2022 ASHP Midyear Clinical Meeting Roundtable and Poster Session: Emergency Medicine

Section of Clinical Specialists and Scientists

Section Advisory Group on Emergency Medicine

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Effect of Standard Potassium Replacement Protocols on Patients with Low Body Weight in an Emergency Department

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MICHIGAN MEDICINE
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Introduction

Background

- Several studies have electrolyte replacement protocols lead to quicker time to treatment and electrolyte concentrations within goal.[1,2] Other studies have shown that body weight may alter the pharmacokinetics of electrolyte replacement therapy.[3] It is unclear if standard electrolyte protocols lead to differences in overall electrolyte concentration in low body weight individuals compared to those with normal body weight. Preliminary study found that low weight patients (<45 kg) are prescribed the standard electrolyte protocol with no definitive guidance on when to switch to weight-based supplementation for low weight individuals.

Objective

- To determine the incidence of potassium over-correction in low weight emergency department patients using a standard electrolyte replacement protocol.

Study Population

Inclusion Criteria

- Adults (≥ 18 years old)
- Located in the Emergency Department at Michigan Medicine
- Received at minimum one dose of potassium for electrolyte replacement

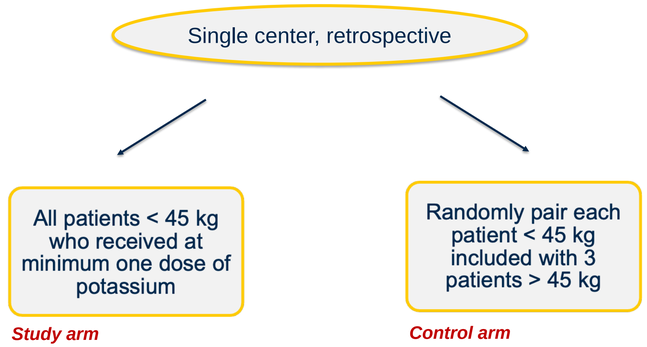
Exclusion Criteria

- Administered potassium for an indication other than replacement
- Did not receive serum electrolyte levels within 6 hours before replacement and 12 hours after replacement

Methods

Study Design

- Retrospective 7-year chart review (2015-2022) assessing efficacy of potassium correction in low weight individuals (< 45 kg) compared to patients > 45 kg in an Emergency Department



Data Collection

Demographics

- Age, sex, weight and height

Baseline labs

- Serum potassium pre- and post- levels

Potassium Replacement

- Dose and formulation

Outcomes

Primary Endpoint

- Relative risk of potassium overcorrection in patients < 45 kg versus > 45 kg

Secondary Endpoints

- Potassium serum concentration change per unit of potassium administered in patients < 45 kg and > 45 kg
- Prevalence of overcorrection of potassium in the following weight groupings: < 35 kg, 35-45 kg, and > 45 kg

Data Analysis

- Primary outcome: Descriptive statistics
- Categorical data: Fisher's exact test or Chi-squared test
- Continuous data: Paired T-tests
- P-value <0.05 considered statistically significant

Discussion

- The results from this study determine if standard electrolyte replacement protocols need to be modified for patients with low body weight in the Emergency Department.

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Disclosure: All authors have nothing to disclose concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation.

Evaluation of the Time from Treatment Decision to Administration of Alteplase versus Tenecteplase for Acute Ischemic Stroke

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Background

- Acute ischemic stroke (AIS) is one of the leading causes of mortality in the United States[1]
- The American Heart Association and American Stroke Association recommend thrombolytic therapy for patients diagnosed with AIS who present within 4.5 hours of symptom onset[2]
- Recent evidence indicates tenecteplase is at least non-inferior to alteplase for the treatment of AIS when dosed at 0.25 mg/kg[3-6]
- Tenecteplase practice advantages include rapid single bolus administration, no dedicated IV catheter requirement, and fibrin specificity reducing paradoxical thrombin activation[7,8]
- In January of 2022, North Kansas City Hospital adopted tenecteplase as the sole thrombolytic for treatment of AIS
- Primary outcome of previous studies evaluated door to needle time

Table 1. Summary of studies evaluating alteplase vs tenecteplase.

Author/Acronym (Year of publication)	Population	Thrombolytic	Results
Huang/ATTEST[3] (2015)	AIS (N = 104)	Alteplase 0.9 mg/kg (n = 52) Tenecteplase 0.25 mg/kg (n = 52)	No significant differences for percentage of penumbra salvaged No difference in mortality or symptomatic ICH
Logallo/NOR-TEST[4] (2017)	AIS (N = 1,050)	Alteplase 0.9 mg/kg (n = 549) Tenecteplase 0.4 mg/kg (n = 551)	No difference in mRS of 1-3 at 3 months Increased mortality in subset of patients with moderate to severe AIS
Campbell/EXTEND-IA TNK[5] (2018)	AIS (N = 202)	Alteplase 0.9 mg/kg (n = 101) Tenecteplase 0.25 mg/kg (n = 101)	Superior angiographic reperfusion mTICI scores of 2b-3 with tenecteplase No difference in mortality or symptomatic ICH
Kvistad/NOR-TEST 2 part A[9] (2022)	AIS (N = 204)	Alteplase 0.9 mg/kg (n = 104) Tenecteplase 0.4 mg/kg (n = 100)	Less favorable outcomes in tenecteplase group Increased mortality and any ICH with tenecteplase
Menon/ACT[6] (2022)	AIS (N = 1,577)	Alteplase 0.9 mg/kg (n = 771) Tenecteplase 0.25 mg/kg (n = 806)	No difference in mRS of 0-1 at 90-120 days after treatment No difference in mortality or symptomatic ICH

AIS = acute ischemic stroke, ICH = intracerebral hemorrhage, mRS = modified rankin scale, mTICI = modified thrombolysis in cerebral ischemia

Purpose

The data from this study will be used to determine if there is a difference in time from treatment decision to administration after implementation of tenecteplase for treatment of AIS

Methods

- Retrospective review will be conducted at a 451-bed Midwestern primary stroke center
- Data to be collected from patients treated for AIS from April 1, 2021 to August 31, 2022
- Patients will be evaluated for time from treatment decision to administration of thrombolytic
- Patients will be compared in the following groups using a 1:1 ratio

Figure 1. Study groups.

Alteplase 0.9 mg/kg (max 90 mg)

Tenecteplase 0.25 mg/kg (max 25 mg)

Figure 2. Study inclusion and exclusion criteria.

Inclusion Criteria:	Exclusion Criteria:
• Adults ≥ 18 years of age • Received thrombolytics for the treatment of AIS	• Patients who were transferred • Contraindications to intravenous thrombolysis per current standard of care

Outcomes

Primary outcome:

- Evaluate the time from treatment decision to administration of thrombolytic

Secondary outcome:

- Evaluate efficacy and safety within 24 hours of administration

Efficacy

- Change in National Institutes of Health Stroke Scale

Safety

- Rate of intracranial hemorrhage
- Rate of angioedemea

Statistical Analysis

Categorical variables will be compared using Fisher's Exact or Chi-Square tests, wherever appropriate

Results

Data collection in progress

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Disclosures

Authors of this presentation have the following to disclose concerning possible or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation:

All Authors: Nothing to Disclose

THIS STUDY IS EXEMPT FROM THE NORTH KANSAS CITY HOSPITAL INSTITUTIONAL REVIEW COMMITTEE

Clinical Management of Acute Agitation in Patients with Schizophrenia or Bipolar Disorder in Emergency Departments in the United States – A Retrospective Chart Review

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BACKGROUND

US psychiatric emergency visits account for 4.3 million annual emergency department (ED) visits.[1]

Agitation is a common presenting feature in the emergency setting. Data suggest more than a million annual ED visits for agitation in patients with schizophrenia or bipolar disorder.[2,3]

Agitation complicates as many as 2.3% of ED visits.[4]

Claims data demonstrate that 12% of patients account for 54% of agitation episodes.[5]

ED visits in patients with schizophrenia or bipolar disorder who require treatment for acute agitation have not been characterized previously.

OBJECTIVE

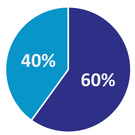
To characterize ED visits by patients with schizophrenia or bipolar disorder where acute agitation required treatment

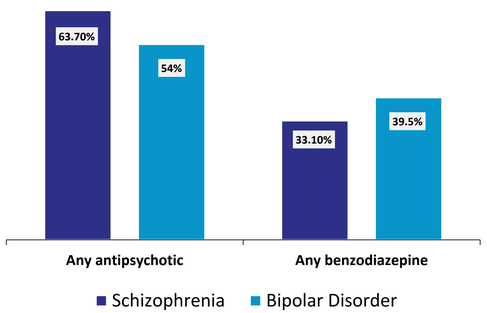
	Schizophrenia (n = 121)	Bipolar Disorder (n = 81)
202 patient records were abstracted from 4 sites		
Male	63%	51%
Mean Age (years)	41	38

METHODS

- Retrospective chart review.[6]
- 2 Year Span: January 2019 - December 2020
- Patients 18 to 75 years presenting to hospital-based EDs
- 4 US research sites in the Southwest, Southeast, and Midwest
- Individuals diagnosed with acute agitation and either schizophrenia or bipolar disorder who require intervention
- Data extracted from EPIC Electronic Health Record (EHR).
- Medication use, physical restraint, and patient disposition data abstracted
- Data separated into 2 cohorts by diagnosis
- Descriptive statistics generated for extracted data

Diagnoses



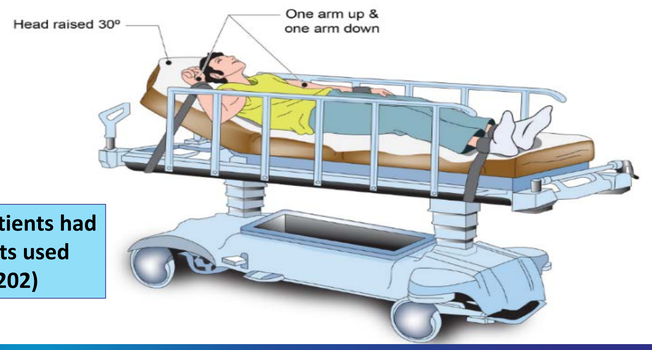


RESULTS

Pharmacologic Treatments With >10% Rate of Administration	SCZ n (%)	BPD n (%)
lorazepam IM	20 (16.5%)	21 (25.9%)
haloperidol IM	19 (15.7%)	16 (19.7%)
olanzapine IM	18 (14.9%)	16 (19.7%)
lorazepam oral	19 (15.7%)	13 (16.0%)
olanzapine ODT	19 (15.7%)	12 (14.8%)
Mode of Administration of All Pharmacologic Treatments*		
Oral	60 (49.6%)	29 (35.8%)
IM	44 (36.4%)	47 (58.0%)
Intravenous/IV Push	5 (4.1%)	1 (1.2%)
Restraints		
Restraint Use	34 (28.1%)	21 (25.9%)
Patient Disposition (N=202)		
Home	75 (62%)	46 (56.8%)
Admitted	27 (22.3%)	29 (35.8%)
Transfer to Different Hospital	10 (8.3%)	3 (3.7%)
Observation or Crisis Center	6 (5%)	2 (2.5%)
Discharged AMA	2 (1.6)	1 (1.2)
Prison	1 (0.8)	0

* Patients who were administered multiple medications by the same mode were counted once in each mode. Patients who received medications by multiple modes were counted once in each mode.

27% of patients had restraints used (55/202)



KEY POINTS

- Individuals with schizophrenia made up a larger percentage of agitated ED patients (60% v 40%) than those with bipolar disorder.
- In the schizophrenia cohort, the oral route of administration appeared to be preferred over IM and IV. Within the bipolar disorder cohort, the preference appeared to be for IM.
- 38% (77/202) required admission or further hospital treatment.
- Restraints were used in over 25% of patients in both diagnostic groups.
- Data from these 4 centers in the US (SW, SE, and Midwest) may be representative of acute agitation management in other US EDs.
- Improved management strategies for acute agitation in patients with schizophrenia or bipolar disorder should be sought to reduce invasive treatment, physical restraint use, and hospital admissions.

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Impact of Pharmacist Education on Culture Follow Up in the Emergency Department (Pharm-CFU)

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BACKGROUND

- Approximately 50% of antibiotic prescriptions given to patients to complete at home following discharge from the ED are potentially inappropriate, and 41% of patients have pending cultures at discharge.[1,2]
- Urinary Tract Infections (UTI), sexually transmitted infections (STI), and Group A Strep pharyngitis (GAS) are common reasons for ED visits and receipt of an antibiotic prescription upon discharge.
- Recently, STI guidelines were updated to include new first-line recommendations for gonorrhea and chlamydia treatment.
- Although the benefits of pharmacist education on antimicrobial stewardship are well documented, evidence is lacking in terms of the ability to reduce ED re-visits and hospital admissions.[3-5]
- An inservice was presented to educate on appropriate empiric antibiotic regimens for STIs, UTIs, and GAS.

OBJECTIVES

Assess 72-hour ED revisit rates and appropriateness of antibiotics prescribed for culture follow-ups before and after a pharmacist-led education on appropriate antibiotic regimens for UTIs, GAS, and STIs.

METHODS

- **Design:** single-center retrospective chart review pre/post education
- **Setting:** JSUMC ED
- **Intervention:** educational inservice on appropriate empiric antibiotic choices for UTI, GAS, and STI culture follow-up

STUDY DESIGN

Inclusion Criteria

- ≥ 18 years old discharged from JSUMC ED during the pre-specified time frames
- Urine culture, rapid GAS pharyngitis culture, or gonorrhea/chlamydia culture that results after discharge

Exclusion Criteria

- Admission to a floor or transfer out
- Pregnant
- Indwelling foley catheter
- Immunocompromised (advanced AIDS, hematologic malignancy, history of bone marrow or solid organ transplant, or on highly immunosuppressive therapies)

Primary outcome: 72-hour ED revisit for the same or related infection
Secondary outcomes: 30-day admission to hospital, receipt of appropriate antibiotic therapy, time to appropriate antibiotic therapy

Chart Review #1	Education	Chart Review #2
November 15, 2021-February 15, 2022	November 8, 2022 & November 14, 2022	November 15, 2022-February 15, 2023

Preferred UTI Treatment*

Uncomplicated cystitis (females)	*Complicated Cystitis*	*Pyelonephritis*
Nitrofurantoin 100 mg PO BID x5 days	Nitrofurantoin 100 mg PO BID x7 days	Cefpodoxime 200 mg PO BID x10-14 days

Preferred STI Treatment

Chlamydia	*Gonorrhea*
Doxycycline 100 mg PO BID x7 days	< 150 kg: Ceftriaxone 500 mg IM x1 dose ≥ 150 kg: Ceftriaxone 1g IM x1 dose

Preferred GAS Pharyngitis Treatment

One of the following:

- Penicillin V 250 mg PO QID x10 days or 500 mg PO BID x10 days
- Amoxicillin 1g PO once daily x10 days or 500 mg PO BID x10 days
- Penicillin G benzathine IM x1 dose (< 27 kg: 600,000 units, ≥ 27 kg: 1,200,000 units)

*based on outpatient institutional E. Coli susceptibilities

ANTICIPATED OUTCOMES

- This study aims to review a maximum of 1,000 charts between both chart reviews.
- The authors hypothesize that pharmacist education will potentially decrease 72-hour ED revisits and 30-day admissions, increase receipt of appropriate antibiotic therapy and reduce time to appropriate antibiotics.

LIMITATIONS

- Retrospective single-center study design
- Implementing a collaborative practice agreement (CPA) for pharmacist-led culture follow-up was not feasible at this time for our institution

NEXT STEPS

- Data collection and analysis

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DISCLOSURES

No authors have any financial or personal disclosures to report relating to the subject matter of this presentation.

Evaluation of Liver Function Improvement with Standard Dosing of N-Acetylcysteine for Acetaminophen Overdose

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University of California San Francisco - Departments of Pharmacy[1] and Emergency Medicine[2]

BACKGROUND

- N-Acetylcysteine (NAC) is the standard antidote for acetaminophen (APAP) overdose management
- A 21-hour three-bag regimen is recommended, which can be continued beyond 21 hours until liver function tests (LFTs) have decreased sufficiently
- Liver damage can occur 24-48 hours from initial APAP ingestion and often necessitates a prolonged NAC infusion
- Current literature does not evaluate the time to LFT resolution with NAC therapy, especially when LFT resolution is not achieved within 21 hours

OBJECTIVE

- Our study aims to describe the time to LFT resolution with NAC for APAP toxicity.

Study Outcomes
Primary Outcome: Time to LFT resolution (down trending LFTs x 2)
Secondary Outcomes: 1. Mean duration of NAC infusion (min) 2. APAP levels (mcg/mL) 3. Infusion-related reactions 4. Emergency department (ED) length of stay (hours)

Table 1: Primary and secondary study outcomes

METHODS

Inclusion Criteria:

Patients with acute APAP overdose receiving intravenous NAC including co-ingestion and acute on chronic ingestion

Exclusion Criteria:

Age <18 years old, prisoners, pregnant patients

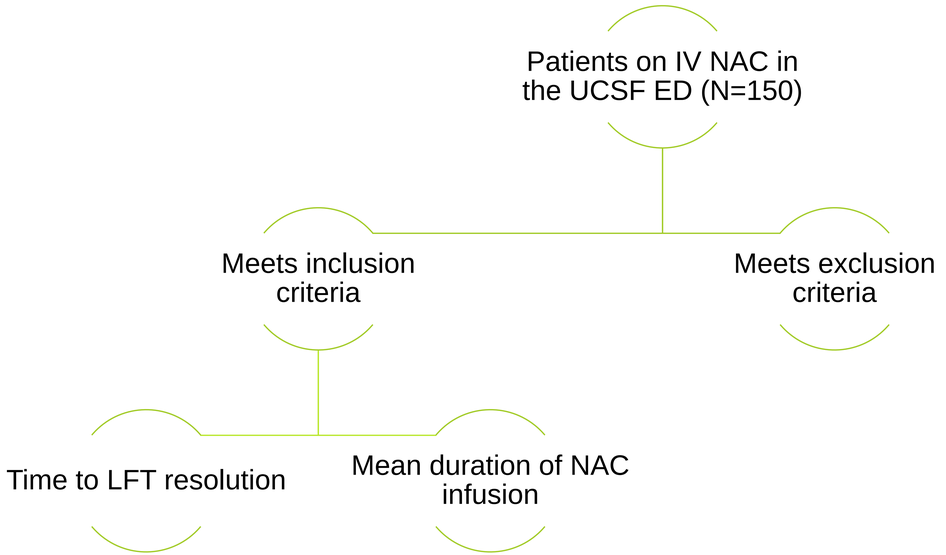

Figure 1: Patient flow diagram

STUDY DESIGN

Study Design: Retrospective cohort study

Setting: UCSF Medical Center Emergency Department

Study Period: January 2012 – October 2022

Data Collection: Patients will be identified using an EPIC report and data will be collected through individual chart review

STATISTICAL ANALYSIS

- Chi-square test for nominal data
- Independent samples t-test for continuous data
- Multivariable regression analysis for confounding variables *i.e.,* prior liver disease, psychiatric history, previous overdose attempts
- All data will be analyzed with STATA software

RESULTS

- Data collection in progress

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Emergency Department Alcohol Withdrawal Implementation

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Background

- Alcohol withdrawal is a significant problem in the United States. More than half of the 8 million people dependent on alcohol are expected to suffer from withdrawal symptoms after a decrease in intake. 5% will require treatment for their withdrawal in an emergency department[1]
- In the St. Luke's Health System, the emergency department (ED) does not have an order panel in EPIC for alcohol withdrawal leading to inconsistent and often undertreatment
- The purpose of this project was to assess current practices in ED management of alcohol withdrawal. Develop an order panel to assist ED clinicians in appropriate treatment of alcohol withdrawal with the hopes that appropriate treatment in the ED will result in a reduction of ICU admissions for alcohol withdrawal

Methods

- **Study Design:** Retrospective data analyzation pre and post implementation of ED alcohol withdrawal panel
- **Inclusion Criteria:** Patients admitted to St. Luke's from the Boise ED with an ED diagnosis of alcohol withdrawal, alcohol abuse, or alcoholism from 1/1/2022-6/30/2022
- **Exclusion Criteria:** Age: <18, transfer to other facility from St. Luke's ED
- **Primary Outcome:** Admission/transfer to ICU during hospital stay
- **Secondary Outcomes:** ED to floor type admission, dexmedetomidine use, intubation, benzodiazepine used, total benzodiazepine usage, total phenobarbital usage

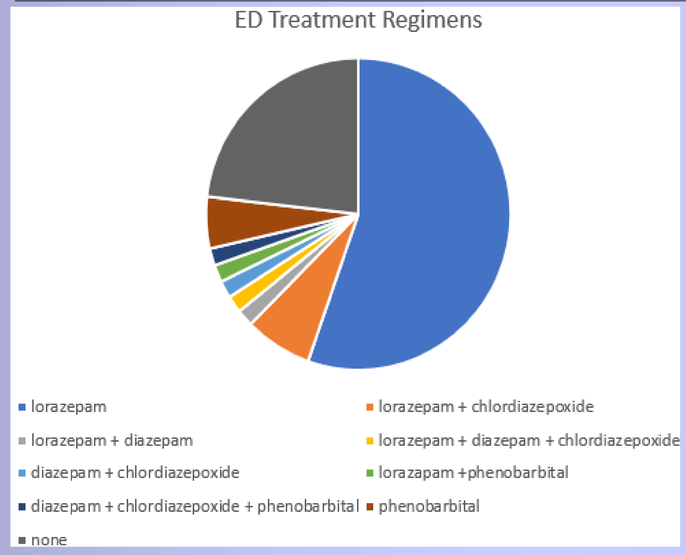
Contact and Disclosure

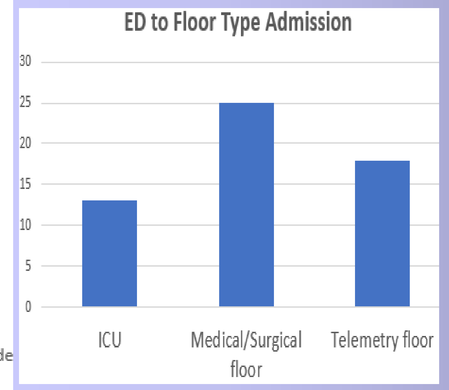
- Rochelle Fabian, PharmD – fabianr@slhs.org

- Authors of this presentation do not have any financial or personal conflicts of interest

Pre-implementation Results

- A total of 56 charts were reviewed in the study time frame
- 20/56 patients (35.7%) were admitted/transferred to the ICU during their hospital stay
- 1/20 patients (5%) admitted to the ICU were intubated
- Of those admitted to the ICU 10/20 (50%) were started on dexmedetomidine
- Average ICU length of stay was 84 hours and 25 minutes
- Average hospital length of stay was 121 hours and 22 minutes





Proposed ED CIWA-Ar protocol

CIWA-Ar Score	Diazepam Dose	Lorazepam Dose
0-7	No Dose, reassess in 2 hours	No Dose, reassess in 2 hours
8-14	5 mg PO, reassess in 1 hour	1 mg PO, reassess in 1 hour
15-20	10 mg IV, reassess in 30 minutes	2 mg IV, reassess in 30 minutes
>20	15 mg IV, reassess in 15 minutes	4 mg IV, reassess in 15 minutes

Proposed ED CIWA-Ar Protocol

- Panel to also include:
  - ❑ Cardiac monitoring
  - ❑ Continuous pulse oximetry
  - Thiamine
    - ❑ 100 mg po tablet
    - ❑ 100 mg IV
    - ❑ 500 mg IV (Only for suspected Wernicke's encephalopathy)
  - Multivitamin
    - ❑ multivitamin po tablet + folic acid 1mg po tablet
    - ❑ Folic acid 1mg IV (Only if patient is NPO)
  - Phenobarbital
    - ❑ Standard dosing 10mg/Kg IV
    - ❑ Reduced dosing: 5mg/Kg IV (patients at high risk of respiratory compromise)

Next Steps

- December 20th: present panel at emergency medicine collaborative of practice
- January: assuming approval – IT to initiate work on build, education for ED nursing, pharmacists, ED and inpatient clinicians
- February: implementation of order panel to all EDs in the St. Luke's System
- May: post implementation retrospective review

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Safety and effectiveness of tenecteplase in patients with NIHSS ≤ 5

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Geisinger

Background/Purpose

The 2018 American Heart Association (AHA)/American Stroke Association (ASA) Guidelines on Acute Ischemic Stroke (AIS) guidelines recommend the National Institutes of Health Stroke Scale (NIHSS) as the preferential stroke severity rating scale. The guidelines state patients with "mild nondisabling stroke symptoms (NIHSS score 0-5)" are not recommended to receive fibrinolytic therapy, and patients whose symptoms are still mild but considered to be disabling may be candidates for fibrinolytic therapy.[1,2]

As a result, care teams may determine that patients with a NIHSS score less than or equal to 5 are candidates for fibrinolytic therapy due to the disability their symptoms present. The Joint Commission National Quality Measures in 2021 recommend use of the modified Rankin Scale (mRS) to assess stroke recovery for Comprehensive Stroke Centers.[3] The preferred formulary agent for AIS in our institution switched from alteplase to tenecteplase dosed at 0.25mg/kg to a maximum of 25mg.

The purpose of this project was to determine if tenecteplase therapy is safe and effective in patients with mild strokes defined by an NIHSS score less than or equal to 5.

Data Collection

This was a retrospective chart review of patients admitted to Geisinger Medical Center from 05/11/2021 – 07/01/2022.

Inclusion criteria:

- Age 18 years or older
- Documented administration of tenecteplase
- Suspected stroke at time of tenecteplase administration
- NIHSS of 0-5 before tenecteplase administration

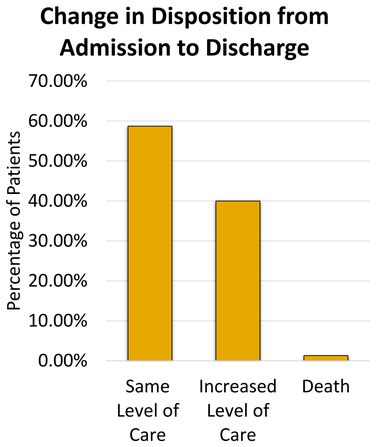
Exclusion criteria:

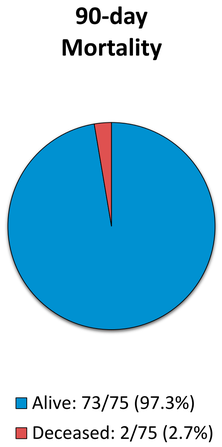
- Pregnancy
- Administration of Tenecteplase for indication other than suspected AIS

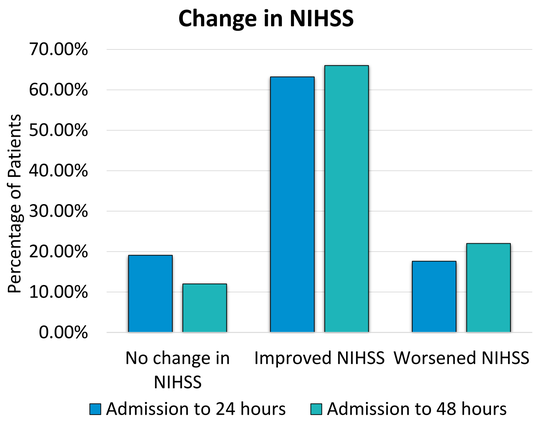
Findings

Patient Characteristics	
Demographics	
Age – years	66.3 +/- 13.7
Female sex – no./total no. (%)	31/75 (41.3%)
Medical History	
Body mass index*	28.2 +/- 7.7
Major ASCVD Events** only – no./total no. (%)	0/75 (0%)
High Risk Conditions*** only – no./total no. (%)	49/75 (65.3%)
Both Major ASCVD Events and High-Risk Conditions – no./total no. (%)	17/75 (22.7%)
Neither Major ASCVD Events or High-Risk Conditions – no./total no. (%)	13/75 (17.3%)

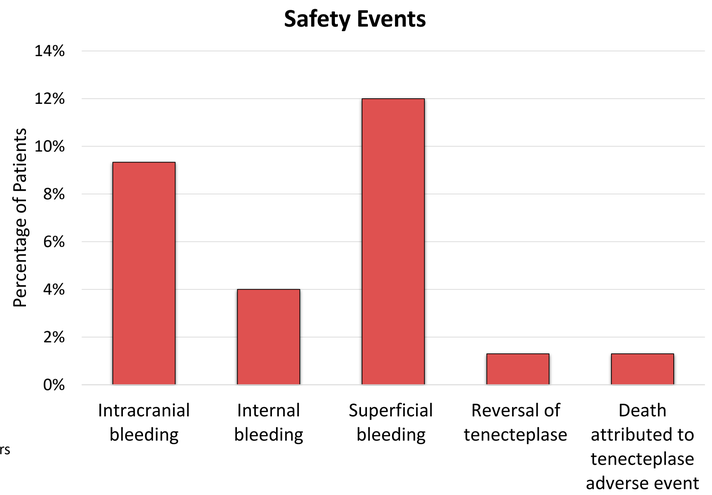
*Body mass index unavailable for 15 patients
**Major ASCVD Events: Recent ACS within 12 months, history of MI, history of AIS, symptomatic PAD
***High-Risk Conditions: Age >65 years, heterozygous familial HLD, history of prior CABG or PCI, DM, HTN, CKD (eGFR 15-59), current smoking







NIHSS data missing for 7 (9.3%) patients at 24 hours, and 25 (33.3%) patients at 48 hours



Conclusions

Administration of tenecteplase was associated with a worsened NIHSS score at 48 hours in 22% of patients, and 58.7% of patients required the same level of care on discharge. While there was insufficient data for mRS scores at all time points, the level of care for patients on discharge is expected in context of the EXTEND-IA TNK trial where 64% of patients achieved 3-month functional independence.[4] 16 patients of 75 (21.3%) in this analysis had safety events, with 3 patients having more than 1, for a total of 21 safety events. The 9% incidence of intracranial bleeding may be higher than the 2.9% incidence of symptomatic intracranial hemorrhage in literature due to the retrospective nature of this review, as we focused on documentation in scheduled imaging rather than patient symptoms.[4] Lastly, our 90-day mortality rate of 2.7% aligns with current literature.[4]

Next Steps

These results will be presented to the Geisinger Medication Use Evaluation Committee and will be shared with the Neurology and Emergency Medicine Departments. Discussions are forthcoming regarding the utility of tenecteplase in patients with NIHSS ≤5, how symptoms are determined to be "disabling," and creating a more consistent documentation process to facilitate pharmacist review of appropriateness of tenecteplase therapy.

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Presented at 2022 American Society of Health System Pharmacists Midyear Clinical Meeting, Las Vegas, Nevada

Narcan or Narcan't: Medication use evaluation of naloxone drips initiated in the emergency department

Denver Health Medical Center, Denver, CO
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Background

- Naloxone is an opioid antagonist typically administered for opioid reversal.[1]
- The effective dose for opioid reversal is highly variable and dependent on the individual characteristics of the patient and opioid used.[2,3]
- Long-acting opioids or novel synthetic analogues display unpredictable pharmacokinetics and outlast the effect of intermittent dosing, which may require transitioning to a continuous infusion.
- There is little evidence-based literature to guide the decision to transition from intermittent doses to a continuous infusion of naloxone.[4,5,6]
- Unnecessary naloxone infusions may lead to inadvertent intensive care unit (ICU) admissions, extra intravenous (IV) lines, and IV compatibility issues.
- Currently, our institution has no protocol providing guidance on initiating naloxone continuous infusion versus continuing intermittent doses.

Objective

- To assess the current utilization of the naloxone infusion at Denver Health Medical Center Emergency Department (DHMC ED) and analyze variables that may be predictive of either early discontinuation or prolonged therapy

Methods

- **Study Design:** Single-center, retrospective cohort
- **Statistics**: Microsoft Excel Version 2002, JMP Version 17
- **Inclusion Criteria**
  - Initiated on a naloxone drip in the ED from August 2019 to August 2022
- **Exclusion Criteria**
  - Intubated prior to initiation of naloxone drip
- Patients were grouped based on an arbitrary infusion duration of less than or more than 4 hours and compared for significant differences in baseline demographics as well as primary and secondary outcomes.
- **Primary Outcomes**
  - ICU admission
  - Discharge disposition
- **Secondary Outcomes**
  - Additional administration of naloxone after initial drip was stopped
  - Incidence of pulmonary edema
  - Hospital and ICU length of stay (LOS)

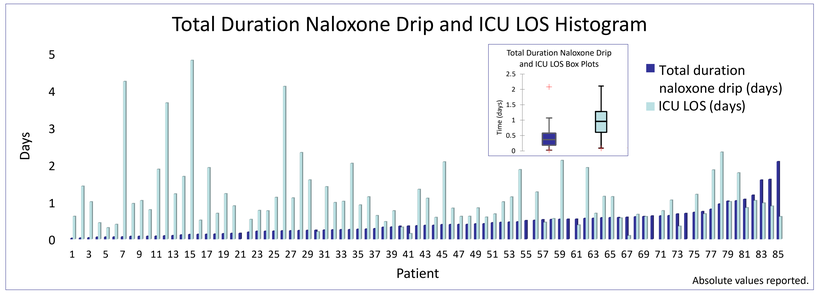
Results

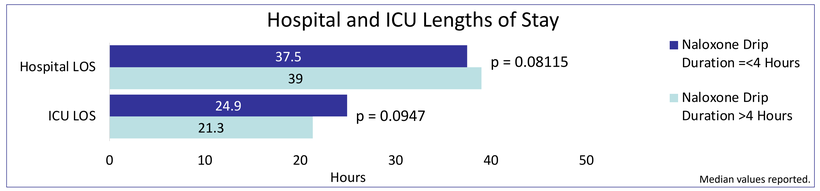
Baseline Demographic	Naloxone Drip Duration >4 Hours (n=59)	Naloxone Drip Duration ≤4 Hours (n=26)	p-value
Age, years, median (IQR)	74 (62-81)	73 (62-81)	0.3426
Weight, kg, mean (SD)	76.2 (18.6)	72.2 (15.7)	0.8483
Female, n (%)	10 (16.9)	8 (30.8)	0.1507
Race, n (%)			
White	46 (78)	19 (73.1)	
Black	6 (10.2)	1 (3.9)	0.3634
Other	6 (10.2)	4 (15.4)	
Unknown	1 (1.7)	2 (7.7)	
Ethnicity of Hispanic, Latinx, or Spanish origin, n (%)	19 (32.2)	6 (23.1)	0.4146
Admitting diagnosis of overdose, n (%)	49 (83.1)	21 (80.8)	0.7993
Suspected opioid(s) of abuse, n (%)			
Fentanyl*	18 (30.5)	7 (26.9)	
Heroin	15 (25.4)	8 (30.8)	
Oxycodone	8 (13.6)	3 (11.5)	0.8766
Unknown	13 (22)	6 (23.1)	
Other†	5 (5.1)	2 (7.7)	
Established methadone patient, n (%)	4 (6.8)	4 (15.4)	0.2106
Urine drug screen opioid positive, n (%)	12/44 (17.9)	5/23 (7.5)	0.6211
Cumulative naloxone dose prior to drip initiation	1.3 (0.9-2.8)	1.35 (0.6-3.6)	0.9013
Total (all routes), mg, median (IQR)	1 (0.7-1.8)	1.05 (0.4-2.05)	0.6883
Intravenous route, mg, median (IQR)			

*Includes illicitly obtained fentanyl; †Other includes morphine extended release, morphine sustained release, methadone, and codeine.

Outcomes	Naloxone Drip Duration >4 Hours (n=59)	Naloxone Drip Duration ≤4 Hours (n=26)	p-value
Admitted to ICU, n (%)	55 (93.2)	25 (96.2)	0.5824
Disposition			
Home, n (%)	57 (96.6)	25 (96.2)	0.5894
Left against medical advice, n (%)	1 (1.7)	1 (3.8)	
Hospice, n (%)	1 (1.7)	0 (0)	
Total duration of naloxone drip, hours, median (IQR)	11.2 (6.8-14.7)	2.6 (1.5-3.8)	**<0.001**
Required additional naloxone after drip initially stopped, n (%)	7 (11.9)	7 (26.9)	0.0949
Pulmonary edema, n (%)	5/33 (15.1)	5/15 (33.3)	0.1505

Results Continued





Discussion

- Overall naloxone duration was relatively brief and did not correlate with ICU LOS.
- No variable was identified as a significant predictor of a long or short duration of the naloxone drip.
- The lack of significant difference among variables may indicate the complexity of predicting naloxone infusion time or LOS in this patient population.
- The standard urine drug screen does not assess for fentanyl presence, which may not be useful as fentanyl is the predominant opioid of abuse.
- **Limitations**:
  - This study may not have evaluated all characteristics predictive of naloxone response or need for a continuous infusion.
  - Data collection was partially completed via manual chart review, which is limited by incomplete data, manual error, and bias.
  - Sample size may be too small to detect a difference in measured outcomes.
  - Presence of pulmonary edema relied on radiographic and sonographic interpretation of imaging, which may vary.

Conclusion

- We did not discover significant patient or treatment variables when comparing longer and abbreviated naloxone infusion times. Overall, naloxone infusion times were of relatively short durations.

References

Disclosure: Authors of this presentation have no information to disclose.

Incidence of Antibiotic Prescribing for Asymptomatic Bacteriuria Upon Discharge from the Emergency Department at an Academic Medical Center

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Background

- Urinary tract infections are one of the most common reasons for presentation to the emergency department (ED) in the United States, accounting for nearly 2% of all ED visits[1]
- Asymptomatic bacteriuria (ASB) is defined as the presence of 1 or more species of bacteria growing in the urine in the absence of signs or symptoms attributable to urinary tract infection[2]
- ASB may be discovered in many patient populations but is only recommended to be screened and treated in individuals undergoing an invasive urologic (GU) procedure or a pregnant patient[2]
- The purpose of this study is to evaluate the rate at which patients are discharged from the ED with unnecessary treatment for ASB

Definitions

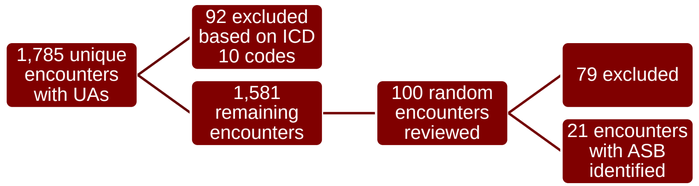
- For the purposes of this study, ASB was defined as having no documented signs or symptoms within the review of systems in the ED note

Methods

- **Design:** Medication use evaluation from April 1, 2022 through June 30, 2022
- **Patients:** Patients encounters were identified if they were charged for a urinalysis (UA) and subsequently discharged from the ED
- **Randomization:** Each encounter was assigned a random number and sorted in numeric order, then encounters were randomly selected for review of ASB
- **Primary Outcome**: Incidence of antibiotic prescribing on discharge for patients with ASB
- **Statistical Analysis:** Descriptive statistics were utilized for baseline characteristics and primary outcomes

Methods (cont.)

Patient Identification



Inclusion Criteria

- Age > 18
- Met study definition for ASB

Exclusion Criteria

- Altered urinary tract anatomy
- Pregnant
- GU procedure within 30 days
- Transplant within 1 year
- ≥ 2 SIRS criteria
- Documented additional bacterial infection
- Receiving treatment or prophylaxis for urinary tract infection at time of UA
- Imaging suggestive of cystitis/pyelonephritis
- Admitted to an inpatient unit

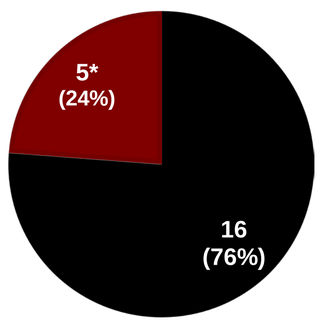
Baseline Characteristics

Characteristic	Patients with ASB (N = 21)	Patients treated for ASB (n = 5)
Age (years), mean	39.9	48.8
Male	1.4%	0%
SBP, mean (mmHg)	135	141
DBP, mean (mmHg)	84	78
HR, mean (beats/min)	98	88
RR, mean (breaths/min)	18	19
Temperature, mean (°C)	36.8	36.9
WBC x 10^9/L, mean	8.7	8.7
Bacteria on UA		
0-50	4	0
50-250	8	0
250-500	3	1
> 500	6	4

SBP: systolic blood pressure; DBP: diastolic blood pressure; HR: heart rate; RR: respiratory rate; WBC: white blood cell

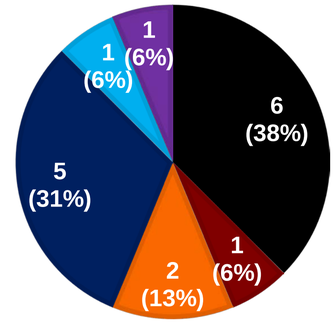
Results

Antibiotics Prescribed for ASB

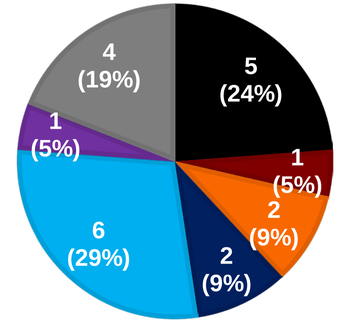


*Musculoskeletal discharge diagnosis: 1 patient
*Urinary discharge diagnosis: 4 patients

ED Chief Complaints



ED Discharge Diagnosis



Results (cont.)

Discharge Antibiotic Regimens

- Cephalexin 500mg PO TID x 7 days
- Cephalexin 500mg PO QID x 7 days
- Ciprofloxacin 500mg PO BID x 3 days
- Ciprofloxacin 500mg PO BID x 7 days
- Nitrofurantoin monohydrate 100mg PO BID x 7 days

Discussion

- Of all 21 patients who were identified as having ASB in the ED, 5 (23.8%) were discharged with inappropriate antibiotic therapy
- Patients who were discharged with antibiotics for their ASB tended to be older in age, though other baseline characteristics were largely the same
- Most patients who were discharged with antibiotics for ASB typically had > 500 bacteria quantified on their UA
- Antibiotic regimens chosen for the treatment of ASB differ from first line recommendations provided in IDSA guidelines

Conclusion

- ASB was identified in 21 patients, and 5 patients (23.8%) received unnecessary antibiotic therapy upon ED discharge

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Disclosure

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

Dosing evaluation of intravenous ketorolac use in the emergency department of a pediatric tertiary care hospital

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Department of Clinical Pharmacy and Translational Science, The University of Tennessee Health Science Center[1] and Le Bonheur Children's Hospital, Memphis, TN[2]

Background[1,2]

- Ketorolac is a nonsteroidal anti-inflammatory drug used for the management of moderate to severe acute pain
- FDA-approved in ages greater than 17 years old; however, it is commonly used off-label to treat pain in pediatric patients
- Evidence in the adult population supports an analgesic ceiling dose of 10 mg when compared to 15 mg and 30 mg doses
- Pediatric dosing is generally 0.5 mg/kg with a maximum dose of 30 mg
- Current practices for the maximum dose of ketorolac is not standardized at our institution

Purpose

To evaluate intravenous ketorolac dosing practices in a pediatric emergency department and assess the need for dosing regimen adjustments in this population

Methods

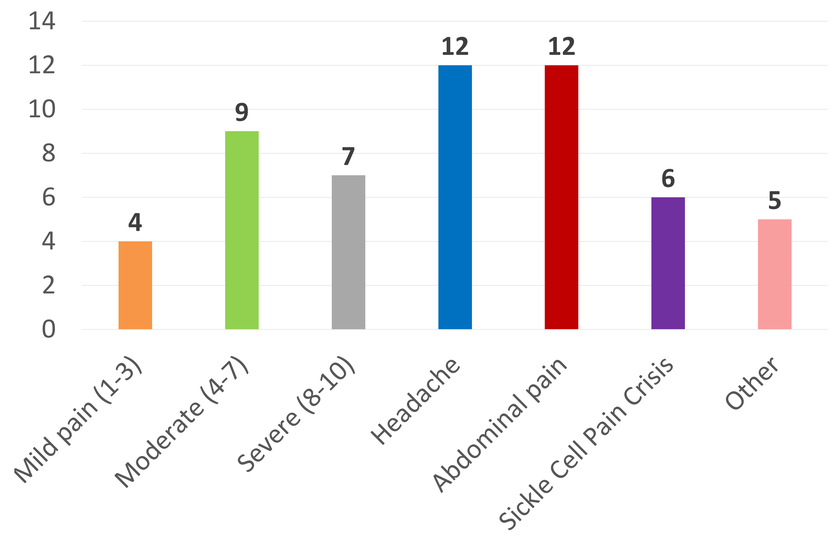
- IRB approved, retrospective review of the electronic medical record for patients aged 0 – 17 years at Le Bonheur Children's Hospital who received ketorolac from January 1, 2022 to September 30, 2022 in the emergency department (ED)
- Data collected includes: patient demographics, diagnosis or indication for ketorolac, dosing and administration time of ketorolac, pain scores, additional pain medications administered, and prescribing medical service
- Descriptive statistics are used to characterize data with a predetermined statistically significant p-value of ≤ 0.05

Preliminary Results

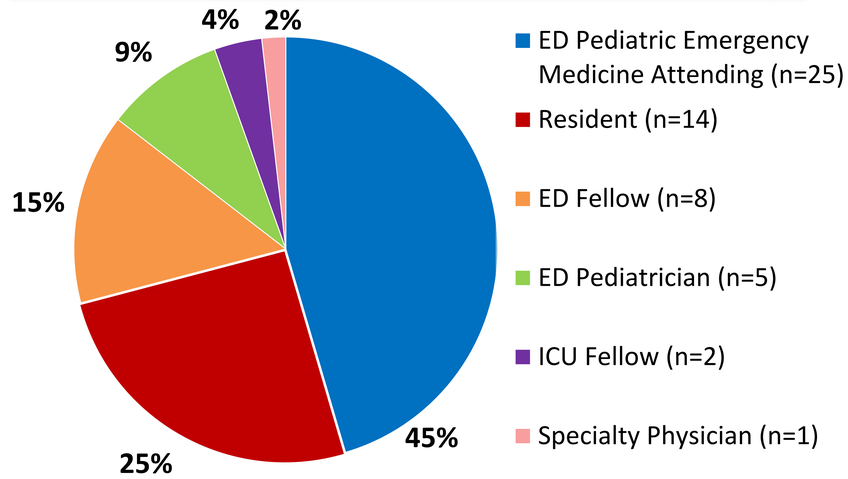
Ketorolac Dosing

Age (years)	Median (mg)	Range (mg)	Median (mg/kg)	Range (mg/kg)
1 to 5 (n=5)	6	4.5-30	0.5	0.47-0.57
6 to 12 (n=11)	15	12-30	0.47	0.21-0.51
13 to 17 (n=39)	20	15-30	0.3	0.12-0.54

Indications



Prescribing Services



Preliminary Analysis

- Over 1,000 occurrences were identified and this is a preliminary analysis of 55 patients
- Of the 55 ketorolac orders reviewed, the maximum dose in each group was 30 mg
- The most common indications were headache (n=12) and abdominal pain (n=12) and most common ordering services were pediatric emergency medicine attendings (n=25)
- Data collection ongoing; Analysis and final results pending

Disclosures

The authors of this poster have no financial conflicts of interest to disclose.

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Hypocalcemia in trauma patients requiring massive transfusion

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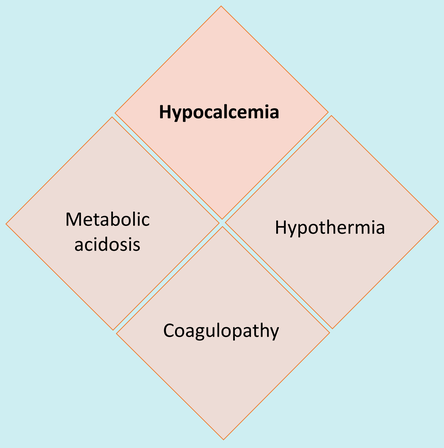
Background

- Many adverse effects are associated with trauma and blood product transfusion

Example criteria for Massive Transfusion Protocol (MTP) activation
- Infusion of at least 10 units of PRBCs in 24 hours
- Replacement of 50% of total blood volume within 3 hours
- Transfusion of at least 4 units of PRBCs in 1 hour

Adult trauma patients
↓
Extensive acute blood loss
↓
Acute hemorrhagic shock
↓
Resuscitation via MTP

"Diamond of Death"



- Hypocalcemia is a well documented occurrence in MTP, but **no current guidance on appropriate calcium replacement in MTP exists**

Objective

To investigate the relationship between calcium supplementation and the quantity of blood products administered in patients with massive transfusion stratified by ionized calcium levels in order to determine the optimal ratio of elemental calcium to total blood products required to prevent hypocalcemia.

Methods

Retrospective case-control study
Urban, Level I Trauma Center
IRB approved for 262 patients

Inclusion Criteria
- 15+ years old
- Admission 1/1/2016-12/31/2021
- OhioHealth Grant Medical Center
- Trauma alert
- MTP activation within 4 hours of ED admission

Exclusion Criteria
- Death in the trauma bay
- Trauma consults
- Catastrophic head injury deemed non-salvageable by neurosurgery service

Primary outcome: Ratio of blood products to calcium supplementation compared between 3 strata of serum iCa

- Severe hypocalcemia: iCa < 3.0 mg/dL
- Hypocalcemia: iCa 3.0 - 4.0 mg/dL
- Normocalcemia: iCa > 4.0 mg/dL

Additional outcomes
- Elemental calcium
- All-cause mortality
- Type & quantity of blood products
- Fluid administration
- Venous blood gas
- iCa values
- TEG derangements
- Systemic hemostatic medications

Data Analysis

Data collection and analysis are in progress
Results will be presented in April 2023

Normality: Shapiro-Wilk test
- Continuous, normally distributed variables → Means & standard deviations
- Continuous, non-normally distributed variables → Medians & ranges
- Categorical variables → Counts & percentages

Future Directions

- Develop institutional, standardized, protocolized calcium supplementation in MTP
- Pilot and prospectively evaluate the effectiveness of a standardized calcium replacement protocol

Abbreviations

iCa: serum ionized calcium
MTP: massive transfusion protocol
PRBCs: packed red blood cells
TEG: thromboelastography

Disclosures

The authors have no relevant financial disclosures.

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Optimal Dosing of Labetalol in Acute Ischemic Stroke

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Cole Sloan, PharmD, BCPS, BCGP; Erin Lingenfelter, PharmD; Helen Hou, PharmD, BCPS

Background

- AHA/ASA guidelines for acute ischemic stroke (AIS) recommend to lower elevated blood pressure (BP) to <185/110 mmHg prior to thrombolytic administration[1]
- Data is lacking to support use of a specific antihypertensive for this population
- Labetalol is an appealing agent for BP lowering in AIS due to its rapid onset and predictable effects[2]
- Questions remain around the use of labetalol due to limitations of various studies[3]

Objective

Compare the effects of doses ≤10 mg or >10 mg of labetalol on median time to target BP after the first dose of antihypertensive is given prior to thrombolytic administration in AIS patients.

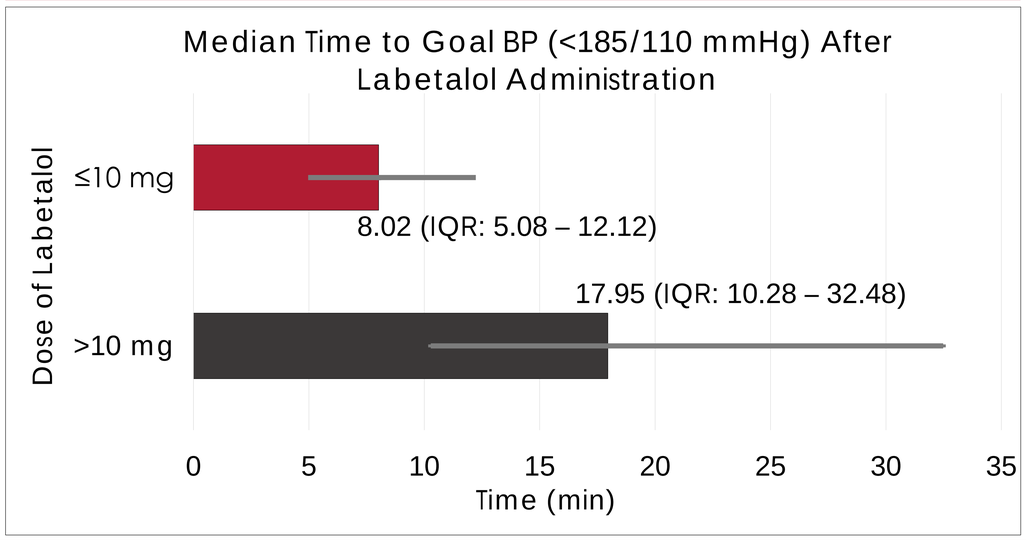
Methods

- Single-center, retrospective, observational
- Chart review from June 2014 to May 2022
- **Inclusion criteria**
  - Thrombolytic receipt for AIS
  - Elevated BP (>185/110 mmHg) and labetalol receipt prior to thrombolytic
  - Age ≥18 years
- **Exclusion criteria**
  - Receipt of antihypertensive prior to labetalol
  - Transfer from outside hospital
  - Prisoners

Characteristics

Baseline Characteristic	≤10 mg (n = 17)	>10 mg (n = 13)
Median age, years (IQR)	67 (57 – 72)	58 (52 – 66)
Median BMI, kg/m^2 (IQR)	27.3 (24.6 – 32.4)	29.7 (25.6 – 34.6)
Median systolic BP (SBP), mmHg (IQR)	187 (172 – 193)	189 (186 – 210)
Median diastolic BP (DBP), mmHg (IQR)	107 (98 – 117)	109 (96 – 130)
Median NIH Stroke Scale (IQR)	8 (5 – 18)	6 (5 – 9)
Hypertension diagnosis, n (%)	11 (64.7)	9 (69.2)
Home antihypertensives, n (%)	8 (47.1)	5 (38.5)
Antihypertensive Use	**≤10 mg (n = 17)**	**>10 mg (n = 13)**
Median dose of labetalol, mg (IQR)	10 (10 – 10)	20 (20 – 25)
Additional antihypertensives:		
Prior to thrombolytic, n (%)	4 (23.5)	6 (46.2)
After thrombolytic, n (%)	5 (29.4)	12 (92.3)

Results



Results Cont.

Secondary Outcome	≤10 mg (n = 17)	>10 mg (n = 13)
Median percent SBP reduction (IQR)	16.1 (7.7 – 22.9)	15.7 (7.2 – 27.2)
Median percent DBP reduction (IQR)	11.2 (4.0 – 18.0)	16.5 (0 – 23.1)
Median door-to-Needle time, min (IQR)	56 (53 – 68)	53 (50 – 60)
SBP <130 mmHg, n (%)	9 (52.9)	5 (38.5)
Heart rate <60 bpm, n (%)	2 (11.8)	2 (15.4)
Post-thrombolytic intracranial hemorrhage, n (%)	8 (47.1)	1 (7.7)

Conclusion

Hypertensive patients with AIS who received ≤10 mg of labetalol had a trend towards faster BP reduction than those who received >10 mg, but results are limited by confounding variables and require further investigation.

Limitations

Results of this study were limited by small sample size as well as confounding variables. Particularly, those who received >10 mg required more additional antihypertensives before and after thrombolytic administration.

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HEALTH UNIVERSITY OF UTAH

The authors of this study have no financial conflicts of interest or disclosures

DEPARTMENT OF PHARMACY

Relationship between Ceftriaxone and Hypoalbuminemia and Potential Impact on Clinical Dosing Strategies

Daniel Smith, PharmD; David Huhtelin, PharmD, BCCCP; Kirk Schubert, PharmD; Veronika Yurchenko, PharmD; Mark Biagi, PharmD

UW Health Northern Illinois - SwedishAmerican Hospital, Rockford, IL

Background

- UWHealth Northern Illinois SwedishAmerican Hospital (SAH) is a 352-bed community hospital in Rockford, IL with a 42-bed emergency department (ED) serving over 70,000 patients annually
- Serum albumin is a globular protein produced by the liver that acts as a binding site for endogenous steroids, fatty acids, bilirubin, and exogenous drugs
- Ceftriaxone is one of the most frequently ordered antibiotics in the inpatient setting for a variety of bacterial infections and is frequently initiated in the emergency department
- Hypoalbuminemia has clinical relevance related to antibiotic pharmacodynamics and pharmacokinetics[1]
- It has been suggested that loading doses of certain highly protein-bound antibiotics, including ceftriaxone, be given to critically ill patients with hypoalbuminemia in order to achieve pharmacokinetic targets[2]

Objectives

Purpose

- To assess the frequency of hypoalbuminemia in patients receiving ceftriaxone in a community hospital emergency department

Primary Objective

- Proportion of patients with documented hypoalbuminemia (defined as serum albumin < 2.5 g/dL) who receive ceftriaxone in the ED

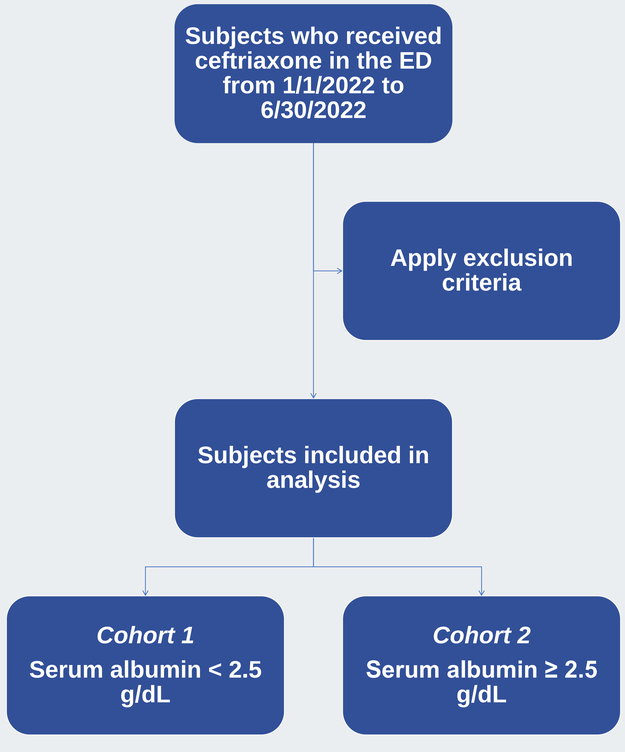
Methods

Inclusion Criteria

- Age 18 to less than 90
- Age 90 and older
- Presentation to SAH ED
- Received at least one dose of ceftriaxone in ED
- Serum albumin level obtained at patient presentation

Exclusion Criteria

- Prison inmate status at time of presentation
- Pregnant patients
- Patients without appropriate lab values to assess outcomes of interest



Expected Sample Size

- It is estimated that data for 1250 subjects will be collected for this study

Results

Data will be collected, analyzed, and presented in 2023 at a regional pharmacy conference

This will also be written as a manuscript for publication

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Disclosures

Authors of this presentation have the following to disclose concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation: None.

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Comparison of Diltiazem Immediate versus Extended Release in Sustaining Acute Rapid Ventricular Response Rate Control

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BACKGROUND

- Atrial fibrillation/flutter with rapid ventricular response (AF with RVR) is a common tachyarrhythmia responsible for >200,000 emergency department (ED) visits annually[1]
- Guidelines recommend either intravenous (IV) beta blockers or non-dihydropyridine calcium channel blockers (NDHP-CCB) for rate control[2,3]
- Diltiazem is commonly used due to its favorable pharmacokinetic profile, including fast onset of action[4]
- After an initial IV bolus dose, a maintenance dose is initiated, either as an IV continuous infusion or oral dose[4]
- A previous study compared IV continuous infusion and oral immediate-release (IR) diltiazem, finding a lower incidence of treatment failure in the oral group (27% vs 46% respectively)[5]
- This previous study also found lower odds of admittance to stepdown unit or intensive care unit and a decreased hospital length of stay (LOS) with oral diltiazem[5]
- Both IR and extended-release (ER) diltiazem formulations are commonly given following successful rate control with an IV bolus dose
- No studies exist comparing outcomes of the two diltiazem oral formulations, leaving agent selection based on provider preference

PURPOSE

Compare oral IR and ER diltiazem for maintaining rate control in patients with AF with RVR who were successfully controlled following an IV bolus dose.

DISCLOSURES

Authors of this presentation have the following to disclose concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation.

All authors: Nothing to disclose

METHODS

Inclusion	Exclusion
• Adult patients who presented to the ED in AF with RVR • Successful rate control within 30 minutes after IV diltiazem bolus dose(s)	• Received electrical cardioversion • Received any other rate control or antiarrhythmic medications • Received IV diltiazem continuous infusion prior to oral diltiazem • Suspected alcohol/drug withdrawal • Inability to tolerate oral medications • Acute decompensated heart failure • Incomplete documentation of study endpoints • Pregnant or incarcerated

IRB-approved, single center, retrospective, cohort study

OUTCOMES

Primary Endpoint:

- Sustained rate control for a minimum of 6 hours after oral medication administration

Secondary Endpoints:

- Doses given
- Need for repeat dose of rate or rhythm controlling agent
- Need for electrical cardioversion
- Time from initial rate control to receipt of study drug
- Need for hospital admission
- Level of care upon admission
- Total hospital LOS

Safety Endpoints:

- Hypotension, bradycardia
- New heartblock on EKG
- Cardiac arrest

INTERIM RESULTS

Variable	IR (n=37)	ER (n=16)
Sustained rate control, %	72.9	31.3
Mode dose, mg	30	180
Mean time from bolus to oral diltiazem, minutes (±SD)	52 (±39.8)	31.6 (±29.8)
Requiring additional rate/rhythm control, %	18.9	43.8
Median hospital LOS, days (IQR)	3 (2-8)	2 (1-2.25)

DEFINITIONS

AF with RVR	HR > 110 bpm
Successful rate control	HR $\leq$ 110 bpm within 30 minutes
Sustained rate control	No more than 1 documented HR > 110 bpm within 6 hours from oral administration
Bradycardia	HR < 60 bpm
Hypotension	SBP < 90 mmHg

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AdvocateAuroraHealth

Impact of Emergency Department Clinical Pharmacist Practitioner-Driven Sepsis Antibiotic Interventions

Primary Investigator: Aubrie Hammond, PharmD **Secondary Investigators:** Regan Porter, PharmD, BCPS, CPP; Kevin E. Lynch, PharmD, BCPS, EMT, CPP; Taylor Cason, PharmD, BCPS, CPP; Patrick Passaretti, PharmD, BCPS, CPP

Background

- The 2021 Surviving Sepsis Guidelines recommend administration of antimicrobials immediately or within the 1st hour of recognition of sepsis in patients with possible septic shock or a high likelihood for sepsis.[1]
- Over the last decade, several trials have demonstrated improved time to antibiotic administration and antibiotic appropriateness when a pharmacist was involved in the care of septic patients.[2-6]
- To our knowledge, no studies evaluating the appropriate use of antibiotics in sepsis driven entirely by an EM (Emergency Medicine) Clinical Pharmacist Practitioner (CPP) have been published. Additionally, no studies have been published following the removal of the pre-specified antibiotics per the SEP-1 CMS requirements.
- EM Clinical Pharmacists at CRMC are formally consulted to assist in antibiotic selection in ~46% of sepsis admissions within the Electronic Medical Record (EMR). Historic practice required consultation with providers prior to antibiotic ordering.
- CRMC's CPP Protocol historically only applied to the Culture Callback Program but entitled CPP pharmacists to manage antimicrobials across disease states when consulted by a provider.

Purpose

The purpose of the study is to evaluate the impact of a Clinical Pharmacist Practitioner-driven protocol on antimicrobial interventions in patients with sepsis in the emergency department (ED).

Objectives

PRIMARY OBJECTIVE

- Compare the rates of appropriate empiric antibiotic utilization in septic patients presenting to the ED pre- and post-intervention

SECONDARY OBJECTIVES

- Broadening of ED-initiated empiric antibiotics upon hospital admission
- Rapid Emergency Medicine Score (REMS) association with in-hospital mortality
- Hospital length of stay
- Pharmacist time spent completing consult (post-intervention)
- Time to antibiotic administration

Methodology

This study will be conducted as a retrospective evaluation on the use of appropriate initial empiric antibiotics in the treatment of sepsis in the ED and has received approval from the CaroMont Health Institutional Review Board (IRB). Two groups will be compared in the study: patients with sepsis prescribed antibiotics by EM providers without pharmacist involvement between October 1, 2021 – February 28, 2022 and those with sepsis prescribed antibiotics with the post-intervention "Sepsis Antibiotic Alert to Pharmacy" between October 1, 2022 – February 28, 2023.

Interventions made include:

- Consult order in EMR updated to require suspected source of infection, allowing CPP's to order empiric antibiotics under scope of practice
- Creation of antibiotic decision trees using Infectious Diseases Society of America (IDSA) guideline recommended empiric antibiotics per indication
- Implementation of standardized documentation

Chi-square test will be used to compare nominal data and a Student's t-test will be used for continuous data. Reliability of data abstracted will be validated through a 10% medical record review by a co-investigator. An inter-rater reliability coefficient will be reported using a kappa statistic.

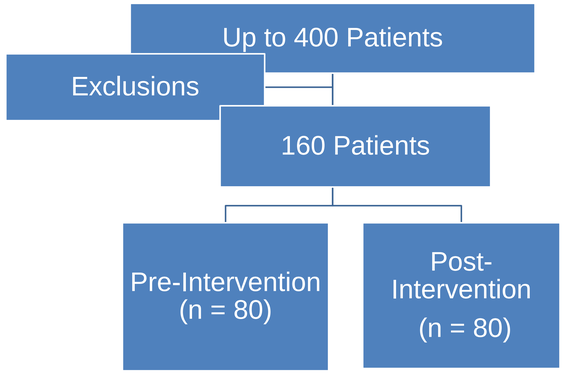
Inclusion Criteria

- Patients ≥18 years of age admitted to the hospital with a diagnosis of sepsis
- Septic patients with antibiotics ordered by providers in the ED without pharmacist involvement between October 1, 2021 – February 28, 2022 (pre-intervention)
- Patients with sepsis with "Sepsis Antibiotic Alert to Pharmacy" ordered in the ED between October 1, 2022 – February 28, 2023 (post-intervention)

Exclusion Criteria

- Patients with unknown or multiple suspected sources of infection
- Vulnerable populations (pregnant patients, prisoners, or patients with significant psychiatric disorders)
- Patients admitted from or transferred to an outside facility
- Patients with advance directives of Do Not Resuscitate (DNR), Do Not intubate (DNI), and/or supportive care only
- Patients transitioned to supportive care, comfort care, or hospice care prior to or during admission
- Patients who expired prior to hospital admission

Study Design



Data Collection

The following data will be collected:

- Demographics
- Suspected source of infection
- Bacterial culture history
- Imaging (abscess, empyema, fractures)
- Medical history (presence of catheter, procedures, diagnoses, etc.)
- Empiric antibiotics ordered in the ED
- Initial antibiotics ordered on admission
- Time of ED presentation, hospital admission, and hospital discharge
- Time of "Sepsis Antibiotic Alert to Pharmacy" order
- Time to 1st antibiotic order
- Time of 1st antibiotic administration
- Vital signs
- Rapid Emergency Medicine Score (REMS)
- In-hospital mortality
- Hospital length of stay
- Time pharmacist spent completing intervention

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Disclosures

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

CaroMont Regional Medical Center Department of Pharmacy
Gastonia, North Carolina

Implementation of Pharmacist-Driven Expedited Partner Therapy in the Emergency Department

Sun Hyee Park, Pharm.D.[1], Natalia Dziadosz, Pharm.D.[1], Destiny Osborne, Pharm.D. Candidate 2023[1,2], Jaclyn Healy, Pharm.D., BCPS[1], Melissa Guarino, Pharm.D., BCPS[1]

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BACKGROUND

- Sexually transmitted infections (STIs) are a leading cause of pelvic inflammatory disease, ectopic pregnancy, and infertility [1]
- Untreated STIs may increase an individual's risk of acquiring or transmitting human immunodeficiency virus (HIV) [2]
- Prompt treatment for curable STIs is critical for preservation of health for all affected individuals, and prevention of transmission to others
- On January 1, 2020 Chapter 298 of 2019 went into effect, expanding New York State Public Health Law §2312 to permit expedited partner therapy (EPT) for chlamydia, gonorrhea, and/or trichomoniasis, following Centers for Disease Control and Prevention (CDC) recommendations [3,4]
- EPT provides an efficient and useful option to facilitate timely medication delivery to sex partners of persons with STIs without completion of a healthcare provider examination
- For patients presenting to the emergency department (ED) for evaluation of acute infections, pharmacists play a valuable role in antimicrobial stewardship through follow-up of post-discharge cultures and assurance of optimal pharmacotherapy [5,6,7]

OBJECTIVE

- This study aimed to to evaluate the effects of implementing a pharmacist-driven EPT policy and procedure for emergency department patients across a health system

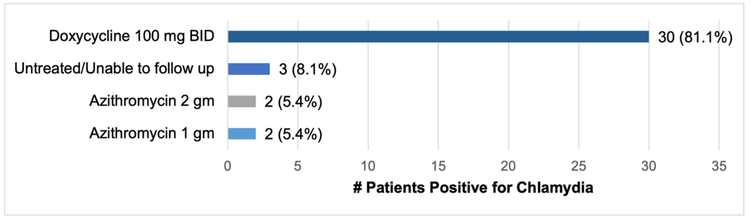
METHODS

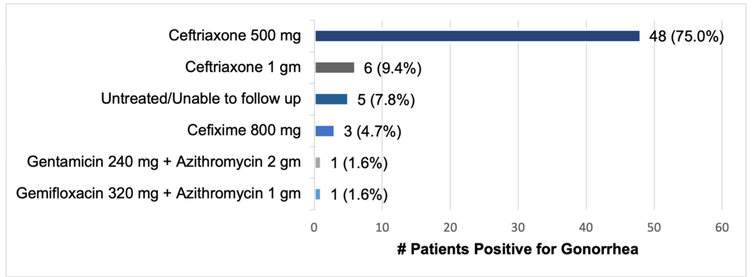
- Multicenter retrospective descriptive analysis
- Generated report of patients presenting to the ED for treatment of acute STIs (March 2022 to October 2022) across three hospitals within a single health system in Western New York
- Patients enrolled (n = 120)
  - Inclusion Criteria:
    - Adult (age ≥18 years)
    - Discharged from the ED
    - Positive ED cultures for acute chlamydia, gonorrhea, and/or trichomoniasis infection(s)
  - Exclusion Criteria:
    - No contact information available for follow-up via phone and/or mail attempts after ED discharge
- Data Collected: patient demographics, type of STI screening test performed, positive STI result, antibiotic treatment(s) received, index partner's decision for EPT
- Categorical variables summarized using frequencies and proportions
- IRB approved
- No financial disclosures or conflicts of interest

RESULTS

Variable	n (%)
Gender	
Male	66 (55.0%)
Age	
18-20 years	16 (13.3%)
21-30 years	56 (46.7%)
31-40 years	38 (31.7%)
≥41 years	10 (8.3%)
Positive STI result	
Chlamydia	32 (26.7%)
Gonorrhea	55 (45.8%)
Trichomoniasis	23 (19.2%)
Co-infections	10 (8.3%)
Chlamydia and Gonorrhea	4 (3.3%)
Chlamydia and Trichomoniasis	1 (0.8%)
Gonorrhea and Trichomoniasis	5 (4.2%)
STI Treatment in ED	
Empirically treated for >1 STI in ED	58 (48.3%)
Tested For	
Trichomoniasis	1 (0.8%)
Gonorrhea/Chlamydia	40 (33.3%)
Gonorrhea/Chlamydia/Trichomoniasis	79 (65.8%)
Post-ED Discharge Pharmacist Follow Up	
Unable to follow up with index patient	67 (55.8%)
Decision for EPT	
Partner(s) of index patient to return to ED for treatment	5 (9.4%)
Clinic information provided for partner(s) to receive treatment	6 (11.3%)
Electronic prescription sent for partner(s) EPT	10 (18.9%)
Index patient to return to ED to pick up EPT kit(s) for partner(s)	0
EPT declined	12 (22.6%)
Pharmacist documentation unclear	20 (37.7%)

Table 1. Baseline Characteristics. Total of 120 patients were included in the study. Majority of the patients comprised of males (55.0%) and those between the ages of 21 and 25 years (24.2%). The STI, among the three that were included in the study, with highest incidence during the study period was gonorrhea (45.8%), not including nine patients who tested positive for both gonorrhea and an additional STI. Less than half of the patients (48.3%) were provided with empiric antibiotic treatment in the ED for more than one STI. Most patients received testing for gonorrhea, chlamydia, and trichomoniasis; however, 41/120 patients (34.1%) were not tested for all three STIs. When attempted to contact after ED discharge to discuss EPT, majority of patients (55.8%) did not respond to neither the phone nor mail attempts. Of the 53 patients that were successfully contacted, less than half of the patients (39.6%) accepted EPT for their partner(s).





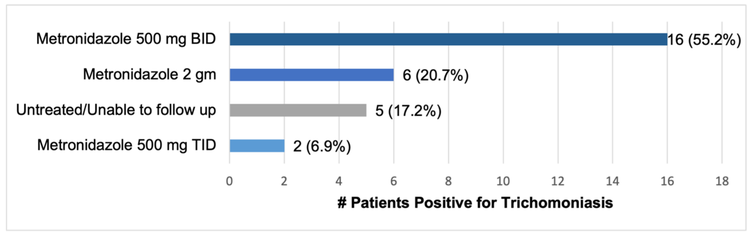


Figure 1. Distribution of Antibiotics Ordered or Prescribed. Majority of patients received first-line antibiotics for the treatment of the respective infection. *BID* = twice daily, *TID* = three times daily

DISCUSSION

- Despite provision of multiple options for EPT, majority of patients declined STI treatment for their partner(s)
- These results oppose previously reported acceptance rates for EPT among index patients with untreated partners [8]
- Exploring barriers and reasons for EPT declination may improve overall awareness and education among patients and clinicians

LIMITATIONS

- Retrospective chart review within a single health system
- Highly dependent on pharmacist documentation of EPT
- Small sample size

CONCLUSION

- Establishment of a pharmacist-driven EPT policy and procedure in the emergency department provides a valuable avenue to improve health equity by expanding access to antibiotic treatment for sex partner(s) of persons diagnosed with chlamydia, gonorrhea, and/or trichomoniasis

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Evaluation of the Antibiotic Spectrum Utilized in Open Fractures at Level I Trauma Centers

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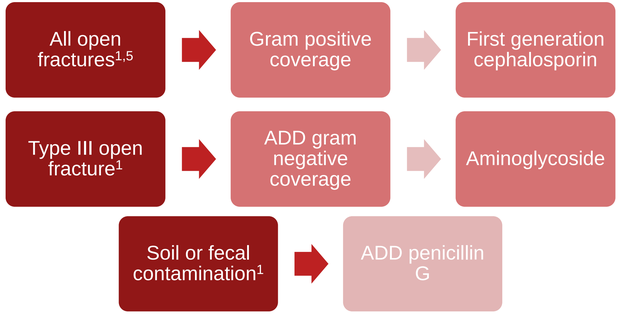
Introduction

- Patients that experience an open fracture are at an increased risk of infection[1]
- Annually, 30.7/100,000 patients ≥ 15 years of age present with an open fracture[2]
- Factors that increase the risk of infection[3]:
  - Failure to utilize prophylactic antibiotics
  - Resistance of organisms to antibiotics
  - Increased time from injury to antibiotic administration and debridement
  - Extent of soft tissue damage
  - Open tibial fractures
  - Positive wound cultures post-debridement
  - Wound closure in the presence of *Clostridium perfringens*
- Currently, guidelines exist from the Eastern Association of Surgery and Trauma (EAST) and the Surgical Infection Society (SIS)
- Guidelines from 2006 and 2011 suggest:



Purpose

To evaluate the utilization of guideline directed antibiotic spectrum of activity in open fractures at level I trauma centers within a hospital system

Study Definitions

Gustilo Fracture Classification and Infection Risk[4,5]

Fracture Type	Definition	Infection Risk
Type I	Skin wound < 1 cm in length and clean	0-9%
Type II	Skin wound > 1 cm in length without soft tissue damage, flaps, or avulsions	1-12%
Type III	Skin wound > 10 cm, extensive soft tissue injury or traumatic amputation	9-55%
Type IIIA	Adequate soft tissue coverage	4%
Type IIIB	Significant soft tissue loss with exposed bone requiring soft tissue transfer	52%
Type IIIC	Vascular injury that requires repair for limb preservation	42%

Term	Definition
Open Fracture	A fracture that has a fracture fragment break through the skin and communicate with the environment[1]
Fracture Related Infection	A superficial or deep infection at the site of injury as noted within the patient chart as fever, erythema, or drainage at the site of injury
Guideline Directed Antibiotic Spectrum of Activity	Type I and II Fractures – First generation cephalosporin (cephalexin, cefazolin) OR clindamycin Type III Fractures – • First generation cephalosporin (cephalexin, cefazolin) OR clindamycin • PLUS an aminoglycoside Soil/Fecal/Clostridium contamination – Penicillin G OR metronidazole

Outcomes

Primary objective:

- Incidence of fracture related infection within 60 days

Secondary objectives:

- Compliance with guideline directed antibiotic spectrum of activity
- Antibiotic choice
- Primary organisms growing in cultures
- *Clostridioides difficile* infection rates
- Organism resistance rates

Methods

This study is submitted to the institution's IRB for approval

Study Setting:

- Multi-center, retrospective cohort review
- Patients will be identified from the electronic medical record through diagnosis codes
  - Duration: 1/1/15-6/30/22
  - Study locations:
    - OSF Saint Anthony Medical Center
    - OSF Saint Francis Medical Center Peoria, IL

Inclusion Criteria	Exclusion Criteria
• ≥18 years of age • Presentation to OSF Saint Anthony Medical Center or OSF Saint Francis Medical Center • Admission for treatment of open fractures	• Patients transferred into the facility from an outside hospital • Incarcerated • Pregnant • ≤17 years of age

Results

This study is ongoing.

Statistical Analysis

- Continuous variables will be described using mean and standard deviation or median and interquartile range
- Comparisons of continuous data will be made utilizing the Student t-test or Wilcoxon rank sum test
- Comparisons of categorical data will be completed utilizing a Chi-squared or Fisher exact test for categorical variables
- Severity of open fracture will be controlled in a multivariate analysis
- All tests will be two-sided and p-values ≤0.05 will be considered statistically significant

References

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The Impact of Buprenorphine Induction for Opioid-Use Disorder on Rates of Emergency Department Visits and Admissions

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DMC DETROIT MEDICAL CENTER always there.

WAYNE STATE

Background

In 2020, there were about **69,000 deaths** due to opioids.

200,000 emergency department (ED) visits in 2016 were due to opioid-related overdose.

Buprenorphine is a safe and effective treatment of opioid use disorder (OUD).

A program to identify, treat, and refer OUD patients from the ED was created and accepted.

Objective

The purpose is to assess the effect of buprenorphine induction therapy in the ED for OUD on rates of emergency department visits and admissions.

Methods

Study Design	• Retrospective cohort • May 1, 2020 - March 1, 2022
Inclusion Criteria	• >18yo presenting to the ED for OUD (index ED visit) • Primary diagnosis opioid dependence or withdrawal • Treated with buprenorphine
Exclusion Criteria	• Pregnant or imprisoned • Death within six months of index visit • Refill of buprenorphine within six months prior to index visit
Primary Outcome	• Incidence of total ED visits and admissions
Secondary Outcomes	• ED visits and admissions due to OUD • Outpatient refill of buprenorphine • Inpatient buprenorphine (mg) administered

Results

Demographics

N = 41	Number of Patients (%)
Sex	
Male	34 (83)
Race	
African American	28 (68)
Caucasian	5 (12)
Comorbid Conditions	
Psychiatric condition	6 (15)
Other drug use	6 (15)
Alcohol use	4 (10)

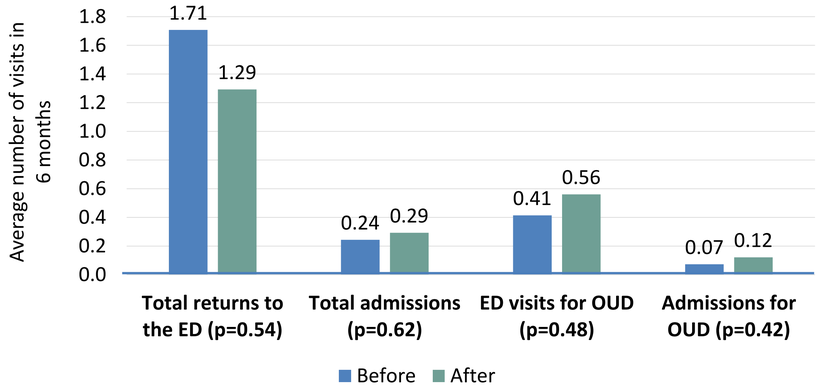
N = 41	Median (interquartile range)
Age	59 (42-67)

Buprenorphine and Naloxone

N = 41	Number of Patients (%)
Index ED Visit Discharge Prescriptions	
Buprenorphine	16 (39)
Naloxone	9 (22)
Refill Within Six Months	
Buprenorphine	19 (46)
Naloxone	2 (5)

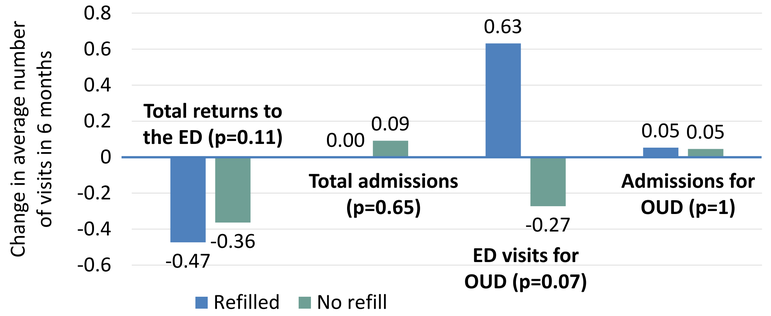
N = 41	Median (interquartile range)
Inpatient Buprenorphine Administration	
Total administered (mg)	12 (8-23)
mg/day	8 (8-16)

Return Visits within Six Months of Index ED Visit



Results

Effect of Outpatient Buprenorphine Refill on Return Visits within Six Months



Conclusion and Future Directions

Discussion	• Total ED visits decreased due to the COVID-19 pandemic? • ED visits specific for buprenorphine refills
Limitations	• May have had prior ED visit where buprenorphine was initially administered • Single-center, small cohort, ED visits at other institutions?
Conclusion	• **Buprenorphine induction in the ED for OUD is an evolving practice that may motivate patients to seek care rather than turn to opioid misuse**
Future	• Opioid overdose rates and safety outcomes • Subgroup analyses – acuity, reason for OUD ED visit, pre- versus post- pandemic statistics

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

Safety Evaluation of Intravenous Heparin Protocol Following Alteplase Treatment in Patients with Suspected or Confirmed Pulmonary Embolism

Beaumont

Erika Waldsmith, PharmD[1]; Lisa Hall Zimmerman, PharmD, BCPS, BCNSP, BCCCP, FCCM, FCCP[1]; Claudia Hanni, PharmD, BCPS[1]; Jenna Holzhausen, PharmD, BCPS[1]

[1]Department of Pharmaceutical Services ▪ Beaumont Hospital, Royal Oak, MI

Background

- Pulmonary embolism (PE) is a medical emergency requiring prompt intervention
- Guidelines recommend systemic thrombolysis in high-risk individuals presenting with hemodynamic compromise[1,2]
- IV alteplase 50-100 mg (0.5-0.6 mg/kg if < 50 kg) in non-cardiac arrest PE should be administered over 2 hours[2]
- IV alteplase during cardiac arrest should be administered as a 50 mg bolus that may be repeated once if return of spontaneous circulation (ROSC) is not obtained[1,3]
  - If ROSC is obtained after the first IV bolus, a subsequent IV alteplase 50 mg should be administered as an IV infusion
- Thrombolytics cause transient elevations in activated partial thromboplastin time (aPTT), thus parenteral anticoagulation should be held during its administration and resumed when aPTT is ≤ 2x ULN without a bolus[1,2,4]
- Transition from parenteral to oral anticoagulation should occur 2-3 days after thrombolytic administration to ensure patient stabilization[1]
- This organization introduced a new, system-wide, post-alteplase heparin workflow on September 13, 2021, which included changes such as aPTT collection times and pharmacist verification of every dose adjustment

Purpose

To assess adherence to a newly implemented health system protocol and safety of IV heparin therapy following alteplase administration for PE

Methods

Study Design: IRB approved, retrospective, 8 hospital health system chart review

Inclusion: Age ≥ 18 years who received IV alteplase for suspected or confirmed PE

Study Period: 9/14/2021 – 8/31/2022

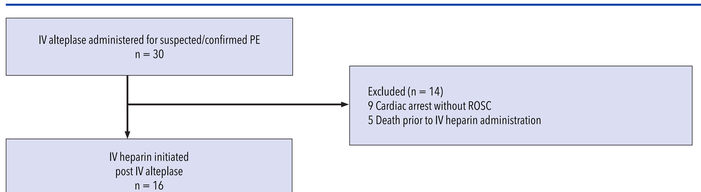
Exclusion: Patients who did not receive IV heparin therapy post IV alteplase

OUTCOMES	
Primary	Overall protocol adherence
Secondary	Time from post-thrombolytic aPTT to IV heparin initiation Accuracy of IV heparin dose modification based on approved protocol Transition time between IV heparin and oral anticoagulation Documentation of pharmacist interventions
Safety	Incidence of major bleeding defined by ISTH criteria[5]

Statistical analysis: mean, median, interquartile range (IQR), and standard deviation (SD) as appropriate

NOTE: Dosing strategies will also be described for excluded patients who did not receive IV heparin therapy post-alteplase

Results



Results cont'd

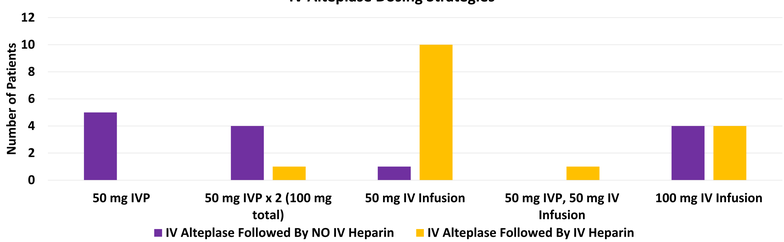


Table 1. IV Alteplase Followed By Heparin Administration

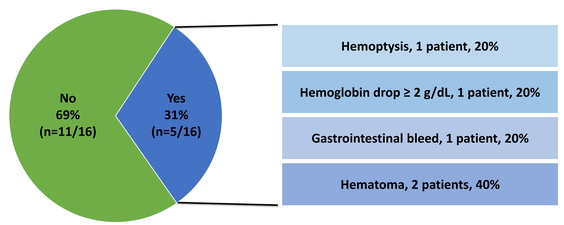
Demographics - IV Alteplase Followed By Heparin Administration	n=16
Male, n (%)	10 (63)
Age, years (SD)	64 (15)
Height, cm (SD)	174 (12)
Weight, kg (SD)	109 (22)
Outside facility transfer, n (%)	1 (6)
Massive PE, n (%)	10 (63)
Cardiac arrest, n (%)	2 (13)
aPTT obtained prior to IV alteplase, n (%)	12 (75)
aPTT, seconds [QR]	50 [27,61]
Heparin prior to alteplase, n (%)	7 (44)
Infusion stopped during alteplase administration, n (%)	7(100)
Heparin discontinuation to alteplase administration, minutes (SD)	43 (20)
Alteplase weight-based dosing, mg/kg (SD)	0.7 (0.3)

HEPARIN

Table 2. Post IV Alteplase Heparin Administration

Post IV Alteplase Heparin Administration	n=16
Overall protocol adherence, n (%)	12 (75)
IV heparin stopped during alteplase administration, n (%)	7 (100)
Post IV alteplase aPTT correctly collected, n (%)	12 (75)
Correct post IV alteplase heparin order set used, n (%)	15 (94)
IV Heparin initiated without initial bolus, n (%)	16 (100)
aPTT obtained 6 hours after initiation of IV heparin, n (%)	16 (100)
IV heparin continuous infusion correctly adjusted per protocol, n (%)	16 (100)
Pharmacist documentation of IV heparin infusion assessment, n (%)	7 (44)
Correct documentation template used, n (%)	3 (43)
Time between IV alteplase completion and IV heparin start, minutes [IQR]	93 [64,155]
Post IV alteplase aPTT value, seconds (SD)	55 (44)
aPTT supratherapeutic, n (%)	2 (13)
IV heparin transitioned to oral or subcutaneous anticoagulation, n (%)	11 (69)
Time to transition, days [IQR]	4.7 [1.8, 5.0]

MAJOR BLEED EVENTS



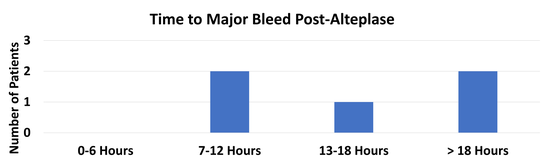


Table 3. Major Bleeding aPTT

Major Bleeding aPTT	n=5
Last documented aPTT prior to major bleed, seconds (SD)	107 (61)
aPTT supratherapeutic, n (%)	3 (60)

Discussion

- Post IV alteplase aPTT collection was found to be the primary area of improvement for overall protocol adherence
- Multidisciplinary education on post-alteplase STAT aPTT collection is necessary including emphasis that STAT aPTT is included in the post-alteplase workflow to ensure heparin is appropriately initiated or reinitiated post IV alteplase
- Supratherapeutic aPTT likely contributed to alteplase associated bleeding events
- Limitations: small sample size due to high thrombectomy rates, high mortality rate, retrospective chart review

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Disclosure statement: The authors do not have any personal or financial disclosures to report in relation to this study

P25404m_111722

Evaluation of Nitroglycerin Bolus Dosing on Hemodynamic Stability in Patients Experiencing Sympathetic Crashing Acute Pulmonary Edema in the Emergency Department

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Northwestern Memorial Hospital; Chicago, IL

Background

- Sympathetic crashing acute pulmonary edema (SCAPE), or flash pulmonary edema, is the extreme end of the hypertensive acute decompensated heart failure (ADHF) spectrum and has an onset of minutes to hours instead of days to weeks
- As fluid accumulates in the lungs, a sympathetic surge causes vasoconstriction of the peripheral vasculature as a result of decreased systemic perfusion resulting in further increases in afterload, causing patients to decompensate quickly
- The use of initial high-dose nitroglycerin (HDN) given as an IV bolus has been explored as an option to quickly vasodilate the vasculature and decrease afterload, allowing fluid within the lungs to redistribute back into the vasculature
- However, its use continues to be controversial due to concerns for drug-induced hypotension
- HDN requires consistent monitoring to allow for dose reduction once the patient begins to respond to therapy
- NMH nitroglycerin soft max in the pump = 200 mcg/min

Purpose

To assess the use of high-dose nitroglycerin in the Emergency Department for the indication of sympathetic crashing acute pulmonary edema and the subsequent outcomes to determine if updating the dosing strategy programmed in the Alaris pump is safe

Disclosures

No author of this study has any financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation.

Results

Total: 50 patient encounters

Demographics

- Average age: 62 years old
- Gender:
  - Female: 52%
  - Male: 48%
- Race:
  - African American: 54%
  - White: 24%
  - Asian: 10%
  - American Indian: 8%
  - Other: 4%
- Ethnicity:
  - Hispanic/Latino: 18%
- Comorbid Conditions:
  - Hypertension: 84%
  - Chronic Kidney Disease: 52%
  - Diabetes: 48%
  - Heart Failure: 34%

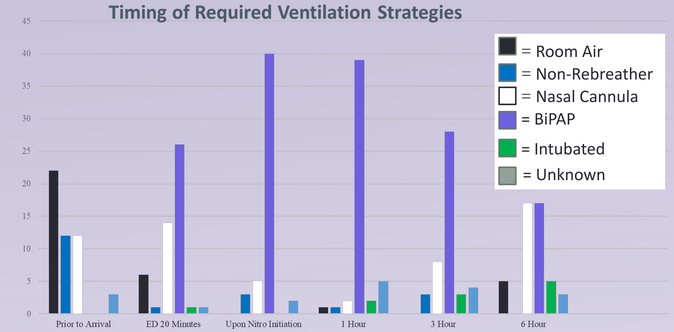
Average Baseline Vitals

- RR: 28 rpm (IQR: 18 – 46)
- SpO2: 90% (IQR: 44 – 100)
- HR: 98 bpm (IQR: 68 – 145)
- SBP: 203 mmHg (IQR: 109 – 274)
- DBP: 108 mmHg (IQR: 76 – 142)

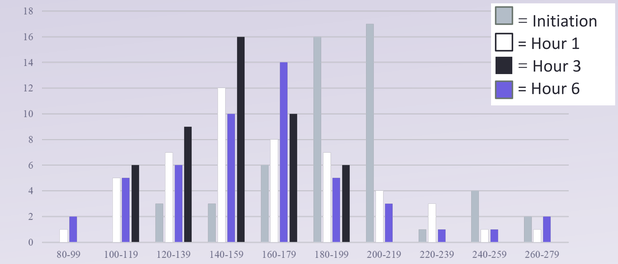
Average Nitroglycerin Dosing

- Starting Dose: 140 mcg/min (IQR: 5 – 400)
- Time at Starting Dose: 44 min (IQR: 1 – 960)
- 1st Titration Dose: 107 mcg/min (IQR: 0 – 400)
- Time at 1st Titration Dose: 50 min (IQR: 0 – 572)
- 2nd Titration Dose: 90 mcg/min (IQR: 0 – 390)
- Time at 2nd Titration Dose: 31 min (IQR: 0 – 395)
- Total Time on Nitro: 671 min (IQR: 5 – 6063)

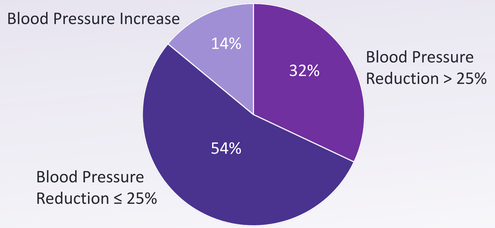
Timing of Required Ventilation Strategies



Systolic Blood Pressure Ranges Based on Time in the ED

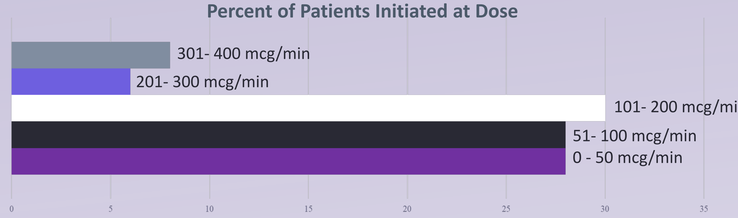


Blood Pressure Change within 1st Hour



Results Cont.

Percent of Patients Initiated at Dose



Discussion

- Dosing of nitroglycerin is exceeding Alaris pump soft max settings of 200 mcg/min
- The average starting dose of nitroglycerin was around 140 mcg/min for a mean duration of 44 minutes
- High dose nitroglycerin was not associated with subsequent hypotension
- Systolic blood pressure reduction within the first hour exceeded 25% in 32% of cases but actually increased in 14% of cases
- Within 6 hours of nitroglycerin initiation, BiPAP requirement decreased over 50% amongst the study population
- This DUE is consistent with reported literature that the effect of high dose nitroglycerin is not associated with hypotension

Limitations

- Retrospective study design
- Small sample size
- Did not collect adjunctive medication administration (antihypertensives, vasopressors, sedation, etc.)
- Short follow-up period

Impact of Pharmacist-Led Interventions on Urine Cultures and Sexually Transmitted Infections in the Emergency Department

Anna-Kathryn Priest PharmD, Alanna Rufe, PharmD, BCIDP, William R. Johnson PharmD, BCCCP, Kaitlyn Claybrook, PharmD, Michael T. Dailey, PharmD, MBA

Jackson Hospital & Clinic Department of Pharmacy Services – Montgomery, AL

Background

- Urinary tract infections (UTIs) and sexually transmitted infections (STIs) are commonly encountered diagnoses in the emergency department (ED).
- In 2019, more than 2 million ED discharge diagnoses were UTI related.[1]
- Due to delay between culture collection and pathogen identification, treatment is empiric.
- ED pharmacists' involvement in culture reviews have shown a decrease in inappropriate antimicrobial use, ED revisits, and hospital admissions.[2]
- The purpose of this quality improvement project is to evaluate the impact of initiating a pharmacist-led service reviewing urine cultures and positive STI results on patients discharged from the ED.

Objectives

Primary Outcome	Intervention required
Secondary Outcomes	Antibiotic appropriateness
	Dose appropriateness
	Utilization of UTI algorithm
	30-day hospital admission due to related infection
	30-day overall hospital admission

Methods

- Single-center, quality improvement process
- Descriptive statistics will be used as well as Chi-squared and t-test where applicable

Inclusion Criteria	Exclusion Criteria
Patients discharged from the ED with a positive urine or STI result	Patients that expired
Patients ≥ 19 years old	Hospital admission

Study Design

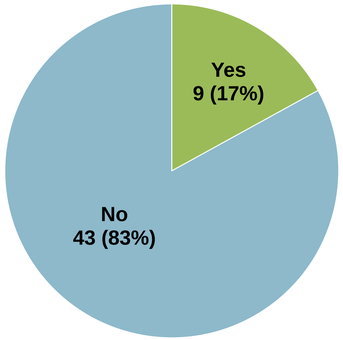
- Patients discharged from the ED at Jackson Hospital between September 2022 and November 2022 with subsequent positive urine or STI result were reviewed by the ED pharmacist daily
- A clinical decision support database was used to identify patients with positive results
- Once identified, the pharmacist notified an ED physician and determined a plan of care
- An algorithm for outpatient UTI treatment was created based on local resistance patterns to guide providers on their empiric antibiotic selection

Results

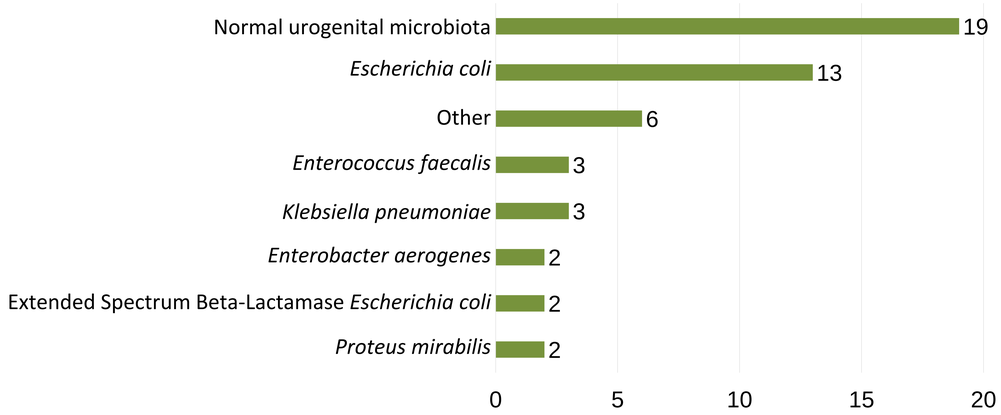
Patient Demographics
n=50

Age (yr) - median (range)	52 (19-97)
Female sex – n (%)	33 (64)
Pregnant – n (%)	1 (2)
Urine cultures – n	52
STI – n (%)	1 (2)
Antibiotic allergies – n (%)	7 (13)

Pharmacist Intervention

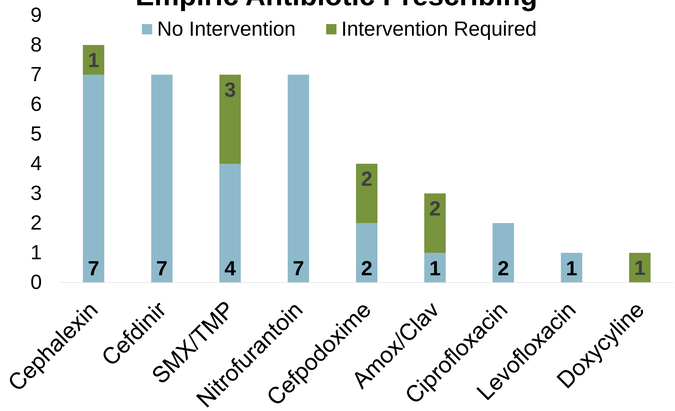


Isolated Organisms from Urine Cultures



Results

Empiric Antibiotic Prescribing



- Initial antibiotics were dosed incorrectly 16% of the time
  - Cephalexin was the most common and was underdosed

Future Directions

Following the initial algorithm implementation, there will be protocol development to streamline follow-up procedures and a post-implementation impact analysis. Additionally, providers will be educated on best practices when treating UTIs for patients discharged from the ED.

Limitations

- Variability in patient management
- Reliance on medical record documentation
- Loss to follow-up

Disclosures

The authors have no disclosures or conflict of interest

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Emergency Department Alcohol Withdrawal Panel Implementation

St. Luke's – Boise Medical Center

Rochelle Fabian PharmD, Kathy Glem PharmD, BCCCP

Background

- Alcohol withdrawal is a significant problem in the United States. More than half of the 8 million people dependent on alcohol are expected to suffer from withdrawal symptoms after a decrease in intake. 5% will require treatment for their withdrawal in an emergency department[1]
- In the St. Luke's Health System, the emergency department (ED) does not have an order panel in EPIC for alcohol withdrawal leading to inconsistent and often undertreatment
- The purpose of this project was to assess current practices in ED management of alcohol withdrawal. Develop an order panel to assist ED clinicians in appropriate treatment of alcohol withdrawal with the hopes that appropriate treatment in the ED will result in a reduction of ICU admissions for alcohol withdrawal

Methods

- **Study Design:** Retrospective data analyzation pre and post implementation of ED alcohol withdrawal panel
- **Inclusion Criteria:** Patients admitted to St. Luke's from the Boise ED with an ED diagnosis of alcohol withdrawal, alcohol abuse, or alcoholism from 1/1/2022-6/30/2022
- **Exclusion Criteria:** Age: <18, transfer to other facility from St. Luke's ED
- **Primary Outcome:** Admission/transfer to ICU during hospital stay
- **Secondary Outcomes:** ED to floor type admission, dexmedetomidine use, intubation, benzodiazepine used, total benzodiazepine usage, total phenobarbital usage

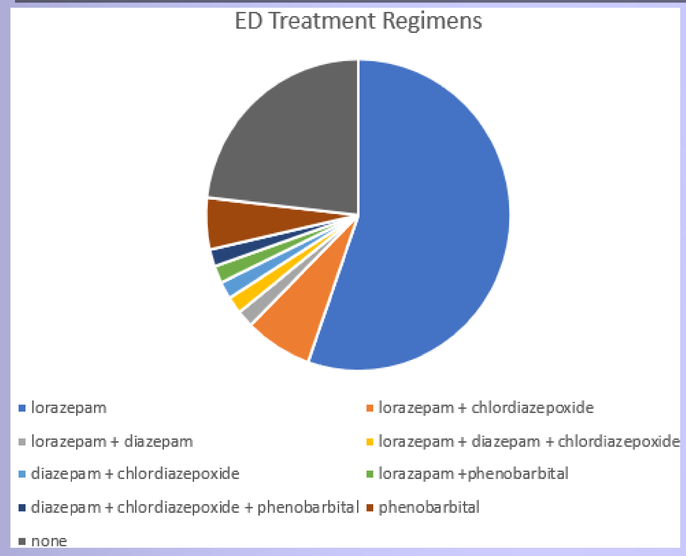
Contact and Disclosure

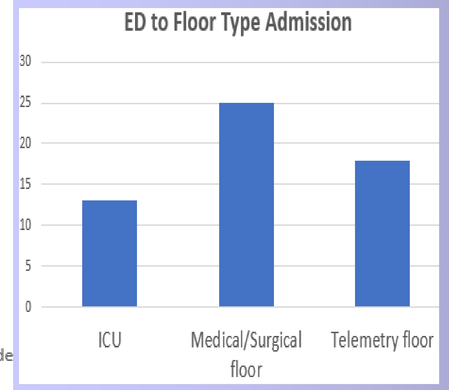
- Rochelle Fabian, PharmD – fabianr@slhs.org

- Authors of this presentation do not have any financial or personal conflicts of interest

Pre-implementation Results

- A total of 56 charts were reviewed in the study time frame
- 20/56 patients (35.7%) were admitted/transferred to the ICU during their hospital stay
- 1/20 patients (5%) admitted to the ICU were intubated
- Of those admitted to the ICU 10/20 (50%) were started on dexmedetomidine
- Average ICU length of stay was 84 hours and 25 minutes
- Average hospital length of stay was 121 hours and 22 minutes





Proposed ED CIWA-Ar protocol

CIWA-Ar Score	Diazepam Dose	Lorazepam Dose
0-7	No Dose, reassess in 2 hours	No Dose, reassess in 2 hours
8-14	5 mg PO, reassess in 1 hour	1 mg PO, reassess in 1 hour
15-20	10 mg IV, reassess in 30 minutes	2 mg IV, reassess in 30 minutes
>20	15 mg IV, reassess in 15 minutes	4 mg IV, reassess in 15 minutes

Proposed ED CIWA-Ar Protocol

- Panel to also include:
  - ❑ Cardiac monitoring
  - ❑ Continuous pulse oximetry
  - Thiamine
    - ❑ 100 mg po tablet
    - ❑ 100 mg IV
    - ❑ 500 mg IV (Only for suspected Wernicke's encephalopathy)
  - Multivitamin
    - ❑ multivitamin po tablet + folic acid 1mg po tablet
    - ❑ Folic acid 1mg IV (Only if patient is NPO)
  - Phenobarbital
    - ❑ Standard dosing 10mg/Kg IV
    - ❑ Reduced dosing: 5mg/Kg IV (patients at high risk of respiratory compromise)

Next Steps

- December 20th: present panel at emergency medicine collaborative of practice
- January: assuming approval – IT to initiate work on build, education for ED nursing, pharmacists, ED and inpatient clinicians
- February: implementation of order panel to all EDs in the St. Luke's System
- May: post implementation retrospective review

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Impact of Paralytic Choice on Post Intubation Analgesia and Sedation in the Emergency Department

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Background

- Rapid sequence intubation (RSI) is a process involving administration of a sedative followed by a neuromuscular blocking agent (NMBA) to facilitate endotracheal intubation
- This procedure allows emergency department (ED) personnel to promptly secure an airway in patients at risk of respiratory compromise
- Two commonly utilized NMBAs include rocuronium and succinylcholine, the former of which has a half-life that is several times longer than that of the latter[1]
- Several studies have examined the impact of NMBA choice on time to analgesia and sedation, as well as the different clinical impacts on patient outcomes, including those of mortality and traumatic events[2,3]

Objectives

Purpose: To compare time to post-RSI sedation and analgesia among patients who received succinylcholine or rocuronium during RSI

Primary outcome: To assess time to administration and proportion of patients receiving sedative and analgesic medications post-RSI

Secondary outcomes: Multivariable logistic regression identifying predictors of avoidance of post-RSI analgesia and sedation (i.e., time of day, pre-RSI systolic blood pressure, post-RSI hypotension, induction agent, paralytic choice, indication, and pharmacist bedside presence)

Methods

Study Design: Multicenter, retrospective review at four major academic medical centers

Study Period: January 1, 2012 to July 31, 2022

Data Collection: Data will be securely stored on REDCap

Methods (continued)

Table 1: Inclusion and exclusion criteria

Inclusion Criteria	Exclusion Criteria
• Patients undergoing endotracheal intubation with RSI in the ED • ED post-intubation length of stay ⩾30 minutes	• Age < 18 years old • Pregnant women • Prisoners • Intubation without the use of paralytic agents • Expired in the ED • Incomplete medical records

Figure 1: Patient inclusion and exclusion algorithm

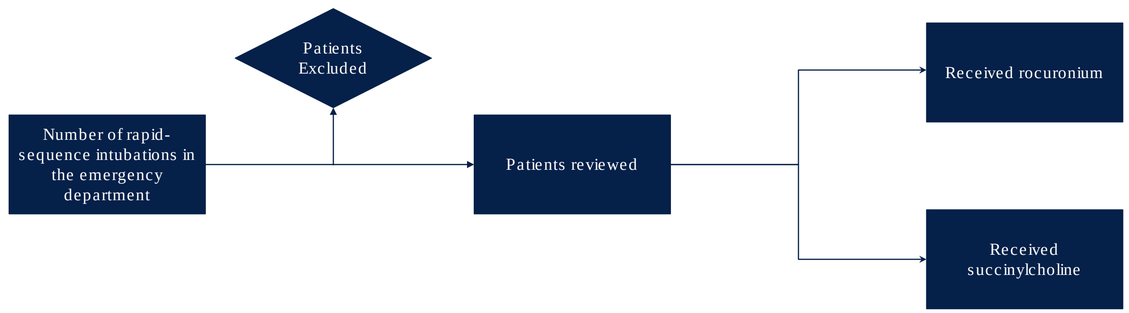

Table 2: Planned data collection points

Baseline Characteristics		Statistical Analysis
• Age • Gender • Race • Height • Weight • Indication for intubation • ED length of stay • ED disposition	• ICU length of stay • Hospital length of stay • Hospital disposition • Blood pressure (pre- & post-RSI) • Heart rate (pre- & post-RSI) • Venous blood pH (pre- & post-RSI)	• Comparison of time to analgesia and sedation (student-t test) • Comparison of proportions (chi-squared) • Predictors of avoidance of analgesia and sedation (multivariable logistic regression)

Results

- Data collection is in progress
- Results pending data collection and statistical analysis

Clinical Implications

- The study will highlight post-RSI practices at different campuses
- The study may demonstrate if there is a delay in post-RSI care after rocuronium administration due to its longer duration of action compared to that of succinylcholine

Limitations

- Retrospective, observational study relying on chart reviews that may vary across campuses
- While other paralytics may be used, our data is limited to use of only rocuronium and succinylcholine
- Differences in level of care, resources, and patient populations provided by each campus, which may impact time to sedation and analgesia
- Inadequate sedation extrapolated from duration of action of sedative agents rather than direct patient interviews

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Optimization of Glucagon Dosing in the Emergency Department

Madeline Volk, PharmD; *Kasheng Lee, PharmD; Joe Halfpap, PharmD, BCPS; Heather Steuerwald, PharmD; BCCCP; Luke Hillman, MD

BACKGROUND

- UW Health emergency department (ED) is a 57-bed unit with 16 pediatric-specific beds
- It is estimated that 13 cases per 100,000 patients in the ED are caused by esophageal foreign body impactions
- Glucagon is commonly used in the ED to facilitate passage of esophageal impactions & avoid the need for endoscopic intervention
- The American Society of Gastrointestinal Endoscopy (ASGE) suggest use of glucagon 1mg IV to induce relaxation of the distal esophagus for passage of food bolus

PURPOSE

To optimize medication therapy with glucagon to enhance the incidence of successful treatment of esophageal impactions in the ED

OBJECTIVES

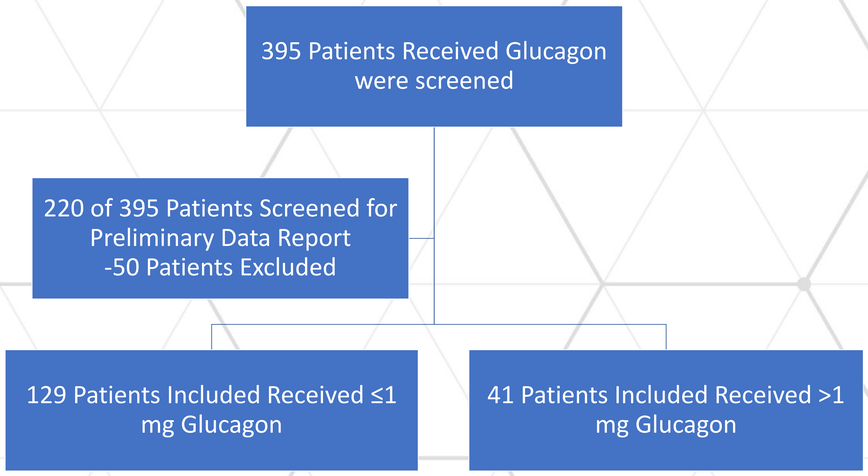
1. Determine if there is an optimal dosing strategy for glucagon in treating esophageal food impactions
2. Review overall effectiveness & adverse effects of glucagon use for passage of food bolus

METHODS

RETROSPECTIVE COHORT STUDY

- Two dosing groups were analyzed with one group who received a cumulative dose of ≤1 mg & another with a total dose of >1 mg of glucagon
- Using Qlik View®, 395 patients were identified in the ED who were administered glucagon from 1/1/2017-5/13/2022
- Inclusion criteria included adult patients (≥18 years) administered glucagon in the ED who were identified to have an esophageal impaction as their chief complaint
- Exclusion criteria included patients <18 years of age or if presenting with a non-edible ingestion
- Patient demographics were collected along with potential confounders such as inability to swallow secretions, history of esophageal disease, history of esophageal impaction, type of food bolus, and duration of symptoms at ED presentation

METHODS



PRELIMINARY DATA

Variable		Cumulative Glucagon Dose: 1 mg or less (N=129)	Cumulative Glucagon Dose: Greater than 1 mg (N=41)
Age		54.1	50.3
Sex, Males (%)		69	63.4
BMI		27.7	25.6
Pre-treatment ondansetron (%)		42.6	53.7
Complete Obstruction (%)		71.3 (n=92)	63.4 (n=26)
History esophageal disease (%)		61.2	53.7
History esophageal impactions (%)		38.8	36.6
Type of bolus (%)			
	Meat	73.6	78
	Vegetable	3.9	2.4
	Other	22.5	19.5
Estimated duration of bolus (%)			
	<2 hr	21.7	12.2
	2 to <6 hr	25.6	39
	6 to <12 hr	24.8	24.4
	12 to <24 hr	18.6	19.5
	≥24 hr	9.3	4.9
Route (%)			
Intravenous		91.5	90.2
Door to Glucagon Time		1:18	1:21

PRELIMINARY DATA

Outcome	Cumulative Glucagon Dose: 1 mg or less (N=129)	Cumulative Glucagon Dose: Greater than 1 mg (N=41)
Resolution without endoscopy (%)	37.2 (n=48)	29.2 (n=12)
LOS, hr	5.33	6.12
Documented vomiting after 1st dose of Glucagon (%)	16.3	34.1
Perforation (%)	1.6 (n=2)	2.4 (n=1)
Disposition, discharge (%)	89.1	92.7

CONCLUSIONS

PRELIMINARY DATA CONCLUSION

- Treatment for esophageal impaction in the ED including doses of glucagon less than or equal to 1 mg resolve 37.2% of food impactions without the need for endoscopy
- Additional doses of glucagon are associated with an additional 30% response to therapy
- Treatment including multiple doses of glucagon appear warranted in this population
- Rates of vomiting differed between the dosing groups, however documentation of vomiting was limited for chart review

FUTURE DIRECTIONS

- Complete data collection with careful chart review to analyze & apply for esophageal impactions
- Present outcomes to stakeholders to assess for changes to promote efficiency on optimizing medication therapy with glucagon for esophageal impaction
- Implement applicable changes to update electronic health record order-sets & esophageal impaction workflows

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Background

- Acute agitation is a common presentation in the emergency department and often these patients may demonstrate disruptive and/or dangerous behavior
- Droperidol has a rapid onset, short duration, and causes less respiratory depression compared to haloperidol and lorazepam
- Combination therapy of antipsychotics and benzodiazepines are commonly utilized but are also associated with adverse effects

Purpose

- Evaluate the efficacy and safety of droperidol as monotherapy and combination therapy with benzodiazepines for emergent sedation of acutely agitated patients in the emergency department

Methods

- Retrospective, observational, chart review to identify all patients receiving droperidol during emergency department encounters from May 1, 2022 to June 30, 2022
- Primary outcome: proportion of patients requiring additional sedation medications
- Secondary outcomes:
  - Proportion of patients receiving monotherapy and combination
  - Adverse effects:
    - QT prolongation defined as a QTc >440 milliseconds for men and >460 milliseconds for women
    - Hypotension defined as need for vasopressors
    - Respiratory depression defined as SpO_2 ≤90%, requiring supplemental oxygen or intubation
- Inclusion Criteria
  - All patients ≥18 years old who received at least one dose of droperidol for acute agitation
- Exclusion Criteria
  - Droperidol used for indications other than acute agitation
- Data points collected included dose, date, and time of droperidol administered, QTc from electrocardiogram before and after droperidol administration, any oxygen supplementation or vasopressor administration, and dose, date, and time of any concomitant sedatives administered with droperidol
- This project was determined to be a quality improvement activity not requiring IRB review by the UMKC Institutional Review Board

Results

- 226 patients eligible for review
  - 158 patient encounters met inclusion criteria

Figure 1: Droperidol Administration

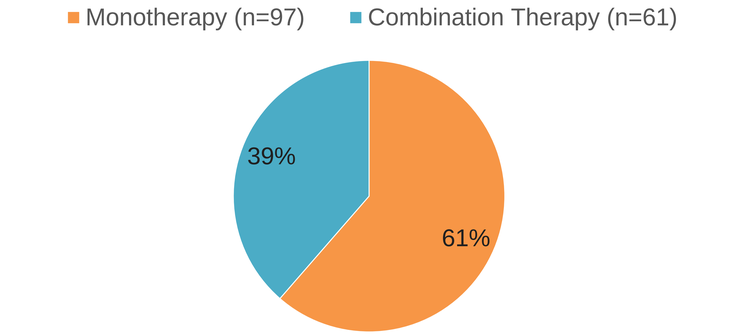


Figure 2: Agents Used in Combination

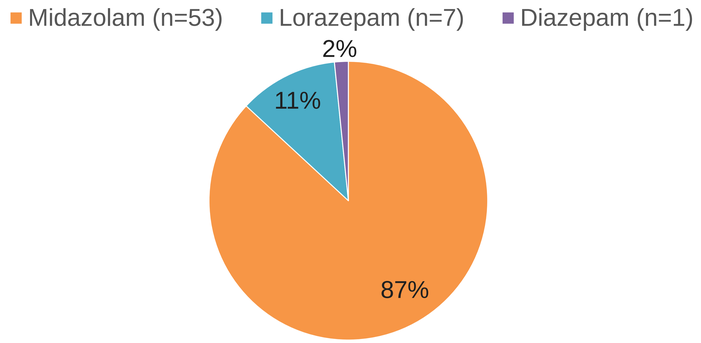
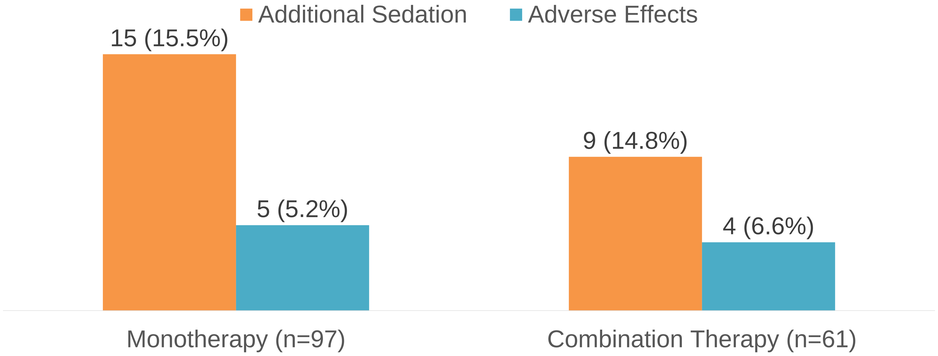


Figure 3: Efficacy and Safety of Droperidol



Results, continued

- Adverse effects in the monotherapy group:
  - 4 patients required supplemental oxygen
  - 1 patient had a prolonged QT at 445 msec (increased from 425 msec) after receiving fluoxetine, trazodone, and droperidol
- Adverse effects in the combination therapy group:
  - 3 patients required supplemental oxygen, one required intubation
  - Patient requiring intubation presented with alcohol intoxication and potentially pre-existing pneumonia

Conclusions

- Droperidol was often used as monotherapy in acutely agitated patients presenting to the emergency department
- Combination therapy with benzodiazepines compared to monotherapy may not be more efficacious in adequately controlling agitation
- Monitoring for respiratory depression is warranted when using droperidol either as monotherapy or in combination
- Limited EKG information to assess true effect of droperidol on QT

Future Directions

- Possible policy changes:
  - Create a criteria for qualification of combination therapy
    - Incorporate an objective scale for undifferentiated agitation
    - Exclude patients with suspected alcohol intoxication
  - Outline monitoring procedure in case combination therapy is used
    - Documentation of SpO_2 at specified time intervals
    - 1:1 sitter for patients with suicidal ideation if requiring oxygen
  - Expand droperidol use beyond the emergency department and behavioral health unit

Study Limitations

- Retrospective, observational chart review study design

University Health

- University Health (formerly Truman Medical Center) is a two-site, safety-net, academic medical center with a large urban trauma center and a small community hospital in Kansas City, Missouri
- University Health serves as the primary teaching hospital for the University of Missouri-Kansas City

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- Disclosures: All authors of this presentation have nothing to disclose

Safety evaluation of weight-tiered, anti-Xa guided enoxaparin prophylaxis in traumatic intracranial hemorrhage.

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BACKGROUND

- The risk of venous thromboembolism (VTE) in trauma patients is well-defined and contributes to significant morbidity and mortality.[1-3]
- Rates of VTE in patients with traumatic intracranial hemorrhage (ICH) are significantly higher than the general trauma population.[2-4]
  - Risk of VTE must be balanced by the risk of life-threatening bleed in a critical organ space.[2-7]
- Weight tiered, anti-Xa guided enoxaparin adjusted to goal serum peak anti-Xa (0.2-0.5 IU/mL) or trough (0.1-0.2 IU/mL) have demonstrated decreased rates of VTE without increasing transfusion requirements.[8-12]
- Small studies in patients with traumatic brain injury (TBI) have not found a difference in peak anti-Xa's in patients who ICH progressed versus those who did not.[13]
- The Western Trauma Association recommends initiation of enoxaparin for VTE prophylaxis within 24 hours of a stable head computed- tomography (CT).[14]
- Data to guide appropriate dosing and monitoring of enoxaparin in traumatic ICH are limited by overall incidence and small sample size.[8-13]
- Over the course of the past 10 years, 3 different enoxaparin protocols have been utilized at the University of Cincinnati Medical Center (UCMC) and are depicted in Figure 1.

SPECIFIC AIMS

Evaluate rates of ICH progression in patients with traumatic ICH managed with weight-tiered, anti-xa guided vs fixed-dose enoxaparin.
Identify risk factors for the progression of traumatic ICH.
Compare the rates of ICH progression across 3 unique enoxaparin dosing protocols
Evaluate the incidence of VTE, hospital, and intensive care unit (ICU) length of stay (LOS) between the two groups.
Compare mortality rates between weight-tiered, anti-xa guided vs fixed-dose enoxaparin

PURPOSE

To evaluate the safety and efficacy of weight-tiered, anti-Xa guided versus fixed-dose enoxaparin prophylaxis in trauma patients with intracranial hemorrhage.

DISCLOSURES

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

METHODS

Study Design

- Single center, retrospective study
  - UCMC, a large academic, quaternary referral, level I trauma center
  - Admitted between January 1, 2013 to October 31, 2022

Table 1. Primary and Secondary Outcomes

Primary Outcomes

• Progression of ICH within 14 days of VTE chemoprophylaxis as defined as:
  • Expansion of ICH on CT
  • New ICH on CT
  • Need for operative intervention

Secondary Outcomes*
• VTE • Intensive care unit and hospital LOS • In-hospital mortality

*Evaluated through 30 days or until hospital discharge, whichever comes first

Definitions

- VTE: deep vein thrombosis (DVT) as diagnosed on venous duplex scan or pulmonary embolism as diagnosed by CT pulmonary angiography
  - Distal DVT's (gastrocnemic and below) will not be included

Figure 1. UCMC Trauma Service VTE Prophylaxis Protocols

Protocol #	1 Prior to 2014	2 2014-2019	3 2019-present
Criteria*	RAP ≥ 5	RAP ≥ 5	All trauma patients
Dosing†	Enoxaparin 30 mg Q12 hours	Weight-based enoxaparin starting at 30 mg Q12 hours**	Weight-based enoxaparin starting at 30 mg Q12 hours
Monitoring	No anti-Xa monitoring	Anti-Xa trough goal 0.1-0.2 IU/mL	Anti-Xa trough goal 0.1-0.2 IU/mL Additional peak monitoring for safety
Dose adjustment	None	Increase dose in 10 mg increments	Increase or decrease dose in 10 mg increments

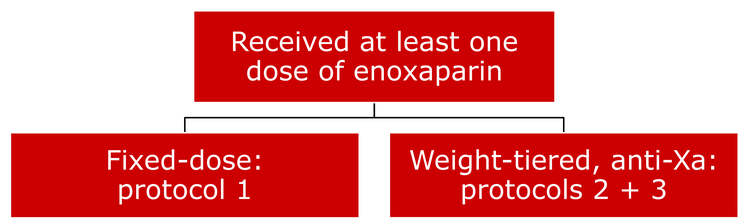
*All patients should be clear of contraindications to chemical prophylaxis (ongoing uncontrolled bleeding, uncorrected coagulopathy, incomplete spinal injury with spinal hematoma (≤ 24 hours post injury), intracranial bleeding (≤ 24 hours post stable head CT)
†Patients on CRRT or worsening AKI should be started on subcutaneous heparin
**If BMI > 30 or weight > 125 kg will start 40 mg Q12

RAP: risk assessment profile score; CRRT: continuous renal replacement therapy; AKI: acute kidney injury

Table 2. Enrollment Criteria

Inclusion Criteria
• Adult trauma patients ≥ 18 years old • Presenting with traumatic ICH • Received at least one dose of enoxaparin within 7 days of admission
Exclusion Criteria
• Length of stay < 3 days • Death within 3 days of admission • Received enoxaparin dosed every 8 hours

Figure 2. Patient Cohorts



Planned Subgroup Analyses

- RAP score ≥ 5
- Patients with an anti-Xa at goal
- Patients with a supra-prophylactic peak or trough anti-Xa

Statistical Analysis

- An estimated 978 patients will be included to meet power of 80% with an α of 0.05.
- Statistics will be performed using SigmaPlot 14.0® (Systat Software, Inc.)
- Baseline characteristics: t-test or chi-squared test, as appropriate
- Progression of ICH: chi-squared test or Fisher's exact as appropriate
- Multivariate logistic regression to identify risk factors associated with expansion of ICH
- Comparison of three enoxaparin dosing protocols and the rates of ICH progression: ANOVA

FUTURE DIRECTIONS

- University of Cincinnati Institutional Review Board exempt status approval obtained.
- Final results to be presented at Great Lakes Pharmacy Residency Conference in 2023.

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