2019 ASHP Midyear Clinical Meeting Roundtable/Poster
Session Summary: Emergency Medicine

Section of Clinical Specialists and Scientists
Section Advisory Group on Emergency Medicine
This is a compilation of the Posters presented at the Emergency Medicine Roundtable/Poster Session at the ASHP Midyear Clinical Meeting 2019 in Las Vegas, Nevada. Inclusion in this document does not imply endorsement by ASHP, the ASHP Section Advisory Group on Emergency Medicine, or its members.

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https://www.ashp.org/Pharmacy-Practice/Resource-Centers/Emergency-Care
A Comparison of Mortality with the Use of Succinylcholine or Rocuronium During Intubation in Traumatic Brain Injury Patients in the Emergency Department

Kelly Richardson, PharmD; Jessica Feih, PharmD, BCCCP; Janelle Juul, PharmD, BCCCP; Cathyyen Dang, PharmD; Ryan Feldman, PharmD, BCPS, DABAT; Matt Stanton, PharmD, DABAT; Chetna Patel, PharmD

PRESENTED AT THE MEDICAL COLLEGE OF WISCONSIN | FROEDERT HOSPITAL | MILWAUKEE, WI

REFERENCES

Present results to emergency medicine providers at Froedert Hospital and pharmacists at the Pharmacy Society of Wisconsin Educational Conference

Evaluate for further publication

Develop potential exclusion criteria for specific patient populations
Characterization of institutional practices, efficacy, and safety of weight-based vs. fixed-dose diltiazem for rate control in atrial fibrillation

Eli Philips, PharmD, Kyle DeWitt, PharmD, BCPS; Blake Porter, PharmD, BCPS

Department of Pharmacy, The University of Vermont Medical Center, Burlington, Vermont

**Background**

Atrial fibrillation with rapid ventricular response (AFib RVR) is a common dysrhythmia encountered in the emergency department (ED). Current guidelines recommend IV metoprolol or diltiazem for rate control. Existing evidence supporting the efficacy & safety of weight-based (WB) IV diltiazem at a dose of 0.25 mg/kg, lower fixed-dose (FD) of 10-15 mg is commonly used.

The objective of this study is to characterize the use of WB vs. lower FD IV diltiazem for AFib RVR, evaluate the effectiveness for heart rate control, and identify adverse events in our ED.

**Study Design**

Retrospective chart review of adult patients that received IV diltiazem for rate control in the ED from August 1st, 2018 to August 31st, 2019.

**Primary Efficacy Endpoint:** Rate control within 15 minutes (min.).

**Secondary Endpoints:**
- Rate control at 30 and 60 mins.
- Transition to definitive rate control agent (oral or IV infusion).
- Failure to achieve rate control or progression within 60 minutes (repeat dose, alternative agent, cv/emergent cardioversion).
- Incidence of hypotension (systolic blood pressure [SBP] <90 mmHg).
- Incidence of bradycardia (HR <60 beats per minute [BPM]).
- HR<110 BPM, >20% reduction, &/or conversion to normal sinus rhythm.

**Preliminary Baseline Characteristics**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Encounters (n=32)</th>
</tr>
</thead>
<tbody>
<tr>
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<td>3 (0)</td>
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<tr>
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**Baseline Vital Signs**

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</tbody>
</table>

**Diltiazem Prescribing Practices**

**Initial Weight-Based IV Dose**

<table>
<thead>
<tr>
<th>Median initial dose (IQR): 10 mg (10, 15)</th>
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<tbody>
<tr>
<td>Initial weight-based IV dose</td>
</tr>
<tr>
<td>&lt;0.2 mg/kg</td>
</tr>
<tr>
<td>0.2-0.3 mg/kg</td>
</tr>
</tbody>
</table>

**Transition to Definitive Rate Control**

| Transition to oral – No. (%) | 5 (17) | 2 (50) |
| 5 (17) | 2 (50) |

| Transition to infusion – No. (%) | 7 (24) | 1 (25) |
| 7 (24) | 1 (25) |

**Adverse Effects**

Two (6%) experienced hypotension after initial dose
- 1 after <0.2 mg/kg
- 1 after 0.2-0.3 mg/kg doses

No encounters in any group experienced bradycardia

**Preliminary Efficacy Endpoints**

<table>
<thead>
<tr>
<th>Rate control vs Initial Dose</th>
<th>0.2-0.3 mg/kg (n=4)</th>
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<tbody>
<tr>
<td>Rate control at 15 min</td>
<td>Rate control at 30 min</td>
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<tr>
<td>Rate control at 60 min</td>
<td>Rate control at 60 mins</td>
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</tbody>
</table>

**Failure or Progression Within 60 Minutes**

<table>
<thead>
<tr>
<th>Failure or progression – No. (%)</th>
<th>3 (10)</th>
<th>0 (0)</th>
</tr>
</thead>
</table>

**Individual endpoints – No. (%)**

<table>
<thead>
<tr>
<th>Allotment antiarrhythmics</th>
<th>17 (54)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical cardioversion</td>
<td>4 (14)</td>
</tr>
</tbody>
</table>

**Interpretation and Future Directions**

Preliminary results of this study found that lower doses were associated with sufficient rate control in the majority of encounters. Few encounters received an initial diltiazem dose of 0.2-0.3 mg/kg. Failure was common and adverse effects associated with diltiazem were rare. Final data collection and analysis is to be completed in early 2020. Results to be disseminated internally and utilized for review of institutional guidelines and electronic medication orders.

**Selected References**

Effect of methocarbamol on opioid consumption in patients with traumatic rib fractures

Lauren Schluenz, PharmD; Ashley Weber, PharmD; Meghan Fletcher, PharmD; Jen Ross, PharmD; Meera Shah, PharmD Candidate; Adriana Carrillo, PharmD Candidate; Preeyaporn Sarangarm, PharmD, BCPS, BCCCP

University of New Mexico Hospital - Albuquerque, New Mexico

Study Outcomes

Primary
- Evaluate opioid consumption in morphine equivalents (ME) in patients with rib fractures who received methocarbamol compared to those who did not receive methocarbamol
- Evaluate factors associated with ME use in rib fracture patients including methocarbamol dose, route, and frequency

Secondary
- Evaluate the effect of methocarbamol on hospital and ICU LOS for patients with rib fractures

Methods

- Study Design: Single center, retrospective chart review
- Inclusion Criteria: age ≥ 18 years, rib fracture(s) due to a traumatic injury
- Exclusion Criteria: Rib fractures secondary to cardiac arrest, patients receiving buprenorphine-containing products or methadone for addiction management, transferred from an outside facility, hospital LOS ≥ 48 hours, pregnant, incarcerated, surgery within 48 hours

Data Analysis

- Data will be analyzed using SPSS statistical software
- Primary outcome will be analyzed with Mann-Whitney U or independent t-test
- Other outcomes will be analyzed with descriptive statistics and linear regression

Data To Be Collected

- Patient Demographic Data
  - Age
  - Gender
  - Ethnicity
  - Admission weight and height
- Patient Specific Data
  - History of renal dysfunction or COPD
  - Serum creatinine
  - Opioid use prior to admission
  - Anaphylactic/ophthalmic/colic/alergy
  - Hospital and ICU LOS
- Rib Fracture Data
  - Type of trauma
  - Number of rib fractures
  - Unilateral or bilateral fractures
- Medication Use
  - Ibuprofen/anti-inflammatory agents
  - Acetaminophen
  - Gabapentin
  - Methocarbamol
  - Discharged with opioids
- Concomitant Therapy Received
  - Bisoprolol anti-inflammatory agents
  - Acetaminophen
  - Gabapentin
  - Methocarbamol
  - Discharged with opioids
- Complications
  - Pneumonia
  - Pneumothorax
  - Atelectasis
  - Mechanical ventilation
  - Mortality

Objective

To assess whether the addition of methocarbamol to the rib fracture protocol reduces the amount of opioids consumed during the first 48 hours of hospital stay.

Hypothesis

The addition of methocarbamol to rib fracture pain management will reduce the amount of opioid consumption.

Definitions

ICU: intensive care unit
LOS: length of stay
COPD: chronic obstructive pulmonary disease

References


Contact Information:
Lauren Schluenz
lschluen@unm.edu
Evaluation of a take-home naloxone kit program for opioid overdose patients discharged from the emergency department

Samantha Spetz, PharmD, William Kirsch, PharmD, BCPS; Kristen Thomas, PharmD, BCPS

Background
- Opioids are psychoactive substances that are derived from the opium poppy or developed as synthetic analogues. When ingested, these agents have the ability to cause respiratory depression and death.1
- The Centers for Disease Control and Prevention reported that Emergency Department (ED) visits for suspected opioid overdoses (OM) increased by 59% in the United States between July 2004 and September 2017.2
- In 2015 alone, approximately 40% of all drug overdose deaths were attributed to opioids.3
- The opioid epidemic continues to rise, with an increasing number of deaths reported annually.4
- Naloxone is an effective and inexpensive medication that works by blocking opioids from the mu receptors.
- Timely administration of naloxone during an opioid overdose has the ability to completely reverse the effects of opioids and reduce associated mortality.5

Purpose
- To evaluate the effectiveness of a take-home naloxone kit program implemented for opioid overdose patients discharged from the ED.
- To assess provider uptake of the program and opioid prescribing patterns in the ED.

Methods
- A 10-month retrospective cohort study was conducted to compare pre- and post-implementation effects of a take-home naloxone kit program.
- The pre-implementation period included patients from June 2016 through November 2016, and the post-implementation period included patients from January 2017 through June 2016.
- All patients 12 years of age or older who presented to the ED as a single institution for an opioid overdose to the defined study periods were included.
- Patients were determined to have an opioid overdose if they stated the overdose was due to an opioid or if an emergency department was positive for an opioid.
- A total of 285 patients were included.

Outcomes
- Outcomes of interest, comparing the pre- and post-implementation periods, included the number of opioid overdoses, the percentage of opioid overdose deaths, length of stay (LOS), hospital admission rates, and the percentage of patients who received ED for an opioid overdose within 24 days of the discharge date.
- The percentage of opioid overdose patients who received a take-home naloxone kit in the post-implementation period was evaluated.
- The percentage of new opioid prescriptions for all patients discharged from the ED was also examined.

Results
- Only 31 patients in the post-implementation period were eligible for a take-home naloxone kit, 28 (71%) received a kit and 3 (9%) did not.
- However, after removing patients who opted for receiving a kit, who wanted to provide to others, or who declined a take-home kit, only 11 (35.5%) patients did not receive a kit when eligible.

Conclusions
- Implementation of our take-home naloxone kit program has been well accepted by providers in the ED of our institution.
- Despite the small number of patients eligible, our program appears to be effective in increasing naloxone prescription rates from the ED.
- Significant reductions in discharge opioid prescriptions from the ED have been observed since implementation of this program.

References
3. Drug overdose deaths on the rise in the United States. 2016. US. Department of Health and Human Services. Available at:
4. Substance Abuse and Mental Health Services Administration. National Survey on Drug Use and Health. Available at:
5. Spetz, Samantha. Evaluation of a take-home naloxone kit program for opioid overdose patients discharged from the emergency department. ProMedica Toledo Hospital. Toledo, OH

Contact & Disclosure
- Samantha Spetz, PharmD, William Kirsch, PharmD, BCPS; Kristen Thomas, PharmD, BCPS
- Authors of this presentation do not have any financial or personal conflicts of interest.
Evaluation of Coagulation factor Xa ([recombinant] Andexxa™) in Patients Requiring Reversal of Apixaban or Rivaroxaban

Mark L. Vestal, PharmD; Mark Friedland, MD; Adam Root, PharmD; Kimberly Hodulik, PharmD, CACP, CPP; Jennifer Mando-Vandrick, PharmD, BCPS; Thomas L. Ortel, MD, PhD; Ian J. Welsby, MBBS, FRCA
Duke University Hospital; Durham, North Carolina

Background

- Coagulation factor Xa (Xa) is known to contribute to thrombosis and Duke guidelines for appropriate use in intravenous heparin therapy were established in 2003.
- ANDEXXA is a recombinant factor Xa inhibitor as a result of the following criteria:
  - Superiority in efficacy (at least 60% reduction in rate of intracranial hemorrhage) (1, 2)
  - Superiority in safety (at least 10% reduction in the rate of bleeding) (1, 2)
- All other Xa inhibitors require an anticoagulation approval

**DUR Formulary Status**

**NEEDS A RECENT STUDY WITH DUR MEDICAL ADVICE TO REVIEW THE CURRENT GUIDELINES**

**METHODS**

- **Study Design**
  - Prospective, observational study of patients at Duke University Hospital who received coagulation factor Xa (Xa) inhibition between July 1, 2013 and September 30, 2013.
- **Inclusion Criteria**
  - Received at least one dose of coagulation factor Xa (Xa) inhibition for reversal of anticoagulation
- **Exclusion Criteria**
- **Primary Objective**
  - To determine if appropriate use of coagulation factor Xa (Xa) inhibition (Andexxa) improved in current practice compared with previous guidelines
- **Secondary Objectives**
  - To determine the prevailing duration of discontinuation of the drug
  - To determine the duration of hospitalization for the whole study
  - To determine the length of hospitalization for the whole study

**RESULTS**

**Table 1.** Length of stay

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Low Dose</th>
<th>Medium Dose</th>
<th>High Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days</td>
<td>7</td>
<td>14</td>
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**Table 2.** Andexxa dosing in patients requiring reversal of anticoagulation

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**Table 3.** Andexxa dosing in patients requiring reversal of anticoagulation

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**Table 4.** Andexxa dosing in patients requiring reversal of anticoagulation

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**Table 5.** Andexxa dosing in patients requiring reversal of anticoagulation

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<td>Days</td>
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<td>28</td>
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**Discussion and Conclusions**

- All patients were treated on the day of hospitalization as outlined in the previous guidelines.
- The majority of patients receiving coagulation factor Xa inhibition for intracranial hemorrhage had a CINR of 2 to 3 prior to administration, thus including higher chances of survival.
- All but one patient who had bleeding with Xa inhibition of the drug.
- One patient received both coagulation factor Xa (Xa) inhibition and lower factor newborn current treatment.
- The expected adverse effects occur with administration of coagulation factor Xa (Xa) inhibition.

**References**

1. ANDEXXA® (recombinant factor Xa, injection) [prescribing information]. Duke University Hospital, Durham, NC; December 2012.
Evaluation of the Appropriate Utilization of the CIWA-Ar Protocol in the General Hospital Setting
Rakhshan Naseeb, PharmD, Lindy Sidelsky PharmD, BCCCP, Erin Quinn, PharmD, BCPS, Edith Liang, PharmD, BCCCP

BACKGROUND
The cessation or reduction of alcohol from chronically altered levels results in decreased irritability, insomnia, and an increase in the excitability levels through glutamate binding to the N-methyl-D-aspartate (NMDA) receptors. Withdrawal symptoms may persist within six hours of the last use of alcohol. Clinical studies suggest benzodiazepines (BZDs) are effective in reducing symptoms and in decreasing risk of seizures. The Clinical Institute Withdrawal Assessment for Alcohol (CIWA) is a validated scale used to assess and quantify a patient’s severity of alcohol withdrawal symptoms and guides clinical treatment using symptom-triggered BZD therapy. Studies have found that symptom-triggered BZD during resulted in reduced BZD usage and shorter length of stay in inpatient addiction centers and emergency department units. A symptom-triggered regimen may also reduce the risk of over-medication and adverse events since dosing is based on withdrawal symptoms.

PURPOSE
The purpose of this retrospective study is to evaluate the appropriate utilization of CIWA-Ar protocol in hospitalized patients at AMITA Health Saints Mary and Elizabeth Medical Center (AHSM/EMC) as determined by documented CIWA-Ar score assessments and BZD orders.

OBJECTIVES
- To identify the appropriate implementation of CIWA-Ar protocol
- To evaluate whether the proper implementation of CIWA-Ar protocol decreases:
  - Total daily dose of BZD
  - Need for additional medication
  - Incidence of withdrawal seizures
  - Amount of rapid response calls
  - Amount of imaginations

METHODS
Study Design:
- This is a retrospective chart review for patients admitted to AHSM/EMC between July 2017 to June 2019
- Data will be collected from 109 patients through electronic medical record by one data abstractor
- This study is exempt from IRB approval

Primary endpoint:
- The percentage of patients compliant with the general inpatient alcohol withdrawal protocol at AHSM/EMC

Secondary endpoints:
- Time to initiation of the CIWA-Ar protocol upon admission
- Intensive care unit transfers
- Additional BZD doses outside the protocol
- Adverse medication use of haloperidol, clonidine, or metaxoprol
- Incidence of rapid response team activation
- Incidence of lab results
- Incidence of seizures
- Duration of BZD therapy on the protocol
- Total daily dose of BZD in lorazepam equivalents

Exclusion Criteria:
- 18 years of age or older
- ICD-10 diagnosis code of alcohol withdrawal upon admission

Exclusion Criteria:
- Rejection
- Progress
- Incarceration
- Prior history of epilepsy

DATA COLLECTION
- Unit of admission where CIWA-Ar was ordered
- Time to CIWA-Ar protocol implementation
- Total daily dose of BZDs in lorazepam equivalents
- Scheduled and as needed doses in addition to protocol
- Use of adjunctive medications such as:
  - Haloperidol, metaxoprol, clonidine
  - CIWA score assessments
  - ICU transfers

CIWA-Ar PROTOCOL FOR INPATIENT ALCOHOL WITHDRAWAL

<table>
<thead>
<tr>
<th>CIWA-Ar Score</th>
<th>Lorazepam Dose</th>
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<tbody>
<tr>
<td>0-4</td>
<td>Use lorazepam 1mg IV/Po as needed for anxiety</td>
</tr>
<tr>
<td>5-7</td>
<td>0.5 mg IV/Po one dose; Reassesses in 4 hours</td>
</tr>
<tr>
<td>8-10</td>
<td>1 mg IV/Po one dose; Reassesses in 4 hours</td>
</tr>
<tr>
<td>11-14</td>
<td>2 mg IV/Po one dose; Reassesses in 2 hours</td>
</tr>
<tr>
<td>15-25</td>
<td>3 mg IV/Po one dose; Reassesses in 1 hour</td>
</tr>
<tr>
<td>&gt;25</td>
<td>4 mg IV/Po one dose; Notify physician and reassess in 15 minutes</td>
</tr>
</tbody>
</table>

ANTICIPATED OUTCOMES
Past studies show that the implementation of CIWA-Ar protocol led to decreased amount of BZDs ordered, use of adjunctive medications and hospital length of stay. We predict our study will show similar results with proper implementation. We also anticipate that there will be a discrepancy between the CIWA-Ar protocol and actual medication administration.

NEXT STEPS
Further results and conclusions of this study will be presented at the 2020 Illinois Pharmacy Residency Conference.

DISCLOSURES
The authors of this presentation have nothing to disclose concerning financial or personal relationships with commercial entities that can have an interest in the subject matter of this presentation.

REFERENCES


Evaluation of the Appropriate Utilization of the CIWA-Ar Protocol in the General Hospital Setting
Rakhshan Naseeb, PharmD, Lindy Sidelsky PharmD, BCCCP, Erin Quinn, PharmD, BCPS, Edith Liang, PharmD, BCCCP
Incidence of Anticoagulation Medication Prescribing Errors in Patients Discharged from the Emergency Department

Morgan Cantley, PharmD Candidate; Haili Gregory, PharmD; Gregory Hall, MD; Andrew Matuskowitz, MD; Kyle Weant, PharmD

Background
- Adverse drug reactions are the 5th leading cause of death in the United States.
- Potential causes of Emergency Department (ED) Medication Errors include:
  - Treating 2-patient, reliance on verbal orders, unfamiliar patients, and a wide range of disease states.
- Anticoagulants have important physiological roles and appropriate dosing is crucial for preventing life-threatening emergencies while managing associated toxicities, such as increased bleeding risk.

Methods
- Retrospective chart review of 797 anticoagulation prescriptions written upon discharge at MUSC ED from January 1, 2015 through August 31, 2016.

Inclusion Criteria:
- Patients who were seen at St. Joseph’s Hospital ED or St. Francis Hospital ED and were discharged on anticoagulant medication.

Exclusion Criteria:
- < 18 years old

RESULTS

<table>
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<tr>
<th>Percentage of Prescription Errors by Anticoagulant</th>
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Primary Outcome
Identify the number of errors in anticoagulation prescriptions written for patients discharged from the Medical University of South Carolina (MUSC) ED.

Secondary Outcome
Categorize errors based on inappropriateness of INR, quantity, patient-specific dose adjustment, dose per unit of INR, 30-day readmission due to prior errors, and prescription status.

<table>
<thead>
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<th>Error Rate by Prescriber Status and Anticoagulant</th>
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Non-ED Residents were more likely to make an error in prescribing any type of anticoagulation compared to all members of all other prescribing status (p<0.05).
- Non-ED residents were more likely to make an error in prescribing subcutaneous/intramuscular warfarin compared to all members of all other prescribing status (p<0.05).
- Of the errors identified, only 3 prescriptions (0.5%) led to patient readmission within 30 days.

SUMMARY
- Of those adjudicated, 102 errors were identified within 321 prescriptions.
- Non-ED residents were more likely to make errors than any other prescribing unit.
- After identification, a majority of errors, and improving the overall quality of care with can reduce the likelihood of this error.

FUTURE DIRECTIONS
- Prescribing restrictions via preauthorization may be useful in ensuring appropriate anticoagulation dosing and prescription accuracy in the future.
- Future studies should investigate the effect that a second-check workflow system managed by an emergency medicine pharmacist has on improving the appropriateness of anticoagulation prescribing habits upon patient discharge.
- Future studies may analyze the time of day that most prescription errors occurred and justify the need for an around-the-clock emergency medicine pharmacist.
**Ketamine for Severe Depression or Suicidal Ideation in the Emergency Department: A Randomized, Double-Blind, Placebo-Controlled Trial**

**Background**
- There is no current standard of care for patients presenting to the ED with severe depression, and traditional medications for depression have a delayed time to therapeutic effect.
- Multiple trials using a subanesthetic dose of ketamine for treatment-resistant depression have demonstrated ketamine to significantly improve depressive symptoms within 4 hours, with the effects persisting for up to two weeks after a single dose.
- Ketamine’s ability to produce a rapid antidepressant effect makes it an appealing option for use in the emergency department to treat patients with severe depression or suicidal ideation, although it has not been studied in this population.
- Depression is not effectively managed by emergent treatment alone. The utility of ketamine for emergent treatment of depression relies on it impacting the patient’s disposition after leaving the ED.

**Objective**
Examine the effect of a low-dose ketamine infusion on (1) rapid reduction of depressive symptoms in the emergency department, (2) rate of follow-up with outpatient psychiatry after the ED visit, and (3) rate of return to the ED within 30 days.

**Study Design**
- Interventions: ketamine 0.5 mg/kg or 50 mL, 0.9% saline, infused over 40 minutes.
- Inclusion: adults with suicidal ideation or a chief complaint of severe depression.
- Exclusion: acute mania or psychosis, acute intoxication, pregnancy or lactation, prior enrollment in study, medical contraindication to ketamine, discharging from ED without a ride, provider judgement, patient does not consent.

**Psychiatric Assessment**
- Brief Psychiatric Rating Scale (BPRS) at baseline and 4 hours.
- Completed by on-call psychiatry resident or on-call psychiatry nurse.

**Safety Assessment**
- Hemodynamic monitoring: continuous telemetry with ECG, HR, and SPO2 documented hourly for 4 hours.
- Intoxication: Visual Analog Scale for intoxication (VAS-High) self-assessed by patient at baseline, 2 hrs, and 4 hrs.

**Post-Discharge Follow-Up**
- ED Records from all Des Moines area hospital for visits within 30 days of discharge.
- Contact patient to ask about outpatient psychiatry visit (will confirm visits with provider).

**Results Pending**
- Approved by IRB 11/1/19.
- Target enrollment 25-100 patients per treatment group, enrolling through April 2020.

**Discussion**
- Ketamine is a low-cost, well-tolerated medication commonly used in the emergency department for sedation, pain, and agitation.
- If ketamine can effectively reduce ED return visits or increase rates of outpatient follow-up, it may be beneficial to routinely use in the emergency department for treatment of depression or suicidal ideation.
- Future research on the use of ketamine for depression in pediatric populations is warranted.

**References**

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**Can a single IV dose of ketamine for severe depression or suicidal ideation affect healthcare utilization after discharge?**
- Outpatient psychiatric follow-up visits within 30 days.
- ED visits within 30 days.

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Ketamine for Severe Depression or Suicidal Ideation in the Emergency Department: A Randomized, Double-Blind, Placebo-Controlled Trial
Kathryn Bress, PharmD; Jessica Nesheim, PharmD, BCPS; Adnan Iqbal, MD
Time to Reversal: The Association Between Four-Factor Prothrombin Complex and Outcomes in Intracranial Hemorrhages with Warfarin

Corey Cicci, PharmD; Ashley Weiss, PharmD; Cathyyen Dang, PharmD, BCPS; Jessica Feih, PharmD, BCCCP; Matthew Stanton, PharmD, BCPS, DABAT; Benjamin Jung, PharmD, MS, MPA; Ryan Feldman, PharmD, BCPS, DABAT

BACKGROUND

- Intracranial hemorrhage (ICH) is associated with high morbidity and mortality.1
- Incidence of ICH has been reported at 34.6 per 100,000 person-years with a median case mortality of 40.4% at one month.2
- Hematoma expansion for patients not on anticoagulants occurs in up to 40% of patients within the first 6 hours after symptom onset.3
- Coagulopathy is an independent risk factor for both mortality and hematoma expansion.4
- For patients taking warfarin, the annual rate of ICH is between 0.3% and 0.6%, and in these patients the rate of hematoma expansion has been shown in prospective studies to be as high as 54%.4

- Neurocritical Care Society Guidelines for ICH:5
  - Recommendations include prompt reversal of warfarin in ICH using intravenous vitamin K and prothrombin complex concentrate.
  - However, no specific time goals exist for achieving this therapeutic intervention.

OBJECTIVE

- To evaluate the clinical outcomes associated with time to administration of four-factor prothrombin concentrate (4F-PCC) in patients with intracranial hemorrhage on warfarin.

METHODS

- Design: Retrospective, single-center study
- Inclusion Criteria:
  - At least 18 years of age
  - Diagnosis of ICH
  - On home warfarin with a current INR > 1
  - Received 4F-PCC for anticoagulation reversal
- Exclusion Criteria:
  - Pregnant, incarcerated, incomplete medical record, received heparin therapy within 24 hours of 4F-PCC, left ventricular assist device, liver disease with Child-Pugh Class C, did not receive vitamin K within 24 hours of admission
- Statistical Analyses:
  - T-test, chi-square (2) test, ANOVA, and logistic regression; significance defined as p<0.05 (2-tailed)

PRELIMINARY RESULTS

Is there an optimal time window for anticoagulation reversal using 4F-PCC for ICH patients on warfarin?

Primary Outcome

- Composite of the following:
  - Incidence of hematoma expansion via 3-hour computed tomography (CT) based on time-to-treatment category (0-30 min, 31-60 min, 61-90 min, 91-120 min, >120 min)
  - Death due to neurological injury prior to repeat CT

Secondary Outcomes

- Mortality, INR change within 6 hours after 4F-PCC, incidence of neurological interventions, functional status change at discharge, hematoma expansion size, hematoma expansion at any time during hospitalization

REFERENCES


FUTURE DIRECTIONS

- This study will characterize clinical outcomes based on time to anticoagulation reversal.
- If there are clear benefits to earlier reversal, it may lead to an increased hospital focus on achieving “time to reversal” for ICH.

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Background

- Pain management is one of the most common reasons for emergency department (ED) visits, with up to 60% of patients currently being prescribed opioid therapy.
- Rates of drug overdose deaths increased 140% from 2000 to 2016, with deaths resulting from opioid overdose increasing from 3 to 5 deaths per 100,000 persons.
- In 2017 the Colorado Hospital Association (CHA) launched a 6-month pilot program within two hospitals across Colorado. This program allowed the Colorado Chapter of the American College of Emergency Physicians (ACEP) Opioid Prescribing & Treatment Guidelines, which led to a reduction in opioid administrations by 26% and increased usage of alternatives to opioids (ALTO) by 31%.
- Denver Health was not selected as a pilot site, however, its data on opioid and ALTO administration over time may be used to reveal trends not related to active ALTO pathways.

Objective

The purpose of this medication use evaluation is to determine baseline opioid and ALTO use prior to the implementation of Colorado ACEP guidelines at Denver Health Medical Center.

Methods

- Retrospective, observational analysis on administration trends of opioids within the ED and Urgent Care between June 1, 2017 and June 30, 2019.
- Included all patients ≥18 years old.
- Data was extracted using the Triad/Intergy database reporting tool.
- All pain medications administered within the ED and Urgent Care were separated into opioids and ALTO groups (Table 1).

Results

- A total of 50,876 unique patients were identified out of over 232,000 ED visits over the two-year period.

Table 1. List of Opiates and ALTO Agents

<table>
<thead>
<tr>
<th>Opiates</th>
<th>ALTO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Codeine</td>
<td>Fentanyl</td>
</tr>
<tr>
<td>IV</td>
<td>Intramuscular</td>
</tr>
</tbody>
</table>

Table 2. Baseline Characteristics

<table>
<thead>
<tr>
<th>Trait</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (y)</td>
<td>29 (16)</td>
</tr>
<tr>
<td>Sex, n (%):</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>25,648 (50.4)</td>
</tr>
<tr>
<td>Female</td>
<td>24,124 (47.4)</td>
</tr>
<tr>
<td>Other/Declined to Answer</td>
<td>784 (14.2)</td>
</tr>
<tr>
<td>Race, n (%):</td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>24,124 (47.4)</td>
</tr>
<tr>
<td>African American</td>
<td>7,304 (14.2)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>12,114 (23.5)</td>
</tr>
<tr>
<td>Other</td>
<td>7,800 (15.0)</td>
</tr>
<tr>
<td>Primary Care Area, n (%)</td>
<td></td>
</tr>
<tr>
<td>ED</td>
<td>36,647 (72)</td>
</tr>
<tr>
<td>Urgent Care</td>
<td>14,229 (28)</td>
</tr>
</tbody>
</table>

- Correlation of ALTO and opioid administrations over time demonstrated a linear increase in ALTO agents, along with a linear decrease in opioid administrations.
- Preceding studies using ALTO intervention pathways have aimed for a similar patient reduction in opioid prescribing, with the CHA targeting a 25% reduction during the pilot period. Our results show an opioid administration reduction of 19% despite no active intervention (Figure 2).
- Administration of ALTO agents increased by 34% over a two-year period, which is similar to the CHA pilot program results, indicating that even without intervention similar positive results were seen at our institution.
- Our data suggests that despite not having ALTO pathways at our institution, there was change in administration per time, which is reflective of community understanding and awareness of the opioid epidemic and a shift away from using opioids when ALTO agents are available.
- Limitations include descriptive ability to explain changes, interventions may have been made but not documented, and retrospective data was used for analysis.

Conclusion

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Utility of Shock Index in Predicting Post-intubation Hypotension in Pediatric Patients Receiving Ketamine

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Background

• The shock index (SI), defined as heart rate divided by systolic blood pressure, was originally validated to predict severity of illness in trauma patients within the adult population. Later, it was discovered that patients with a high SI (>0.8) are more likely to experience hypotension after intubation leading to its use as a predictor of post-intubation hypotension in adults undergoing rapid sequence intubation (RSI).6

• From the utility seen in the adult population, the SI was adapted to identify severely injured pediatric patients at high risk for death between the ages of four and sixteen years old (known as shock index, pediatric age group) (SIAG). Recently, SIAG was additionally validated for ages 1 through 15 years old to explore the ability to identify pediatric patients at high risk for mortality.6

• Ketamine is known to affect hemodynamics and increase risk of hypotension in adults with a high SI.8

• The SIAG tool has not been evaluated for prediction of post-intubation hypotension in pediatrics.

Purpose

The objective of this study is to determine if the newly validated SIAG index will be able to predict post-intubation hypotension in pediatric patients who received ketamine as an induction agent.

Methods

Study Design: Retrospective cohort study

Inclusion Criteria: Pediatric patients age 1 to 16 at Inova Fairfax Medical Campus who received ketamine as an induction agent

Exclusion Criteria: Patients who received vecuronium therapy starting or within 10 minutes after intubation, and those without documented vital signs pre and post-intubation

Primary Outcome: Incidence of hypotension, defined as based on the patient’s age as outlined by Pediatric Advanced Life Support (PALS) recommendations, between the two groups

Secondary Outcome: Mean change in systolic blood pressure and heart rate

Statistical Analysis:

• Fisher’s exact test will be performed for primary outcome between high shock and low shock groups

• Estimated 80 patients in total were needed to achieve 80% power in detecting a 25% difference between SIAG groups

Conclusions

• Our preliminary results show that patients who received ketamine as an induction agent with a high SI experience post-intubation hypotension more frequently than those with a low SI. Our results of 25% incidence confirm the findings of the research performed in adults, in which 28% of patients with a high SI experienced post-intubation hypotension with ketamine.

• Majority of patients who experienced the primary outcome of post-intubation hypotension required intubation due to shock or anaphylactic crisis. In these select patient populations, they may be more likely to experience hypotension during induction, which is contrary to previous findings affirming the negative inotropic effects of ketamine to dominate.

• Findings will guide better identification of pediatric patients at increased risk for post-intubation hypotension allowing early intervention to prevent hypotension by avoiding ketamine as an induction agent. Utilizing the SIAG tool may minimize post induction complications.

Limitations

• Single-center, retrospective study

• Some patients may have been excluded due to report limitations

• Accuracy of data dependent on proper chart documentation

Disclosures

Authors of this presentation have nothing to disclose concerning potential financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation.

References


