2022 ASHP Midyear Clinical Meeting Roundtable and Poster Session: Critical Care

Section of Clinical Specialists and Scientists

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Comparison of Glycemic Control in Basal Versus Basal/Bolus Insulin Regimens in Medical Intensive Care Unit Patients on Continuous Tube Feeds

Jessica Briscoe, PharmD†; Lauren Caldwell, PharmD, BCCCP†; Aaron Cohen, DO‡;
Jeremy Greenberg, MD‡; Jessica Parker, MS, GStat¥; Megan VanBerkel Patel, PharmD, BCCCP, FCCM†

Background

- Maintaining glycemic control in critically ill patients is associated with preventing complications and improving outcomes.
- Literature regarding optimal insulin regimens in patients requiring continuous tube feeds is limited.
- The American Diabetes Association (ADA) recommends utilization of a bolus-based regimen consisting of basal, bolus, and correctional insulin components. In practice, however, a basal and correctional-only insulin regimen is still commonly utilized.[1]

Objectives

- The primary outcome is to compare glycemic control between a basal-only versus basal/bolus insulin regimen in Medical ICU (MICU) patients on continuous tube feeds.
- Secondary outcomes are incidence of hypoglycemia, frequency of hyperglycemic emergencies, and glycemic variability.

Methods

- This single-center, retrospective study included patients ≥ 18 years old admitted to the MICU and who simultaneously received continuous tube feeds and at least 20 units of insulin detemir daily for a minimum of 48 hours.
- Exclusion criteria are diagnosis of diabetic ketoacidosis (DKA), hyperglycemic hyperosmolar state (HHS), insulinoma, pancreatic tumor, or end-stage liver disease. Additionally, patients who received non-insulin antidiabetic agents will be excluded.
- Total study days will include any consecutive days a patient meets inclusion criteria for up to 14 days.
- Glycemic control will be assessed by comparing mean blood glucose and percentage of blood glucoses (BG) within the target range of 70-180 mg/dL.
- Mild hypoglycemia will be defined as BG < 70, severe hypoglycemia will be defined as BG ≤ 40. Hyperglycemia will be defined as BG >180.
- Hyperglycemic emergencies will be defined as development of DKA or HHS requiring intravenous insulin infusion.
- Glycemic variability will be expressed by standard deviation of mean blood glucose.
- Daily administration of tube feeds, steroids, and insulin will be collected in addition to all blood glucose values.

Patient Demographics (n=50)

	Basal (n=25)	Basal/Bolus (n=25)
Age, years*	60 (57-76)	63 (55-67)
Sex, male, n (%)	11 (44)	14 (56)
Body Mass Index, kg/m²*	32.6 (28.3-36.5)	37 (38.9-27.8)
History of Diabetes Mellitus, n (%)	19 (76)	21 (84)
History of Chronic Kidney Disease, n (%)	1 (4)	4 (16)
Hemoglobin A1c, %*	8.2 (6.8-10.4)	8.1 (7.6-9.4)
Insulin Prior to Admission n (%)	6 (24)	7 (28)
Oral Antidiabetics Prior to Admission, n (%)	11 (44)	4 (16)
qSOFA Score on ICU Admission*	2 (1-2)	2 (1-2)
Hospital Length of Stay, days*	22 (12-26)	27 (17-34)
ICU Length of Stay, days*	11 (6-20)	18 (11-27)
In-Hospital Mortality, n (%)	7 (28)	10 (40)

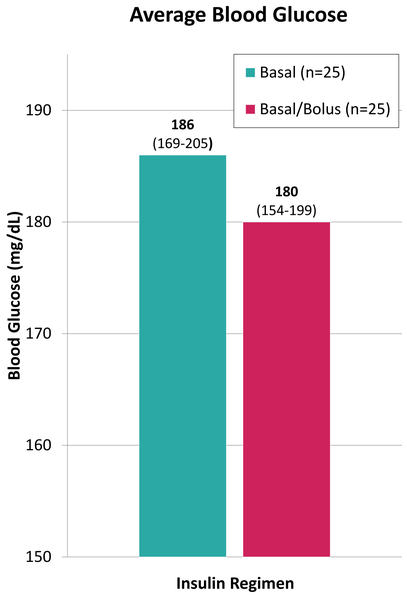
*median (interquartile range)

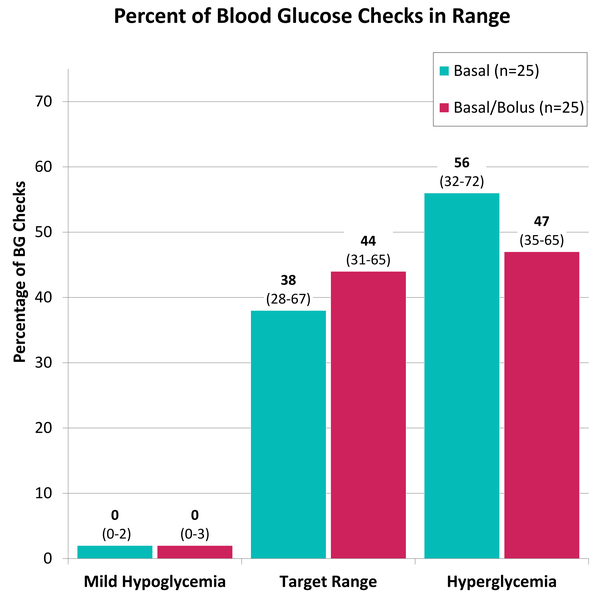
Additonal Demographics

	Basal (n=25)	Basal/Bolus (n=25)
Study Days*	6 (3-8)	5 (4-12)
Total Daily Insulin Dose, units*	41 (33-52)	81 (67-97)
Daily Levemir Dose, units*	30 (21-34)	53 (35-60)
Percent of Levemir Doses Held *	0 (0-13)	0 (0-8)
Daily Sliding Scale Dose, units*	16 (7-20)	12 (7-18)
Daily Bolus Dose, units*	----	16 (12-24)
Percent of Bolus Doses Held *	----	27 (13-33)
Daily Carbohydrate Load, grams*	146 (129-175)	132 (107-173)
Percent of Days Tube Feeds Held*	11 (0-38)	0 (0-13)
Percent of Steroid Days*	0 (0-67)	20 (0-75)
Daily Prednisone Equivalent Dose, mg*	0 (0-27)	13 (0-40)

*median (interquartile range)

Primary Outcomes





Secondary Outcomes

	Basal (n=25)	Basal/Bolus (n=25)
Total Glucose Checks, n	1101	1191
Hypoglycemic Checks, n	17	23
Severe Hypoglycemic Checks, n	0	3
Glycemic Variability, mg/dL*	36	40
Hypoglycemia Requiring Treatment, n (%)	8 (32)	10 (40)

*median (interquartile range)

Preliminary Results

- Patients in the basal/bolus group were more likely to have a lower average blood glucose (180 mg/dL) when compared to the basal-only group (186 mg/dL).
- The basal/bolus group had more blood glucose checks in target range and fewer hyperglycemic blood glucose checks than the basal-only group.
- While the incidence of mild hypoglycemia was similar between groups, the basal/bolus group was associated with higher incidence of severe hypoglycemia and more patients who required treatment for hypoglycemia when compared to the basal-only group.
- Glycemic variability was higher in the basal/bolus group.
- Levemir doses held were comparable between groups.
- Twenty-seven percent of scheduled bolus were held in the basal/bolus group.
- The basal/bolus group received approximately twice the total daily insulin dose of the basal-only group.

Discussion

- The mean blood glucoses of 180 mg/dL and 186 mg/dL are similar to those cited in previous literature where inclusion was limited to patients requiring a minimum of 0.2 units/kg of long-acting insulin per day.[2]
- While the two groups had similar baseline insulin administration and HbA1c, the basal/bolus group had a higher percent of steroid days and a higher median daily prednisone equivalent dose, which may have contributed to its higher total daily inuslin dose compared to the basal-only group.
- More than a quarter of scheduled bolus doses were held, indicating that this regimen requires more close monitoring and clinical judgment than a basal-only regimen.
- Based on the results of this study, it appears that a basal/bolus regimen may help achieve better glycemic control than a basal-only regimen, but this control may come with increased risk of severe hypoglycemia and hypoglycemia requiring treatment.
- Current literature regarding insulin regimens for continuous tube feeds fails to reach a consistent conclusion regarding the optimal regimen. This is the first study to compare the ADA–recommended basal/bolus regimen to a traditional basal-only regimen in MICU patients receiving continuous tube feeds.

Conclusions and Next Steps

- The results presented are preliminary. Data will continue to be collected for patients meeting inclusion criteria between January 1, 2018 and August 1, 2022.
- Further statistical evaluation following data collection may further help determine the optimal insulin regimen for MICU patients on continuous tube feeds.

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Disclosures

Authors of this poster 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. The primary author may be contacted with any additional questions.

- Jessica Briscoe, PharmD† (jessica.briscoe@erlanger.org)
- Lauren Caldwell, PharmD, BCCCP †
- Aaron Cohen, DO‡
- Jeremy Greenberg, MD‡
- Jessica Parker, MS, GStat‡
- Megan VanBerkel Patel, PharmD, BCCCP, FCCM †

†Erlanger Health System, Department of Clinical Pharmacy
‡Erlanger Health System, Pulmonary Critical Care
¥Spectrum Health

Perioperative management of buprenorphine at an urban academic medical center

Tessa Brighton, PharmD[1,2]; Michael Ha, PharmD, BCCCP[1]
UMass Memorial Medical Center, Worcester MA[1]; UMass Memorial Medical School, Worcester, MA[2]

INTRODUCTION

- An estimated 2 million Americans suffer from opioid use disorder and medication-assisted treatment has been shown to reduce opioid-related mortality[1]
- Buprenorphine is a partial opioid mu receptor agonist utilized in opioid use disorder to prevent both withdrawal and overdose[1]
- It has high affinity toward opioid receptors, and can block or displace full opioid agonists leading to precipitated withdrawal[1, 2]
- There is concern that in the perioperative period opioid agonists may be ineffective at treating pain in patients receiving buprenorphine[3]
- Buprenorphine itself has high analgesic potency and stopping may lead to suboptimal pain control and lead to risk for relapse[1, 3]
- Available literature is limited to small retrospective studies with variability in procedures and doses of buprenorphine and conflicting results on improvement in outcomes[4-7]

OBJECTIVE

To determine differences in cumulative opioid requirements and postoperative pain scores in patients where buprenorphine was stopped versus continued postoperatively.

STUDY DESIGN

- Single-center, retrospective, observational cohort study
- Conducted at a level 1 trauma urban academic medical center

METHODS

Patients admitted to UMass Memorial Medical Center from October 1st, 2017 to March 8th, 2022

INCLUSION

- Age ≥ 18 years
- Taking buprenorphine for opioid use disorder prior to admission
- Admission for orthopedic, abdominal or colorectal surgery
- Hospital length of stay for ≥ 48 hours

EXCLUSION

- Taking buprenorphine for an indication other than opioid use disorder
- Pregnant patients
- Prisoners

Included patients

Buprenorphine continued within 48 hours post-op

Buprenorphine not continued within 48 hours post-op

OUTCOMES

Primary	• Total non-buprenorphine opioid requirements in the first 48 hours post-op
Secondary	• Mean numerical rating scale and critical care pain observation tool pain scores in the first 48 hours post-op • Other analgesic use in the first 48 hours post-op • Mean daily buprenorphine dose in the first 48 hours post-op
Safety	• Incidence of oversedation (defined as RASS ≤ -2), nausea or vomiting, and constipation

STATISTICS

- Categorical data will be analyzed using logistic regression, X^2 or Fisher's exact tests
- Continuous variables will be analyzed using student t-test
- Continuous variables will be expressed as mean ± standard deviation or median and interquartile range
- Categorical data will be expressed as percentage (%) of the group from which they are derived

RESULTS

Research is in progress.

For updated results, scan the QR code, email *tessa.brighton@umassmemorial.org*, or visit us on social media *@UMassRxRes.*

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2. Dahan A, Yassen A, Romberg R, et al. Buprenorphine induces ceiling in respiratory depression but not in analgesia. *Br J Anaesth*. 2006;96(5):627-632.
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DISCLOSURE INFORMATION

The authors have no actual or potential conflicts of interest in relation to the content of this presentation.

Use of Hydroxocobalamin for Refractory Vasoplegia

Renee McTee, PharmD, Weston Bush, PharmD, BCPS, Brian Lauer, PharmD, BCCCP, Ahmed Darwish, MD

University Hospitals Cleveland Medical Center

ashp Accredited

Introduction

- Hydroxocobalamin is a medication used to treat vasoplegic syndrome; the hypothesized mechanism of action is by inhibition of nitric oxide synthase
- Vasoplegic syndrome is characterized by low systemic vascular resistance and profound hypotension
- This evaluation of hydroxocobalamin usage seeks to determine its place in therapy for refractory vasoplegia among other options such as methylene blue and angiotensin II

Outcomes

Primary
- Achievement of mean arterial pressure (MAP) ≥ 65 mmHg

Secondary
- Rate of nephrotoxicity
  - Serum creatinine increase of ≥ 20% or use of continuous renal replacement therapy
- 30-day mortality

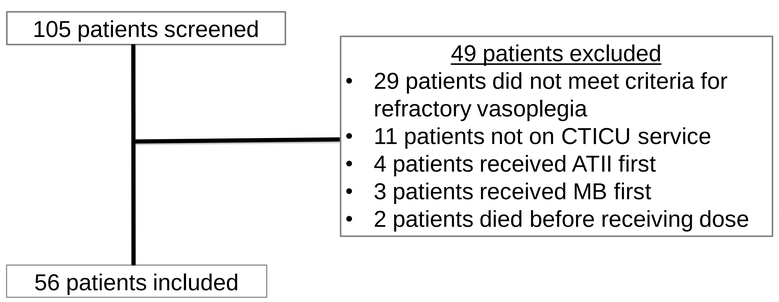
Methods

IRB-approved single-center retrospective chart review
- January 1st, 2021 through August 1st, 2022
- Patients must have received a dose of hydroxocobalamin for refractory vasoplegia while being followed by the University Hospitals Cleveland Medical Center Cardiothoracic Intensive Care Unit (CTICU) team

Exclusion Criteria
- Usage of angiotensin II (ATII) or methylene blue (MB) prior to hydroxocobalamin administration
- Usage of hydroxocobalamin for cyanide poisoning

Results

Figure 1. Patient Selection



Results

Table 1. Patient Demographics (N = 56)	
Age, years (IQR)	62 (54-71)
Sex, n (%)	
Male	46 (82)
Female	10 (18)
Race, n (%)	
White/Caucasian	40 (71)
Black/African American	10 (18)
Other/Not Reported	6 (9)
Comorbidities, n (%)	
Acute Kidney Injury	25 (45)
Chronic Kidney Disease	17 (30)
End Stage Renal Disease	8 (14)
Congestive Heart Failure	28 (50)
MAP Prior to Hydroxocobalamin (IQR)	69 (62-74)
Pre-Administration Vasopressors, n (%)	
One	4 (7)
Two	17 (30)
Three or More	34 (63)
Patients with Extracorporeal Membrane Oxygenation (ECMO) Use, n (%)	19 (34)
Type of Surgery	
Coronary Artery Bypass Graft	15 (27)
Mechanical Circulatory Support	13 (23)
Valvular	10 (18)
Other Cardiac	4 (7)
Non-Cardiac	8 (14)
No Surgery	5 (9)

Figure 2. Achievement of MAP ≥ 65 mmHg, N=56 (%)

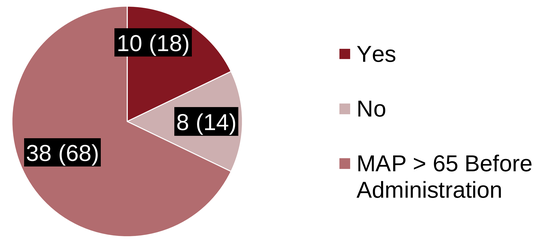
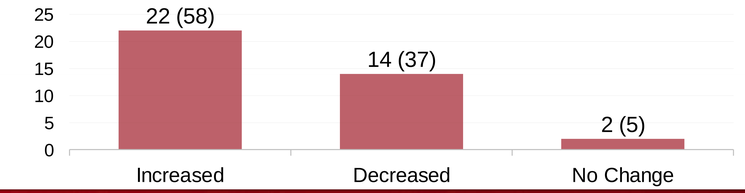


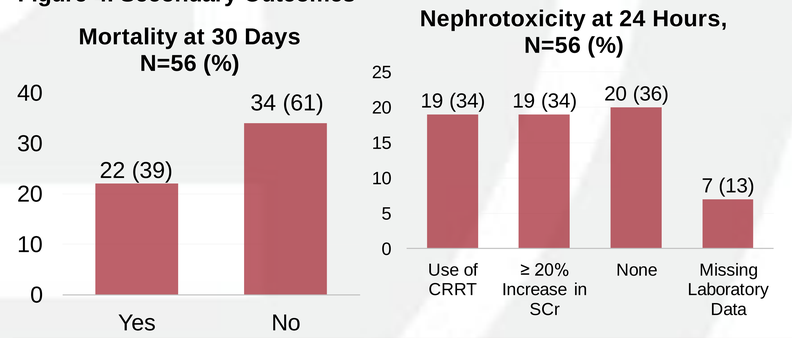
Figure 3. MAP Response in MAP ≥ 65 Before Administration Cohort, N=38 (%)



Results

Table 2. Hemodynamic Data, N=56	
Vasopressor Rate Prior to Dose, Norepinephrine Equivalents, (IQR)	0.24 (0.15-0.31)
Vasopressor Rate 1 Hour After Dose, Norepinephrine Equivalents, (IQR)	0.16 (0.10-0.30)
Patients Requiring Additional Vasopressors, n (%)	19 (34)

Figure 4. Secondary Outcomes



Conclusions

- Hydroxocobalamin increased MAP in the majority of patents with refractory vasoplegia
- Most patients will have an increase in serum creatinine and/or require continuous renal replacement therapy
- Nearly 40% of patients with vasoplegia requiring hydroxocobalamin expired within 30 days of administration

Future Opportunities

- Provide education to prescribers on the place in therapy of hydroxocobalamin
- Revise current system-wide vasoplegia algorithm to utilize angiotensin II prior to hydroxocobalamin

Disclosure/References

The authors have no financial interests to disclose for this study

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Evaluation of Venous Thromboembolism Prophylaxis Dosing in the Low Body Weight Population

Dalia Kassabieh, PharmD Candidate 2023[1]; Kelly Kepley, PharmD Candidate 2023[1]; Souheila Hachem, PharmD[2]; Zachary Smith, PharmD, BCPS, BCCCP[2]; Mathew Jones, PharmD, BCPS, BCCCP[2]; Urszula Grabowski, BSPharm[2]; David Gutenschwager, PharmD[2]

[1]Wayne State University, Eugene Applebaum College of Pharmacy and Health Sciences, Detroit, MI; [2]Henry Ford Hospital, Detroit, MI

Introduction

- Weight-based dose adjustments for medications are not commonly provided for patients with low body weight due to under representation of this population in clinical trials[1]
- Anticoagulants, such as enoxaparin and unfractionated heparin (UFH), are examples of High-alert medications that may require dose adjustments in the low body weight population
- The purpose of this study is to describe the dosing practices, safety, and efficacy of venous thromboembolism (VTE) prophylaxis in low body weight populations

Objectives

- Characterize VTE prophylaxis regimens utilized based on Food and Drug Administration (FDA) vs non-FDA labeled dosing in low body weight patients
- Describe the rates of adverse hematologic outcomes associated with FDA and non-FDA labeled dosing strategies
- Evaluate the frequency of dose adjustments made with anticoagulants in the low body weight population

Methods

Design

This was a retrospective, cohort study used to collect information regarding dosing of low body weight patients on enoxaparin or UFH for VTE prophylaxis. Investigators identified patients at Henry Ford Health (HFH), a 5-hospital health system located in Metro Detroit, who received one of these anticoagulants for VTE prophylaxis using the electronic health record (Epic). Patients' charts were reviewed to describe the dosing method used and VTE or bleeding events that occurred.

Inclusion Criteria	Exclusion Criteria
• Patients admitted to HFH from 7/1/2019 to 6/30/2022 • Patients who received enoxaparin or UFH for VTE prophylaxis for a minimum of 2 consecutive days during acute hospital stay • Weight <45 kg on admission • Patients aged 18 and older	• Special populations including those that are pregnant, incarcerated, cognitively impaired • Patients receiving therapeutic anticoagulation • Patients with an amputation • 20% weight increase from initial weight during admission • Active bleeding or acute VTE diagnosed within 48 hours of admission • Baseline INR >2, platelets <50,000 x10^9/L, or both

Primary Outcome

Incidence of receiving FDA labeled doses of enoxaparin or UFH for VTE prophylaxis compared to alternative dosing regimens.

- FDA labeled dosing: enoxaparin 40 mg SQ daily (30 mg SQ daily for creatinine clearance <30 mL/min) or 30 mg SQ twice daily, or UFH 5000 units SQ every 8-12 hours
- Non-FDA labeled dosing: Any other dosing that does not follow the regimens above

Secondary Outcomes

Adverse hematologic outcomes

- VTE event: DVT or PE occurring during admission while on VTE prophylaxis, confirmed by ultrasound (DVT), V/Q scan (PE), CT scan with contrast (PE)
- Bleeding event: Any bleeding that occurs during admission while on VTE prophylaxis
  - Major: fatal, bleed in critical organ or area, or hemoglobin drop of >2g leading to transfusion of 2+ units of blood
  - Non-major: any sign of hemorrhage that does not meet the major bleed criteria

Frequency of dosing adjustments made to regimen

- Change in dose: If a patient's dose was changed, they were included for the period while on prophylaxis if it met a minimum of 2 days regardless of if they were taken off anticoagulation, changed to therapeutic dosing, or given a dosage adjustment

Analysis

Descriptive measures (incidence, proportions, measures of central tendency and dispersion) were used to evaluate all data for this study. Statistical analysis was completed with Microsoft Excel.

Results

Study Population

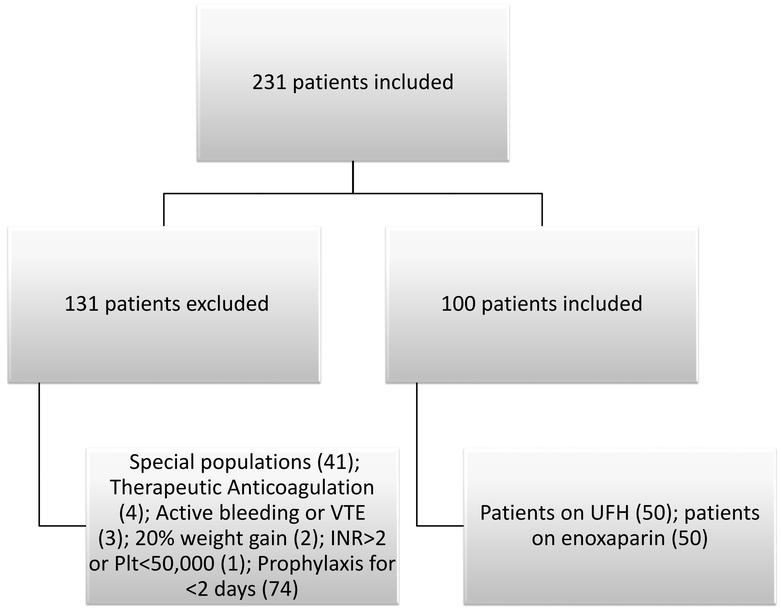


Figure 1: Patient Enrollment

Table 1: Patient Demographics

	Enoxaparin (n=50)	UFH (n=50)
Age (years), median (IQR)	72 (17.50)	66 (28)
Sex, n (%)		
Male	7 (14)	5 (10)
Female	43 (86)	45 (90)
Race, n (%)		
White	35 (70)	33 (66)
African American	11 (22)	10 (20)
Asian*	0	5 (10)
Not Listed	4 (8)	2 (4)
Weight (kg), median (IQR)	41.6 (4.75)	41.1 (3.60)
BMI (kg/m^2), median (IQR)	16.21 (2.39)	16.46 (2.39)
DM, n (%)	5 (10)	8 (16)
CKD,* n (%)	2 (4)	11 (22)
HTN, n (%)	24 (48)	27 (54)
CAD, n (%)	14 (28)	15 (30)
HLD, n (%)	14 (28)	13 (26)
IMPROVE VTE score, median (IQR)	1 (1)	1 (1)
Risk Factors		
Smoker*, n (%)	14 (28)	6 (12)
Anti-Platelet Use, n (%)	14 (28)	10 (20)
NSAID use, n (%)	1 (2)	1 (2)

*Significant with a p-value <0.05

BMI= Body mass index; DM= Diabetes Mellitus; CKD= Chronic kidney disease; HTN= Hypertension; CAD= Coronary artery disease; HLD= Hyperlipidemia; IMPROVE VTE Score= International Medical Prevention Registry on Venous Thromboembolism; NSAID= Non-Steroidal Anti-Inflammatory Drugs

Primary Outcome

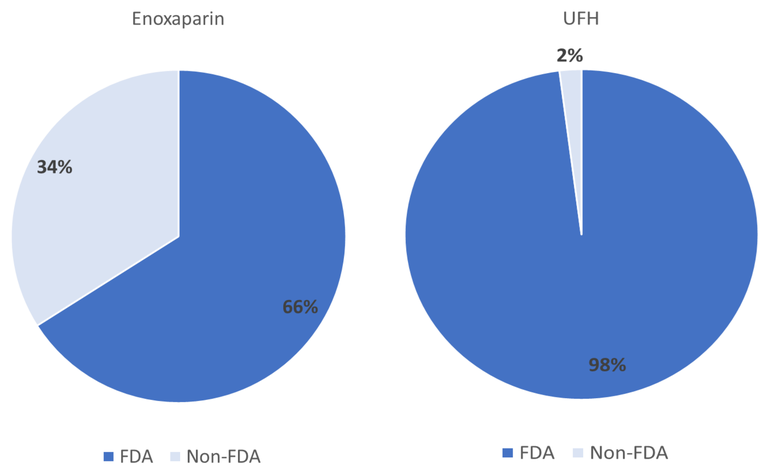


Figure 2: Primary Outcome: Percent of Patients who received FDA vs Non-FDA Labeled Dosing for Enoxaparin and Heparin

Secondary Outcomes

Adverse Events

Out of 100 patients, 2 adverse events occurred. One bleed in the FDA UFH group and one VTE in the FDA UFH group.

Dosage Adjustments

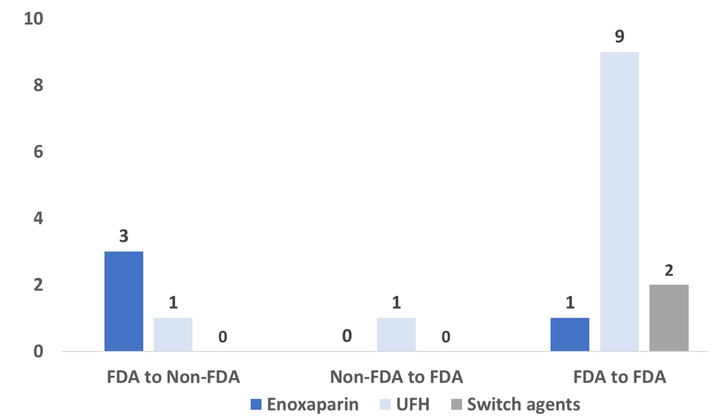


Figure 3: Secondary Outcome: Frequency of Dosing Adjustments Made to VTE Prophylaxis Regimens

Summary

This study showed that patients with low body weight at Henry Ford Health receiving VTE prophylaxis during their admission were more likely to be dosed based on FDA labeled dosing rather than alternative regimens. Adverse outcomes were minimal in both groups. Based on these results, the current dosing strategies for VTE prophylaxis in this population appear safe and effective, but larger studies with appropriate power are necessary for future applications.

Reference: 1. Buckheit D, et al. Clin Appl Thromb Hemost. 2021:10760296211018752.

The Use of Intravenous/Intraarterial tPA and Heparin for Patients Undergoing Catheter Directed Thrombolysis: A Medication Use Evaluation

Denver Health Medical Center, Denver, CO
Doan Do, PharmD; Katie Dionne, PharmD, BCCCP, Megan Pollard, PharmD, BCCCP

Background

- Acute limb ischemia is associated with high mortality and one of the major causes is arterial thrombosis.[1]
- Strategies for restoring perfusion to areas of ischemia include surgery, percutaneous intervention, or catheter directed thrombolysis (CDT).
- Intra-arterial CDT with tissue plasminogen activator (tPA) with or without heparin directly into the thrombosed portion of the vessel has been shown to be more effective at restoring perfusion and safer than systemic anticoagulation.[2]
- At Denver Health Medical Center, patients undergoing CDT can be managed by either cardiology, interventional radiology, or vascular surgery.
- Heparin and tPA are both high risk medications where variability between providers results in a lack of standardization of concentrations and doses utilized.

Objectives

- Characterizing prescribing habits of tPA and heparin for CDT at Denver Health Medical Center.
- Evaluating safety outcomes for patients receiving tPA with or without heparin for CDT.

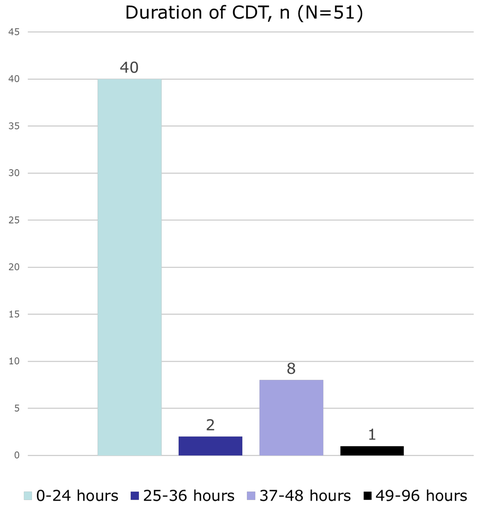
Methods

- Single-center, retrospective medication use evaluation reviewing patients receiving CDT from January 2020 to January 2022.
- Primary outcome: the ranges of medication concentrations ordered and rates of administration.
- Secondary outcomes: duration of CDT, frequency of lab monitoring while on CDT, concomitant systemic anticoagulation, interruption in CDT due to bleeding or out of range lab value, mortality, ordering service, and incidence of safety reports.
- Inclusion criteria: adult patients undergoing CDT who have received intra-arterial or intravenous tPA with or without heparin.
- Exclusion criteria: patients less than 18 years of age.

Results

Demographics	N = 51
Age, years, mean (± SD)	61 (13.8)
Female, n (%)	21 (41.2)
Admission Diagnosis, n (%)	
Critical Limb Ischemia	39 (76.5)
Severe PAD	4 (7.8)
Sub-massive PE	3 (5.9)
Other	5 (9.8)
Location, n (%)	
Medical ICU	36 (70.6)
Surgical ICU	15 (29.4)
Medication, n (%)	
tPA alone	3 (5.9)
tPA and heparin	48 (94.1)
Route of tPA, n (%)	
Intra-arterial	38 (74.5)
Intravenous	8 (15.7)
Both	5 (9.8)
Route of heparin, n (%)	
Intra-arterial	14 (27.5)
Intravenous	30 (58.8)
Both	7 (13.7)

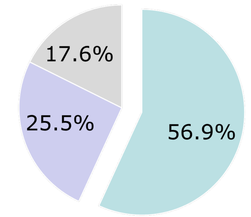
Primary Outcome	
tPA concentration, n (%)	
0.02 mg/mL	19 (37.3)
0.05 mg/mL	**24 (47)**
0.1 mg/mL	7 (13.7)
0.4 mg/mL	1 (2)
tPA rate, n (%)	
0.5 mg/hr	5 (9.8)
1 mg/hr	**38 (74.5)**
2 mg/hr	4 (7.8)
Other	4 (7.8)
Heparin concentration, n (%)	**N=48**
50 units/mL	**42 (87.5)**
20 units/mL	3 (6.3)
10 units/mL	2 (4.2)
2 units/mL	1 (2)
Heparin Rate, n (%)	
300 units/hr	5 (10.4)
400 units/hr	9 (18.8)
500 units/hr	**28 (58.3)**
1000 units/hr	4 (8.3)
Other	2 (4.2)



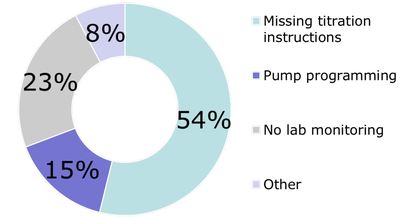
Secondary Outcomes	
Lab monitoring frequency, hours, median (range)	
PTT	8 (4-24)
Hgb, Hct, Fibrinogen	12 (4-24)
Concomitant systemic anticoagulation, n (%)	23 (45.1)
Interruptions in CDT, n, (%)	**N=27**
Bleeding	6 (22.2)
Out of range lab	21 (77.8)
28-Day mortality, n (%)	8 (15.7)
Safety reports, n (%)	13 (25.5)

Results continued

Ordering Service (N=51)



Safety Reports (N=13)



Discussion

- This review was able to highlight the variability of tPA and heparin orders used for CDT.
- Only 5.9% of medication orders originated from an existing order set, indicating a need to optimize electronic order entry.
- A majority of safety reports submitted were related to lack of instruction for managing these high-risk medications.
- Monitoring of lab parameters (PTT, Hgb, Hct, and fibrinogen) was inconsistent.
- Limitations: data was collected using manual chart review which is prone to incomplete data, manual error, and bias; safety incidence reporting is voluntary and might not capture all events, confounding factors, especially for mortality could not be accounted for.

Conclusion

- The results of this medication use evaluation will be used to create a standardized protocol for patients receiving CDT to streamline patient care, result in a lower incidence of medication errors, and create a safer practice standard at our institution.

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Disclosure: Authors of this presentation have no information 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.

Clinical Utility of MRSA Nasal Surveillance Screening in Critically Ill Patients: Impact of Timing and Effect of Anti-MRSA Antibiotics

Whitney Anderson, PharmD[1]; Paige Bradshaw PharmD, BCCCP[1,2]; Jessica Winter, PharmD, BCCCP, BCPS[1,2]; Kristen Carter, PharmD, BCCP, BCPS[1,2]; Siyun Liao, PharmD, PhD, BCPS, BCIDP[1,2]; Eric Mueller, PharmD, FCCM, FCCP[1,2]

[1]UC Health - University of Cincinnati Medical Center, Cincinnati, Ohio; [2]University of Cincinnati James L. Winkle College of Pharmacy, Cincinnati, OH

BACKGROUND

- Methicillin-resistant *Staphylococcus aureus* (MRSA) infections increased prevalence over the past two decades in the United States has led to a serious antibiotic resistance threat.[1]
- MRSA pneumonia is associated with increased hospital mortality, 28-day mortality, and mechanical ventilation days compared to other intensive care unit (ICU) infections.[1-6]
- High morbidity associated with MRSA infections in critical illness emphasizes the importance of appropriate empiric antibiotic selection.[1-6]
- Initial studies found that 75% of critically ill patients with MRSA lower respiratory tract infections had negative nasal MRSA surveillance screens.[7]
- Diagnostic performance characteristics of MRSA nasal surveillance screening including negative predictive value (NPV), positive predictive value (PPV), sensitivity, and specificity have described excellent NPV of 99.2% in populations with low MRSA pneumonia incidence.[8]
- Current evidence evaluating MRSA surveillance screening as a tool to predict MRSA pneumonia may not be generalizable to critically ill patients and the sustainability of surveillance screening over time or antibiotic exposure has not been previously explored.[7-13]

SPECIFIC AIMS

1. Impact of timing on diagnostic performance of MRSA nasal surveillance screening for MRSA pneumonia in critically ill patients at specific time cohorts (<24 hours, 25-48 hours, 3-7 days, 8-14 days, and 15-30 days) from first MRSA nasal surveillance screening swab to positive respiratory culture
2. Impact of systemic anti-MRSA antibiotics on diagnostic performance of MRSA nasal surveillance screening for MRSA pneumonia in critically ill patients based on antibiotic exposure cohorts (no exposure, <48 hours, 3-7 days, 8-14 days, or >14 days)
3. Evaluate and describe risk factors for discordant MRSA nasal surveillance screening results and MRSA pneumonia in critically ill patients (Age, Extracorporeal Membrane Oxygenation (ECMO), COVID-19, inhalation injury, duration of mechanical ventilation, vasopressors)
4. Evaluate time to nosocomial nasal MRSA colonization in patients who have sequential nasal MRSA surveillance screening performed during hospital admission

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

Purpose

Evaluate the diagnostic performance characteristics of MRSA nasal surveillance screening for the prediction of MRSA pneumonia in critically ill patients.

Table 1. Enrollment Criteria

Inclusion Criteria

• Age 18 years or older admitted to any adult ICU or medical stepdown unit
  • Positive respiratory culture (Bronchoalveolar lavage, tracheal aspirate, bronchial wash, sputum sample)
  • MRSA nasal surveillance swab obtained up to 30 days prior to respiratory culture

Exclusion Criteria
• Active pregnancy • Incarceration • Receipt of MRSA decolonization within 5 days of MRSA nasal surveillance swab

Study Design and Data Collection

- Single center, retrospective study at University of Cincinnati Medical Center, a large academic, quaternary referral, level 1 trauma center
- Admitted between January 1st, 2013 to September 30th, 2022

Figure 1. Baseline Characteristics To Be Collected Per Swab

Demographics

- Age, Sex, Race/ethnicity, Primary diagnosis, Unit of admission, Prior hospitalization within 90 days, ECMO, COVID-19, Inhalational injury, Duration of mechanical ventilation, Vasopressors, Hospital length of stay, ICU length of stay

Outcome Data Points

- MRSA nasal surveillance screening result, Respiratory culture result, Anti-MRSA antibiotics administered, Length of anti-MRSA antibiotics, Pneumonia type at time of respiratory culture (CAP, HAP, VAP)

DEFINITIONS

Community acquired pneumonia (CAP): positive respiratory culture within 48 hours of hospital admission

Hospital acquired pneumonia (HAP): positive respiratory culture >48 hours from hospital admission

Ventilator associated pneumonia (VAP): positive respiratory culture >48 hours after endotracheal intubation

Positive respiratory culture: including any isolated bacteria on culture with any quantify of isolated colony forming units (CFU/mL) or grade of qualitative assessment

Negative respiratory culture: including normal respiratory flora with no isolated bacteria on culture with any quantity of isolated CFU/mL

Anti-MRSA antibiotics: receipt of vancomycin, daptomycin, linezolid, ceftaroline, doxycycline, minocycline, sulfamethoxazole-trimethoprim (SMZ-TMP), or clindamycin

MRSA pneumonia: positive respiratory culture growing MRSA and associated treatment with anti-MRSA antibiotics

MRSA surveillance screening: nasal MRSA surveillance screening swab including both nasal swabs from PCR or culture

STATISTICAL ANALYSIS

- Convenience sample of 1,000 patients meeting inclusion criteria will be evaluated. Statistical analysis will be completed using SigmaPlot 14.0® (Systat Software, Inc.)
- Diagnostic performance characteristics (NPV, PPV, sensitivity, specificity) assessed as follows:
  - From screening swab to positive respiratory culture at specific time cohorts
  - From screening swab to positive respiratory culture at specific anti-MRSA antibiotic exposure cohorts
- Categorical: chi-square or Fischer's Exact test, as appropriate
- Continuous: student's t-test or Wilcoxon Rank Sum, as appropriate
- Multivariable logistic regression analysis for predictors of discordant MRSA nasal surveillance screening results and MRSA pneumonia. A priori variables identified on univariate analysis with a P >0.2 will be included.

FUTURE DIRECTIONS

- University of Cincinnati Institutional Review Board exempt status approval in-process. Results from this study will be presented at the Great Lakes Pharmacy Residency Conference in 2023.

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Evaluation of a Neuromuscular Blocking Agent Order Set in Achieving and Maintaining Adequate Sedation

Andrew Jung, PharmD; Eric Whittenburg, PharmD, BCCCP; Christopher Miller, PharmD, BCCCP
Centura St. Anthony Hospital, Lakewood, Colorado

centura
St. Anthony Hospital

Introduction/Purpose

- Neuromuscular blocking agents (NMBA) do not have amnestic or sedative properties
- Patients who are paralyzed with an NMBA require deep sedation to a Richmond Agitation-Sedation Scale (RASS) score of -5 before initiation
- NMBA related patient safety concerns have been identified, including lack of analgosedation, nursing-driven down titration, and RASS goals of 0 to -2 in sedation administration directions
- An order set was implemented to address all patient care instruction and to prevent possible harm such as undersedation while paralyzed

Objective

- To evaluate the effectiveness of an NMBA order set in ensuring adequate sedation

Methods

Study Design

- Single-center, retrospective, pre-post study
- Pre-time frame: 1/1/2017 to 7/31/2018
- Post-time frame: 1/1/2021 to 9/1/2022

Inclusion Criteria

- ≥18 years old
- Cisatracurium infusion for acute respiratory distress syndrome (ARDS) or acute respiratory failure with hypoxia

Exclusion Criteria

- Pregnant
- NMBA for intracranial pressure control
- NMBA for targeted temperature management
- NMBA infusion duration <4 hours

Definition

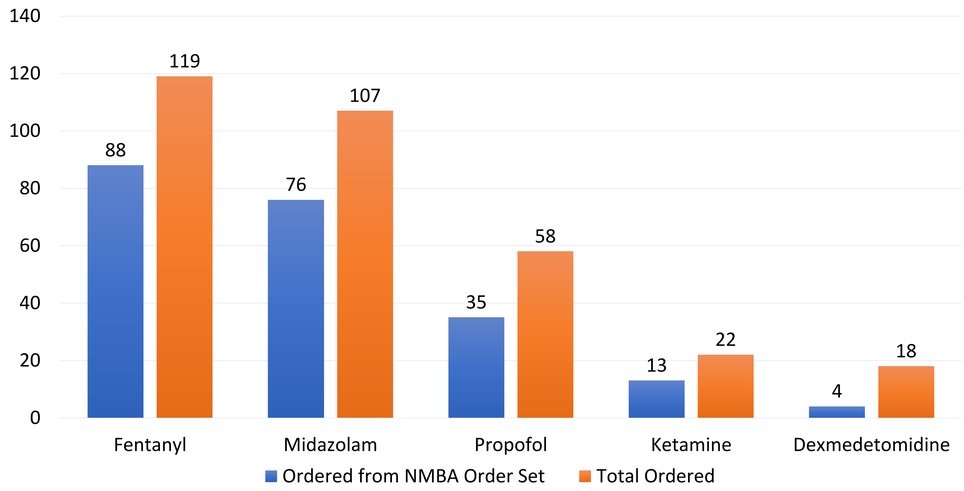
- Adequate analgosedation: continuous infusion sedation and analgesia medication doses are not decreased while on cisatracurium infusion

Results

Table 1. RASS Outcomes	Pre-Order Set n=52	Post-Order Set n=119
Incidence of RASS score of -5 documented prior to NMBA initiation, n	11 (21.2%)	80 (67.2%)
RASS score, median [IQR]	-2 [-4 to 0]	-5 [-5 to -4]

Table 2. Post-Cisatracurium Initiation Analgosedation Outcomes	Pre-Order Set n=52	Post-Order Set n=119
NMBA infusion duration (hr), mean	38.1	66.5
Incidence of adequate analgosedation, n	9 (17.3%)	57 (47.9%)
Incidence of adequate analgesia, n	26 (50.0%)	96 (80.7%)
Incidence of adequate sedation, n	12 (23.1%)	61 (51.3%)

Figure 1. Incidence of Sedation and Analgesia Infusion Agents Ordered Within the NMBA Order Set (n=119)



Discussion

- Although a longer mean cisatracurium infusion duration and improved RASS outcomes were demonstrated in the post-order set group, incidence of adequate analgosedation was still low
- The order set requires added clinical decision support when switching analgosedative agents is required
- Targeted education for critical care physicians, nurses, and pharmacists regarding the availability of the order set may further improve outcomes

Conclusion

- Implementation of an NMBA order set improved sedation-related safety outcomes in patients who received continuous infusion cisatracurium for the management of ARDS or acute respiratory failure with hypoxia

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Contact

Disclosure of Relevant Financial Relationships:
Authors of this presentation have nothing to disclose
Correspondence: Andrew Jung
Email: AndrewJung2@Centura.org

Evaluation of Midodrine Use in Critically Ill Patients Requiring Intravenous Vasopressors

Michaela Todd, Pharm.D.; Wendy Slipke, Pharm.D., BCPS, BCCCP; Jessica Jones, Pharm.D., BCPS; Cindy Kelling, APRN
UW Health Northern Illinois - SwedishAmerican Hospital; Rockford, IL

Background

- Midodrine (ProAmatine®) is an alpha-1 agonist that affects arteriolar and venous vasculature to raise blood pressure by increasing vascular tone
- FDA-approved for orthostatic hypotension; has been used off-label for hypotension in the ICU to aid in weaning off of IV vasopressors
- UW Health Northern Illinois - SwedishAmerican Hospital is a 352-bed community hospital in Rockford, Illinois with a 30-bed mixed medical, surgical, and neuro ICU

Purpose

- To determine if the use of midodrine makes an impact on IV vasopressor requirements or other patient factors including ICU length of stay (LOS) and ventilator duration
- Assess if midodrine is being continued through transitions of care

Review of Literature

Levine et al. 2013	-Prospective, observational study of 20 surgical ICU patients with ≥24 hours of phenylephrine or norepinephrine requirements -Most common midodrine dose was 20 mg TID -Faster weaning of IV vasopressors with midodrine
Poveromo et al. 2016	-Retrospective analysis of 188 ICU patients -Patients required IV vasopressors for an average of 1.2 days after starting midodrine -No difference in ICU LOS or readmission -Increased hospital LOS with midodrine
Whitson et al. 2016	-Retrospective study of 275 ICU patients with septic shock requiring ≥24 hours of IV vasopressors -Decreased IV vasopressor duration, ICU LOS, and hospital LOS in midodrine group
Santer et al. 2020 (MIDAS)	-Randomized controlled trial (RCT) of patients with low-dose IV vasopressor requirements ≥24 hours -132 patients were randomized to receive 20 mg TID of midodrine or placebo -No difference in time to discontinuation of IV vasopressors, discharge readiness, or LOS -More bradycardia in midodrine group -≥60% of patients were post-op/surgical

Methods

A retrospective chart review will be performed on patients who meet the inclusion/exclusion criteria below:

Primary Endpoint:
- Impact of midodrine on intravenous vasopressor requirements
  - Number of days requiring IV vasopressors

Safety Endpoint:
- Incidence of bradycardia

Secondary Endpoints:
- Assessment of outpatient continuation of therapy
  - Midodrine inclusion on discharge medication list
- Midodrine discontinuation practice
  - Abrupt stop vs. titration
- Patient outcomes:
  - ICU days
  - Ventilator days (if applicable)

Inclusion

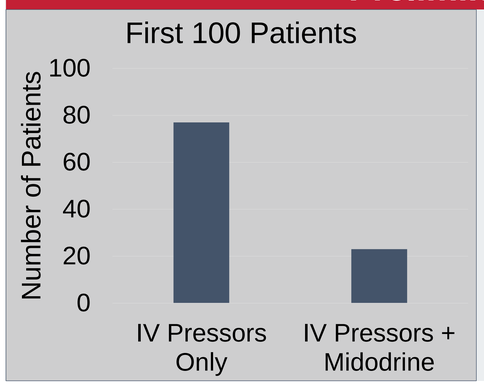
- Intravenous vasopressor therapy* between January 2020 - January 2022
- Mean arterial pressure goal ≥65 +/- systolic blood pressure goal ≥100 mmHg

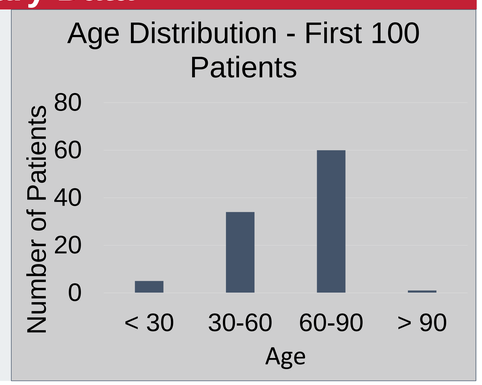
Exclusion

- Midodrine was used at home prior to admission
- Patient populations: <18 years old, cardiac surgery, cirrhosis, end-stage renal disease, incarcerated, pregnant

*norepinephrine, epinephrine, vasopressin, and phenylephrine

Preliminary Data





Future Directions

- Determine an optimal dose and frequency for midodrine
- Create vasopressor tapering protocol to standardize use of midodrine

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Author Contact & Disclosures

Authors of this presentation disclose the following relationships with commercial interests related to the subject of this poster:
-Michaela Todd (mtodd2@uwhealth.org): None
-Wendy Slipke: None
-Jessica Jones: None
-Cindy Kelling: None

Angiotensin II in Patients with Catecholamine-Resistant Vasodilatory Shock Requiring Continuous Kidney Replacement Therapy

Sydney Wilson, PharmD; Timothy Berry, PharmD, BCPS; Adham Mohamed, PharmD, BCCCP; Shelby Shemanski, PharmD, BCCCP; Julie Welge, PharmD, BCPS

Saint Luke's HOSPITAL OF KANSAS CITY

KANSAS CITY, MISSOURI

BACKGROUND

- ATHOS-3 trial and subsequent post-hoc analyses evaluated the use of angiotensin II (Giapreza®) in vasodilatory shock
- ATHOS-3 trial showed a significantly higher response with respect to mean arterial pressure (MAP) in the angiotensin II group[1]
- *Tumlin et al.* observed significantly higher rates of survival to day 28 with patients in the angiotensin II group and on renal replacement therapy (RRT)[3]
  - Higher rate of patients in the angiotensin II group were off RRT by day 7
- *Bellomo et al.* observed significantly better response in patients with renin levels above the study median[2]
  - 28-day mortality was lower in the angiotensin II group
  - Renal function recovery at day 7 and ICU discharge by day 28 were higher in angiotensin II group
- Endothelial injury during CRVS can decrease angiotensin-converting enzyme (ACE) function[2]
  - Leads to increased renin and angiotensin I/II ratios which have been associated with increased mortality in CRVS[2]

PURPOSE

Evaluate time to shock resolution in patients with catecholamine-resistant vasodilatory shock (CRVS) on continuous kidney replacement therapy (CKRT) receiving angiotensin II

DESIGN

- Multi-center, single health system, retrospective propensity score-matched cohort study
- April 1, 2014– February 28, 2023
- Statistics will include Kaplan-Meier Survival analysis, chi square test, Mann Whitney U, and Cox Hazard Regression Model

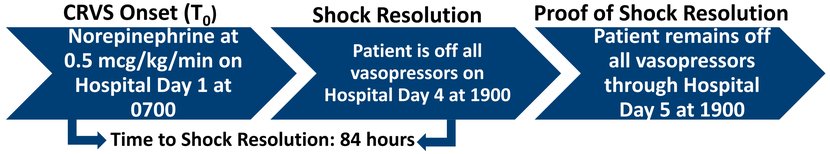
PATIENT POPULATION

- **Adult ICU patients with CRVS who are receiving CKRT**
  - CRVS defined as requiring a total norepinephrine equivalent (NE-equivalent) dose of 0.5 mcg/kg/min

Inclusion Criteria	Exclusion Criteria
• Adults at least 18 years of age • Catecholamine-resistant vasodilatory shock • Concomitant use of CKRT while on angiotensin II or NE-equivalents of 0.5 mcg/kg/min • Survived at least 12 hours from meeting CRVS criteria	• Pregnancy • Primary shock etiology is cardiogenic as diagnosed by a provider

PRIMARY ENDPOINT

Time to Shock Resolution: difference in time between meeting inclusion criteria and all vasopressors being stopped and remaining off for at least 24 consecutive hours



ADDITIONAL ENDPOINTS

Secondary Endpoints	Safety Endpoints
In hospital mortality at 30 days	Rate of thromboembolic events
ICU mortality	Incidence of fungal infection
ICU length of stay from CRVS inclusion	Time to serum lactate normalization
Days on CKRT from CRVS inclusion	Rate of ischemic bowel or peripheral ischemia
Vasopressor dose in NE-equivalents 12 and 24 hours from meeting CRVS inclusion	
SOFA score 72 hours from meeting CRVS inclusion	

PROPENSITY SCORE MATCHING

- Patients will be randomized 1:1 to norepinephrine or angiotensin II group

Variables for Propensity Matching	
Age	Gender
Weight	ECMO prior to CRVS inclusion
History of atrial fibrillation	History of hypertension
History of chronic kidney disease	SOFA score at time of CRVS inclusion
Use of mechanical ventilation prior to CRVS inclusion	Maximum lactate level up to 24 hours prior to meeting CRVS inclusion
Lowest MAP prior to vasopressor initiation	Maximum vasopressor dose in NE-equivalents in the 24 hours prior to initiation of angiotensin II

MAP: mean arterial pressure
SOFA: sequential organ failure assessment
ECMO: extracorporeal membrane oxygenation

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- The 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.

Safety and efficacy of valproic acid for agitation management in the intensive care unit

Brittany Block, PharmD[1,2]; Mackenzie Piché, PharmD, BCPS, BCCCP[1]; Krystina Ahern, PharmD, BCPS, BCCCP[1]
UMass Memorial Medical Center, Worcester MA[1]; UMass Memorial Medical School, Worcester, MA[2]

INTRODUCTION

- Agitation occurs in up to 96% of critically ill patients and is associated with a longer duration of hospitalization, as well as increased morbidity and mortality[1,2]
- Current management includes sedative, anxiolytic, and antipsychotic agents, but adverse effects may preclude the usage of these medications[3]
- Nonbenzodiazepine agents are recommended over benzodiazepines given the increased risk of morbidity associated with their use[3]
- Valproic acid (VPA) has been utilized as an alternative or adjunctive agent for agitation in the intensive care unit (ICU)
- VPA works as an antagonist at the N-methyl-D-aspartate receptor, inhibits sodium channels, and upregulates gamma-aminobutyric acid[4]
- Literature evaluating the use of VPA for the management of agitation and delirium for critically ill patients is limited to several retrospective studies

OBJECTIVE

The purpose of this study is to evaluate the safety and efficacy of VPA for management of agitation in the ICU

STUDY DESIGN

- This will be a single center, retrospective, descriptive study of patients admitted to the ICU who received VPA for the treatment of agitation
- We plan to report these findings in conjunction with published data from previous trials in the form of a meta-analysis

METHODS

Patients admitted to an ICU at UMass Memorial Medical Center from January 1st, 2020 to April 1st, 2022

Inclusion

- Age ≥ 18 years
- Received any formulation of VPA for ≥ 48 hours for the treatment of agitation

Exclusion

- Pregnant patients
- Prisoners
- Use of VPA for indications other than agitation
- Use of VPA as continuation of home therapy

OUTCOMES

Primary

- Prevalence of agitation while on VPA defined by Richmond Agitation-Sedation Scale scores ≥ 2

Secondary

- VPA prescribing practices
- Duration of therapy
- Use of sedative and antipsychotic agents
- ICU length of stay
- Mortality
- Prevalence of delirium

Safety

- Hepatotoxicity
- Thrombocytopenia
- Leukopenia
- Hyperammonemia
- Pancreatitis

STATISTICS

- Descriptive statistics and measures of association will be used to summarize all variables
- Categorical data will be analyzed using logistic regression, Chi-square test, or Fisher's exact test
- Continuous data will be analyzed using Student's t-test or Mann-Whitney U test

RESULTS

Research is in progress.

For updated results, scan the QR code, email *Brittany.block@umassmemorial.org*, or visit us on social media *@UMassRxRes.*

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DISCLOSURE INFORMATION

The authors have no actual or potential conflicts of interest in relation to the content of this presentation.

The Impact of an Automatic Pharmacist-Led Consult Process on Anticoagulation Outcomes in Patients with a Percutaneous Left Ventricular Assist Device

Authors: Victoria Miles, PharmD; Evan Westlake, PharmD, BCCCP; Oksana Kamneva, PharmD, BCPS, BCCP, BCCCP; Debbie Liang, PharmD, BCCCP; W. Russell Laundon, PharmD, MS, BCPS; Olivia Roberts, PharmD, BCCP
Department of Pharmacy, UNC Health Rex, Raleigh, NC, USA

BACKGROUND

- The Impella device is a percutaneous left ventricular assist device used to provide temporary mechanical circulatory support in patients with refractory cardiogenic shock[1]
- Randomized studies demonstrate improved hemodynamic parameters with Impella compared to intra-aortic balloon pump[2,3]
- Critical device complications can include thromboembolic events, bleeding, hemolysis, and device occlusion[3]
- To prevent device complications, the manufacturer recommends addition of heparin to the purge solution once activated clotting time (ACT) falls below 180 seconds following device placement[4]
- To prevent systemic complications, the manufacturer recommends a goal ACT of 160 to 180 seconds[4]
    - Many patients require systemic anticoagulation in addition to heparinized purge solution to achieve this goal
- Landmark studies did not provide framework for anticoagulation management and clinical practice varies greatly
- UNC Health Rex developed an automatic pharmacist consult process to standardize anticoagulation practices with the goal of improving patient safety and outcomes

PURPOSE

- The purpose of this study is to compare anticoagulation patterns and evaluate device complications before and after implementation of an institutional pharmacist consult process in patients with an Impella device

OBJECTIVES

Primary Objective

- To evaluate the effectiveness of a pharmacist consult process for achieving therapeutic anticoagulation in patients with an Impella device

Secondary Objective

- To evaluate the safety and effectiveness of an automatic pharmacist consult process to manage anticoagulation in patients with an Impella device

Primary Endpoint

- Percentage of ACT values in therapeutic range after addition of heparin to Impella purge solution

Secondary Endpoints

- In-hospital mortality, thromboembolic events, device complications, major bleeding, non-major bleeding, number of purge solution concentration changes, percentage of ACT values outside of therapeutic range, percent adherence to protocol, number of ACT draws, number of safety event reports

DISCLOSURES

None of the authors of this presentation have any disclosures 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

Setting

- Data will be collected from UNC Health Rex Hospital located in Raleigh, North Carolina, USA
- This study was approved by UNC Health System Institutional Review Board

Data Collection

- Eligible patients will be identified based on medication orders for heparin purge solution between April 4, 2014 and August 31, 2022
- Data collection will involve chart review of patients eligible for inclusion
- Patients will be grouped into two treatment groups based on timing of Impella placement before or after implementation of the pharmacist consult process on August 1, 2021

Study Design

- Retrospective, single center, cohort study

Figure 1. Study Design

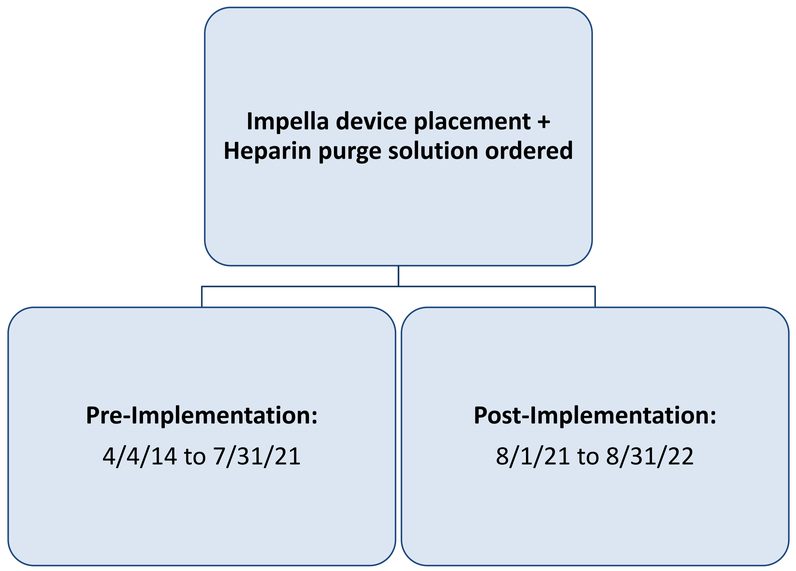

Table 1. Inclusion and Exclusion Criteria

Inclusion criteria	Exclusion criteria
• Age ≥18 years • Impella device placement in setting of cardiogenic shock • Anticoagulation with heparin purge solution	• Extra-corporeal membrane oxygenation • History of and/or confirmed heparin-induced thrombocytopenia • History of and/or confirmed heparin allergy • Pregnancy or lactation • Incarceration

Contact: victoria.miles@unchealth.unc.edu

Table 2. Data Points To Be Collected

Baseline Demographics:
Age, height, weight, sex, intensive care unit length of stay, hospital length of stay, duration of Impella support, sepsis diagnosis during encounter, continuous renal replacement therapy during encounter, SOFA score
Past Medical History:
Hypertension, diabetes mellitus, dyslipidemia, myocardial infarction, stroke, smoking status, bleeding, venous thromboembolism, atrial fibrillation, cirrhosis, etiology of cardiogenic shock
Baseline Labs:
Serum sodium, serum potassium, serum creatinine, hematocrit, white blood cell count, aspartate aminotransferase, alanine aminotransferase, alkaline phosphatase, ACT
Baseline Vital Signs:
Heart rate, temperature, respiratory rate, Glasgow Coma Scale
Stage of Cardiogenic Shock at Device Placement:
Lactate, systolic blood pressure, mean arterial pressure, alanine aminotransferase, arterial pH, number of vasopressors or inotropes at device placement, number of mechanical circulatory support devices
Primary Endpoint:
Serial ACT values
Secondary Endpoints:
In-hospital mortality, thromboembolic events, serial purge flow rates, serial purge pressures, serial lactate dehydrogenase levels, serial plasma-free hemoglobin levels, blood product administration, serial hemoglobin and hematocrit values, number of purge solution concentration changes

STATISTICS

- Primary endpoint will be analyzed using a chi-squared test
- Secondary endpoints will be analyzed using a chi-squared test for categorical variables or t-test for continuous variables
- Descriptive statistics will be utilized to analyze baseline characteristics

RESULTS

- Results will be available Spring 2023

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Subcutaneous versus Intravenous Neostigmine in Acute Colonic Pseudo Obstruction and Refractory Constipation

Erica Thacker, PharmD[1], Janice Tsui, PharmD, BCCCP[2], Julia Mathew, PharmD, BCCCP[2], Stephen Neely, MPH[1]
Kara Kubbs, PharmD, BCCCP[2]
[1]University of Oklahoma College of Pharmacy & [2]University of Oklahoma Medical Center

The UNIVERSITY of OKLAHOMA College of Pharmacy

Background

Acute colonic pseudo-obstruction (ACPO) is a severe form of colonic ileus seen in medical, surgical, and trauma patients[1,2]. The exact physiology is not fully understood, but is believed to be secondary to alterations in the autonomic nervous system. This increased sympathetic tone or parasympathetic suppression leads to decreased motility.[2,3]

Neostigmine reversibly inhibits acetylcholinesterase activity to increase the concentration of acetylcholine at synapses, leading to an increase in intestinal tone and peristalsis[4,5]. Neostigmine has been shown to improve clinical response in ACPO by enhancing smooth muscle contraction and colonic motor activity.

Subcutaneous neostigmine was first studied for ACPO; however, newer literature has shown that IV administration can also be utilized. While there are multiple studies comparing various dosing strategies of IV bolus and IV continuous infusion, there is no literature directly comparing outcomes with subcutaneous and intravenous administration.

Specific Aims

The purpose of this study is to evaluate the efficacy and safety of subcutaneous versus intravenous administration of neostigmine for the treatment of ACPO and severe post-operative constipation.

The primary efficacy outcome will be successful treatment, defined as a bowel movement within 72 hours of initial neostigmine dose.

Secondary efficacy outcomes will include time to bowel movement, total duration of neostigmine treatment, need for colonoscopic decompression or surgery, and reduction in bowel diameter on repeat scan.

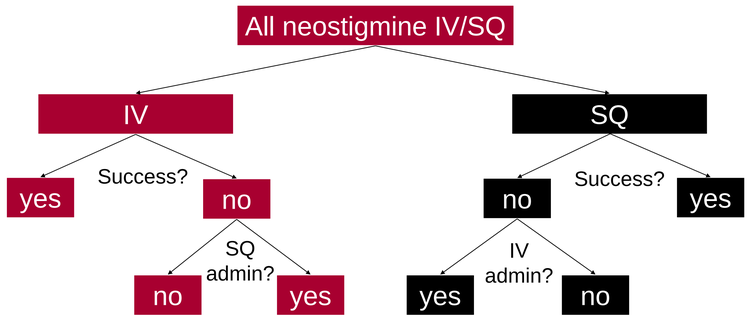
Secondary safety outcomes included bradycardia (defined as HR < 60 or atropine administration) following neostigmine administration or antiemetic use within 30 minutes of neostigmine administration.

Anticipated Timeline

- Data collection anticipated completion at end of December 2022
- Manuscript anticipated completion of June 2023

Methods

- Single-center, retrospective study
- Reviewed Medical records of patients admitted to surgical or trauma ICU between July 1, 2021 and November 30, 2022 that received neostigmine
- Inclusion criteria
  - Age ≥ 18
  - No bowel movement > 72 hours prior to neostigmine administration
  - Colonic distension ≥ 10 cm
- Exclusion criteria
  - Prior surgical intervention for ACPO



Data Collection

- **Demographics**: age, sex, height, weight, comorbidities, and ICU service (trauma, emergency general surgery, colorectal, vascular, surgical oncology, transplant, thoracic, and ear, nose and throat)

Neostigmine data
Route of administration
Initial dose
Initial frequency
Total number of doses
Total mg given
Duration of neostigmine
Need for colonoscopic decompression

Prokinetics and laxatives attempted prior to neostigmine	
Alvimopan	Bisacodyl
Metoclopramide	Lactulose
Methylnaltrexone	Senna
Magnesium citrate	Enema
Polyethylene glycol	Docusate

- **Patient hospital course**: SOFA score; receipt of beta blockers, narcotics, ECMO, or CRRT during neostigmine administration
- **Safety**: bradycardia or atropine administration

Statistical Analysis

- Propensity matching will be performed on:
  - Patient age
  - Colon diameter
  - Vasopressor administration
  - Use of narcotics within 72 hours prior to neostigmine administration
  - Use of laxatives or prokinetics within 72 hours prior to neostigmine administration
- Baseline characteristics will be evaluated with descriptive statistics
  - Continuous variables will be reported using mean (standard deviation) or median (interquartile range)
  - Categorical variables will be reported as frequency (percent) using chi-square tests

References

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Disclosure Statement

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:

ashp Accredited

Evaluation of Enteral and Parenteral Protein Nutrition in Trauma Patients

Princy John, PharmD – PGY2 Critical Care Pharmacy Resident
Sally A. Tice, RPh, PharmD, MHA, BCPS
Geisinger Medical Center, Danville, PA

Geisinger

Background

- The American Society of Parenteral and Enteral Nutrition (ASPEN) Guidelines suggest that provision of protein in critically ill trauma patients is more closely linked to positive outcomes than provision of total energy.
- Protein needs for trauma patients range from 1.2 to 2 grams/kilogram/day.
- Moderate or severe protein energy delays wound healing as protein is essential for new capillary formation, fibroblastic proliferation, production of proteoglycans and collagen synthesis.

Purpose

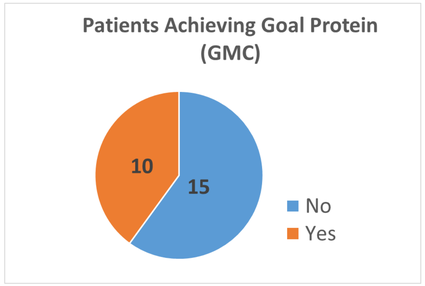
- To evaluate enteral and parenteral protein nutrition received by trauma patients at Geisinger Medical Center (GMC) and Geisinger Wyoming Valley Medical Center (GWV).

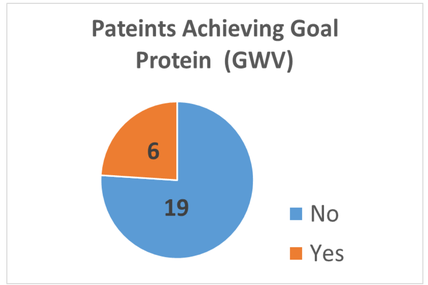
Methods

- Retrospective EMR chart review (EPIC)
  - Inclusion Criteria:
    - ≥ 18 years old
    - Admitted to Trauma Intensive Care Unit (TICU)
    - Receiving TPN or enteral feeds
    - Admitted between 06/01/2021 – 07/01/2022
  - Exclusion Criteria
    - Pregnant

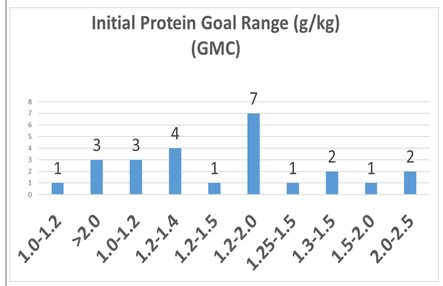
Results

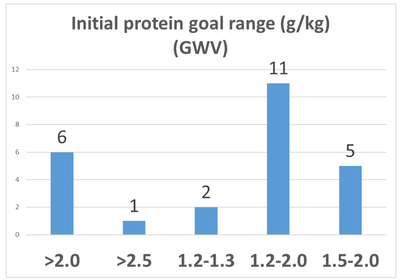
- A convenience sample of fifty patients was analyzed:
  - N=25 (GMC)
  - N=25 (GWV)
- Dieticians used the Nutrition Risk Screening tool (NRS-2002) to predict the risk of malnutrition in hospitalized patients. Findings were not universally documented in progress notes.
- 64% of patients had their protein needs reassessed after initiation of enteral or parenteral nutrition.
- On average, patients had 5 nutrition assessments per hospital stay in GMC and 4 nutrition assessments in GWV where protein needs were assessed.





- 10 patients achieved their protein goal at GMC and 6 patients achieved their protein goal at GWV.





- **GMC**
  - 13 patients were started on the lower end of the protein range
  - 4 patients were started in the mid-range
  - 8 patients were started on the higher end of the protein range
- **GWV**
  - 14 were started on the lower end of the protein range
  - 4 patients were started in the mid-range
  - 7 were started on the higher end of the protein range
- In both hospitals, patients often attained their goal tube feed rate yet not their goal protein target.

Conclusion

- Results indicate that opportunities for improvement exist in supporting achievement of target protein goal in critically ill trauma patients.
- Most patients are initiated on the lower end of their protein requirements.
- Although more than half of the patients' protein needs are reassessed, not all achieve their goal protein
- Possible reasons for patients not achieving protein goals included
  - Inability to tolerate enteral feeds
  - Interruption of enteral feeds for procedures or medication administration
  - Refeeding syndrome
  - Patients advancing to their goal rate for nutrition with no changes to meet their goal protein needs
  - Transitions to an oral diet
- Results are limited by a small sample size and heterogeneity of traumatic injury complex.

Future Directions

- A multidisciplinary team of nutrition, pharmacy, physician and nursing representatives will be convened to assess current practice and formulate a plan for improvement.

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Disclosures

- Nothing to disclose.

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

Adverse Reactions Associated with High-dose Fentanyl as Primary Opioid Agent for Analgosedation in Critically Ill Medical Patients

Jennifer Spadgenske, PharmD | Elizabeth Gau, PharmD, BCCCP | Megan Moore, PharmD, BCPS, BCCCP
Sanford Medical Center – Fargo, ND

Background

- Intensive care unit (ICU) patients have a high frequency of pain or discomfort which is associated with agitation, cardiac instability, respiratory compromise, and immunosuppression.[1-2]
- Analgosedation is associated with longer ventilator-free time and shorter ICU length of stay.[2-4]
- Potential adverse effects associated with opioids utilized in an analgesia-first approach include depressed respiratory drive, reduced gastric motility, withdrawal, and delirium.[5-8]
- To date, there is limited literature discussing dose related adverse events associated with fentanyl analgosedation.

Objective

- The objective of this study is to determine if high doses of fentanyl as the primary sedative in an analgosedation strategy led to a higher risk of adverse drug reactions when compared to low doses of fentanyl

Population

Inclusion Criteria:

- Medical Intensive Care Unit Patients
- Greater than 18 years of age

Exclusion Criteria:

- History of IV drug use
- Admitted for alcohol withdrawal, trauma, or surgical intervention
- Post cardiac arrest
- Chronic Ileus or small bowel obstruction
- Cognitively impaired
- Duration of fentanyl infusion or mechanical ventilation less than 48 hours

Methods

- **Design:** Retrospective, multicenter cohort study in the medical ICU
- **Cohorts:**
  - Low fentanyl exposure: 0-2,500 mcg/day
  - Moderate fentanyl exposure: 2,500-5,000 mcg/day
  - High fentanyl exposure: >5,000 mcg/day

Outcomes

Primary Outcome:

Within 7 days of fentanyl infusion discontinuation, composite of:

Ileus	Delirium
Confirmed with imaging	Confusion Assessment Method (CAM) ICU positive documentation

Secondary Outcomes:

- Duration of mechanical ventilation
- ICU length of stay
- Hospital length of stay
- Hospital and 28-day mortality
- Oral opioid use at discharge
- Discharge location

Data Collection

Baseline Data

- Demographics
- Sequential organ failure assessment
- Morphine milligram equivalents
- Deepest RASS score recorded

Drugs of Interest

- Sedatives: dexmedetomidine, propofol, continuous benzodiazepines, and ketamine
- Paralytic agents: atracurium
- Antipsychotic agents
- Peripherally acting μ-receptor antagonists
- Neostigmine

Disclosures

Authors of this presentation have nothing to disclose regarding financial or personal conflicts of interest that may impact subject matter presented.

References

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BOSTON MEDICAL CENTER

The aim of this initiative is to reduce overnight administration of targeted medications to less than 5% of total administrations.

Project Delirium: Reducing Overnight Medication Administration in the Intensive Care Unit

Jacob T. Peace, PharmD; Danielle E. Famularo, PharmD;
Kevin Yeh, PharmD, BCCCP; Kimberly Ackerbauer, PharmD, BCCCP;
Megan E. Feeney, PharmD, BCCCP; Ava E. Cascone, PharmD, BCCCP
Boston Medical Center, Boston, MA USA

IRB research versus quality improvement assessment completed and IRB submission not required.
No conflicts to disclose among the primary workgroup or its stakeholders

Background

- Sleep disturbances in critically ill patients are often multifactorial and increase risk of delirium in the intensive care unit (ICU)[1,2]
- Delirium has been associated with increased ICU and hospital length of stay, as well as increased costs[2]
- A sleep-promoting protocol which restricted patient-care activities between 00:00 and 04:00, with the exception of time-critical activities or emergency care, demonstrated improvement in operational outcomes[3]
- Limited data exists regarding impact of sleep-promoting protocols on clinical outcomes

Methods

- The aim of this initiative is to reduce ICU overnight administration of targeted medications to less than 5% of total administrations
- Overnight is defined as 22:00 to 04:00
- Data is retrospectively collected on a weekly basis and will utilize Plan-Do-Study-Act (PDSA) cycles with data represented over time in run charts

Outcome Metric

- Percent reduction of total targeted medication administrations per one-week period

Process Metrics

- Percent reduction of individual targeted medication administrations per one-week period
  - Subcutaneous heparin (SQH)
  - Low molecular weight heparin (LMWH)
  - Metoprolol tartrate
  - Future PDSA cycles to incorporate antibiotics

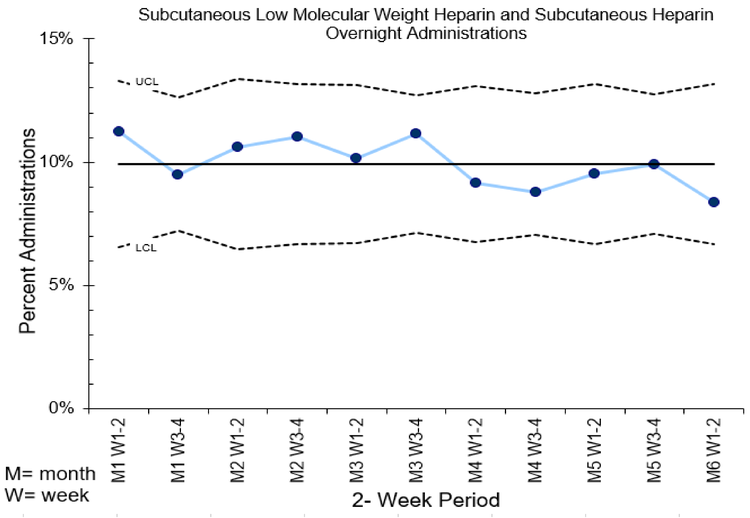
Balance Metrics

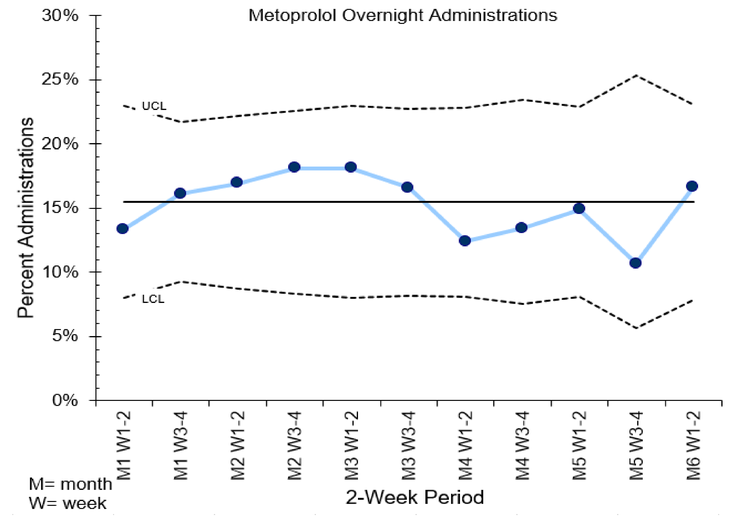
- Number of one-time doses administered overnight for each individual targeted medication per week

Correspondence:
Jacob.Peace@bmc.org *or* Danielle.Famularo@bmc.org

Baseline Data

- Baseline data over a 6-month period demonstrated weekly averages of:
  - 10.3% of all SQH doses administered overnight
  - 8.3% of all LMWH doses administered overnight
  - 15.5% of all metoprolol tartrate doses administered overnight





Future Directions

- Pharmacist-led intervention to independently edit order times at verification to be scheduled within the pre-defined period of 04:00-22:00
- Information technology (IT) changes to the electronic health record to automatically time administration intervals between 04:00-22:00
- Interprofessional education with pharmacists, nurses, and physicians

References

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Clarifying the Confusion: Comparison of Treatment Modalities for Valproate-Associated Hyperammonemia in Critically Ill Patients

Authors: Megan Taylor, PharmD, MSCR; Tia Collier, PharmD, BCCCP; Rachel Kolar, PharmD, BCCCP; Mary Petrovskis, PharmD, MS, BCPS; Ashley Kamp, PharmD, BCCCP
Department of Pharmacy, UNC Health Rex, Raleigh, NC, USA

BACKGROUND

- Valproic acid (VPA) is prescribed in the intensive care unit (ICU) for a variety of indications including seizures, headaches, and psychiatric conditions
- Despite its wide use, VPA-associated hyperammonemia can lead to potentially fatal consequences[1-2]
- Risk factors include: multiple anti-epileptic agents and interacting medications, genetic conditions, liver dysfunction, urea cycle disorders, VPA doses >20mg/kg/day, supratherapeutic VPA levels, and nutritional carnitine deficiency[3]
- Treatment options may include VPA discontinuation or dose reduction in combination with ammonia-lowering therapies, including lactulose and levocarnitine, which act via osmotic ammonia excretion and replenishment of depleted carnitine, respectively
- A retrospective analysis evaluated various treatment modalities for VPA-associated hyperammonemia in critically ill patients and found that discontinuation of VPA therapy and levocarnitine monotherapy were the most effective options for lowering elevated ammonia levels[4]
- Evidence surrounding the most effective treatment option for VPA-associated hyperammonemia in critically ill patients remains unknown

PURPOSE

- To compare the efficacy of lactulose monotherapy, levocarnitine monotherapy, lactulose in combination with levocarnitine, and no ammonia-lowering therapy in the management of VPA-associated hyperammonemia in critically ill patients

ENDPOINTS

Primary Endpoint

- Proportion of patients with >20% reduction in serum ammonia levels at 48 hours following initiation of lactulose monotherapy, levocarnitine monotherapy, lactulose in combination with levocarnitine, or no ammonia-lowering therapy

Secondary Efficacy Endpoints

- Absolute change in serum ammonia levels from treatment initiation to ICU discharge, ICU and hospital length of stay, and in-hospital mortality

Secondary Safety Endpoints

- Occurrence of lactulose-associated hypokalemia and diarrhea

METHODS

Table 1. Inclusion and Exclusion Criteria

Inclusion criteria	Exclusion criteria
Age ≥18 years	Hepatotoxicity (LFTs > 10x ULN)
Admitted to an ICU for ≥24 hours	Cirrhosis
Hyperammonemia diagnosis (serum ammonia level >50 µmol/L)	Lactulose use prior to admission
Received ≥1 dose of VPA or divalproex while hospitalized	Inmates of the state
≥2 serum ammonia levels drawn during hospitalization	Pregnancy

METHODS

Setting

- Data will be collected from UNC Health Rex and UNC Medical Center
- This study was submitted for approval by UNC Health System Institutional Review Board

Data Collection

- Eligible patients will be identified based on diagnosis of hyperammonemia following VPA or divalproex administration as well as medication orders for ammonia-lowering agents within UNC Health System between January 1, 2014 and September 1, 2022
- Data collection will involve chart review of patients eligible for inclusion
- Patients will be grouped into four treatment groups based on hyperammonemia treatment received

Study Design

- Retrospective, multicenter, cohort study

Figure 1. Study Design

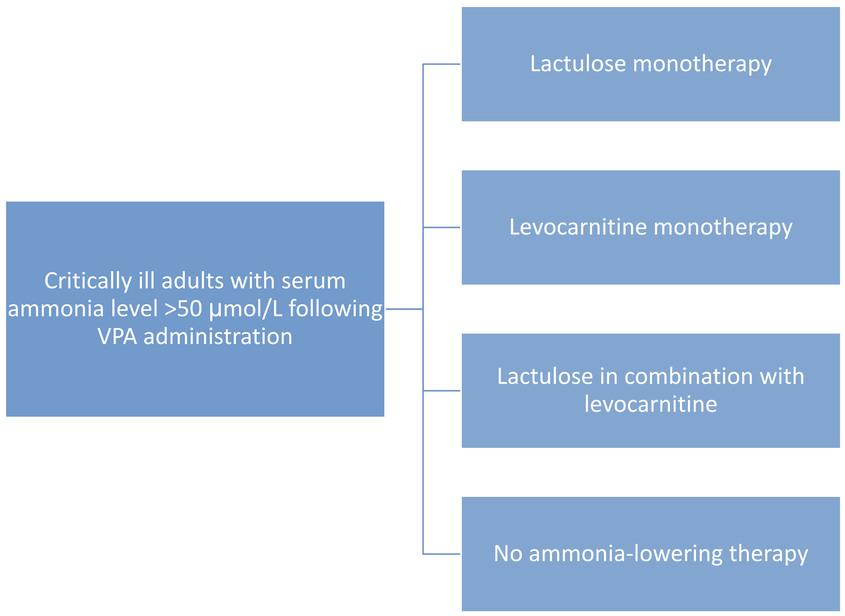

Table 2. Data Points To Be Collected

Patient demographics: age, sex, race, ethnicity
Relevant past medical history: seizures, alcohol withdrawal, mood disorders, headache, cirrhosis
Admission ICU: medical, surgical, neurosciences, cardiac, cardiac surgery, trauma
ICU admission weight (kg)
Concomitant medications: levetiracetam, topiramate, lamotrigine, phenytoin, phenobarbital, carbamazepine, risperidone, olanzapine, zonisamide, meropenem
Baseline AST and ALT
VPA: initial dose, initial VPA level (total), VPA dose changes or discontinuation
Hyperammonemia treatment modalities: initial dose, route, duration
Initial and subsequent serum ammonia levels
Safety: serum potassium levels <3mEq/L, documentation of fecal management system (FMS) placement, ≥8 bowel movements in 24h
ICU and hospital admission and discharge dates
Discharge disposition: home, rehab, skilled nursing facility, expired, hospice, long term acute care hospital, transfer, other

STATISTICS

- Study outcomes will be examined using descriptive and inferential statistics
- Categorical data will be analyzed using Chi-Square or Fisher's Exact test and continuous data will be analyzed using Student's t-test or Mann Whitney-U test as appropriate for parametric versus non-parametric data
- Propensity score matching in a 1:1 ratio will be used for both primary and secondary outcomes due to differences seen from logistic regression in baseline characteristics between the two groups

RESULTS

- Results will be available Spring 2023

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Contact: megan.taylor3@unchealth.unc.edu

Disclosures: None of the authors of this presentation have anything 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 Non-Intubated Analgesia Practices in Critical Care Transport

Hannah Gilchrist, PharmD; Jacob Markwood, BS, NRP, FP-C; Molly Bondurant, BSN, RN, CMTE, NRP; Alyson Esteves, PharmD, BCPS, BCCCP; Matthew Roginski, MD, MPH
Dartmouth-Hitchcock Medical Center, Lebanon, NH; Geisel School of Medicine at Dartmouth, Hanover, NH

Background

- Literature surrounding prehospital and critical care transport analgesia is sparse
- Recommendations focus on use of age appropriate pain assessment scales and dosing of pain medications to provide optimal analgesia[1]
- Risks of hypoventilation and hypoxemia may be present in those receiving high doses of analgesics [1,2]
    - Risk increased without a protected airway and in conjunction with benzodiazepines[2]
- Prior internal projects involving intubated patients during transport showed heterogeneity in choice of analgesic, dose administered, and frequency of deep levels of sedation

Methods

- Retrospective chart review
- July 1, 2020 through July 1, 2022
- **Inclusion criteria**
    - All adult patients who received fentanyl or ketamine during transport
- **Exclusion criteria**
    - Patients intubated pre-transport or with a depressed mental status upon initial evaluation
- Combination therapy is defined as patients who received multiple analgesic medications or an analgesic medication plus a benzodiazepine

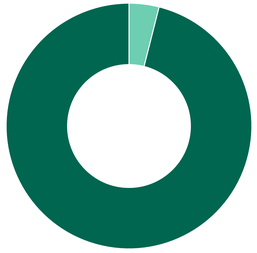
Outcomes

Primary outcome:
- Proportion of patients over sedated, defined as a Richmond Agitation Sedation Scale (RASS) score ≤ -3 and/ or a Glasgow Coma Scale (GCS) score ≤ 10

Secondary outcomes:
- Characterization of analgesic medication use during transport
- Percentage of patients co-administered benzodiazepines
- Percentage of patients who received naloxone
- Escalation of respiratory intervention (defined as new oxygen requirement, new application of a non-rebreather oxygen mask or positive pressure ventilation)

Results

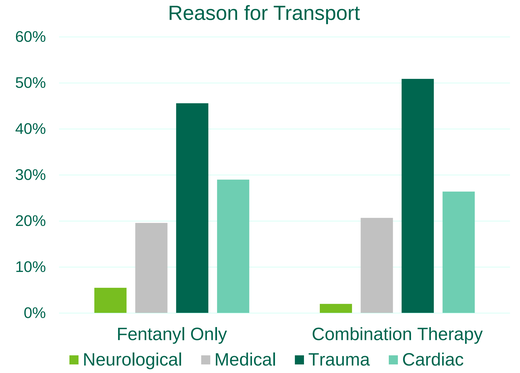
Primary Outcome - Patients Oversedated (n=15)



Baseline Characteristics

	Fentanyl Monotherapy (n =327)	Combination Therapy (n=53)	p Value
Age, years (mean ± SD)	58 ± 17	53 ± 18	0.07
Male (%)	228 (70%)	38 (72%)	0.77
Weight, kg (mean ± SD)	89.3 ± 23.3	90.6 ± 21.1	0.71
Ground Transport, n (%)	24 (7.3)	3 (5.7)	0.66
Rotorwing Transport, n (%)	303 (92.7)	50 (94.3)	0.66
Contact time, minutes (mean ± SD)	67.7 ± 23.2	75.4 ± 32.4	0.04
Initial MAP (mean ± SD)	96.4 ± 19.0	98.0 ± 17.8	0.58
Initial GCS (mean ± SD)	14.8 ± 0.6	14.7 ± 0.8	0.65
Initial RASS (mean ± SD)	0.1 ± 0.7	0.9 ± 1.0	<0.001
Initial Pain Score (mean ± SD)	6.2 ± 2.7	6.9 ± 2.9	0.06

Secondary Outcomes	Trauma Patients (n=176)	Non-Trauma Patients (n=204)	p Value
First Analgesic: Fentanyl, n (%)	170 (96.6)	196 (96.1)	1
First Analgesic: Ketamine, n (%)	3 (1.7)	1 (0.5)	0.34
Lorazepam Co-administration, n (%)	7 (4)	21 (10.3)	0.03
Midazolam Co-administration, n (%)	7 (4)	3 (1.5)	0.2
Naloxone Administration, n (%)	0 (0)	0 (0)	**1**
Escalation of Respiratory Support, n (%)	193 (59.2)	37 (69.8)	0.17



Primary Outcome Subgroup Analysis

	Fentanyl Monotherapy (n =327)	Combination Therapy (n=53)
Oversedated, n (%)	9 (2.8)	6 (11.3)
Not Oversedated, n (%)	318 (97.4)	47 (88.7)

Discussion

- This project shows a low rate of oversedation in non-intubated transport patients, with 15 of 380 total patients being oversedated during transport
- Patients who were oversedated more commonly received combination therapy as compared to fentanyl alone (9/327 vs 6/53, p=0.01)
- Trauma patients received a higher total quantity of fentanyl administered as compared to non-trauma patients (146.9 mcg vs 112.8 mcg, p=0.0005)
- Although an increase in respiratory support was required in 59.2% of trauma patients and 69.8% of non-trauma patients, the most common increase was from room air to nasal cannula

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Disclosure
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.

Evaluation of Direct Oral Anticoagulant Use Following Surgical Bioprosthetic Valve Replacement

Kayla Torppey, PharmD, BCPS; Dana Serao, PharmD, BCPS; Rouel Guiang, RPh

Newark Beth Israel Medical Center
Children's Hospital of New Jersey
RWJBarnabas HEALTH
Let's be healthy together.

BACKGROUND

- Antithrombotic therapy with a vitamin K antagonist (VKA) after bioprosthetic or mechanical valve replacement is recommended to reduce the incidence of thrombotic events[1]
- Following the results of the RE-ALIGN study, patients with bioprosthetic and mechanical valves have been excluded in major trials studying direct oral anticoagulants (DOACs) in patients with atrial fibrillation (AF) until the recent PROACT Xa trial[2,3]
- This trial was halted early due to increased clot formation and stroke in On-X mechanical aortic valve patients receiving apixaban[3]
- The use of DOACs is currently contraindicated in mechanical heart valves and considered off-label in bioprosthetic heart valves[4]
- The multidisciplinary cardiothoracic surgery team at Newark Beth Israel Medical Center (NBIMC) performs over 100 valve replacement procedures each year

OBJECTIVE

- To evaluate clinical outcomes in patients initiated on DOACs in the early post-operative period following surgical bioprosthetic and mechanical valve replacement

METHODOLOGY

- Site: 665-bed regional care, teaching hospital
- Inclusion criteria: Adult patients discharged on apixaban, rivaroxaban, or dabigatran after surgical bioprosthetic or mechanical valve replacement from January 1, 2019 to March 31, 2022
- Exclusion criteria: Treatment of venous thromboembolism (VTE)
- Design: Retrospective, single center, observational study
- Primary outcome: Incidence of major bleeding or thrombosis within 30 days of valve replacement
- Safety outcomes: Minor bleeding events, post-operative stroke, and 30-day mortality
- Secondary endpoint: 30-day readmissions
- Data obtained from Biome Analytics and the electronic medical record (EMR)
- Data analyzed using descriptive statistics

RESULTS

Figure 1: Screening and Inclusion

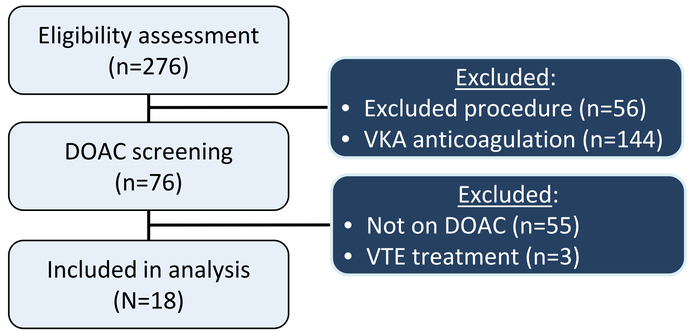


Table 1: Baseline Characteristics

Characteristic*	N=18
Age (years)	73 [60-77]
Sex (male)	12 (66.7)
BMI (kg/m^2)	26 [24-30]
Dialysis therapy	1 (5.6)
Prior indication for anticoagulation	7 (38.9)
Procedure and valve type†	
Aortic valve replacement (AVR)	12 (66.7)
Mitral valve replacement (MVR)	3 (16.7)
AVR + MVR	1 (5.6)
AVR + mitral valve repair	2 (11.1)

*All data presented as n (%) or median [IQR]
†All valves bioprosthetic

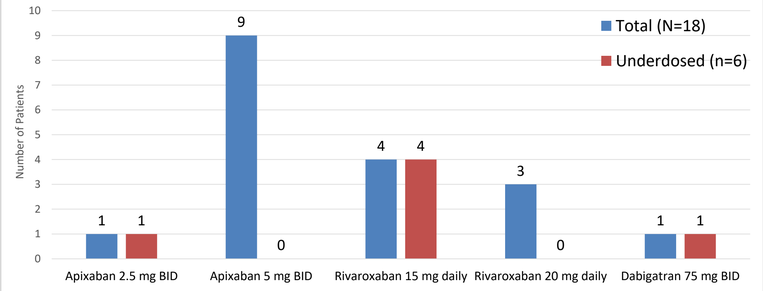
Table 2: Efficacy and Safety Data

Outcomes at 30-days of Procedure	N=18
Major bleeding	0
Thrombosis	0
Minor bleeding	0
Post-operative stroke	0
Mortality	0
Readmissions†	2 (11.1)*

*Unrelated to cardiovascular complications
†30-days from discharge

RESULTS

Figure 2: Dosing Subanalysis



DISCUSSION

- Patients who had baseline indication for anticoagulation were restarted on the same agent and dose after the procedure
- Significant variability existed in the choice of DOAC for patients who developed AF after valve replacement
- Dosing of DOACs did not follow a conventional dosing guideline
- All patients were also discharged on aspirin 81 mg daily
- No patients were discharged on triple antithrombotic therapy
- Limitation in reliance on data extracted from billing documentation and retrospective documentation in the EMR

CONCLUSION

- Despite limitations in sample size and the retrospective design, findings suggest DOACs may have an expanded role in patients with bioprosthetic valves
- Larger randomized studies are needed to assess the true safety and efficacy of DOACs in this population

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Disclosure

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:
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Dana Serao: Nothing to disclose
Rouel Guiang: Nothing to disclose

Baby "Bullets": Use of 23.4% Sodium Chloride for Neurologic Emergencies and Safely Preventing Delays in Administration at a Children's Hospital

Elizabeth Vadasz, PharmD[1], Jeff Moss, PharmD[1], Lindsey Rasmussen, MD[2]

[1]Department of Pharmacy, Lucile Packard Children's Hospital at Stanford
[2]Division of Critical Care, Department of Pediatrics, Stanford University School of Medicine

Background

- 23.4% sodium chloride (NaCl) is recommended by consensus guidelines for refractory intracranial pressure (ICP) management to urgently reduce intracranial hypertension and prevent cerebral herniation in pediatric patients.[1]
- At Lucile Packard Children's Hospital Stanford (LPCHS), an ICP protocol was developed in 2018 and includes 23.4% NaCl in an order set for intracranial hypertension refractory to 3% NaCl.
- Due to the urgent need for ICP reduction and importance of preventing dispensing and administration delays while maintaining patient safety, the ICP order set and protocol were optimized in January 2021.
  - 23.4% dose: 0.5 mL/kg (maximum 30 mL)
    - Direct dispense upon order verification requiring pick-up from pharmacy
  - Restricted to intensive care unit (ICU) administration
  - Central line administration
  - Recommended monitoring: serum sodium (Na) and osmolality every 4-6 hours
    - Hold criteria: Na ≥ 160 mEq/L, serum osmolality > 320 mOsmol/kg, Na correction > 4 mEq/L in 4 hours
- Continued monitoring of workflow related to dispensing and administration of 23.4% NaCl is necessary to identify opportunities to implement interventions to reduce time to administration while maintaining patient safety.

Purpose

- Assess adherence to our institution's ICP management protocol and characterize time to 23.4% NaCl administration
- Identify opportunities to improve dispensing and administration time and reduce delays in care while ensuring safe practices

Methods

- Medication use evaluation
- Chart review of one-time orders for 23.4% NaCl between January 1, 2016, and June 30, 2022
  - LPCHS patients admitted to ICUs
  - Time analysis:
    - Provider order entry to pharmacist dispense tracking
    - Pharmacist tracking to nursing administration
  - Review of internal reporting system for patient safety events related to 23.4% NaCl administration

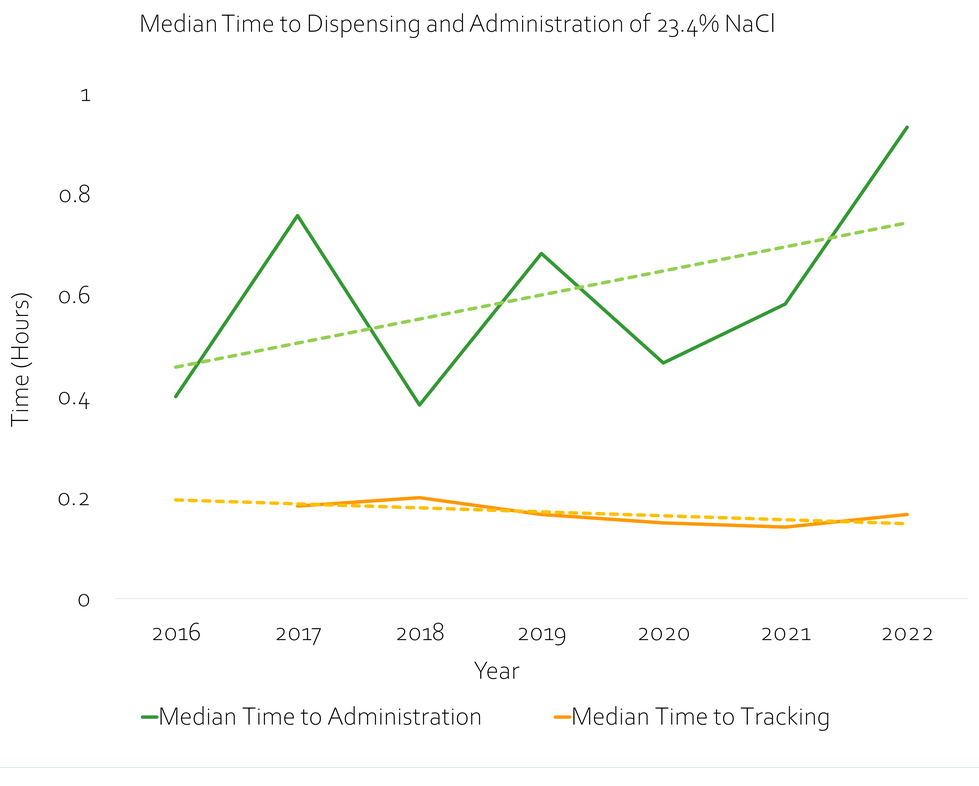
Results

Table 1. 23.4% NaCl Usage

	Patients (N=30)
ICU administration, n (%)	30 (100%)
CVICU, n (%)	7 (23%)
PICU, n (%)	23 (77%)
Central line administration, n (%)	30 (100%)
Doses Administered (N=125)	
Volume (mL), median (IQR)	15 (9.3-30)
Volume (mL/kg), median (IQR)	0.5 (0.26-0.5)
Volume > 30 mL, n (%)	2 (1.6%)
Time Analysis	
Time to dispense (minutes), median (IQR)	10 (7-14.5)
Time to administer (minutes), median (IQR)	48 (27-78)

Abbreviations: IQR: interquartile range; CVICU: cardiovascular intensive care unit; PICU: pediatric intensive care unit

Figure 1. Dispensing and Administration Trends



Discussion

- Adherence to protocol restrictions: ICU location, central line administration, few deviations in maximum dose
- No serious safety events reported with 23.4% NaCl administration
- Up trended time to administration with stable time to dispensing identifies potential area for further exploration to prevent delays in administration
- Opportunity to increase familiarity with use in ICU while balancing risks to ensure patient safety
- Workflow changes implemented:
  - Ordering provider mandatory acknowledgement to communicate with pharmacy for urgent need
  - Verifying pharmacist mandatory acknowledgment to dispense urgent doses and communication with bedside RN to pick-up from pharmacy or prepare at bedside

Conclusion

- Appropriate and safe use of 23.4% NaCl per protocol in ICUs at LPCHS allows for timely administration for neurologic emergencies.

Future Directions

- Ensure adequate provider, pharmacy, and nursing training related to ICP protocol
- Continued monitoring of adherence to protocol, time to administration, and patient safety events associated with 23.4% NaCl

Disclosures and Acknowledgements

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

Contact

Please contact Elizabeth Vadasz, PharmD
Evadasz@stanfordchildrens.org

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Evaluation of Hydrocortisone Discontinuation Strategies in Patients with Septic Shock

Niti Shah, PharmD[1,2], Adam Pennoyer, PharmD, BCCCP[2], Justin Kaplan, PharmD, BCCCP[1]
[1]Overlook Medical Center, Summit, New Jersey, [2]Morristown Medical Center, Morristown, New Jersey

Background

- Patients with septic shock refractory to moderate doses of vasopressors often receive intravenous hydrocortisone (HC) as part of their guideline-directed regimen.[1]
- After resolution of shock, there is no consensus on whether to taper HC over several days or abruptly discontinue steroids.
- Although abrupt discontinuation reduces glucocorticoid burden, it raises concern for adrenal insufficiency and hemodynamic instability warranting vasopressor reinitiation.
- Previous studies reported mixed results regarding clinical outcomes associated with each strategy. [2,3,4]
- This study aims to describe HC discontinuation practices in medical intensive care unit (ICU) patients with septic shock.

Methods

- **Retrospective chart review** at two academic community medical centers
- **Inclusion Criteria:** Hospitalized patients who received HC as an adjunct to vasopressor therapy for septic shock for ≥ 24 hours between July 2020 to July 2022
- **Exclusion Criteria**: Glucocorticoids within 30 days of HC initiation, withdrawal of care or patient expiration prior to HC discontinuation

- **Primary Analysis:**
  - Percent of patients with HC abruptly discontinued vs. tapered off, number of downward dose titrations, and length of taper in patients who are weaned

- **Secondary Analysis:**
  - Incidence of vasopressor reinitiation during taper or within 48 hours following last HC dose
  - Incidence of hyperglycemia (BG >180 mg/dL) during HC therapy and within 24 hours of last HC dose

Results

Figure 1. Study Profile

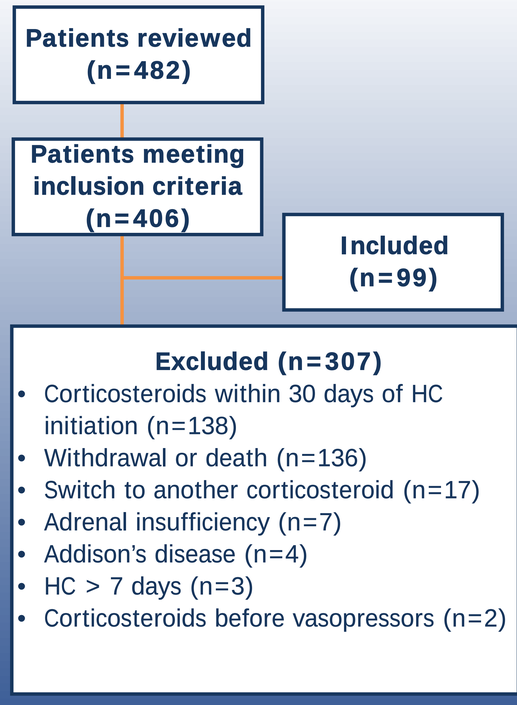

Table 1. Baseline and Clinical Characteristics

Characteristics	Abrupt n=21	Taper n=78
Age (years)	65 (62-74)	70 (59-80)
Male, n (%)	13 (62)	44 (56)
SOFA Score on ICU admission	6 (4-8)	6 (4-8)
Hospital LOS (days)	15.9 (9.9-31.0)	17.8 (10.9-25.7)
ICU LOS (days)	5.1 (3.3-11.1)	6.7 (3.9-12.3)
Vasopressor duration (days)	2.8 (1.9-3.6)	3.5 (1.9-4.8)
HC duration (days)	2.2 (1.5-2.6)	3.9 (2.9-5.5)
NE equivalents (mcg/min) when HC ordered	34.4 (29.2-37.8)	27.5 (14.2-38.0)
NE equivalents (mcg/min) when HC abruptly discontinued or tapered	0 (0-2)	2 (0-8.7)

Data represented as median (IQR) unless otherwise noted.
Abbreviations: SOFA, sequential organ failure assessment; LOS, length of stay; NE, norepinephrine

Figure 2. Primary Analysis

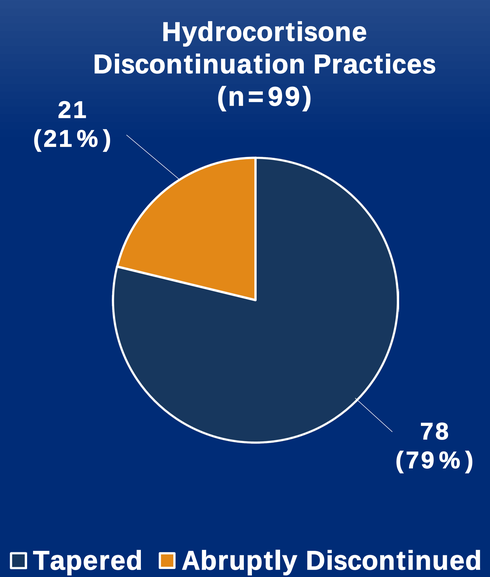

Table 2. Study Endpoints

Endpoints	Abrupt n=21	Taper n=78
Vasopressor reinitiation during taper or within 48 h following discontinuation*	1/14 (7)	6/65 (9)
Time from HC taper start or abrupt discontinuation to vasopressor reinitiation (days), median (IQR)	0.8	1.4 (1.2-1.9)
Hyperglycemia during HC therapy	11 (52)	55 (71)
Hyperglycemia within 24 h following last HC dose**	6/20 (30)	23/76 (30)
Length of taper (days), median (IQR)	N/A	2.0 (1.4-3.0)
Number of downward dose titrations prior to discontinuation, median (IQR)	N/A	2.0 (1.0-2.0)

Data represented as n (%) unless otherwise noted.
*Outcome evaluated in 79 patients as 20 patients had vasopressors running at time of HC discontinuation
**Outcome evaluated in 96 patients as 3 patients expired within 24 h following HC discontinuation

Discussion

Results

- At our institution, more patients with septic shock had HC tapered off than abruptly discontinued.
- There was no difference in SOFA score on ICU admission, eliminating severity of illness as a confounding variable when assessing physicians' preferences of a HC discontinuation strategy.
- Hospital LOS, ICU LOS, and vasopressor therapy duration were longer in the taper group.
- While the incidence of reinitiation of vasopressors was comparable between the two groups, incidence of hyperglycemia during HC therapy was higher in the taper group. There was no difference in patients who experienced hyperglycemia within 24 hours of the last HC dose. However, duration of hyperglycemia or insulin requirements during and after vasopressor discontinuation were not collected.

Limitations

- Small sample size
- Did not collect comorbidities which may have influenced the HC discontinuation strategy chosen or incidence of vasopressor reinitiation

Conclusion

- Providers at our institution were more likely to taper HC than abruptly withdraw HC in refractory septic shock.
- Abrupt cessation of HC did not lead to hemodynamic instability warranting vasopressor reinitiation more often than tapering.
- Abrupt discontinuation could potentially reduce exposure to HC by approximately two days and reduce adverse effects and medication burden.

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Disclosures

All authors have nothing to disclose