, resulting in a potential barrier to providing ideal patient care. As clinical trials that directly compare the three agents are almost non-existent, this project was designed to determine which anesthetic is most effective for reducing patient discomfort associated with PIC placement.

Methods: This study is designed as a randomized, parallel-group, double-blind, clinical trial as part of an ASHP accredited PGY1 pharmacy residency project. Prior to commencement, this study received full Institutional Review Board approval. Patients will be enrolled at the bedside by the primary author, with informed consent being obtained on all eligible patients. Non-English speaking patients less than 18 years of age and unable to report pain scores will be excluded. Preparation, verification, and blinding of treatment doses will be completed at the start of each study week. Blinding is done using an internet-based number generator to assign random integer treatment numbers to each of the three groups. Records of these numbers are kept on the primary authors protected computer. A specific group of IV resource nurses were selected for study participation and will be charged with administering the

anesthetic. Once identified and enrolled, patients are asked to report a pain score upon injection of the local anesthetic and following insertion of the PIC, using a numeric model employed at this institution. Pain scores are recorded following each intervention using a data collection sheet labeled with an identical treatment number. No patient identifiers will be recorded, but the patient MRN will be collected for purposes of obtaining background demographic information. A comparative pharmacoeconomic analysis will be conducted by assessing the cost of each agent and the time allocated to the hospital pharmacy for compounding buffered lidocaine. Assuming 95% confidence, this study will be powered to observe a difference of means of 1 in pain scores between groups, which the authors have deemed to be clinically significant.

ASHP 2013 Summer Meeting Professional Poster Abstract

33-T

Category: Practice Research / Outcomes Research / Pharmacoeconomics

Poster Type: Evaluative Study Report

Title: Analysis on the importance of group service at the patients and inpatients dispensaries at saiful anwar general hospital malang

Primary Author: Arofa Idha, RSU. Dr. Saiful Anwar malang, Jl. Jaksa Agung Suprpto No. 2, Malang, 65122 Indonesia; Email: arofaidha@gmail.com

Purpose: Customer satisfaction level was found to be 2,96 on < skala of 1,00-4,00>, so the purpose of this study was to analyse levels of customer satisfaction as a way to evaluate the dispensary departments performance and to uncover priority factors for improvement in customer service with the view to increasing patient or their families satisfaction levels methods. This study was enacted between January and may 2011 at the outpatients and inpatient dispensaries, Saiful Anwar General Hospital Malang

Methods: A descriptive kuantitatif design was employed using observation and questionnaires. The respondents were 600 patients over 15 (fifteen) and their families, who were prescribed more than 3 (three) medicines. The questionnaire concen was tested for validity, where as its reliability was tested using Cronbach,s Alpha coefficient, and to discover patient satisfaction a customer satisfaction index (CSI) and an importance performance matrix were employed (IPM)

Results: The validity test result indicated that the wording of the questions in the questionnaires revising, on the other hand, Cronbach,s Alpha coeffisien on the with the help of the SPSS 16 computer software found that this studys reliability level was 0,6 or suitable for research studies. The customer satisfaction index (CSI) show that outpatient satisfaction level was respectively 3,08 (satisfied) and 3,36 (very satisfied) for inpatient. And the Importance performance matrik analysis score for outpatient was 35,71 (five of the fourteen) and for inpatient 14,29 (two of the fourteen), and this the top priority for improvement.

Conclusion: From the point of view of both outpatients and inpatients, the service provided by the dispensary farmasi department Saiful Anwar general hospital Malang is satisfactory.

ASHP 2013 Summer Meeting Professional Poster Abstract

34-T

Category: Practice Research / Outcomes Research / Pharmacoeconomics

Poster Type: Evaluative Study Report

Title: Subsequent hospital inpatient and emergency department (ED) encounters following initial ED visits by chronic opioid patients: opportunities to correct suboptimal medication practices

Primary Author: Todd Berner, Endo Health Solutions, 1400 Atwater Drive, Malvern, PA 19355; Email: Berner.Todd@Endo.com

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Purpose: Patients using opioids chronically have been shown to be especially costly to providers and hospitals due to emerging incentive payment models. Drug-drug exposure (DDE) to opioids and Cytochrome P-450 (CYP-450) enzyme inhibitors and inducers, as well as exclusive use of short-acting opioids (SAOs), may be particularly problematic. This is especially true if a patient returns to the hospital within 72 hours, since the care provided during the return visit may not bring additional reimbursement. The objective of our study was to examine readmission rates following emergency department (ED) encounters during which pharmacists or other providers might have the opportunity to help correct suboptimal medication practices for their patients.

Methods: Using linked hospital data from the Premier healthcare alliance and commercial claims data from Optum, we identified patients who presented to the ED and were subsequently sent home (not admitted). All had received opioids chronically, defined as at least 60 out of 75 days' supply immediately prior to the ED visit. We identified those taking CYP-450 inducers or inhibitors or exclusive SAOs (no long-acting opioids), and divided the latter by C-II versus C-III SAO use. Data up to 90 days following the index ED visit was used to examine hospital admissions and return ED visits within 72 hours and up to 90 days. Univariate comparisons of patient characteristics between comparison groups used chi-squared tests for categorical measures and t-tests for continuous measures ($\alpha=0.05$). Multivariable hierarchical logistic regression analyses of inpatient readmissions and additional ED visits were used to estimate odds adjusted for 28 comorbidities.

Results: Among 9214 patients receiving opioids chronically up to the day of an ED visit, 6337 (68.8%) had a DDE, some of whom were among 5240 (56.9%) patients who took exclusively C-II opioids and 1587 (17.2%) who took exclusively C-III opioids. Patients with DDE were 18-25% more likely to have an inpatient readmission within 30, 60, and 90 days than patients without a DDE (Odds ratios [OR] 1.18, 1.25, 1.24; $p=0.004$, $p<0.001$, $p<0.001$, respectively). Patients taking exclusively SAOs, had more subsequent ED visits at each time point, but not more inpatient admissions. Patients taking exclusively C-II SAOs had 27% higher odds of 90-day readmission than patients taking exclusively C-III SAOs (OR 1.27, 95% CI 1.09-1.48; $p=0.001$). Among DDE patients, those taking only C-II SAOs had higher inpatient readmission rates at 60 and 90 days than those taking only C-III SAOs (OR 1.25 [95% CI 1.06-1.46; $p=0.007$] and 1.29 [95% CI 1.11-1.51; $p=0.001$], respectively). Among patients without DDEs, exclusively C-II SAO patients had slightly higher readmissions than the exclusively C-III SAO users. Patients taking exclusively C-II SAOs, regardless of presence or absence of DDE, had more ED visits within 72 hours and through 90 days. Adjusted odds of subsequent ED visits within 72 hours and through 90 days of follow-up were 36%-42% higher (OR 1.36 to 1.42; all $p<0.05$) for exclusive C-II SAO patients than for exclusive C-III patients.

Conclusion: Chronic opioid patients who present to an ED and who have DDEs are more likely to have an inpatient hospital readmission within 30 to 90 days than those who do not have DDEs. Exclusive C-II SAO users have more subsequent ED admissions than patients whose regimen includes long-acting opioids. Exclusive C-II SAO users are more likely to have an inpatient readmission within 90 days than exclusive C-III SAO users. Medication reconciliation and review with correction of suboptimal opioid medication practices targeting DDE and/or exclusive SAO use could potentially decrease subsequent ED visits and hospital admissions within 72 hours and up to 90 days. The complexity of managing chronic opioid patients may necessitate an ED-based clinical pharmacy intervention.

ASHP 2013 Summer Meeting Professional Poster Abstract

35-T

Category: Practice Research / Outcomes Research / Pharmacoeconomics

Poster Type: Descriptive Report

Title: Community pharmacists' attitudes towards mental illness and providing pharmaceutical care for mentally ill patients

Primary Author: Mohamed Nasser Al-Arifi, King Saud University, College of Pharmacy, Riyadh, Saudi Arabia; Email: malarifi@ksu.edu.sa

Purpose: To examine the attitudes of community pharmacist toward both mental illness and provision of pharmaceutical care and explore the barriers that may limit its implementation as well as facilitators that make implementation of pharmaceutical care easier.

Methods: The survey is composed of 4 sections. Section 1 collected demographic characteristics of the respondents. Section 2 asked 6 Likert type questions attributed to the attitudes of the pharmacists toward mental illness. Section 3 asked questions about the attitudes of community pharmacists toward providing pharmaceutical care to mentally ill patients and differentiated between different types of mental illness and compares them with cardiovascular medications. Respondents were asked to indicate the degree of interest, comfort and confidence to provide various functions of pharmaceutical care to mentally ill patients. Section 4 asked what parries make it difficult to provide pharmaceutical care as well as facilitators that makes implementation of pharmaceutical care easier. Data were collected via face-to-face encounter using pre-tested questionnaire.

Results: Forty three pharmacists participated in the study. Eighty-eight of the pharmacists felt that mental illness is the same as other illness. Nearly two third of the respondents strongly agree or agree with the statement that mentally ill patients are easily recognizable. Only one third of respondents disagree or strongly disagree with the statement that mentally ill patients have not the ability to tell right from wrong. In general 43.3%-87.7% of respondents are being "much more" or "more" interested, comfortable and confident to perform different pharmaceutical care functions to mentally ill patients. With regard to the different types of mental illness the respondents expressed varied attitudes toward providing pharmaceutical care to mentally ill patients depending on the type of mental illness. An average range of 30-67% of respondents felt neutral or "much more" or "more" comfortable, confident screening for, solving drug-related problems and monitor for efficacy, adverse effects and compliance

with drug therapy. Additionally, the respondents felt that they screening and solving drug-related problems and monitoring mentally ill patients less frequently than patients with cardiovascular medications. Several demographic characteristics including age, year in practice, those with family history of mental illness and experience with mental illness were associated with attitudes toward providing pharmaceutical care to mentally ill patients. Various barriers that limit the provision of pharmaceutical care were identified by the respondents. These include Lack of training in pharmaceutical care practice (88.4%), lack of therapeutic knowledge (83.7%), lack of documentation skill (79%), lack of communication (76.8%), lack of space for counseling (76.7%), insufficient time (74.5%) and lack of staff (72.1%).

Conclusion: Although pharmacists have generally positive attitudes toward both mental illness and providing pharmaceutical care to mentally ill patients, they felt uncomfortable counseling or follow-up monitoring patients for adverse drug-related problems when consider distinguishing between different types of mental illness.

ASHP 2013 Summer Meeting Professional Poster Abstract

36-T

Category: Practice Research / Outcomes Research / Pharmacoeconomics

Poster Type: Research-in-Progress

Title: Physician-Pharmacist Duo for Optimal Patient Care

Primary Author: Adrienne Giddens, Mission Hospital, 509 Biltmore Avenue, Asheville, NC 28801; Email: phaapg@msj.org

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Sonal Taylor

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Purpose: The focus of the Doctor of Pharmacy and the Doctor of Medicine degrees are vastly different, therefore it is reasonable to suspect patient care would be optimized by utilizing the two as one. This study aims to characterize the benefits that pharmacists can add to a physicians service in a community hospital, determine physician perspective, and identify practice challenges that must be overcome.

Methods: Participating physicians maintained current practice for two weeks while baseline data was collected. Baseline data included prescribing errors, medication regimen tune-ups, drug cost per discharge, and utilization of pharmacy consults. In addition, retrospective electronic chart review was completed to identify opportunities for optimization of home medication regimens. Next, the physicians were joined with a pharmacist for the two-week study period. Pharmacists provided drug information knowledge, made interventions on medication regimens and discharge information, provided discharge counseling to patients and family members, facilitated filling of discharge prescriptions prior to leaving the hospital, and provided the discharge summary of inpatient care and drug regimen changes to the primary care provider. The primary objective was to identify the opportunity and impact of pharmacist-driven therapeutic optimization. 15 and 30-day readmissions and emergency department visits will be evaluated. The secondary objective was to identify physician perception on the study practice model. This study was approved by the appropriate ethics committee and received IRB approval. Informed consent was waived.

ASHP 2013 Summer Meeting Professional Poster Abstract

37-T

Category: Practice Research / Outcomes Research / Pharmacoeconomics

Poster Type: Evaluative Study Report

Title: Clinical and cost effectiveness of bupivacaine liposome injectable suspension in a community hospital setting

Primary Author: Jodie Pepin, Seton Medical Center Williamson, Department of Pharmacy 201 Seton Parkway, Round Rock, TX 78665; Email: jpepin@seton.org

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Purpose: Bupivacaine liposome injectable suspension (BL) was approved in October 2011 for the management of postsurgical pain. Compared to conventional bupivacaine injection, BL has a substantially longer duration of action (up to 72 hours), but is significantly more expensive. The potential for safety issues related to medication handling (due to similarities in appearance to propofol) have been raised for BL. The primary purpose of this retrospective cohort study was to assess the potential cost tradeoffs associated with use of BL in a real-world community hospital setting. Secondly, we aimed to assess the clinical effectiveness and safety of BL compared to a historical comparator.

Methods: This study protocol was approved by our institutional IRB. The BL cohort (n=18) included adult patients (18-89 years) that received BL at a single community hospital between October and December 2012. A historical control cohort (n=365) was identified through query of electronic databases and included all patients (18-89 years) with similar DRG groupers to the BL cohort, but prior to introduction of BL at our institution (January to September 2012). Key outcomes assessed included total direct costs, length of stay, and elastomeric pump utilization. Opioid use and pain scores were collected for 72 hours postoperatively.

Results: Percent female patients (72 versus 59%) and mean age (64 versus 60 years) were slightly higher and length of stay was slightly lower (6.4 versus 7.3 days) in BL patients versus control. Total direct costs were similar between BL and control patients. The difference between actual and expected total costs for the same DRG by the same surgeons was approximately \$315 lower for BL patients compared to

historical controls. Use of BL was also associated with a substantial reduction in the use of elastomeric pumps (0% versus 22%). PCA use was higher with BL compared to control (83 versus 77%). No significant issues related to medication handling were identified for BL and no patients in either cohort required naloxone for reversal of opioid-related adverse events.

Conclusion: Use of BL in a community hospital setting was not associated with higher overall medical costs. Other non-pharmacy costs, including use of elastomeric pumps, may be important when considering the cost effectiveness of novel therapies like BL. Medication handling concerns with BL are manageable with appropriate staff education.

ASHP 2013 Summer Meeting Professional Poster Abstract

38-T

Category: Practice Research / Outcomes Research / Pharmacoeconomics

Poster Type: Descriptive Report

Title: Impact of metabolic comorbidities on inpatient cost and rehospitalization rates for patients diagnosed with schizophrenia and bipolar disorder

Primary Author: Mariam Hassan, Sunovion Pharmaceuticals Inc., 84 Waterford Drive, Marlborough, MA;
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Purpose: Metabolic comorbidities are common among patients diagnosed with bipolar disorder and schizophrenia. Such comorbidities may contribute to premature treatment discontinuation and poor adherence, which in turn can lead to symptom worsening, relapse, and greater healthcare resource utilization. This analysis evaluated and quantified the impact of metabolic comorbidities on healthcare resource utilization and costs in hospitalized patients with schizophrenia or bipolar disorder.

Methods: A retrospective observational study was conducted utilizing data from the Premier Perspective Database, from October 1, 2010 to May 31, 2012. Patients with an admitting, primary or secondary diagnosis of schizophrenia or bipolar disorder during the study period were eligible for inclusion. Patients were classified as having 0, 1, 2 or 3+ metabolic comorbidities based upon diagnoses of diabetes mellitus, hyperglycemia, hypertension, dyslipidemia, coronary heart disease, ischemic heart disease or cardiovascular disease (CVD) during their index hospitalization. Generalized linear models were used to compare costs across the 4 comorbidity cohorts (0, 1, 2, 3+). Logistic regressions were used to compare the likelihood of readmission and the likelihood of death among the comorbidity cohorts.

Results: 57,506 patients with schizophrenia met all inclusion criteria; 33.9% with no comorbidities, 26.7% with 1 comorbidity, 19.9% with 2 comorbidities and 19.4% with 3 or more comorbidities. 124,803

patients with bipolar disorder met all inclusion criteria; 39.5% with no comorbidities, 27.1% with 1 comorbidity, 16.6% with 2 comorbidities and 16.8% with 3 or more comorbidities. The prevalence of comorbidities in the schizophrenia cohort was hypertension 57%, hyperlipidemia 30%, diabetes 28%, coronary/ischemic heart disease 10%, CVD 4% and hyperglycemia 2%. Similar comorbidity rates were observed in the bipolar cohort: hypertension 52%, hyperlipidemia 28%, diabetes 22%, coronary/ischemic heart disease 9%, CVD 3% and hyperglycemia 2%. As the number of comorbidities increased from 0 to 3+ in the schizophrenia cohort, there were increases in medical costs (\$9,619 to \$13,111; $p < 0.0001$), pharmacy costs (\$501 to \$1,540; $p < 0.0001$) and total costs (\$10,120 to \$14,651; $p < 0.0001$). Patients with a higher number of comorbidities were more likely to have a readmission for any cause (9% to 13%; $p < 0.0001$). Although costs were generally lower in the bipolar cohort, a similar increase in cost categories across comorbidity categories was observed: medical costs (\$6,374 to \$11,518; $p < 0.0001$), pharmacy cost (\$426 to \$1,385; $p < 0.0001$) and total costs (\$6,800 to \$12,904; $p < 0.0001$). Bipolar patients with a higher number of comorbidities were also more likely to have a readmission for any cause (7% to 12%; $p < 0.0001$).

Conclusion: High prevalence of metabolic comorbidities was found in this study population of hospitalized schizophrenia and bipolar disorder patients. An increase in the number of metabolic comorbidities had economic consequences including increased costs and readmission rates.

ASHP 2013 Summer Meeting Professional Poster Abstract

39-T

Category: Psychotherapy / Neurology

Poster Type: Research-in-Progress

Title: Efficacy evaluation of a modified onabotulinumtoxinA injection regimen in patients with chronic migraine headaches

Primary Author: Michele Faulkner, Creighton University, Creighton University School of Pharmacy 2500 California Plaza, Omaha, NE 68178; Email: faulkner@creighton.edu

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Purpose: In October, 2010, the FDA approved botulism toxin injections for the treatment of chronic migraine headache. The approved regimen consists of 31 separate intramuscular injections (totaling 155 units) into 7 muscle groups. We plan to evaluate the efficacy of a modified injection protocol consisting of 13 separate injections (totaling 46 units) into 6 muscle groups.

Methods: Prior to commencement, this study will be submitted to the Creighton University Institutional Review Board for approval. Patients who are being treated for migraine headaches who continue to have symptoms at a frequency consistent with a diagnosis of chronic headache (experiencing headache pain at least 14 days per month) despite adequate trials of medications for acute headache pain and headache prophylaxis will be offered treatment with onabotulinumtoxinA as per the standard of care. Individuals deemed possibly eligible for treatment will be required to keep a headache diary for one month prior to their first onabotulinumtoxinA treatment. Patient-reported data will include number of headache days, number of headaches per day, severity of each headache (on a scale of 1-10), duration of each headache, associated symptoms (e.g. phonophobia, nausea), and medications used for self-treatment. If criteria for injection is met, patients will undergo a modified injection protocol consisting of intramuscular onabotulinumtoxinA administration as follows: six units at four sites in the frontalis muscle, six units in each corrugator muscle, four units in the procerus muscle, 10 units in each temporalis muscle, 10 units in each occipitalis muscle, and 10 units in each splenius capitis muscle. Patients will return in three months for a second treatment. Data regarding headache frequency, intensity and duration will continue to be gathered at each appointment. Three month and six month

data will be compared with baseline data to determine therapeutic efficacy of the modified injection protocol.

ASHP 2013 Summer Meeting Professional Poster Abstract

40-T

Category: Psychotherapy / Neurology

Poster Type: Evaluative Study Report

Title: Use of isoflurane for refractory status epilepticus: a case report

Primary Author: Becky Doman, Intermountain Healthcare, 1034 North 500 West, Provo, UT 84604;
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Purpose: This case report describes 1) the use of isoflurane in the management of refractory status epilepticus and 2) the management of hemodynamic instability during the administration of high-dose isoflurane. The patient is a 34-year old Caucasian male who arrived at the emergency department in a somnolent, nonverbal state following a reported thirty second to one minute seizure. Past medical history was significant for a voice and extremity tremor, which was treated with topiramate 50 mg twice daily. Initial imaging, lab tests, and procedure results were found to be unremarkable. Possible withdrawal from the patients home topiramate was also considered and found to be non-contributory. No etiology for the seizures could be determined despite considering various structural, immunologic, and infectious processes. Over the subsequent weeks, the patients seizure activity progressed to refractory status epilepticus despite receiving several anticonvulsants including benzodiazepines, fosphenytoin, levetiracetam, lacosamide, valproic acid, and a pentobarbital infusion. The patient also received intravenous immunoglobulin and a five day course of methylprednisolone. Due to failure of the previous and current anticonvulsant regimens, as well as concern of increasing tolerance to gamma-aminobutyric acid-mediated agents, isoflurane and a new anticonvulsant regimen were initiated. Isoflurane was initially administered at 0.5% and titrated up to a maximum end-tidal volume of 4%, with which complete electroencephalogram suppression was achieved. Over the next 48 hours, the patient developed a paralytic ileus and progressive hypotension and bradycardia secondary to the isoflurane. Despite the use of high-dose norepinephrine, vasopressin, and epinephrine, the patients mean arterial pressure remained in the mid-40s mm Hg with a heart rate of approximately 70 beats per minute. The

hemodynamic effects, including the absence of compensatory tachycardia during profound hypotension, demonstrate both a complete central and peripheral anesthetic effect with high-dose isoflurane. The patient's blood pressure and heart rate normalized initially after administering two doses of atropine 0.5 mg and starting a continuous infusion of dobutamine. However, continued hemodynamic instability with additional comorbidities, including acute respiratory distress syndrome, required the isoflurane to be discontinued. The patient was started on a continuous infusion of ketamine, at which time the family chose to withdraw care and the patient expired secondary to refractory status epilepticus. Isoflurane has shown to be an effective agent in halting or significantly attenuating seizure activity. Isoflurane does not correct the underlying cause of the seizures, but may be an option in circumstances when traditional therapies have failed and the underlying cause requires continued investigation. Proper management of common side effects of isoflurane should be considered prior to its use. This case has been approved by the Institutional Review Board.

Methods: N/A

Results: N/A

Conclusion: N/A

ASHP 2013 Summer Meeting Professional Poster Abstract

41-T

Category: Toxicology

Poster Type: Descriptive Report

Title: Endoscopic removal of pharmacobezoar in case of intentional potassium overdose

Primary Author: Lisa Deal, Carilion Clinic: Carilion Roanoke Memorial Hospital, 1906 Belleview Avenue
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Purpose: Hyperkalemia is a potentially life threatening electrolyte abnormality commonly seen in the Emergency Department (ED). Intentional overdose of potassium supplements is an uncommon occurrence. This case illustrates a novel approach to treatment of pharmacobezoar with EGD and demonstrates its effectiveness in the setting of extended release potassium chloride overdose.

Methods: A 44 year old female presented to the ED with intentional ingestion of an unknown amount of extended release potassium chloride (K-Dur) tablets and alprazolam (Xanax). The patients serum potassium was initially 7.3 mmol/L and treated with standard treatments including albuterol, calcium gluconate, insulin, dextrose, and sodium bicarbonate. Radiographic investigation showed a pharmacobezoar in the gastric fundus. Treatment was then augmented due to pharmacobezoar formation and whole bowel irrigation (WBI) was initiated with polyethylene glycol solution via nasogastric tube. Patient did not tolerate the WBI and developed increasing altered level of consciousness. After discussion with the gastroenterologist, the patient was treated with esophagogastroduodenoscopy (EGD) to remove the pharmacobezoar. The EGD was successful in the removal of the pharmacobezoar and the patients potassium normalized without complications.

Results:

Conclusion: This was a case of intentional potassium and alprazolam overdose resulting in hyperkalemia with normalization of potassium levels after utilizing both potassium lowering medications and EGD. Although intentional overdose with potassium supplementation is rare, bezoar formation can lead rebound hyperkalemia and increased risk of adverse reactions. In addition to standard treatments for

hyperkalemia, our case report demonstrates the benefit from EGD in extended release potassium bezoar formation.

ASHP 2013 Summer Meeting Professional Poster Abstract

42-T

Category: Transplant / Immunology

Poster Type: Research-in-Progress

Title: Single center experience using sirolimus in cardiac transplant

Primary Author: Michael Kesti, Abbott Northwestern Hospital, 800 East 28th Street, Minneapolis, MN 55407; Email: michael.kesti@allina.com

Additional Author(s):

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Purpose: Cardiac allograft vasculopathy (CAV) is a major barrier to long-term patient and graft survival after cardiac transplantation. Typical maintenance immunosuppression regimens consist of a calcineurin inhibitor plus mycophenolate and corticosteroids. This combination has enhanced short-term patient and graft survival but long-term survival has not significantly changed due to the development of CAV. Patients with CAV, have worse outcomes, and therefore effective CAV prevention and treatment are needed. Sirolimus possesses antiproliferative properties which make it a potential option for both prevention of rejection and treatment of CAV. Sirolimus use is often limited by adverse effects, sometimes life threatening, which may lead to discontinuation of therapy. The purpose is to analyze the impact of sirolimus use in allograft vasculopathy at Abbott Northwestern (ANW) Hospital.

Methods: The study was submitted to and approved by the Allina institutional review board. ANWs electronic medical record system will be used to collect data on patients who received sirolimus. A total of forty-eight cardiac transplant patients have been identified. Data will be collected by means of retrospective chart review and will focus on variables that pertain to CAV such as graft ischemic time, sirolimus indication (CAV or adverse effects attributed to other immunosuppressants), concomitant immunosuppressants, time to sirolimus initiation, and adverse effects (renal, myelosuppression, dermal, stomatitis, hyperlipidemia, interstitial pneumonitis). CAV status will be classified by ISHLT grading. The progression of CAV will be identified by comparing angiogram/intravenous ultrasound (IVUS) results. The information collected will assist ANWs transplant program in selecting optimal immunosuppressant regimens for cardiac transplants in the future.