Appropriate Statin Therapy in Type-2 Diabetes Mellitus Patients

Charbel Aoun[a], Diana Tran[b], Garrett Strawn[c]

[ab]*Department of Pharmaceutical Sciences, School of Pharmacy, Philadelphia College of Osteopathic Medicine, Suwanee, GA 30024;*

INTRODUCTION

Atherosclerotic cardiovascular disease (ASCVD) is the primary cause of death in patients with type 2 diabetes mellitus (T2DM)[3]. ASCVD can include a history of acute coronary syndromes, a myocardial infarction, stable or unstable angina, coronary or other arterial revascularization, stroke, transient ischemic attack, or peripheral arterial disease[3]. An increase in the 10-year ASCVD risk also increases the percent likelihood of having a heart attack within the next ten years. Approximately 92% of individuals with type 2 diabetes who do not have cardiovascular disease (CVD) have dyslipidemia[4]. Hypertension and dyslipidemia are common conditions that coexist in patients with type 2 diabetes. The American Diabetes Association (ADA) Standard of Care Guidelines, American College of Cardiology (ACC), and American Heart Association (AHA) suggests the use of high-intensity statin therapy for T2DM patients age 50–75 regardless of ASCVD risk. High-intensity statins include rosuvastatin (20 mg and 40 mg) or atorvastatin (40mg and 80 mg)[2]. A recent study from CARDS demonstrated that atorvastatin reduced acute coronary heart disease events by 36%, coronary revascularizations by 31%, stroke by 48%, and death rate by 27%. Rosuvastatin, another high intensity statin, is also used to reduce cardiovascular events in T2DM patient[1]. Rosuvastatin has the added benefit of being better than atorvastatin at lowering low-density lipoprotein (LDL) levels[4]. Given the data, it is recommended that T2DM patients are started on statins to reduce their risk of cardiovascular events.

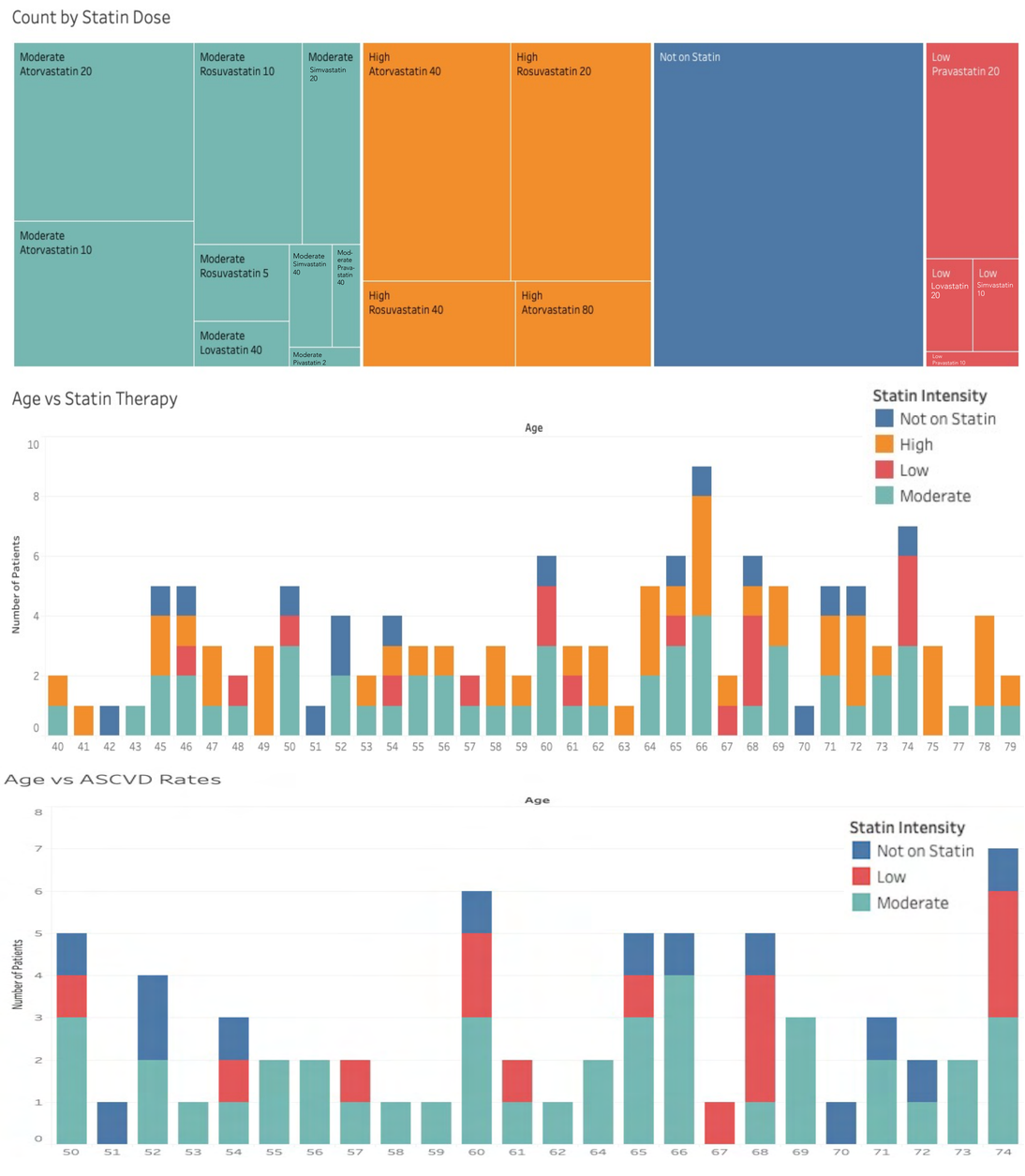
OBJECTIVE

Determine the number of patients who are not on recommended statins set forth by the ADA Standard of Care Guidelines.

METHODS

- The data was collected at several retail chain stores in the metro-Atlanta area using the Drug Use Reports tool from the data warehouse.
- Patients who have been prescribed one of the following metformin doses over a 12-month period were selected: 500 mg IR, 500 mg ER, 750 mg ER, 800 mg IR, and 1000 mg IR.
- Other assumptions were that our population were non-smokers and were not on aspirin therapy.
- From there, data was collected to confirm the patient's age and the statin intensity therapy the patient is on, if there is one that the patient is on at the time of data collection.

RESULTS



DISCUSSION

A cohort of 222 patients with T2DM was analyzed to determine if appropriate statin usage was prescribed for these patients. 26.7% of patients (60/222) were not on statin therapy. 9.46% of patients (21/222) were on a low-intensity statin therapy. 34.7% of patients (77/222) were on a moderate-intensity statin therapy. 28.8% of patients (64/222) were on a high-intensity statin therapy. Among patients with T2DM, there was a 44.6% (99/222) incidence of being aged between 50 and 75. Among T2DM patients aged 50-75, there was an 68.9% (86/99) incidence of being on an inappropriate therapy, or a 38.7% (86/222) incidence from the cohort of patients studied.

CONCLUSION

The primary outcome of the study found that patients were not prescribed appropriate statin therapy or no statin therapy at all based on suggested guidelines described by the ADA. Among patients with type two diabetes, there was a 38.7% (86/222) incidence of being prescribed an inappropriate statin. The data from this study could be used to help future T2DM patients reduce their risk of cardiovascular event. Furthermore, this study was inexpensive, posed no additional risk to subjects, and used existing records. Therefore, studies like this can be readily replicated in other areas of patient care. This analysis emphasizes the importance of improving prescribing patterns for statin therapy among T2DM patients.

REFERENCES

1. Colhoun, H. M., Betteridge, D. J., Durrington, P. N., Hitman, G. A., Neil, H. A., Livingstone, S. J., Thomason, M. J., Mackness, M. I., Charlton-Menys, V., Fuller, J. H., & CARDS investigators (2004). Primary prevention of cardiovascular disease with atorvastatin in type 2 diabetes in the Collaborative Atorvastatin Diabetes Study (CARDS): multicentre randomised placebo-controlled trial. *Lancet (London, England), 364*(9435), 685–696. https://doi.org/10.1016/S0140-6736(04)16895-5
2. Lee, Y., & Siddiqui, W. J. (2020, July 26). *Cholesterol levels.* https://www.ncbi.nlm.nih.gov/books/NBK542294/
3. Marathe, P. H., Gao, H. X., & Close, K. L. (2017). American Diabetes Association Standards of Medical Care in Diabetes 2017. *Journal of diabetes, 9*(4), 320–324. https://doi.org/10.1111/1753-0407.12524
4. Tuomilehto, J., Leiter, L. A., & Kallend, D. (2004). A review of the efficacy of rosuvastatin in patients with type 2 diabetes. *International journal of clinical practice. Supplement,* (143), 30–40. https://doi.org/10.1111/j.1368-504x.2004.00390.x

ACKNOWLEDGEMENTS

Charbel Aoun, PharmDc (ca7976@pcom.edu) "Nothing to Disclose"
Diana Tran, PharmDc (dianatr@pcom.edu) "Nothing to Disclose"
Advisors: Garrett Strawn, PharmD, "Nothing to Disclose"

A comparison of hepatitis B (HBV), influenza, and pneumococcal polysaccharide vaccine (PPSV23) vaccination rates to national standards in pharmacist managed patients with type 2 diabetes mellitus (T2DM)

Caitlin Brown, PharmD; Tara Koehler, PharmD, MPH, BCACP; Meredith Lopez, PharmD, MPH, BCACP

AU Medical Center , Department of Pharmacy, Augusta, Georgia

INTRODUCTION

- HealthyPeople 2020 (HP2020) sets objectives for several core measures to **improve health and well-being** from 2010-2020.
- Immunization rates in the United States are continuously lagging behind the goals set by HP 2020.

Vaccine	Current Vaccination Rate (CDC)	Goal Vaccination Rate (HP2020)
Annual Influenza	61.6%	70%
PPSV23	52.6%	60%
Hepatitis B	17.1%	--

- There are many pharmacist-led proven interventions used to increase vaccination rates that differ by practice setting.
- Primary Objective: To determine if patients with T2DM who are managed by a pharmacist in an ambulatory care setting are more up to date on HBV, influenza, and PPSV23 vaccinations than national averages reported by the CDC and goals set by HP 2020.
- Secondary Objectives: To describe the HBV, influenza, and PPSV23 vaccination rates of pharmacist-managed patients with T2DM and determine if any healthcare disparities have influenced vaccination status.

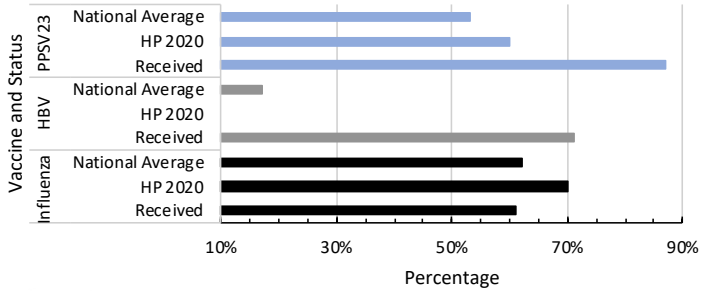
METHODS

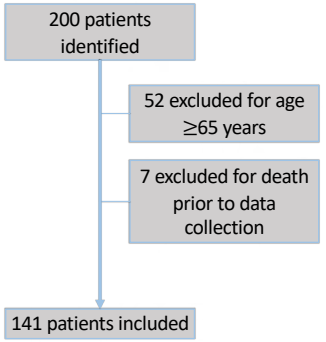
- Retrospective cross-sectional study
- SAS 9.4
- Utilized: descriptive statistics, binomial test of proportion, and logistic regression

Inclusion	Exclusion
• Established patient of the outpatient family medicine clinical RPh as of September 1, 2020 • Referral to outpatient family medicine clinical RPh for T2DM management • Age 18-64 years	• Type 1 diabetes mellitus • Pregnant • Age ≥65 years or <18 years

RESULTS

Vaccination Rates





HBV Vaccination	Received	Statistic
Dose 1 – n (%)	Yes	100 (70.9)
	No	41 (29.1)
Dose 2 – n (%)	Yes	79 (56.0)
	No	62 (44.0)
Dose 3 – n (%)	Yes	58 (41.1)
	No	83 (58.9)
Total– mean (SD)		1.9 (1.6)

Demographics (n=141)	
Age (years) – mean (SD)	51.4 (10.4)
Race – n (%)	
Black	90 (63.8)
Asian	2 (1.4)
Hispanic	5 (3.6)
Other	1 (0.7)
White	43 (30.5)
Gender – n (%)	
Female	89 (63.1)
Male	52 (36.9)
Insurance – n (%)	
Medicaid	34 (24.1)
Medicare	23 (16.3)
ICTF	13 (9.2)
Dual Eligible Medicaid/Medicare	18 (12.8)
Other	3 (2.1)
Self-Pay	6 (4.3)
Commercial	44 (31.2)
Rural Community – n (%)	
Rural	8 (5.7)
Urban	133 (94.3)
Years of RPh Management – mean (SD)	2.9 (0.8)

PPSV23 Vaccination Status	
Received	Not Received
Years of RPh Management	
3 years (SD 0.7)	2.4 years (SD 0.8)

CONCLUSIONS

- Due to sample size, correlation between pharmacist management and vaccination rates could not be established.
- More research utilizing a larger sample size and examining reasons for vaccine refusal should be conducted to further understand the pharmacist role in vaccination status.
- Limitations: unable to meet power due to small sample size, limited variables, study design, combination hepatitis A/B vaccine, shortage during study period, COVID-19 protocols limiting patient encounters

CLINICAL IMPLICATIONS

- The sample patient population is meaningful and adds to current literature.
- Future trials could investigate vaccine hesitancy amongst groups found to have lower vaccination rates.

REFERENCES

1. Villarroel M, Vahratian A. Vaccination Coverage Among Adults With Diagnosed Diabetes: United States, 2015. CDC.
2. Immunization and Infectious Diseases Data Details. Immunization and Infectious Diseases Data Details. Healthy People 2020.
3. Skelton JB. *J Am Pharm Assoc (2003)*. 2011;51(6):704-712.
4. Isenor JE, et al. *Vaccine*. 2016;34(47):5708-5723.
5. Vondracek TG, et al. *Arch Intern Med*. 1998;158(14):1543-1547.
6. Van Amburgh JA, et al. *Pharmacotherapy*. 2001;21:1115-1122.
7. Stilwell AM, et al. *J Am Pharm Assoc (2003)*. 2017;57(4):520-525.
8. Matta TJ, et al. *J Am Pharm Assoc (2003)*. 2017;57(2):183-187.
9. Stewart-Lynch AL, et al. *J Am Pharm Assoc (2003)*. 2020;60(2):362-367.
10. Rihtarchik L, et al. *Res Social Adm Pharm*. 2018;14(4):367-371

DISCLOSURES

- None of the authors have anything to disclose.

Dexmedetomidine Medication Use Evaluation in a Community Hospital Intensive Care Unit

Connor Lockridge, PharmD. Candidate, Memorie Wilcoxon, PharmD., BCPS, Ah Hyun Jun, PharmD., BCCCP,
Ester Lee, PharmD., Kunal Patel, PharmD., BCPS

Northside Hospital – Cherokee, Department of Pharmacy

BACKGROUND

- Dexmedetomidine (Precedex®) is a semi-selective alpha-2 adrenergic agonist with sedative and analgesic effects.[1]
- Dexmedetomidine is FDA approved for procedural sedation in non-intubated patients and intensive care unit (ICU) sedation in mechanically ventilated patients for less than 24 hours.[1]
- The association of dexmedetomidine with low incidence of respiratory depression has led to its use in other various applications, but it is not well studied in non-intubated patients.[2]

OBJECTIVES

Provide insight on the prescribing practices and safety of dexmedetomidine in a community hospital 24-bed mixed ICU.

Compare the percentage of patients who were intubated vs. non-intubated when dexmedetomidine was initially administered.

METHODS

- Data was collected via retrospective chart review using the hospital's electronic medical record.
- The study included data from June 1, 2019 to December 31, 2019.
- Inclusion criteria:
  - ≥ 18 years of age,
  - Admitted to the ICU during the study timeframe,
  - Received dexmedetomidine for ≥ 24 hours.
- Predetermined data points included:
  - Demographics
  - Prescribing information (indication for use, duration of therapy, infusion rates, concomitant sedatives and reason for discontinuation).
- Descriptive statistics were utilized to analyze data.

RESULTS

Patient Characteristics (n = 75)	
Age – years, average (Range)	61.5 (22-95)
Weight – kg, average (Range)	80.1 (42.2-302.4)
Sex – male, n (%)	39 (52)

Table 1: Baseline demographics

Prescribing Information (Intubated and Non-intubated)	
Indication for use – n (%)	n = 75
Sedation	28 (37.3)
Delirium/agitation	19 (25.3)
Alcohol withdrawal	16 (21.3)
Other (anxiety or compliance/tolerance with O_2 therapy)	9 (12.0)
Noninvasive positive pressure ventilation (NIPPV)	2 (2.7)
Unclear indication	1 (1.3)
Highest infusion rate recorded – mcg/kg/min, mean (Range)	
Intubated	1.05 (0.1-1.5)
Non-intubated	1.04 (0.3-1.7)
Duration of therapy – hours, mean (Range)	
Prior to intubation	48.3 (2.3-126.5)
While intubated	69.5 (1.3-310.1)
After extubation	37.0 (1.6-97.9)
Lowest Heart Rate charted while on dexmedetomidine – bpm, mean (Range)	59 (39-78)

Table 2: Prescribing information

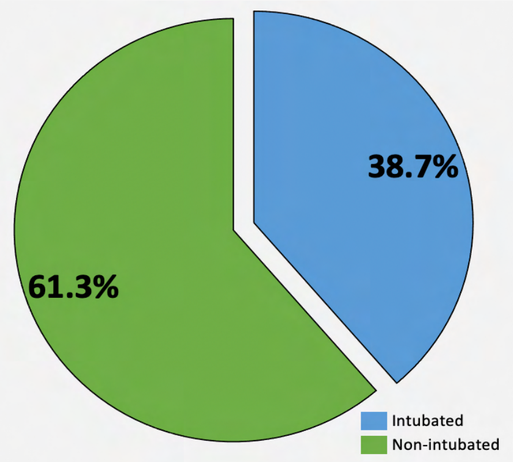


Figure 1: Intubated vs. non-intubated patients at initiation of dexmedetomidine (n = 75)

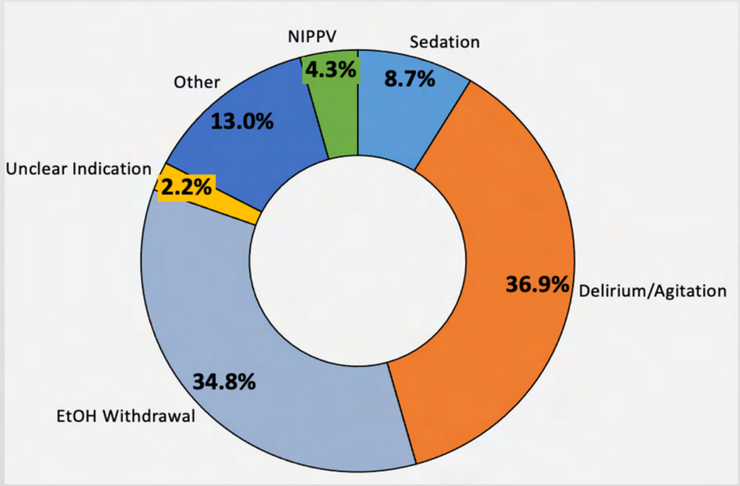


Figure 2: Initial indication in non-intubated patients (n = 46)
*Other includes anxiety and compliance/tolerance of oxygen therapy

DISCUSSION

- This study illustrated prescribing patterns, indications, and safety parameters of patients who received dexmedetomidine in a community hospital ICU.
- Almost two-thirds of the time, dexmedetomidine was initially administered to patients who were not intubated with a mean duration of therapy of 48.3 hours.
- These findings provide an opportunity to educate providers and optimize practice, especially when it is used in non-intubated patients for the indications of alcohol withdrawal and delirium/agitation.

REFERENCES

1. Product Information: Precedex(TM) intravenous injection, dexmedetomidine HCl intravenous injection. Hospira, Inc. (per FDA), Lake Forest, IL, 2016.
2. Gerlach AT, Murphy CV, Dasta JF. An updated focused review of dexmedetomidine in adults. Ann Pharmacother. 2009;43(12):2064–74. doi: 10.1345/aph.1M310.

The authors of this study have nothing to disclose.

Impact of Clinical Pharmacists on Type 2 Diabetes Mellitus outcomes in the primary care setting before and during the Public Health Emergency surrounding COVID-19

Chelsea Orvin, PharmD; Caleb Rich, PharmD Candidate; Ashley G. Woodhouse, PharmD, BCACP, CACP,CDTM; Joseph Crosby, PhD, RPh; Chelsea Keedy, PharmD, BCACP, CDTM

Background

- The American Diabetes Association (ADA) recommends targeting an A1C goal of <7% in most patients as well as initiating statin therapy in the majority of patients[1]
- The ADA also highlights the importance of utilizing multidisciplinary teams, including pharmacists, to increase therapeutic outcomes in patients with Type 2 Diabetes Mellitus (T2DM)[2]
- The COVID-19 pandemic has provided a unique opportunity to promote telehealth

Purpose

- To determine the impact of ambulatory care pharmacists on Type 2 Diabetes Mellitus outcomes prior to and during the COVID-19 pandemic

Methods

- Retrospective, observational, chart review
- Inclusion Criteria
  - Patients ≥18 years old with T2DM managed by a clinical pharmacist at least once between August 2019-October 2020
- Exclusion Criteria
  - Type 1 diabetes mellitus, pregnancy, initial A1C < 8%
- Data Collected
  - History of T2DM, history of comorbidities, A1C values, diabetes medication history and adherence, statin therapy initiation and adherence, billing codes associated with pharmacists visits, insurance type, medication reconciliation history

Pre-Pandemic (N=30)	During Pandemic (N=61)
August 2019- February 2020	March 2020-October 2020

Outcomes

- **Primary**
  - Determine overall change in A1C at 3 and 6 months in patients with T2DM in which therapy was managed by a pharmacist within a primary care setting before and during the pandemic
- **Secondary**
  - Determine percentage of diabetic patients on statin therapy, adherence to statin and diabetic medications related to HEDIS and MIPS measures, and the amount of billing codes generated due to pharmacist visits
- **All outcomes were measured prior to and during the pandemic**

Results

Primary Outcomes			
	Pre-Pandemic (N=30)	During Pandemic (N=61)	P-value
3 Month A1C Reduction	-1.3%	-2%	0.305
6 Month A1c Reduction	-1.2%	-2.2%	0.249

Secondary Outcomes		
	Pre-Pandemic (N=30)	During Pandemic (N=61)
Appropriately on Statin Therapy	96.2%	82.6%
HEDIS Measure: Statin Use in Persons with Diabetes	95.2%	84.2%
HEDIS Measure: Statin Adherence	95.2%	84.2%
HEDIS Measure: Diabetic Medication Adherence	100.0%	100.0%
HEDIS Measure: A1C Control (<8%)	41.7%	54.0%
MIPS Measure: Medication Reconciliation	100.0%	100.0%
MIPS Measure: A1C Control (<9%)	60.0%	73.8%
Billing Code: 99211	32	34
Billing Code: 99212	1	5
Billing Code: 99213	6	17
Billing Code: 99214	8	11
Billing Code: 99457	0	38
Total Billing Codes	47	105

Analysis

- Z test
  - 3 and 6 month A1C values
  - p value <0.05 statistically significant
  - Study not adequately powered to detect statistical significance
- Descriptive statistics for secondary objectives

Discussion

- The pandemic allowed for more frequent utilization of existing remote monitoring technologies
  - Resulted in improved clinical, quality, and economic outcomes
  - Provided additional potential avenues for future expansions and sustainment

Limitations

- Insurance claim data not available for medication adherence
- HEDIS and MIPS define A1C control differently
- HEDIS does not account for statin intolerance or allergy
- Some A1C values not drawn within a timely manner
- Not every patient had an A1C value for both 3 and 6 months after their initial value

Conclusion

- Clinical pharmacists were able to maintain and improve clinical outcomes related to T2DM despite the ongoing pandemic through implementation of telephonic monitoring

References

1. American Diabetes Association. Diabetes Care. Jan 2020;43 (Suppl.1): S66-S676. DOI: 10.2337/dc20-S006.
2. American Diabetes Association. Diabetes Care. Jan 2020;43(Suppl.1): S111-S34. DOI: 10.2337/dc20-S010.

Evaluation of Clinical Pharmacist Utilization of Cardioprotective Antidiabetic Agents in Patients with Diabetes

Cody Parker, PharmD; Grace Simpson, PharmD, BCACP; Joseph Crosby, PhD, RPh;

Jasmyn Ellison, PharmD candidate; Allison Presnell, PharmD, BCACP, BC-ADM, CDTM

Parkercod@sjchs.org

Background

- Glucagon-like peptide-1 receptor agonists (GLP-1) and sodium-glucose co-transporter 2 inhibitors (SGLT2) have proven cardioprotective benefits in diabetic patients with heart disease[1,2]
- ADA guidelines recommend first-line use of GLP-1 or SGLT2 after metformin for patients with history of cardiovascular disease (CVD) or high risk for CVD[3]
- Clinical pharmacists in primary care diabetes management have been shown to significantly lower hemoglobin A1c and 10-year coronary heart disease risk[4,5]
- Lack of data for the impact of clinical pharmacists on the use of cardioprotective antidiabetic medications

Purpose

- Determine the utilization of cardioprotective antidiabetic medications by a clinical pharmacist working in collaboration with a physician in a primary care setting

Methods

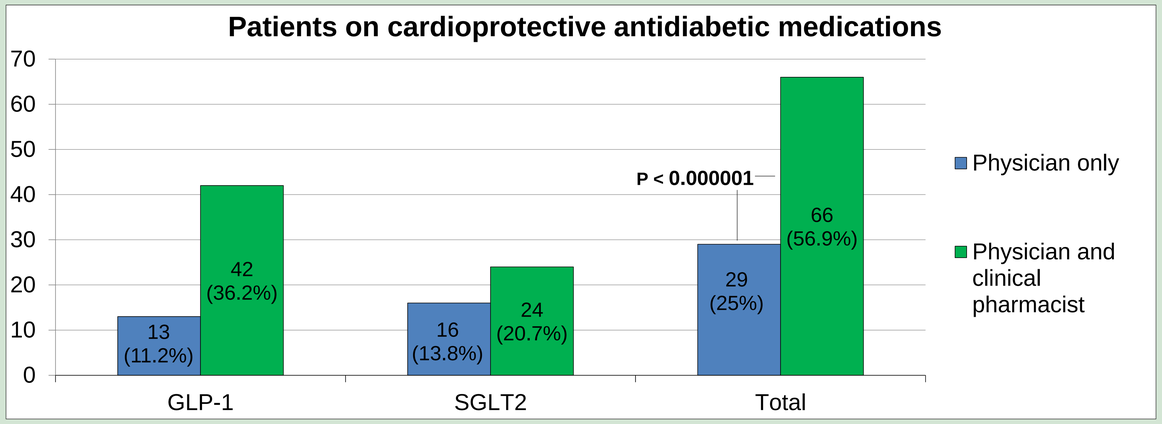
- Retrospective chart review of patients seen in three primary care offices in the health system
- Inclusion criteria: adult patients with uncontrolled type II diabetes and cardiovascular disease or risk factors
- Exclusion criteria: contraindication, allergy, or adverse reaction to GLP-1 and SGLT2
- Patients were stratified and number matched based on encounters with a physician only or collaborative care from a physician and a clinical pharmacist
- Chi-square test was used for group comparisons with a P-value ≤0.05 considered significant

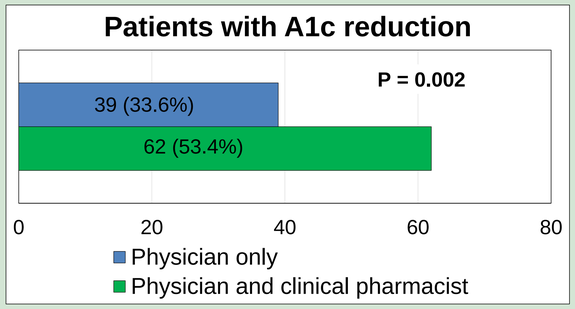
Outcomes

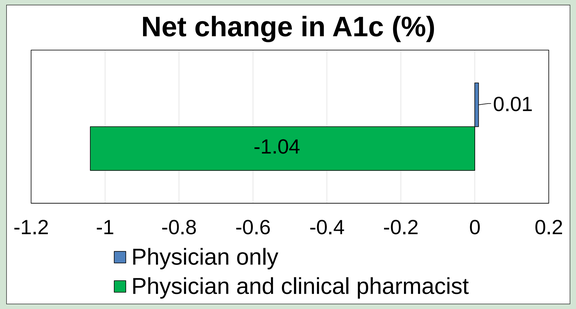
Primary	**Rate of cardioprotective antidiabetic medication usage**
Secondary	**Change in hemoglobin A1c**

Results

Demographics	Physician only (n = 116)	Physician and clinical pharmacist (n = 116)	P-value
Female sex (%)	60 (51.7)	61 (52.6)	0.395
Average age (years)	55	62	-
Baseline A1c (%)	8.5	9.4	0.388
History of ASCVD (%)	19 (16.4)	25 (21.6)	0.24
ASCVD risk factors (%)	116 (100)	116 (100)	-
HFrEF (%)	7 (6)	9 (7.8)	0.344







Discussion

- Under the collaborative care of a physician and clinical pharmacist:
  - Statistically significant increase in utilization of cardioprotective antidiabetic medications
  - Statistically significant increase in number of patients achieving A1c reduction
  - Medication access issues were resolved by the clinical pharmacist for 49 patients (prior authorization, assistance programs, free samples)
- Future directions
  - Clinical pharmacist utilization of SGLT2 inhibitors specifically in heart failure and chronic kidney disease patients (low number of these patients in this study)

Conclusions

- Clinical pharmacists in the primary care setting have a significant impact on the usage of cardioprotective antidiabetic medications and reduction of A1c.

References

1. Marso SP, Bain SC, Consoli A, et al. Semaglutide and Cardiovascular Outcomes in Patients with Type 2 Diabetes. N Engl J Med. 2016;375(19):1834-1844.
2. McMurray JJV, Solomon SD, Inzucchi SE, et al. Dapagliflozin in Patients with Heart Failure and Reduced Ejection Fraction. N Engl J Med. 2019;381(21):1995-2008.
3. American Diabetes Association. 9. Pharmacologic Approaches to Glycemic Treatment: Standards of Medical Care in Diabetes-2021. *Diabetes Care*. 2021;44(Suppl 1):S111-S124.
4. Ip EJ, Shah BM, Yu J, Chan J, Nguyen LT, Bhatt DC. Enhancing diabetes care by adding a pharmacist to the primary care team. Am J Health Syst Pharm. 2013;70(10):877-886.
5. Benedict AW, Spence MM, Sie JL, et al. Evaluation of a Pharmacist-Managed Diabetes Program in a Primary Care Setting Within an Integrated Health Care System. J Manag Care Spec Pharm. 2018;24(2):114-122.

Critical Care Collaborative
College of Pharmacy
UNIVERSITY OF GEORGIA

Hidden Fluids Stewardship: Pharmacy-driven Recommendations for Critically Ill Patients with COVID-19

Diana Dang, Pharm.D. Candidate; Ryan Bok, Pharm.D. Candidate; Anthony Hawkins, Pharm.D., BCCCP; Rachel Rikard, Pharm.D. Candidate; Susan E. Smith, Pharm.D., BCCCP, BCPS

BACKGROUND

- Intravenous fluids (IVFs) are routinely administered in the intensive care unit (ICU). [1]
- This includes hidden fluids, which are defined as fluids requisite to routine care, but the volumes of which are not explicitly prescribed (e.g., medication diluents, flushes). [1]
- Improper administration of IVFs can lead to volume overload, which is associated with organ dysfunction and mortality. [1]
- With the overwhelming number of patients in the ICU with coronavirus disease 2019 (COVID-19), proper management of fluids is crucial to minimize the risks of acute respiratory distress syndrome and fluid overload. [2]

PURPOSE

Identify pharmacy recommendations related to hidden fluids in the treatment of critically ill patients with COVID-19

OUTCOMES

Primary

- Percentage of pharmacy recommendations related to hidden fluids

Secondary

- Classification of hidden fluids recommendations according to the following:
  - Conversion of medications from IV to non-IV route
  - Adjust dose of enteral fluid
  - Discontinue enteral water
  - Adjust volume of parenteral nutrition
  - Change albumin concentration
  - Concentrate infusions of sodium bicarbonate, vasopressors, or antibiotics

STUDY DESIGN

- **Design:** IRB-approved, single-center, retrospective cohort
- **Time Frame:** May 2020 through September 2020
- **Setting:** 450-bed community teaching hospital
- **Inclusion Criteria:**
  - Critically ill adults admitted to the ICU with COVID-19
  - Followed by academic rounding team
  - Recommendations documented in TheraDoc®
- **Methods:** Recommendations were assessed for relevance to fluid stewardship and hidden fluids
- **Statistical Plan:**
  - Descriptive statistics were used to report outcomes

RESULTS

Figure 1. Screening and Recommendation Types

13% of pharmacy recommendations were related to fluid stewardship

Figure 2. Fluid Stewardship Recommendations

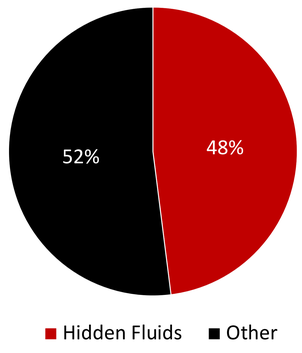


Figure 3. Average Number of Recommendations Per Patient Day

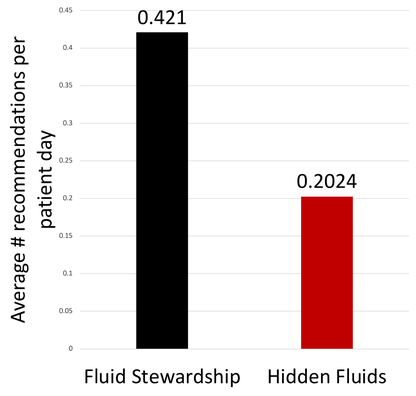


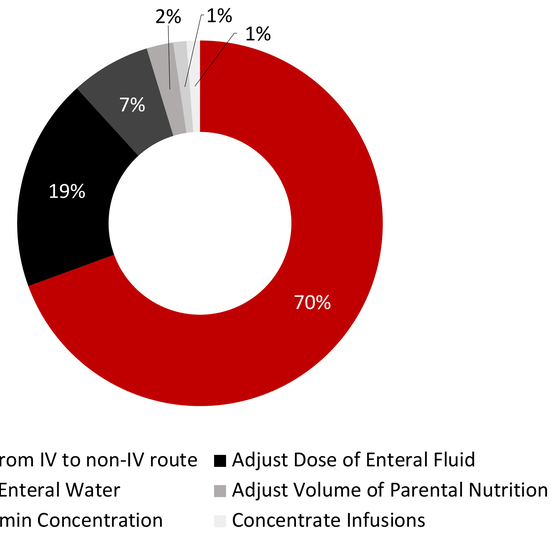
Table 1. Classification of Hidden Fluids Recommendations (n=85)

	n	# per patient day
Conversion of medications from IV to non-IV route	59	0.143
Adjust dose of enteral fluid	16	0.038
Discontinue enteral water	6	0.014
Adjust volume of parenteral nutrition	2	0.005
Change albumin concentration	1	0.002
Concentrate infusions of sodium bicarbonate, vasopressors, or antibiotics	1	0.002

**Classifications established by investigators a priori*

RESULTS CONTINUED

Figure 4. Hidden Fluids Recommendations



CONCLUSIONS

- Roughly 1 in 8 pharmacy recommendations were related to fluid stewardship, and nearly half of those were related to hidden fluids.
- The most common hidden fluids recommendation involved converting medications from IV to non-IV route.
- Pharmacists play a role in minimizing the volume of this oftentimes unrecognized hidden fluids.

Limitations

- Single center, retrospective design
- Potential for inaccurate classification of recommendations by reviewers

Future Direction

- Compare hidden fluids recommendations in critically ill patients with and without COVID-19

REFERENCES

1. Hawkins, W. A., Smith, S. E., Newsome, A. S., Carr, J. R., Bland, C. M., & Branan, T. N. (2019). Fluid Stewardship During Critical Illness: A Call to Action. Journal of Pharmacy Practice. https://doi.org/10.1177/0897190019853979

2. Kazory, A., Ronco, C., & McCullough, P. A. (2020). SARS-CoV-2 (COVID-19) and intravascular volume management strategies in the critically ill. *Proceedings (Baylor University. Medical Center)*, *0*(0), 1–6. https://doi.org/10.1080/08998280.2020.1754700

Evaluating the Utility of a Penicillin Allergy Reconciliation Program within an Infectious Diseases Consult Population in a Community Health System

Emily A. Plauche, PharmD Candidate 2021[2]; Bruce M. Jones, PharmD, BCPS[1,2]; Susan E. Smith, PharmD, BCPS, BCCCP[2]; Christopher M. Bland, PharmD, FCCP, FIDSA, BCPS[1,2]
St. Joseph's/Candler Health System, Savannah, GA[1]; The University of Georgia College of Pharmacy, Savannah, GA[2]

Background

- Up to 10% of the population, and 15% of inpatients, report a penicillin (PCN) allergy, while ~90% are not true allergies. Over-reported PCN allergies lead to higher drug costs, worse patient outcomes, and increased risk of resistance.[1,2]
- Our 714-bed community health system includes two hospitals, Candler and St. Joseph's, and has 4 Infectious Diseases (ID) physicians that rotate between both hospitals.
- Our institution (Candler) uses a Penicillin Allergy Reconciliation Program (PARP) led by an ID pharmacist, pharmacy residents, and Advanced Pharmacy Practice Experience (APPE) students to clarify, update, challenge, and remove allergies as appropriate.
- There is no formal allergy reconciliation program in place at St. Joseph's.
- PARP process:

Print daily report of every inpatient with a PCN allergy listed in the electronic health record (EHR). → Review allergy history, including past and present inpatient and outpatient antibiotics. → Interview patient about the history of the allergy and reaction. → Review interview details with preceptor and update EHR. Determine if intervention is appropriate. → Perform challenge or PCN skin test and educate patient on removal of allergy if applicable.

Objectives

- To evaluate allergy reconciliation and intervention among ID consult patients admitted with a penicillin allergy
- To determine the percentage of ID consultation patients with a PCN allergy in our health system

Outcomes

Primary

- Documented penicillin allergy reconciliation in the EHR at an institution with PARP versus one without PARP

Secondary

- Percentage of ID consultation patients in 2019 with a self-reported PCN allergy
- Percentage of patients admitted in 2019 with a self-reported PCN allergy

Methods

- Study design: retrospective chart review
- Reconciliation was defined as an edit or clarification to a patient's PCN allergy in the EHR, which included updating the severity, reaction, or comments section as well as deleting the allergy

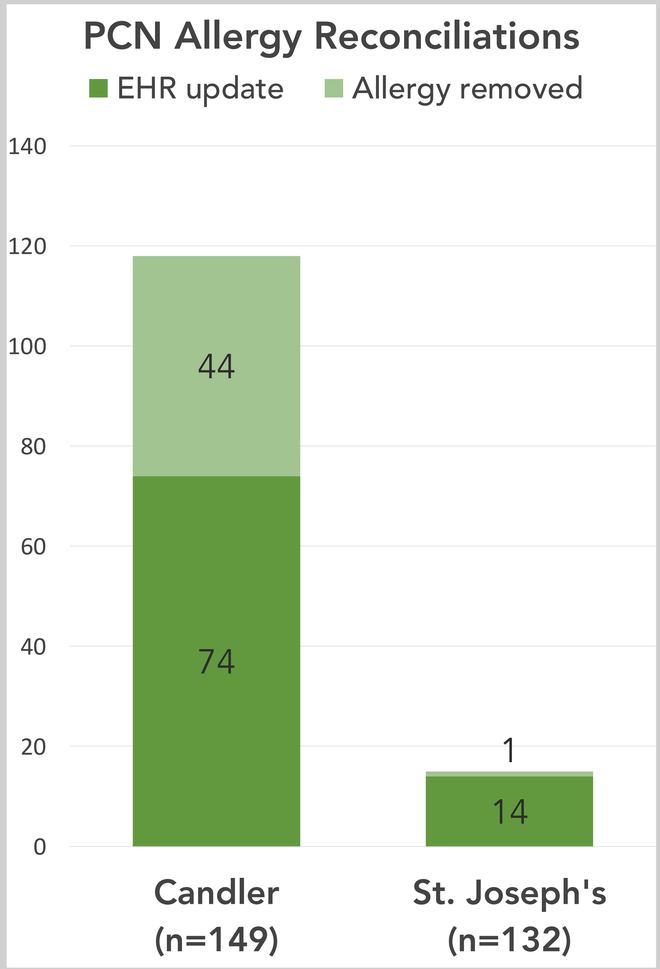
Inclusion Criteria

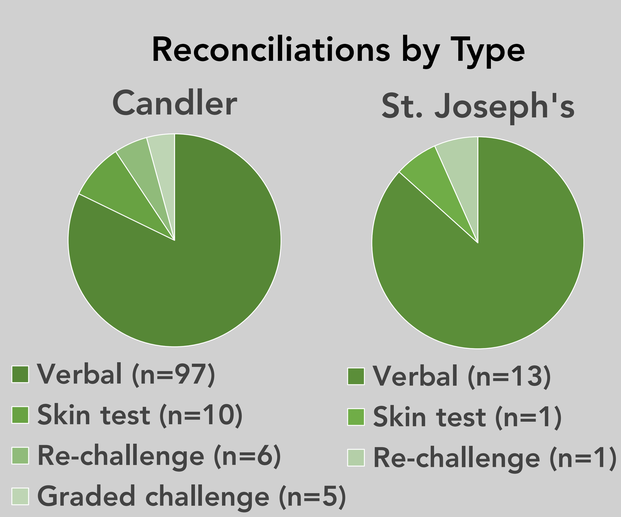
- Inpatient at Candler Hospital or St. Joseph's Hospital with at least one ID consultation from 1/1/2019 – 12/31/2019
- Self-reported PCN allergy
- Adults ≥ 18 years old

Exclusion Criteria

- Patients admitted to Day Surgery, 23-hour observation, Emergency Department without subsequent admission, or Labor and Delivery/ Mother Baby units

Results





Percentage of patients admitted in 2019 with a PCN allergy	
Candler	12.0% (1209/10071)
St. Joseph's	14.0% (1512/10797)
Health System	**13.1% (2721/20868)**

Percentage of ID consultation patients in 2019 with a PCN allergy	
Candler	13.2% (149/1132)
St. Joseph's	11.9% (132/1108)
Health System	**12.5% (281/2240)**

Conclusions & Discussion

- A PARP was an effective method to perform penicillin allergy reconciliations and interventions, even in the presence of an ID consult. Reconciliations and interventions are not routinely being performed without a formalized program.
- Reconciliations at Candler were done by pharmacy (n=118; 100%), and reconciliations at St. Joseph's were done by pharmacy (n=10, 66.7%) and nursing (n=5, 33.3%).
- The ID consult population had a similar percentage of patients with a listed PCN allergy as all inpatients in 2019.
- Future research: Percentage of PCN allergies that are re-added following removal

References

1. Jones BM, Bland CM. "Penicillin Skin Testing an Antimicrobial Stewardship Initiative". *Am J Health Syst Pharm.* Feb 2017, 74 (4) 232-237.
2. Lee CE, Zembower TR, Fotis MA, Postelnick MJ, Greenberger PA, Peterson LR, Noskin GA. The incidence of antimicrobial allergies in hospitalized patients: implications regarding prescribing patterns and emerging bacterial resistance. *Arch Intern Med.* 2000;160(18):2819-22.

Evaluating the Appropriate Use of Parenteral Iron Therapy in Iron Deficiency Anemia in a Primary Care Setting

Emily Royal, Pharm.D. Candidate, Kate O'Connor, PharmD, BCACP, BC-ADM
AU Medical Center and University of Georgia College of Pharmacy, Augusta, GA

Background

- Parenteral iron therapy is indicated when patients with iron deficiency are unable to absorb or tolerate oral iron, comorbid disease states affect the ability to tolerate or absorb iron, or a patient's need exceeds the capacity of oral therapy.
- Since parenteral therapy is not typically first-line treatment in the outpatient setting, the purpose of this project was to ensure optimal parenteral therapy to manage iron deficiency.

Objective

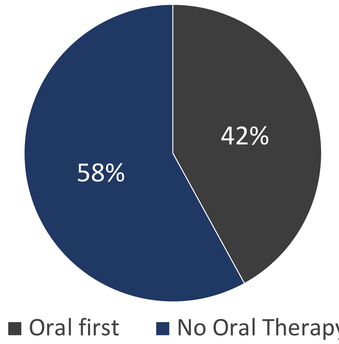
- Evaluate the appropriate use of parenteral iron therapy, specifically iron sucrose and ferric carboxymaltose, in iron deficiency anemia as prescribed by internal medicine primary care providers at an academic medical center.

Methods

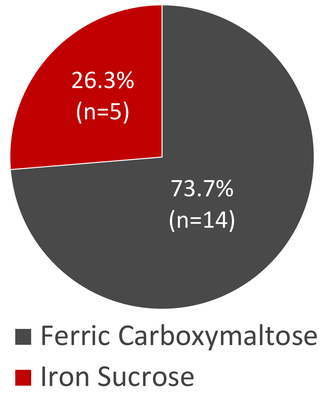
- Of the 60 identified patients, 19 patients were included in this retrospective chart review between January 1, 2019 and December 31,2019 and were identified through the electronic medical record.
- Included patients were those 18 years and older who received parenteral iron sucrose or ferric carboxymaltose.
- 41 patients were excluded who received IV therapy in an inpatient setting or whose iron deficiency was managed by a specialist.
- Data collection included patient demographics and any concomitant disease states including GI conditions, heart failure, chronic kidney disease, and pregnancy.
- An appropriate diagnosis of iron deficiency anemia as well as hemoglobin, ferritin, TSAT, and MCV values were collected before and after completion of therapy.

Results

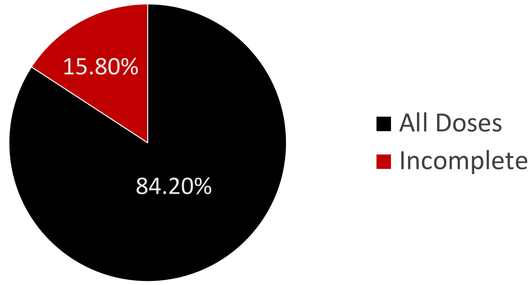
Percentage of Patients Receiving Oral Therapy Prior to Parenteral



Percentage of Drugs Received



Percentage of Patients Receiving Correct Number of Doses



Labs	Before Infusion (median)	After Infusion (median)
Hemoglobin	9.9 g/dL	12.6 g/dL
Ferritin	10 ng/mL	71.8 ng/mL
TSAT	4%	21%

Patient Demographics (n=19)	
Mean Age (years)	49
Female	17
Male	2
Mean Weight (kg)	80.1
GI Conditions	2
Heart Failure	1

Conclusion

- Primary care providers order parenteral iron therapy appropriately based on indication of iron deficiency anemia. However, there is inconsistency in appropriately using oral therapy first as well as a lack in follow-up labs to determine parenteral iron efficacy.
- Although the majority of parenteral iron therapy was ordered appropriately, there is opportunity for improvement with regards to correct dose and number of doses.
- Limitations include a small sample size and the potential impact of the COVID-19 pandemic on follow-up.

Clinical Implications and Next Steps

- The gap in follow-up care could be a result of the lack of an electronic order set for iron studies as well as use of a paper medication administration record for outpatient infusions that has to be scanned into the electronic record, with regard to provider awareness of medication administration.
- Potential solutions include provider education on the appropriate dosing of intravenous iron in the outpatient setting and on follow-up and monitoring parameters as it pertains to iron studies.

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 subject matter.

Comparison of Three Adjunctive Agents for the Treatment of Benzodiazepine-Refractory Alcohol Withdrawal Syndrome

Gina Cherniawski, PharmD; Erica Merritt, PharmD, BCPS; Allison Powell, PharmD, BCPS

Background

- Alcohol Use Disorder (AUD) is the impaired ability to stop or control the use of alcohol despite adverse consequences[1]
- Standard treatment is symptom-triggered administration of benzodiazepines in response to a Clinical Institute Withdrawal Assessment for Alcohol-revised (CIWA-Ar) score[2,3]
- Benzodiazepine-refractory alcohol withdrawal (BRAW) is not well defined
- Medications such as phenobarbital, propofol, and dexmedetomidine have proven effective for treatment of BRAW, but limited data exists comparing the effectiveness of these agents[4,5,6]

Objectives

- Primary: Compare the utilization and efficacy of phenobarbital, propofol, and dexmedetomidine for patients admitted with BRAW
- Secondary: Evaluate the frequency of patients requiring treatment with a second study agent within 24 hours after initiation of the primary study agent

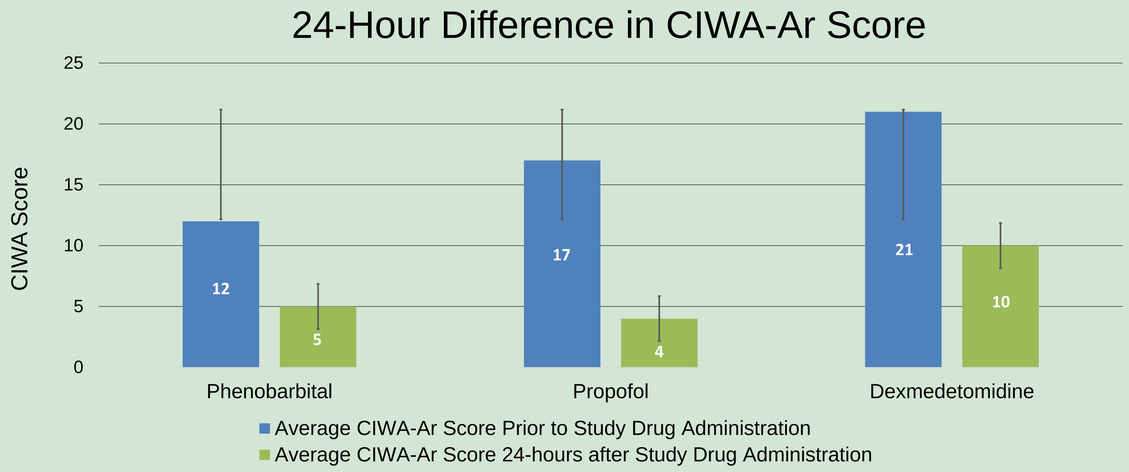
Methods

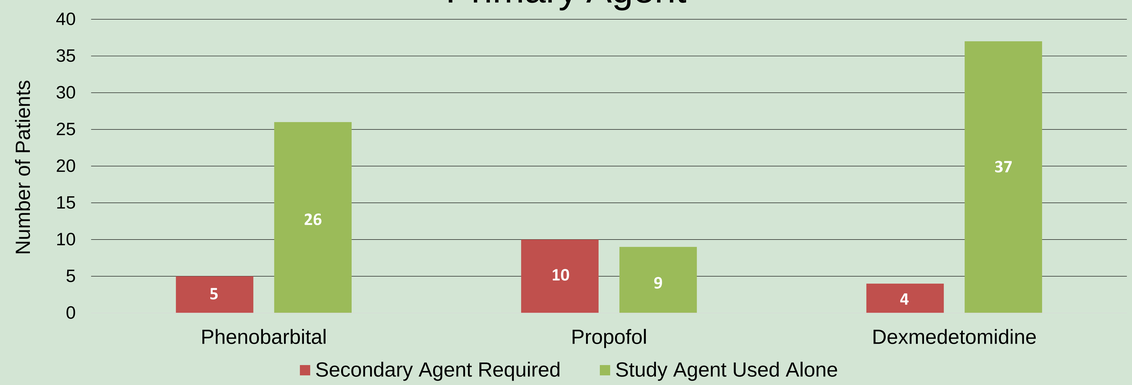
- Retrospective electronic medical record (EMR) evaluation of patients with BRAW treated with phenobarbital, propofol, dexmedetomidine, or a combination of these agents between January 1, 2017 to September 30, 2020
- Patients excluded were those with a documented allergy to any study agent, treated with any study agent for purposes other than management of AWS, initially treated with more than two study agents, or given a study agent prior to ordering the alcohol withdrawal order set

214 Patient Charts Reviewed

Patients included (n=91)	Patients Excluded (n=123)
• Phenobarbital (n=31) • Propofol (n=19) • Dexmedetomidine (n=41)	• Prior use of alternative study agent (n=46) • Medication use for purposes other than AWS (n=36) • Incomplete data (n=41)

Results





Additional Secondary Objective Results

	Phenobarbital (n=31)	Propofol (n=19)	Dexmedetomidine (n=41)	p value
Presence of seizures, hallucinations, or delirium tremens	19% (6)	79% (15)	73% (30)	**p = <0.00001**
Intubated	10% (3)	100% (19)	17% (7)	**p = <0.00001**
Total ventilatory days, median	0	6	0	**p = <0.00001**
ICU length of stay, median days	0	11	6	**p = <0.00001**
Hospital length of stay, median days	8	16	9	**p = 0.022593**
Mortality	3% (1)	21% (4)	5% (2)	p = 0.099908

Analysis

- Prior to administration, 32%, 58%, and 63% of patients in the phenobarbital, propofol, and dexmedetomidine groups had a CIWA-Ar >16, respectively
- Of those evaluated, 97%, 89%, and 73% of patients receiving phenobarbital, propofol, and dexmedetomidine achieved a CIWA-Ar score <16 24-hours after administration, respectively (**p = 0.03448**)
- 16%, 53%, and 10% of patients in the phenobarbital, propofol, and dexmedetomidine groups required treatment with a secondary agent, respectively
- There was a difference between the groups in presences of seizures, hallucinations, or delirium tremens, frequency of intubation, total ventilatory days, and ICU and hospital lengths of stay

Discussion

- Phenobarbital displayed the highest treatment success in achieving a CIWA-Ar score <16 24-hours after study drug administration
- Further studies are needed to assess and compare its effectiveness in BRAW

Limitations

- Inconsistent utilization of phenobarbital in this patient population
- Small sample size and disproportionate intervention arms
- Underpowered
- Results confounded by benzodiazepine used and alternative symptom management agents

References

1. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*. 5th ed. Washington, Dc: American Psychiatric Association; 2013.
2. Sullivan, John T., et al. "Assessment of alcohol withdrawal: the revised clinical institute withdrawal assessment for alcohol scale (CIWA-Ar)." British journal of addiction 84.11 (1989): 1353-1357.
3. Daeppen, Jean-Bernard, et al. "Symptom-triggered vs fixed-schedule doses of benzodiazepine for alcohol withdrawal: a randomized treatment trial." Archives of internal medicine 162.10 (2002): 1117-1121.
4. Rosenson, Jonathan, et al. "Phenobarbital for acute alcohol withdrawal: a prospective randomized double-blind placebo-controlled study." The Journal of emergency medicine 44.3 (2013): 592-598.
5. Wong, Adrian, et al. "Management of benzodiazepine-resistant alcohol withdrawal across a healthcare system: benzodiazepine dose-escalation with or without propofol." Drug and Alcohol Dependence 154 (2015): 296-299.
6. Mueller, Scott W., et al. "A randomized, double-blind, placebo-controlled dose range study of dexmedetomidine as adjunctive therapy for alcohol withdrawal." Critical care medicine 42.5 (2014): 1131-1139.

Continuous epinephrine infusion compared to standard bolus dosing in advanced cardiac life support

Hilary Smith, PharmD; Eric Shaw, PhD; Stephanie Lesslie, PharmD, BCPS, BCCCP

Background

- Epinephrine is the primary medication administered during advanced cardiac life support (ACLS).
- The use of epinephrine is recommended by the American Heart Association and is vital to improving the return of spontaneous circulation (ROSC).
- Epinephrine is a catecholamine that acts on alpha and beta adrenergic receptors on cardiac and vascular smooth muscle.
- Epinephrine is most commonly administered by a standard IV push every 3 to 5 minutes and may be administered by a continuous infusion.
- Theoretical benefits of infusion are decrease task burden among healthcare workers to help investigate potential causes for arrest and maintenance of ROSC.

Objective

To compare continuous epinephrine infusion to standard bolus dosing in advanced cardiac life support

Methods

Retrospective chart review from January 1st, 2019 to December 31st, 2020 was approved by the Institutional Review Board.

- Patient population
- **Inclusion criteria:**
  - Adults ≥ 18 years old
  - In hospital cardiac arrest
  - Patients received either epinephrine infusion or bolus dosing
  - Complete code documentation
- **Exclusion criteria:**
  - Pregnant
  - Incarcerated

Results

Table 1. Baseline Demographics

	Bolus group (n=136)	Continuous infusion group (n=40)	*p*-value
Age, mean ± SD	62.9 ± 15.3	59.8 ± 15	0.25
Gender, n (%)	76 (556)	24 (60)	0.64
Cause of cardiac arrest			
Non-cardiac, n (%)	97 (64)	28 (70)	0.73
Cardiac n (%)	49 (36)	12 (30)	0.12
ICU cardiac arrest, n (%)	73 (54)	32 (80)	0.003
Length of cardiac arrest (min), mean ± SD	14.7 ± 10.8	18.5 ± 14	0.03
Comorbidities			
ESRD, n (%)	14 (10)	3 (7)	0.22
CHF, n (%)	27 (20)	2 (5)	<0.0001
Obesity, n (%)	4 (3)	1 (2)	0.74
Trauma, n (%)	9 (7)	2 (5)	0.39

Table 2. Primary and Secondary Outcomes

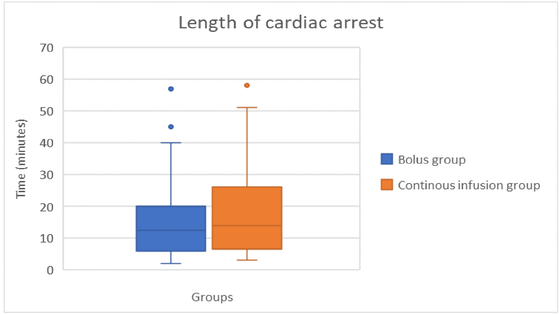
	Bolus group (n=136)	Continuous infusion group (n=40)	*p*-value
Mortality at 24 hours, n (%)	94 (69)	35 (88)	0.02
Any achievement of ROSC, n (%)	78 (57)	22 (55)	0.79
ICU mortality, n (%)	115 (85)	38 (95)	0.09
Discharge mRS of 3 or less, n (%)	4 (3)	1 (3)	0.36
ICU LOS (day), mean ± SD	8.8 ± 19.2	8 ± 8.2	0.20
Hospital LOS (day), mean ± SD	14.7 ± 21.3	8.9 ± 9.4	0.02
Need for RRT, n (%)	7 (5)	4 (10)	0.27

Table 3. Subgroup Analysis – ICU Cardiac Arrest

	Bolus group (n=73)	Continuous infusion group (n=32)	*p*-value
Mortality at 24 hours, n (%)	43 (60)	27 (84)	<0.01

Results

Figure 1. Length of cardiac arrest



Conclusion

- Continuous epinephrine infusion in cardiac resuscitation was associated with higher mortality at 24 hours than standard bolus dosing
- Subgroup analysis of ICU cardiac arrest showed higher mortality in the continuous infusion group compared to standard bolus dosing
- Recommend against the use of continuous epinephrine infusion during ACLS
- Theories:
  - Push dosing overcomes arrest with catecholamine surge
  - Backflow of infusion during compression

References

1. Shao H, Li CS. Epinephrine in Out-of-hospital Cardiac Arrest: Helpful or Harmful? *Chin Med J* (Engl). 2017;130(17):2112-2116.

2. Adrenalin (epinephrine) [prescribing information]. Chestnut Ridge, NY: Par Pharmaceuticals; January 2019.

3. Michael JR, Guerci AD, Koehler RC, Shi AY, Tsitlik J, Chandra N, et al. Mechanisms by which epinephrine augments cerebral and myocardial perfusion during cardiopulmonary resuscitation in dogs. *Circulation*.1984; 69:822–835.

4. Panchal AR, Berg KM, Hirsch KG, et al. 2019 American Heart Association Focused Update on Advanced Cardiovascular Life Support: Use of Advanced Airways, Vasopressors, and Extracorporeal Cardiopulmonary Resuscitation During Cardiac Arrest: An Update to the American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation*. 2019;140(24):e881-e894.

5. Bodon C. The intracardiac injection of epinephrine. *Lancet*.1923; 1:586.

6. Johansson J, Gedeborg R, Basu S, Rubertsson S. Increased cortical cerebral blood flow by continuous infusion of adrenaline (epinephrine) during experimental cardiopulmonary resuscitation. *Resuscitation*. 2003;57(3):299-307.

This research was supported (in whole or in part) by HCA Healthcare and/or an HCA Healthcare affiliated entity. The views expressed in this publication represent those of the author(s) and do not necessarily represent the official views of HCA Healthcare or any of its affiliated entities.

Assessing the impact of medication adherence packaging at an outpatient primary care provider clinic on hemoglobin A1c and low-density lipoproteins

Joseph Farrell, Pharm.D. Candidate, Class of 2021[1]; Kandon Render, Pharm.D.[2]

[1] Mercer University College of Pharmacy, Atlanta, Georgia
[2] Gwinnett Drugs, Lawrenceville, Georgia

INTRODUCTION

Background

Medication adherence is defined as the extent to which the actions of the patient related to their medication therapy align with the directions from their prescribed regimens.[1] A report by World Health Organization (WHO) estimated that compliance rates in most developed nations are approximately 50%. The same report listed various factors such as race, socio-economic status, and psychological factors (i.e. anxiety and stress) as major contributors to non-adherence to medication therapy.[2] Poor adherence has been shown to have economic consequences as well, with proper adherence linked to reduced healthcare costs at both the patient and provider levels.[3,4] Studies have examined the potential benefits of utilizing blister and calendar packaging as ways to organize a patient's medication therapies, especially if multiple regimens exists, in order to determine their effects on patient medication adherence rates.[5,6]

Response

Gwinnett Drugs implemented medication adherence packaging as part of their Chronic Care Management (CCM) Program. Medications are packaged and separated based on the time of day and date in which they should be administered by the patient. The service targets patients with multiple chronic conditions, such as type II diabetes and hyperlipidemia. Various patient outcomes, such as hemoglobin A1c and LDL, were examined at baseline, as well as at 3 and 6 months following the initiation of medication adherence packaging.

Purpose

To assess the impact of medication adherence packaging on hemoglobin A1c and LDL in patients with type II diabetes and/or dyslipidemia after six months.

METHODS

Inclusion Criteria

- Diagnosis of type II diabetes mellitus and/or dyslipidemia for at least 3 months prior to study
- All type II diabetes and/or dyslipidemia medications managed by Abraham's Family and Geriatrics Medicine Clinic
- All type II diabetes and/or dyslipidemia medications filled by Gwinnett Drugs
- Actively taking at least one oral medication therapy for type II diabetes and/or dyslipidemia
- Initiation of medication adherence packaging between February 2020 – June 2020

Exclusion Criteria

- Less than 18 years of age
- Pregnancy

Primary Outcome: Change in A1c and LDL values at 6 months

Secondary Outcomes:

- Change in A1c and LDL values at 3 months
- Difference in the number of hospitalizations in each patient from 6 months before and 6 months following the use of adherence packaging
- Medication possession ratio (MPR) at six months following the initiation of medication adherence packaging.
- Difference in the total number of medications after 6 months following the start of adherence packaging
- Side effects experienced after initiation of medication adherence packaging

Statistical analysis: Descriptive and comparative statistics

RESULTS

	A1c	p-value
Average A1c for patients with baseline and 3-month readings (Baseline)	8.4%	p = 0.09
Average A1c for patients with baseline and 3-month readings (at 3 months)	7.8%	
Average A1c for patients with baseline and 6-month readings (Baseline)	8.2%	p = 0.4
Average A1c for patients with baseline and 6-month readings (at 6 months)	8.1%	
Average A1c for patients with A1c > 9 mg/dL at Baseline (Baseline)	10.8%	p = 0.3
Average A1c for patients with A1c > 9 mg/dL at Baseline (3 months)	9.7%	
Average A1c for patients with A1c > 9 mg/dL at Baseline (6 months)	8.1%	p = 0.004

	LDL	p-value
Average LDL for patients with baseline and 3-month readings (Baseline)	84.5	p = 0.02
Average LDL for patients with baseline and 3-month readings (3 months)	69.2	
Average LDL for patients with baseline and 6-month readings (Baseline)	83.8	p = 0.3
Average LDL for patients with baseline and 6-month readings (6 months)	81.7	

	Average number of hospitalizations	p-value
Average number of hospitalizations for patients within 6 months prior to initiation of adherence packaging	1.25	p = 0.4
Average number of hospitalizations for patients within 6 months following the initiation of adherence packaging	1.22	

	Average number of medications	p-value
Average number of medications taken by patients within 6 months prior to initiation of adherence packaging	12.9	p = .004
Average number of medications taken by patients within 6 months following the initiation of adherence packaging	11	

- **Medication possession ratio (MPR):** 100% for all patients following initiation of medication adherence packaging

Adverse Drug Reactions (ADRs)	Number of patients with reported ADR
Fatigue/dizziness	n = 3 (9.4 %)
Diarrhea	n = 1 (3.1 %)
Myalgia	n = 1 (3.1 %)
Leg Swelling	n = 1 (3.1 %)
Bradycardia	n = 1 (3.1 %)
Hypoglycemia	n = 1 (3.1 %)
Hypotension	n = 1(3.1 %)

CONCLUSION

- Medication adherence packaging resulted in decreases in observed laboratory values (A1c, LDL)
- Statistical significance was shown in A1c reductions after 6 months for patients with initial A1c > 9%
- Fewer hospitalizations were reported among patients following initiation of medication adherence packaging
- Patients were prescribed fewer medications after 6 months following the start of adherence packaging, showing evidence of better disease control
- MPR was reported at 100%, as Gwinnett Drugs dispensed medication packaging at 30-day intervals
- Few adverse effects were reported by patients

ACKNOWLEDGEMENTS

1. Boeni F, Spinatsch E, Suter K, Hersberger KE, Arnet I. Effect of drug reminder packaging on medication adherence: a systematic review revealing research gaps. *Systematic Reviews*. 2014;3(1):1-15. doi:10.1186/2046-4053-3-29.
2. World Health Organization. Adherence to long-term therapies evidence for action. World Health Organization. 2003; 28– 30.
3. Sokol MC, Mcguigan KA, Verbrugge RR, Epstein RS. Impact of Medication Adherence on Hospitalization Risk and Healthcare Cost. *Medical Care*. 2005;43(6):521-530. doi:10.1097/01.mlr.0000163641.86870.af.
4. Pittman DG , Tao Z , Chen W , *et al*. Antihypertensive medication adherence and subsequent healthcare utilization and costs. Am J Manag Care 2010;16:568–76
5. Bosworth H, Brown JN, Danus S, et al. Evaluation of a packaging approach to improve cholesterol medication adherence. Am J Manag Care. 2017;23(9):280–286.
6. Tan BY, Shafie AA, Ahmad, MA, et. al. Improving medication adherence through calendar packaging: results of a randomized controlled trial among hypertensive patients. Journal of Pharmaceutical Health Services Research. 2017;8:115-122. 10.1111/jphs.12171

Evaluation of chronic opioid prescribing by family medicine physicians

Juliette Miller, PharmD; Mary Carpenter, PharmD, BCACP; Savannah Rainey, PharmD Candidate; Brandy D. Gunsolus, DCLS, MLS(ASCP)^{CM}; Thad Wilkins, MD

AU Medical Center, Department of Pharmacy, Augusta, Georgia

INTRODUCTION

Georgia law requires patients on chronic opioid therapy receiving more than thirty morphine milligram equivalents to be seen face-to-face by their prescriber at least every ninety days. Providers are also required to check the Georgia prescription drug monitoring program (PDMP) at least every ninety days, conduct a random urine drug screen (UDS) at least four times a year, and sign a controlled substance agreement (CSA) with the patient annually.[1,2] Previously, investigators at a family medicine clinic found educational intervention increased frequency of UDS monitoring and appropriate controlled substance prescribing.[3]

PURPOSE

To evaluate a family medicine clinic on physician adherence to state regulations regarding prescribing chronic opioids, including adherence to required face-to-face encounters and UDS, as well as appropriate documentation of patient encounters and PDMP checks.

METHODS

Study Design	Retrospective chart review
Patient Population	Patients prescribed a controlled substance in the clinic between July 1, 2019 and June 30, 2020
Data Analysis	Descriptive statistics

Inclusion Criteria	Exclusion Criteria
≥18 years old Prescribed schedule II opioid for chronic pain	Chronic opioid prescribed for: cancer pain, terminal illness, hospice care

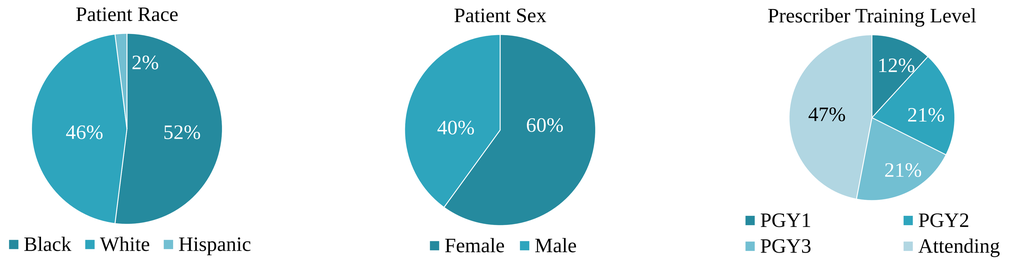
5942 controlled substances prescribed during study period

→ 2709 schedule II opioids prescribed during study period

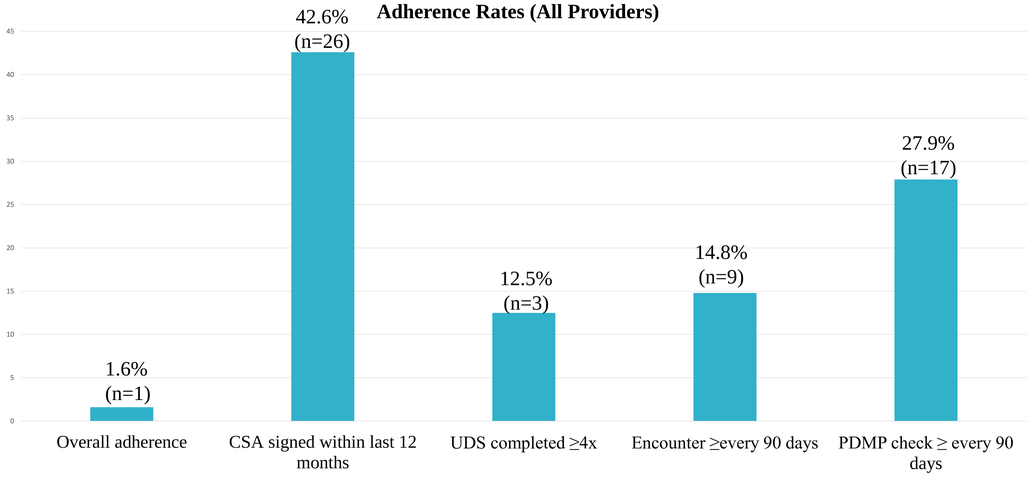
→ 61 patients randomly selected (2 patients per provider)

RESULTS

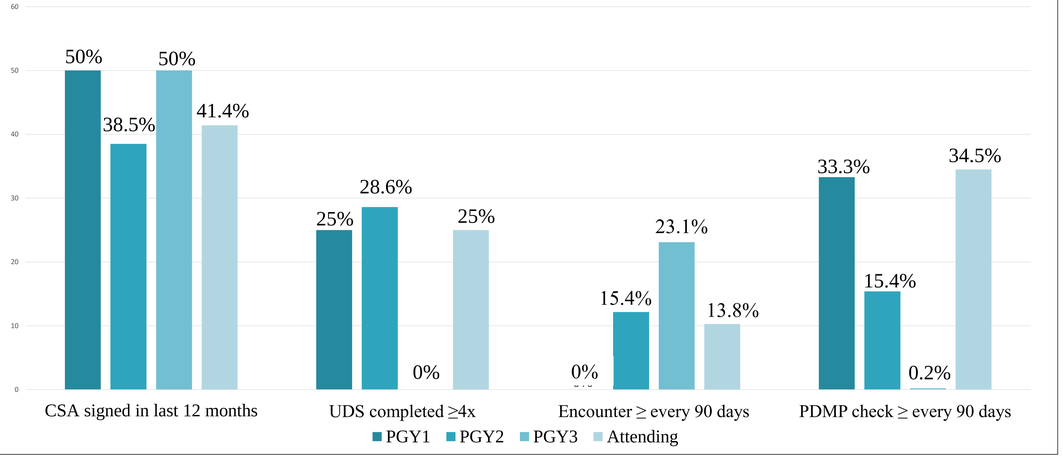
Patient and Provider Demographics



Adherence Rates (All Providers)



Individual Adherence Rates



CONCLUSIONS

- Adherence rates to Georgia chronic opioid prescribing regulations were exceedingly low.
- Only one attending was adherent to all components of Georgia regulations.
- Lowest rates of individual components of the regulations:

UDS monitoring → Face-to-face encounters

- Possible limitations:

Part of the study period was during the COVID-19 pandemic
- Patients may have been less willing to come in for appointments
- There may have been challenges with telehealth

Lack of documentation of hardship
- Required to waive the requirement of a face-to-face encounter at least every 90 days
- Unable to assess why patients were not being seen at least every 90 days

CLINICAL IMPLICATIONS

- Data will be presented to members of the family medicine clinic
  - **Goal:** Increase awareness of low adherence
- Data will be presented to several institutional committees
  - **Goal:** Standardize processes & improve adherence
- This study reveals the lack of adherence to regulations like those for chronic opioid prescribing, which are in place to address the opioid epidemic..
- After the Jeffrey Dallas Gay Jr Act was signed, prescription opioid-related deaths in Georgia decreased by about 4%, while the rate of opioid prescriptions written by Georgia providers was the lowest ever reported at 63.2 prescriptions for every 100 persons.[1,2,4]
- Appropriate chronic opioid prescribing by adhering to the law can potentially save hundreds, if not thousands, of lives.

REFERENCES

1. Jeffrey Dallas Gay, Jr. Act, H.B. 249 (2017).
2. Amendment to the Jeffrey Dallas Gay, Jr. Act, H.B 249 (2019).
3. Kruse K, Gunsolus B, Carpenter M, Wilkins T. Urine drug screen monitoring in family medicine patients: an evaluation of adherence to new state regulations. Poster presented at: 2019 North American Primary Care Research Group (NAPCRG) Annual Meeting; November 2019; Toronto, Canada.
4. Centers for Disease Control and Prevention. U.S. Opioid Prescribing Rate Maps. 2019 Oct 3. Available from https://www.cdc.gov/drugoverdose/maps/rxrate-maps.html.

DISCLOSURES

All study investigators have nothing to disclose.

Evaluation of the utilization of ceftaroline at an academic medical center

Amanda Seals, PharmD; Jason Lin, PharmD

Background

- Ceftaroline is a bactericidal cephalosporin antibiotic approved to treat acute bacterial skin and skin structure infections (SSTIs) caused by methicillin-resistant *Staphylococcus aureus* (MRSA) and methicillin-sensitive *Staphylococcus aureus* (MSSA).[1]
- Ceftaroline is approved to treat community-acquired pneumonia (CAP) caused by MSSA.[1]
- Ceftaroline is also used to treat non-labeled indications such as sepsis, MRSA pneumonia (PNA), MRSA bacteremia (MRSAB), endocarditis, and osteoarticular infections.[2]
- Ceftaroline use is restricted to pulmonary critical care physicians for ICU patients with criteria for use or Infectious Diseases (ID) physicians.
- In February 2020, Memorial Health University Medical Center (MHUMC) also implemented criteria for use (Table 1) requiring ID or Antimicrobial Management Program (AMP) approval if ceftaroline is continued for more than 24 hours.

Table 1: MHUMC Criteria for Use

MRSA pneumonia – vancomycin or linezolid can't be used
Pneumonia with significant risk for *Staphylococcus aureus* -- vancomycin or linezolid cannot be used
Persistent (>3 days) MRSA bacteremia despite source control
Polymicrobial SSTI with confirmed/suspected MRSA – vancomycin (VAN), linezolid (LZD), or daptomycin (DAP) can't be used
Other severe MRSA infection – vancomycin, linezolid, or daptomycin can't be used
Vancomycin-resistant *Enterococcus* infective endocarditis (IE) (in combination with daptomycin)

Objective

The objectives of this study are to identify opportunities for the improvement of use and to promote antimicrobial stewardship in regards to ceftaroline at our institution.

This research was supported (in whole or in part) by HCA Healthcare and/or an HCA Healthcare affiliated entity. The views expressed in this publication represent those of the author(s) and do not necessarily represent the official views of HCA or any of its affiliated entities.

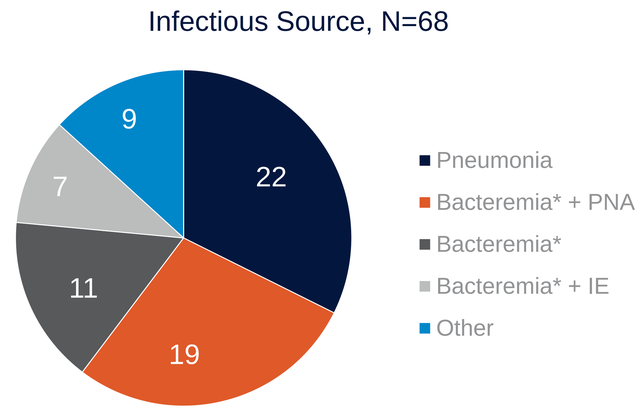
Methods

- Retrospective chart review approved by the MHUMC Institutional Review Board
- Included adult inpatients admitted from January 1, 2019 to July 31, 2020 who received at least one dose of ceftaroline
- Demographic information, lab values, and clinical data collected from electronic health records
- Age, gender, weight (total body weight and ideal body weight)
- Culture and sensitivity results, MRSA PCR screen, and serum creatinine
- Indication for use, duration of therapy, criteria for use
- Patients were divided into pre-criteria and post-criteria groups based on date of ceftaroline administration
- Patients in each group were analyzed based on indication to determine if criteria were met

Results

Table 2: Patient demographics and characteristics (N=68)

Gender – female (n [%])	35 (51%)
Age (years, mean, ± SD)	53 (±19)
Total Body Weight (kg, mean, ± SD)	83 (±23)
ID Consulted (n [%])	59 (87%)
Pulmonary Critical Care (n [%])	9 (13%)



*23 of 40 patients with bacteremia had persistent (>3 days) MRSAB despite source control

Results

Table 3: Therapy Duration per Indication (N=68)

Indications	Pre-Criteria Change Patients n=47 (69%)		Post-Criteria Change Patients n=21 (30%)	
	Patients n (%)	Mean Duration (days)	Patients n (%)	Mean Duration (days)
Criteria Met	**26 (55%)**	**15.9**	**11 (52%)**	**17.6**
MRSA PNA	-	-	1	11
Persistent (>3 days) MRSAB	16	19.4	7	20.9
Polymicrobial SSTI	1	12	-	-
Other severe infection	9	10	3	12
VRE endocarditis	-	-	-	-
Criteria Unmet	**21 (45%)**	**3.9**	**10 (48%)**	**4**
MRSA PNA (LZD*)	2	4	3	5.7
MRSAB (VAN or DAP*)	1	6	1	2
MRSAB (DAP*)	1	4	-	-
MRSA SSTI/Osteomyelitis	1	3	-	-
MRSAB and PNA (VAN*)	-	-	1	5
MSSA infections	7	4	1	6
Non-*Staphylococcus* PNA	9	3.7	4	2.5

Discussion

- After implementation of criteria, the percentage of patients treated with ceftaroline for an unapproved indication did not change.
- We aim to modify criteria to promote appropriate use of ceftaroline among ID and pulmonary critical care physicians.
- Limitations include a larger sample size and seasonal variation within the pre-criteria patient population.

Conclusion

- The addition of specific reasons for why vancomycin, linezolid, or daptomycin cannot be used (i.e. adverse effects, drug interactions) will be implemented into our electronic health record.

References

1. Teflaro (ceftaroline fosamil) package insert. Madison, NH: Allergan USA, Inc.; 2019 Sep.
2. Pani A, et al. Int J Antimicrob Agents. 2019 Nov;54(5):562-571.

Impact of granulocyte colony stimulating factor administration after autologous stem cell transplant in patients with lymphoma

Akhilesh Sivakumar, PharmD[1]; Victor Orellana-Noia, MD[2]; Jonathon Cohen, MD, MS[2]; Kristie Blum, MD[2]; Kelly Valla, PharmD, BCOP[1]

[1]Department of Pharmaceutical Services, Emory Healthcare, Atlanta, GA
[2]Department of Hematology and Medical Oncology, Winship Cancer Institute of Emory Healthcare, Atlanta, GA

EMORY WINSHIP CANCER INSTITUTE
A Cancer Center Designated by the National Cancer Institute

Aim Statement

The goal of this project was to determine whether use of granulocyte-colony stimulating factor (GCSF) after autologous stem cell transplant (ASCT) in patients with lymphoma impacted time to engraftment, hospital length of stay (LOS), and/or febrile neutropenia (FN) incidence.

Background

- Patients undergoing autologous stem cell transplant (ASCT) after high-dose chemotherapy are at risk for infectious complications due to prolonged neutropenia.
- Use of GCSF after ASCT is endorsed by national oncology practice guidelines.[1,2]
- GCSF use post-ASCT has been reported to decrease time to neutrophil engraftment, though results are conflicting regarding benefit in reducing infection rates, hospital LOS, and medical costs.[3]
- At Emory Healthcare (EHC), use of GCSF post-ASCT has been at the discretion of the treating oncologist due to lack of definitive evidence supporting this practice.
- The optimal time to start GCSF post-ASCT is also not clearly defined and is per the treating oncologist's discretion (day +7 [i.e. 7 days post-transplant] at EHC).

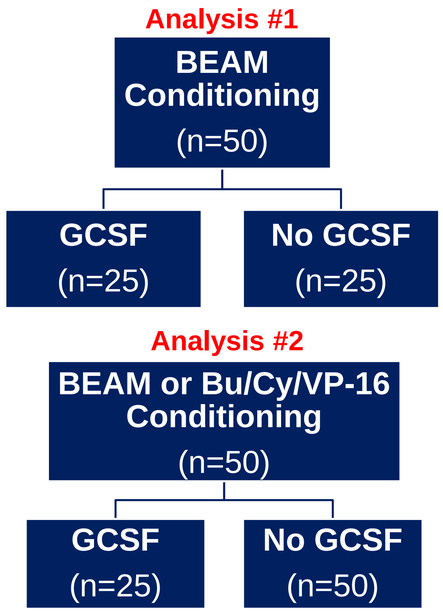
Problem

- Given differences in physician practice regarding GCSF use and limited clinical trial data in this context to inform a program-wide policy, we performed a retrospective evaluation of outcomes among lymphoma patients who received GCSF vs. those who did not receive GCSF post-ASCT. Outcomes of interest included time to engraftment, hospital LOS, and FN incidence.

Methods

- EHC's internal bone marrow transplant database was utilized to generate a list of all lymphoma patients who underwent ASCT between July 2015 and July 2020, and clinical data was then abstracted from EHC's electronic medical record.
- All patients who received GCSF (n=25) and a randomly selected sample of those who did not receive any GCSF post-ASCT were selected for inclusion. Two separate analyses were conducted to assess the impact of pre-ASCT conditioning regimen on outcomes.

Figure 1. Consort Diagram



BEAM = carmustine, etoposide, cytarabine, melphalan

Bu/Cy/VP-16 = busulfan, cyclophosphamide, etoposide

Results

Table 1. Analysis #1

Variable	GCSF[a] (n=25)	No GCSF (n=25)	*p*-value
Female (n,%)	12 (48)	8 (32)	0.33
Age (median, IQR)	55.5 (29-65)	60 (43.5-70)	0.09
Post-ASCT Hospital LOS (days) Median (IQR)	13 (12-14)	14 (13-15)	0.22
Time to ANC engraftment[b] (days) Median (IQR)	11 (10-11)	12 (11-14)	**<0.001**
Time to PLT engraftment[c] (days) Median (IQR)	19 (16-22)	20 (14-22)	0.66
Variable	**GCSF w/ FN (n=25)**	**No GCSF w/ FN (n=25)**	***p*-value**
FN Onset Prior to Day +7 (n, %)	11 (61.1)	12 (54.5)	N/A

Table 2. Analysis #2

Variable	GCSF[a] (n=25)	No GCSF (n=50)	*p*-value
Female (n,%)	12 (48)	17 (34)	0.33
Age (median, IQR)	55.5 (29-65)	56.5 (45-63)	0.09
Post-ASCT Hospital LOS (days) Median (IQR)	13 (12-14)	14 (13-15)	N/A
Conditioning Regimen (n, %) BEAM Bu/Cy/VP-16	25 (100) 0	25 (50) 25 (50)	**<0.001**
Time to ANC engraftment[b] (days) Median (IQR)	11 (10-11)	12 (11-14)	**<0.001**
Time to PLT engraftment[c] (days) Median (IQR)	19 (16-22)	17 (14-21)	0.2
Variable	**GCSF w/ FN (n=25)**	**No GCSF w/ FN (n=50)**	***p*-value**
FN Onset Prior to Day +7 (n, %)	11 (61.1)	17 (39.5)	N/A

[a]Median number of GCSF doses administered = 4
[b]Day of transplant to first day (following nadir) when absolute neutrophil count > 500 for 3 consecutive days
[c]Day of transplant to first day (following nadir) when platelets > 20,000 without transfusions within prior 7 days
N= number, IQR = interquartile range, Txp = transplant, ANC = absolute neutrophil count, PLT = platelet

Figure 2. Incidence of FN: Analysis #1

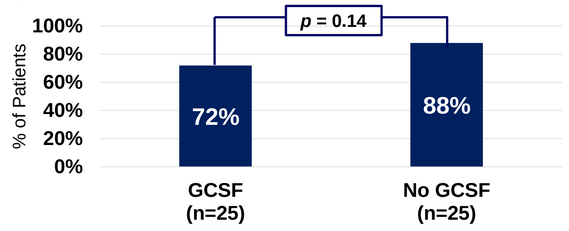
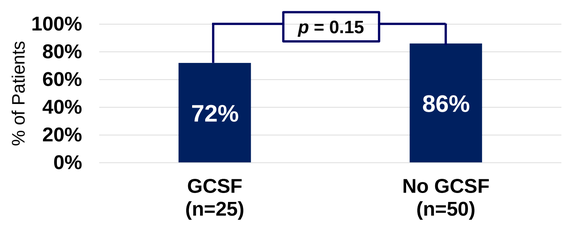


Figure 3. Incidence of FN: Analysis #2



- **Culture-positive infection rates:**
  - Analysis #1: 3/18 (16.7%) with GCSF vs. 4/22 (18.2%) without GCSF; *p*=0.97
  - Analysis #2: 3/18 (16.7%) with GCSF vs. 9/43 (20.9%) without GCSF; *p*=0.71
- **Financial considerations for on-formulary GCSFs:**
  - Tbo-filgrastim 300 mcg/0.5 mL = $115.82 (per dose)
  - Tbo-filgrastim 480 mcg/0.8 mL = $185.36 (per dose)

Reflection/Follow-up

- Use of GCSF post-ASCT was associated with a shorter time to ANC engraftment and post-transplant hospital LOS as well as lower rates of FN.
- Most patients who experienced FN had onset prior to day +7.
- Based on these findings, use of GCSF starting day +5 and continued until ANC > 500 cells/mcL or hospital discharge for all patients undergoing ASCT will now be standardized on a provisional basis with plans for future outcomes analysis after a 6-month evaluation period.
- Based on a median of 6 GCSF doses required per patient and an annual estimate of 50 bone marrow transplants for a lymphoma indication, the average estimated annual cost to EHC is approximately $45,000 (assuming even distribution of 300 mcg and 480 mcg dose requirements),

References

1. Griffiths EA, Roy V, Alwan L, et al. Hematopoietic Growth Factors. *NCCN Clinical Practice Guidelines in Oncology.* Version 1.2021.
2. Smith TJ, Bohlke K, Lyman GH, et al. Recommendations for the use of WBC growth factors: American Society of Clinical Oncology Clinical Practice Guideline Update. *J Clin Oncol.* 2015;33(28):3199-3212.
3. Trivedi M, Martinez S, Corringham S, Medley K, Ball ED. Optimal use of G-CSF administration after hematopoietic SCT. *Bone Marrow Transplant* 2009;43(12):895-908.

Evaluation of the Key Potentially Inappropriate Drugs in Pediatrics (KIDs) List

Aubrey Slaughter, PharmD; Anita Gallay, PharmD, BCPPS;
Katelyn Hood, PharmD, BCPPS

University of Georgia College of Pharmacy

Children's Hospital of Georgia, Augusta University

INTRODUCTION

- Medication errors occur in every patient population, with errors being more common in pediatric patients compared to adults.
- The Pediatric Pharmacy Association (PPA) recently published the Key Potentially Inappropriate Drugs in Pediatrics: The KIDs List.
- This list, similar to the Beers criteria for geriatrics, outlines medications that can be associated with severe adverse drug reactions in the pediatric population.

PURPOSE

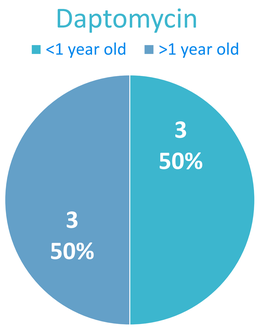
The purpose of this review was to evaluate the use of inappropriate medications in pediatric patients at the Children's Hospital of Georgia to establish the need for additional safety measures.

METHODS

- Design
  - Single site retrospective chart review
- Data collection
  - Patient demographics: age, gender, weight, and height
  - 18 out of 67 medications from the KIDs list
  - Indication, dose, dosage form, and duration for medications
  - Adverse drug reactions
  - Safeguards already in place for each medication
- Inclusion criteria
  - Pediatric patients ≤18 years old admitted from September 1, 2019 – September 1, 2020 prescribed 18 of the 67 medications mentioned on the KIDs list

RESULTS

Patient Demographics	n = 122
Age (year), mean ± SD	10.1 ± 6.3
Male Sex, no. (%)	66 (54.1%)
Weight (kg), mean ± SD	41.7 ± 28.2



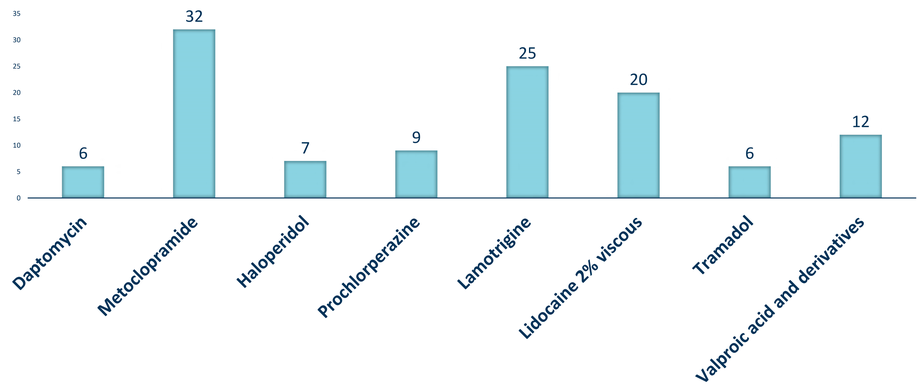
Valproic acid and derivatives	n = 12
Valproic acid	6 (50%)
Divalproex sodium	6 (50%)
≤6 years old,† no. (%)	2 (17%)
New starts, no. (%)	5 (42%)
Indications for new starts, no. (%)	
Headaches	4 (80%)
Epilepsy	1 (20%)
Continued from home, no. (%)	7 (58%)

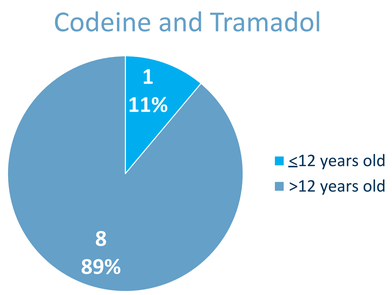
†Both patients had medications continued from home

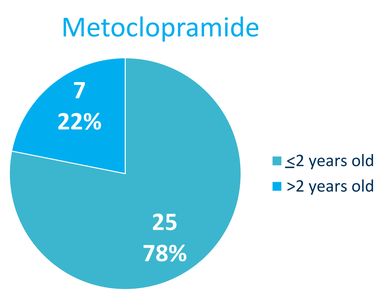
Lamotrigine	n = 25
Adverse drug reactions, no. (%)	0 (0%)
New starts,* no. (%)	2 (8%)
Continued from home, no. (%)	23 (92%)

*All new starts were started by neurology with titration schedules

Most Common Medications from KIDs List







Safeguards	n = 18
Pop-up alerts for pharmacists, no. (%)	4 (22%)
Dose range alerts, no. (%)	10 (56%)

CONCLUSIONS

- The majority of medications ordered were metoclopramide, lamotrigine, and lidocaine 2% viscous.
- 1 out of the 122 medication orders resulted in an adverse drug reaction.
- 23% of the medications were given in age groups less than the recommendations made by PPA.
- For codeine and tramadol, 33% of the orders were for trauma or surgery patients.
- The results indicated there were many opportunities for improvement regarding the prescribing of medications found on the KIDs List, such as pop-up alerts for both physicians and pharmacists.

CLINICAL IMPLICATIONS

- Dose range alerts have been added to the four medications that currently do not have an alert.
- Safeguards were implemented for each medication to deter physicians from ordering inappropriate medications in certain age groups.
- Inappropriate medications included in PowerPlans commonly used in pediatrics have been removed (i.e. codeine).
- Education about the KIDs List has been provided to pharmacists, as well as other healthcare professionals.

REFERENCES

- Otero P, Leyton A, Mariani G, et al. Medication errors in pediatric inpatients: prevalence and results of a prevention program. *Pediatrics.* 2008;122(3):e737-e743.
- Allen HC, Garbe MC, Lees J, et al. Off-label medication use in children, more common than we think: A systematic review of the literature. *J Okla State Med Assoc.* 2018;11(8):776-783.
- Elzagallaai AA, Greff M, Rieder MJ. Adverse Drug Reactions in Children: The Double-Edged Sword of Therapeutics. *Clin Pharmacol Ther.* 2017;101(6):725-735.
- Meyers RS, Thackray J, Matson KL, et al. Key Potentially Inappropriate Drugs in Pediatrics: The KIDs List. *J Pediatr Pharmacol Ther.* 2020;25(3):175-191.

Evaluation of a non-intensive care unit nurse driven magnesium protocol

Maggie Raker, PharmD; Danielle Carroll, PharmD, BCPS | HCA Healthcare

Introduction

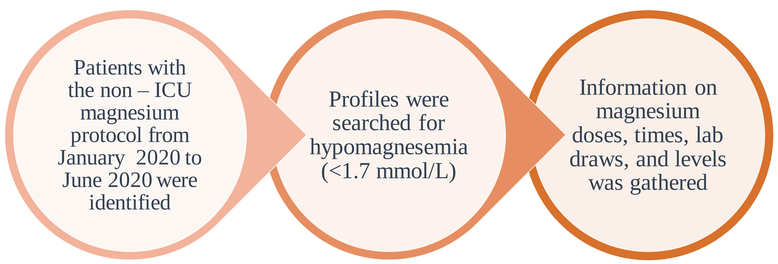
- Magnesium is an intracellular cation that is stored within the skeletal system[1]
- It is used as a cofactor in biochemical processes, as well as protein synthesis, muscle and nerve function, blood glucose control, and blood pressure regulation[1,2]
- Hypomagnesemia is seen in approximately 7-11% of hospitalized patients[3]
- Electrolyte replacement protocols are commonplace within Intensive Care Unit (ICU) settings and on non-ICU floors[4]
- Memorial Health University Medical Center instituted a non-ICU magnesium protocol in July of 2018
- Optimal magnesium level of 1.7-2.2 mmol/L

Objective

- Primary goal
  - To determine if the non-ICU magnesium replacement protocol is effective at replacing magnesium in patients with hypomagnesemia at our institution
- Secondary goals
  - Determine if our magnesium replacement protocol is optimally followed
  - Identify improvements needed within the magnesium protocol process

Methods

Figure 1: Data collection process



Methods

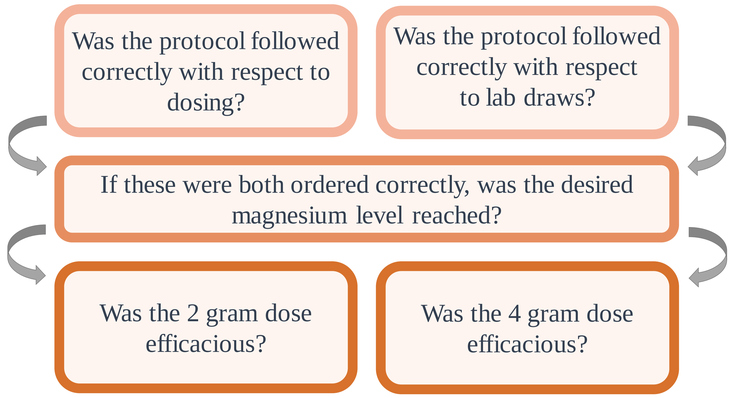
Figure 2: Magnesium protocol

MAGNESIUM REPLACEMENT (Oral route of administration is preferred)
Consider higher level of care with continuous cardiac monitoring for symptomatic/ severe patients; such as those with lethargy, tetany, muscle weakness, tremors, arrhythmias or seizures

Serum Magnesium (mmol/L)	Treatment Regimen Follow protocol for any subsequent labs ordered
1.7-1.9	➢ Administer Magnesium Oxide 400 mg PO every 12 H X 2 doses: recheck level in AM ➢ If unable to give PO, give Magnesium Sulfate 2 grams IV over 1 H X 1 dose; recheck level in AM
Less than 1.7	➢ Administer Magnesium Sulfate 4 grams IV over 2 H X 1 dose; check level 2 hours after dose • Remote Telemetry Monitor x 24 hours

NOTIFY MD: For serum magnesium level less than 1.7 mmol / L OR If patient requires more than 4 grams of Magnesium IV in any 24 H period

Figure 3: Data interpretation process



Results

Table 1: Baseline Characteristics (N=94)

Gender, male, n (%)	42 (45%)
Age, average (years), (SD)	61.6 (13.6)
Weight, average (kg), (SD)	87.6 (27.1)
Body mass index, average, (SD)	29.7 (10)

References

1. National Institute of Health. Magnesium Fact Sheet for Health Professionals. https://ods.od.nih.gov/factsheets/Magnesium-HealthProfessional/
2. Gragossian A, Friede R. Hypomagnesemia. StatPearls [Internet]. 8 January, 2020.
3. Hypomagnesemmia in critically ill patients. Hansen BA, Bruserud O. *Journal of Intensive Care*. 2018; 6(21).
4. Hikazi A, Al-Ansari M. Protocol-driven vs. physician-driven electrolyte replacement in adult critically ill patients. *Annuals of Saudi Medicine*. 2005 Mar-Apr; 25(2): 105-110.
5. National Institute of Health. Medication safety self assessment. https://www.ismp.org/sites/default/files/attachments/2018-01/EntireAssessmentWorkbook.pdf/

This research was supported (in whole or in part) by HCA and/or an HCA affiliated entity. The views expressed in this publication represent those of the author(s) and do not necessarily represent the official views of HCA or any of its affiliated entities.

Results

Table 2: Results

Compliance with dosing protocol n, (n%)		
Dose given per-protocol	**44 (47%)**	
	4 gm IV	36 (82%)
	2 gm IV	4 (8%)
	400 mg x2 PO	2 (5%)
	Other	2 (5%)
Deviation from protocol	**50 (53%)**	
	Dose not given	37 (74%)
	Dose too high	2 (4%)
	Dose too low	5 (10%)
	Other	6 (12%)
Compliance with lab ordering protocol n, (n%)		
Yes, per protocol	**53 (56%)**	
Deviation from protocol	**41 (44%)**	
	No lab ordered	20 (49%)
	Post-dose lab indicated, not ordered	19 (46%)
	Other	2 (5%)
Efficacy of 4 gram dose n, (n%)		
After 4 hours	Within goal	5 (36%)
	Too high	8 (57%)
	Too low	1 (7%)
With morning labs	Within goal	15 (63%)
	Too high	8 (33%)
	Too low	1 (4%)
Efficacy of 2 gram dose n, (n%)		
With morning labs	Within goal	3 (100%)

Conclusion

- Protocol followed incorrectly a majority of the time
  - 53% of doses were given incorrectly
  - 44% of subsequent labs ordered correctly
- When indicated, the 4 gram magnesium dose resulted in a magnesium goal 63% of the time
- Results of this medication use evaluation will be presented to nursing staff and education will be provided

Impact of Probiotics on the Development of *Clostridioides difficile* Infection in Patients Receiving Fluoroquinolones

Mary Sheffield, PharmD; Bruce M. Jones, PharmD, BCPS; Blake Terrell, PharmD Candidate; Jamie L. Wagner, PharmD, BCPS; Christopher M. Bland, PharmD, FCCP, FIDSA, BCCPS

Background

- Antibiotic exposure is the primary risk factor for development of *Clostridioides difficile* infections (CDI)
  - Clindamycin, ceftriaxone, and fluoroquinolones[1,2]
- Incidence of hospital-onset CDI shown to be approximately 8 per 10,000 patient-days[3,4]
- Significant risk of recurrence (25%) with initial episode of CDI[5]
- Probiotic supplementation has been shown to reduce the risk of antibiotic-associated diarrhea and primary CDI, but is not recommended for routine use[6]

Purpose and Outcomes

- To evaluate the impact of probiotic administration on the development of primary CDI among patients receiving fluoroquinolones
- Primary Outcome: Incidence of primary CDI
- Secondary Outcomes
  - Rates of *C. difficile* diagnostic stool testing
  - Rates of additional infectious diagnostic stool testing
  - Non-*C. difficile* related gastrointestinal (GI) side effects

Methods

- Multi-center, retrospective, observational cohort
- Randomized to include 100 patients/group

Inclusion Criteria	Exclusion Criteria
• ≥ 18 years of age • ≥ 3 days of levofloxacin or ciprofloxacin started within 72 hours of admission • Probiotic group required ≥1 dose of probiotics during antibiotic treatment	• Documentation of prior CDI • Antibiotic use within 90-days of hospitalization • Co-administration of systemic antibiotics for >24 hours during definitive therapy • Immunocompromised • History of IBS or IBD

Results

Table 1. Patient Characteristic	Probiotic Use (n=100)	No Probiotic Use (n=100)	P-value
Male, No. (%)	41 (41)	35 (35)	0.382
Age, years	68 [57-78]	64 [55-74.75]	0.120
Race, No. (%) White Black Hispanic American Indian/Alaskan Native	 72 (72) 28 (28) 0 (0) 0 (0)	 57 (57) 41 (41) 1 (1) 1 (1)	 0.027 0.053 1.000 1.000
Charlson Comorbidity Index	4 [2-5]	4 [2-5]	0.652
Definitive monotherapy, No. (%) Levofloxacin Ciprofloxacin	 53 (53) 47 (47)	 56 (56) 44 (44)	0.670
FQ duration, days	7 [5–10]	7 [5–9]	0.277
PPI use, No. (%)	41 (41)	61 (61)	0.005
H2RA use, No. (%)	26 (26)	25 (25)	0.871
Prior antibiotic use, No. (%)	51 (51)	9 (9)	<0.001

Table 2: Details of Probiotic Administration	Probiotic Use (n=100)
Probiotic use, No. (%) Lactobacillus Saccharomyces	 78 (78) 24 (24)
Probiotic frequency, No. (%) Daily BID TID Other	 30 (30) 24 (24) 44 (44) 2 (2)
Doses administered	6 [4–9]
Time from the start of FQ to first probiotic dose, days	0 [0–1]

Figure 1. Incidence of CDI and Stool Testing Ordered

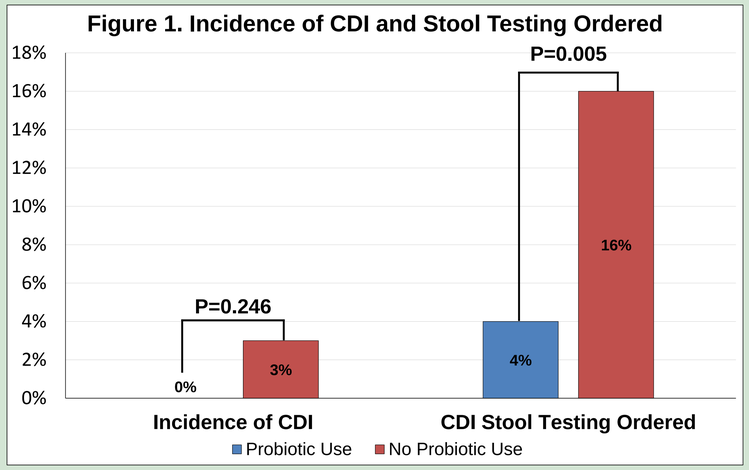


Figure 2. Additional Diagnostic Testing Ordered

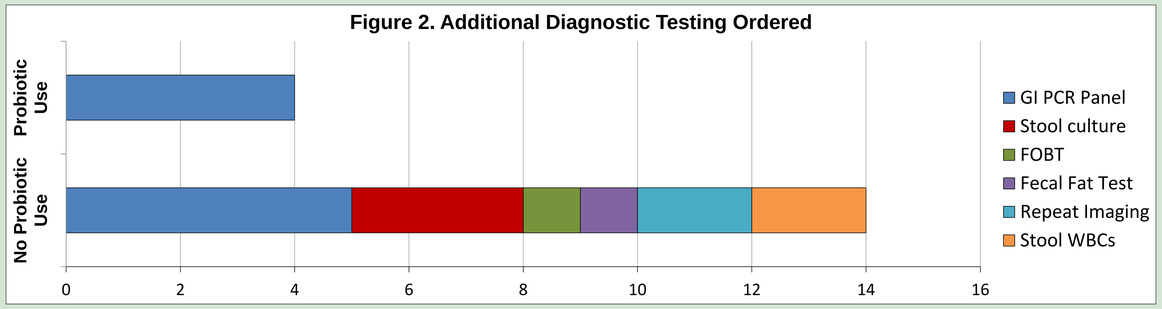


Table 3. Non-CDI GI-Related Side Effects	Nausea	Vomiting	Bloating	Gas	Non-CDI diarrhea	Other	No symptoms
Probiotic Use (n=100)	11 (11)	2 (2)	3 (3)	6 (6)	17 (17)	0 (0)	70 (70)
No Probiotic Use (n=100)	13 (13)	9 (9)	4 (4)	10 (10)	20 (20)	2 (2)	65 (65)
P-value	0.663	**0.030**	1.000	0.297	0.585	0.497	0.450

Analysis

- Fewer overall incidence of CDI among patients on fluoroquinolones who received probiotics compared to those who did not (0% vs. 3%, p=0.246).
- Patients who received probiotics had statistically significantly fewer stool tests performed compared to those who did not receive probiotics (4% vs. 16%, p=0.005).
- Non-CDI gastrointestinal-related side effects occurred in 30% and 35% of patients receiving fluoroquinolones with and without probiotics, respectively.

Discussion

- Rates of CDI in patients receiving fluoroquinolones without probiotics were consistent with current literature.
- Probiotic use was associated with a statistically and clinically significant decrease in *C. difficile* diagnostic stool testing performed.
- Further research is warranted to optimize probiotic prescribing in high-risk patients, such as patients receiving fluoroquinolones.

References

1. DePestel DD, Aronoff DM. “Epidemiology of clostridium difficile infection.” *J Pharm Pract.* 2013;26(5):464-475.
2. Pakyz AL, Jawahar R, Wang Q, et al. “Medication risk factors associated with healthcare-associated clostridium difficile infection: a multilevel model case-control study among 64 US academic medical centres.” *J Antimicrob Chemother* . 2014;69(4):1127–31.
3. Kazakova SV, Baggs J, McDonald LC, et al. “Association between antibiotic use and hospital-onset clostridioides difficile infection in US acute care hospitals, 2006-2012: an ecologic analysis” *Clin Infect Dis*. 2020:70(1):11-18.
4. Marra AR, Perencevich EN, Nelson RE, et al. “Incidence and outcomes associated with clostridium difficile infections: a systematic review and meta-analysis” *JAMA Network Open.* 2020;3(1):e1917597.
5. Tabak YP, Zilberberg MD, Johannes RS, et al. “Attributable burden of hospital-onset clostridium difficile infection: a propensity score matching study.” *Infect Control Hosp Epidemiol* . 2013;34(6):588-96.
6. McDonald LC, Gerding DN, Johnson S, et al. “Clinical practice guidelines for clostridium difficile infection in adults and children: 2017 update by the infectious diseases society of america (IDSA) and society for healthcare epidemiology of america (SHEA).” *Clin Infect Dis.* 2018;66(7):e1-48.

Examining connections between HIV Pre-Exposure Prophylaxis prescribing parameters and literacy rates among Georgia counties

Mia Turner, PharmD, MBA Candidate, MPH; Kenric B Ware, PharmD, MBA, AAHIVP
South University School of Pharmacy – Columbia, South Carolina

Background

The means of transmission of the Human Immunodeficiency Virus (HIV) are well known and although there are well documented ways of reducing the rate of transmission, there are still new infections daily. With the development of Pre-exposure prophylaxis (PrEP), this is another tool that can be used to reduce transmission in a population of those who are at higher risk of contracting the virus. However, just like any medication regimen, for the treatment to be affective, those who are candidates for PrEP use must have a basic level of reading literacy to receive the benefits of taking this medication

Purpose

Taking PrEP can drastically reduce the possibility of transmitting HIV, if taken correctly. Pre-exposure prophylaxis (PrEP) is a therapeutic strategy designed to prevent the acquisition of Human Immunodeficiency Virus (HIV). Aspects of prevention among most disease states include patients' self-awareness and their comprehension levels. The purpose of this study was to evaluate whether HIV PrEP prescribing patterns were associated with percentages of populations lacking basic prose literacy skills.

Methods and Materials

A retrospective analysis occurred through data presented by the National Center for Education Statistics (NCES) and AIDSVu.com. Percent lacking basic prose literacy rates and the number of PrEP users, PrEP prescribing rates, and PrEP-to-Need Ratios (PnRs), at the county level in Georgia, emanated from NCES and AIDSVu.com, respectively. PnR refers to the ratio of the number of PrEP users in a certain year to the amount of people newly diagnosed with HIV in the previous year. Data reporting was restricted to 2003 and 2018 findings from NCES and AIDSVu.com, respectively. Linear regression techniques assessed percent lacking basic prose literacy skills as the predictor variable with the number of PrEP users, PrEP prescribing rates, and PnRs, as the outcome variables. Statistical significance was set a $p < 0.05$.

Demographics

The following Figures A, B, and C are visual depictions of the PrEP-to-Need Ration, PrEP Rate and PrEP Users reported per district throughout the state of Georgia. Data includes the listed prominent and surrounding counties
District 1: (Rome Dalton) District 2: (Gainesville) District 3: (Cobb-Douglas, Fulton): District 4: (LaGrange) District 5: (South Central, North Central) District 6 (East Central, Augusta) District 7: (West Central) District 8: (Valdosta) District 9: (Waycross) District 10: (Athens)

Figure 1. PrEP-to-Need Ratio per District

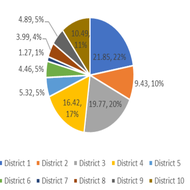


Figure 2. PrEP Rate per District

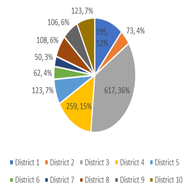
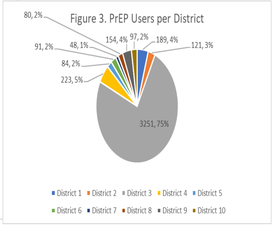
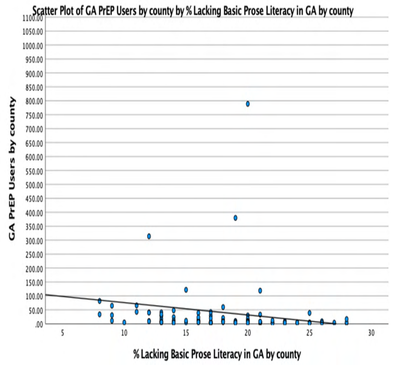


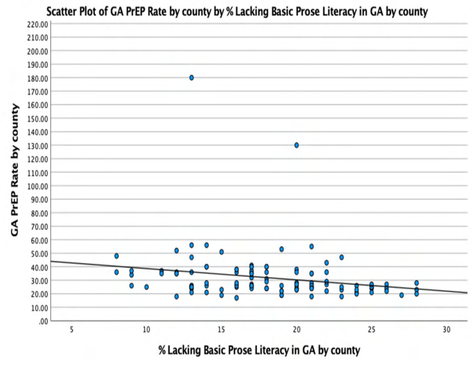
Figure 3. PrEP Users per District

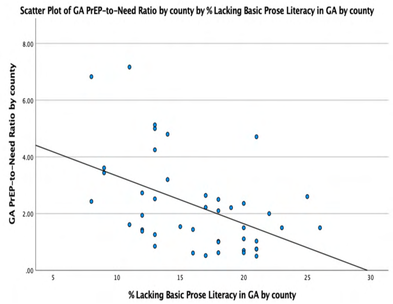


Results

Of the 159 counties slated for analyses, 117 (74%) comprised the analyses of the number of Georgia PrEP users by county and the rate of Georgia PrEP users by county. Forty-four of the 159 counties (28%) constituted the analyses of Georgia PnRs by county. Omission of counties from these analyses resulted from data not being available to safeguard privacy due to limited number of HIV cases or too few people in a particular county. Percent of individuals lacking basic prose literacy was not predictive of the number of GA PrEP users by county ($p=0.128$). Percent of individuals lacking basic prose literacy was predictive of the rate of Georgia PrEP users and PnR by counties, $p=0.024$ and $p=0.001$, respectively.







Discussion

The findings of this research show that there is a correlation between the prose literacy skills and counties PrEP-to-Need Ratio, PrEP Users and PrEP Rates. As the literacy level decreased, there is also a decrease in the amount of PrEP Users by county. The line of regression shows the negative correlation is present in all three graphs. This is strong evidence that the basic prose literacy rate has a strong impact on the PrEP use. There are a few outlier counties that who a more positive correlation; however, most counties all show the same correlation.

Future Considerations

1. Data used in the analysis should encompass more counites within the state of Georgia for a better understanding of how literacy rates impact the amount of PrEP distribution.
2. More research should be conducted to determine how information about PrEP use candidacy, availability, and effectiveness is being distributed per district.
3. The data utilized in the study was collected from the year 2018, the number of counties that reported years ago may have increased and may show different results.

Limitations

1. There were several counties that data was not available for and therefore no data was available to utilize in statistical analysis. For PrEP to Need ratio, 116 counties were missing, 41 counties for Rate of PrEP Use and 39 counties for PrEP Users were also missing.
2. Data collection methods used by AIDSVu was not disclosed so validity of the reported data cannot be confirmed

Conclusion

The findings of this research show that there is a correlation between the prose literacy skills and counties PrEP-to-Need Ratio, PrEP Users and PrEP Rates. As the literacy level decreased, there is also a decrease in the amount of PrEP Users by county. It an be seen that in the areas where there are higher leaves of reading and comprehension, the area more individuals in that are who are on PrEP. Since the use of PrEP has proven to reduce the rate of HIV transmission there may also be a lower amount of those who test positive in the areas with higher literacy levels and higher amount of PrEP users. More research should be done to determine if there is also a correlation in the rates of PrEP-to-Need Ratio.

References

1. AIDSVu.org (2018). "Tools & Resources" Retrieved from https://aidsvu.org/resources/#/
2. District Map. Dph.Georgia.gov/sites/dhp.Georgia.gov/files/DistrictMap.pdf

Disclosures

Authors of this presentation have the following to disclose concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation.
-Mia Tunrer: Nothing to disclose
-Kenric B. Ware: Nothing to disclose

Assessment of a Best Practice Alert in Managing Patients on Anticoagulation

Queen O. Olocha, Student Pharmacist[1,2]; Sweta Patel, PharmD[1,2]; Jennifer Elliott, PharmD[1,2]

[1]Grady Memorial Hospital, Atlanta, Georgia; [2]Mercer University College of Pharmacy, Atlanta, Georgia

INTRODUCTION

- Estimated 900,000 patients in the United States and nearly 1 million patients worldwide have Venous Thromboembolism (VTE).[1,2]
- Untreated VTE can lead to long-term morbidity and mortality with an increased risk of stroke, heart failure, and death.[1,2]
- Estimated total annual cost ranges from $2 to $10 billion per 300,000 to 600,000 patients.[1]
- Best Practice Alerts (BPAs) are clinical support tools accessible through EHR to alert the clinicians about a particular element of a patient's care, such as improper dosing, platelet counts, high serum creatinine, infections, blood transfusions, or overuse of testing.[3,4,5]
- The use of BPAs has been effective in both studies for understanding and managing diseases and the need for therapy adjustment and improved response in patients requiring intervention.[6]
- BPAs can help support clinicians in identifying poor anticoagulant management and improve preventive measures.
- Kucher et al. shown that BPAs could reduce the incidence of symptomatic and asymptomatic deep vein thrombosis among hospitalized patients, and it has increasing effects.[7,8,9]
- This poster includes data at Grady from July 2019 to August 2019 with a total of 100 patients.

OBJECTIVES

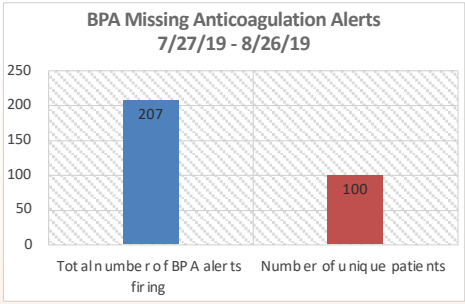
- Objective 1: Determine the accuracy of the firing of BPAs related to VTE prophylaxis.
- Objective 2: Assess the frequency of provider implementation of accurately fired VTE prophylaxis BPA.

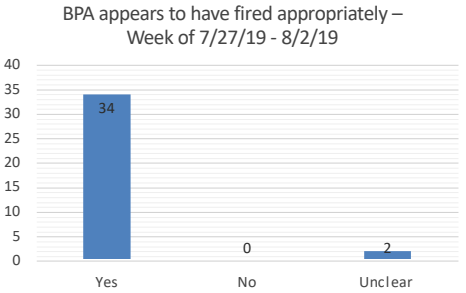
METHODS

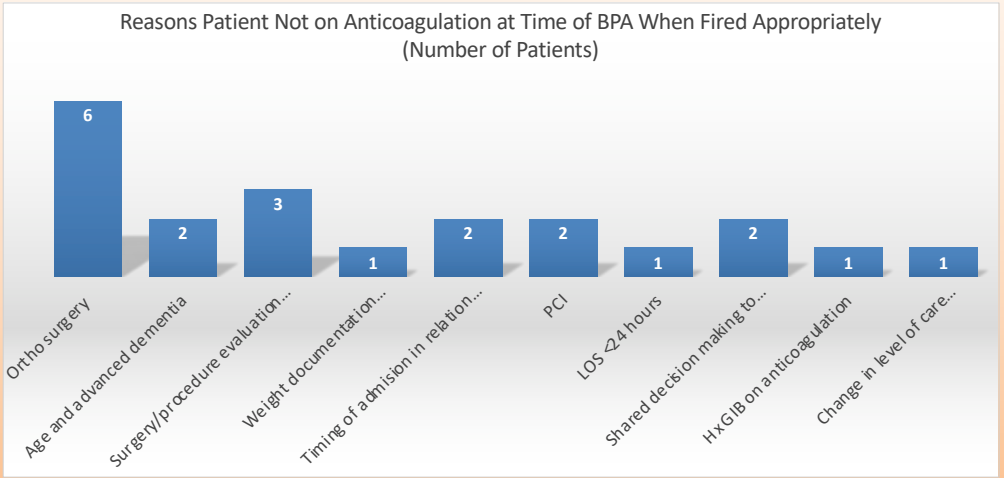
- Single-center, retrospective, chart review study assessed eligible adult patients who were prescribed anticoagulants for VTE prophylaxis.
- Eligible adult patients were 18 years old and older and were at increased risk for venous thromboembolism.
- A VTE prophylaxis report was processed through EPIC® at Grady Memorial Hospital between July 27, 2019 – August 26, 2019.
- Electronic orders were searched for VTE prophylaxis and mechanical prophylactic measures, including sequential compression devices.
- Patient notes were screened for past/present medical history, accidents, providers, surgeries/procedures, length of stay, or social history.
- Screened for the presence of prophylactic pharmacologic measures, including UFH/Lovenox, aspirin, DOACs, or Warfarin of active and discontinued medications.

RESULTS

- 100 patients identified and 207 BPAs.
- The number of BPAs was fired per unique patient weekly and by floor unit.
- The firing of the BPAs related to VTE prophylaxis was 94.5% accuracy for 36 patients.
- Providers could not prescribe each unique patient with anticoagulation therapy due to having PCI, dementia, or timing when the BPA fired.







CONCLUSION

- BPAs were accurately fired and assessed.
- The assessment showed that VTE prophylaxis was not needed due to a specific event that the patient may have had.
- This specific BPA improved the appropriate management of anticoagulation for VTE prophylaxis in patients.
- Limitations:
  - Fewer studies on the role of BPAs in patient care and the management of anticoagulants for VTE prophylaxis in patients.
  - Providers ignored alerts.
  - BPAs fired after patients left the hospital.
  - BPAs would fire when patients was receiving proper prophylaxis.

REFERENCES

1. Beckman MG, Hooper WC, Critchley SE, Ortel TL. Venous thromboembolism: a public health concern. Am J Prev Med. 2010;38(4 Suppl):S495–501. doi:10.1016/j.amepre.2009.12.017
2. Cohen AT, Agnelli G, Anderson FA, et al. Venous thromboembolism (VTE) in Europe. The number of VTE events and associated morbidity and mortality. Thrombosis and Haemostasis. 2007 Oct;98(4):756-764.
3. Swedlund M, Norton D, Birstler J, Chen G, Cruz L, Hanrahan L. Effectiveness of a Best Practice Alerts at Improving Hypertension Control. Am J Hypertens. 2018;32(1):70-76. doi:10.1093/ajh/hpy155
4. Lee J, Szeto L, Pasupula D et al. Cluster Randomized Trial Examining the Impact of Automated Best Practice Alert on Rates of Implantable Defibrillator Therapy. Circulation: Cardiovascular Quality and Outcomes. 2019;12(6). doi:10.1161/circoutcomes.118.005024
5. Kaako A. Evaluating the efficacy of best practice alerts to improve Clostridium difficile early detection in hospital settings: A 6-month interim analysis of the 2-year prospective study. Avicenna J Med. 2018;8(3):87. doi:10.4103/ajm.ajm_85_17
6. Chanas T, Volles D, Sawyer R, Mallow-Corbett S. Analysis of a new best-practice advisory on time to initiation of antibiotics in surgical intensive care unit patients with septic shock. J Intensive Care Soc. 2018;20(1):34-39. doi:10.1177/1751143718767059
7. Karlsson L, Nilsson S, Bång M, Nilsson L, Charitakis E, Janzon M. A clinical decision support tool for improving adherence to guidelines on anticoagulant therapy in patients with atrial fibrillation at risk of stroke: A cluster-randomized trial in a Swedish primary care setting (the CDS-AF study). PLoS Med. 2018;15(3):e1002528. doi:10.1371/journal.pmed.1002528
8. Beeler PE, Kucher N, Blaser J. Sustained impact of electronic alerts on rate of prophylaxis against venous thromboembolism. Thromb Haemost. 2011; 106(4):734–8. https://doi.org/10.1160/TH11-04- 0220 PMID: 21800010
9. Kucher N, Koo S, Quiroz R, Cooper JM, Paterno MD, Soukonnikov B, et al. Electronic alerts to prevent venous thromboembolism among hospitalized patients. N Engl J Med. 2005; 352(10):969–77. https://doi.org/10.1056/NEJMoa041533 PMID: 15758007

Fluid Stewardship and the Four Rights: Pharmacy Recommendations in the Treatment of Critically Ill Adults with COVID-19

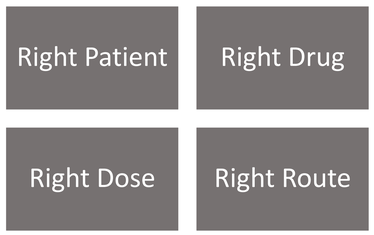
Critical Care Collaborative
College of Pharmacy
UNIVERSITY OF GEORGIA

Ryan Bok, Pharm.D. Candidate; Diana Dang, Pharm.D. Candidate; W. Anthony Hawkins, Pharm.D., BCCCP; Rachel Rikard, Pharm.D. Candidate; Susan E. Smith, Pharm.D., BCCCP, BCPS

BACKGROUND

- Intravenous fluids (IVFs) are widely used in the intensive care unit (ICU) to maintain hydration and organ perfusion.
- In the past year, a significant portion of ICU patients have had coronavirus disease 2019 (COVID-19).
- Inappropriate use of IVFs in ICU patients can lead to volume overload, which is associated with increased hospital length of stay and mortality.

Purpose: To identify pharmacy recommendations related to the four rights of fluid stewardship in the treatment of critically ill adults with COVID-19



METHODS

- **Design:** IRB-approved, retrospective, single-center cohort study
- **Time Frame:** May 19, 2020-September 30, 2020
- **Setting:** Community hospital
- **Inclusion Criteria:**
  - Adult (≥18 years old)
  - COVID-19 positive
  - Critically ill
  - Followed on academic rounds
- All pharmacy recommendations for each patient day were reviewed for relevance to fluid stewardship and classified based on the four rights.
- **Statistics:** Outcomes were analyzed with descriptive statistics.

OUTCOMES

- **Primary:** Percentage of pharmacy recommendations relevant to fluid stewardship
- **Secondary:** Percentage of fluid stewardship recommendations belonging to each right

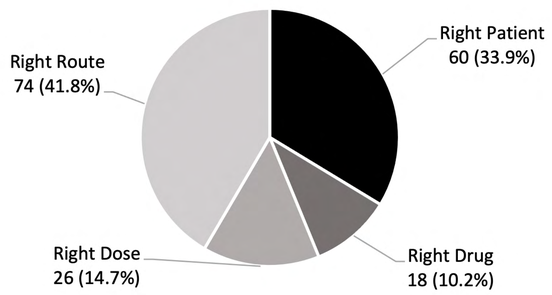
RESULTS

Table 1. Overview of Recommendations	
Total Patients	**79**
Total Patients-days	420
Total Pharmacy Recommendations	**1,338**
Fluid Stewardship Recommendations – n (%)	177 (13.2)

Table 2. Types of Fluid Stewardship Recommendations (n=177)	
Right Patient – n (%)	
Initiate bolus IVF not based on fluid responsiveness	11 (6.2)
Initiate maintenance IVF	1 (0.6)
Discontinue maintenance IVF	14 (7.9)
Discontinue bolus IVF not based on fluid responsiveness	1 (0.6)
Recommend to assess volume responsiveness	4 (2.3)
Initiate enteral water	8 (4.5)
Discontinue enteral water	6 (3.4)
Initiate albumin	3 (1.7)
Discontinue albumin	2 (1.1)
Initiate parenteral nutrition	5 (2.8)
Discontinue parenteral nutrition	5 (2.8)
Right Drug – n (%)	
Change type of maintenance IVF	3 (1.7)
Initiate loop or thiazide diuretic	8 (4.5)
Discontinue loop or thiazide diuretic	7 (4.0)
Right Dose – n (%)	
Change albumin concentration	1 (0.6)
Adjust dose of enteral fluid	16 (9.0)
Adjust dose of maintenance IVF	2 (1.1)
Adjust volume of parenteral nutrition	2 (1.1)
Concentrate infusions of $NaHCO_3$, vasopressors, or antibiotics	1 (0.6)
Adjust dose of loop or thiazide diuretic	4 (2.3)
Right Route – n (%)	
Convert medication route from IV to non-IV	59 (33.3)
Convert medication route from non-IV to IV	15 (8.5)

RESULTS CONTINUED

Figure 1. Fluid Stewardship Recommendations Stratified by the Four Rights



CONCLUSIONS

- Fluid stewardship accounted for more than 1 in 8 pharmacy recommendations for critically ill adults with COVID-19.
- Of the four rights, the right route accounted for the most fluid stewardship recommendations.
- The most common fluid stewardship recommendation was conversion of medications from an IV to non-IV route of administration.
- Fluid stewardship is a timely intervention that pharmacists can make in the ICU during the COVID-19 pandemic.
- The risk of acute respiratory distress syndrome in COVID-19 patients underscores the importance of more conservative fluid management.

Limitations: Lack of comparator group; retrospective, single-center design

Future Direction: Compare IVF recommendations for critically ill patients with and without COVID-19.

REFERENCES

Hawkins WA, Smith SE, Newsome AS, Carr JR, Bland CM, Branan TN. Fluid Stewardship During Critical Illness: A Call to Action. *J Pharm Pract*. 2020;33(6):863-873. doi:10.1177/0897190019853979

De novo use of LCP-Tacrolimus in kidney transplant recipients

Antonia Fagbamiye, Pharm.D. candidate, Melissa Laub, Pharm.D., BCPS, Rachel Stephens, Pharm.D., BCPS

AU Medical Center, Augusta, Georgia

INTRODUCTION

- Tacrolimus is a narrow therapeutic index immunosuppressant used in kidney transplant recipients to prevent organ rejection
- There are several dosage forms of tacrolimus including IR-tacrolimus capsules (Prograf), XL-tacrolimus capsules (Astagraf XL), and LCP-tacrolimus tablets (Envarsus XR)
- These medications are not interchangeable and have different dosing recommendations, which are listed in Table 1
- Dosing recommendations across institutions vary from the package insert dosing due to inter- and intra- patient variability
- African American patients might require higher doses to reach therapeutic levels[1]
- De novo use of LCP-tacrolimus began at AU Medical Center in October 2019, and dosing was dependent upon provider preference

Table 1. Package insert dosing recommendations for de novo use

IR-tacrolimus[2]	With MMF/IL-2 antagonist: 0.1 mg/kg/day in 2 divided doses
XL-tacrolimus[3]	With MMF, steroids, and basiliximab induction: 0.15 to 0.2 mg/kg/day
LCP-tacrolimus[1]	0.14 mg/kg/day

MMF: mycophenolate mofetil; IL-2: interleukin-2

OBJECTIVES

- Describe de novo dosing of LCP-tacrolimus at AU Medical Center
- Evaluate time to first therapeutic level and weight-based dose at first therapeutic level

METHODS

- Single center, retrospective chart review
- **Inclusion criteria:**
  - Adult patients who underwent a kidney transplant between October 2019 and July 2020
  - Received de novo LCP-tacrolimus as part of initial regimen
- **Exclusion criteria:**
  - Received a different tacrolimus formulation following transplant
  - Received any interacting medications
  - Passed away within 30 days post-transplant
- At our center, LCP-tacrolimus is initiated once serum creatinine is trending down and urine output is adequate with a goal of 8-10 ng/ml for the first three months
- Descriptive statistics were used to analyze the data collected

RESULTS

- 48 patients started LCP-tacrolimus de novo; 16 patients were excluded

Table 2. Baseline demographics (N = 32)

Age at time of transplant (years)	46.5 (37.3, 55)
Gender	
Male	21 (65.6%)
Female	11 (34.4%)
Race	
African American	27 (84.4%)
Caucasian	3 (9.4%)
Hispanic/Latino	2 (6.2%)
Deceased or living donor	
Deceased	30 (93.75%)
Living	2 (6.25%)

Values listed as median (IQR) or No. (%)

Figure 1: Initial weight-based dosing and weight-based dosing at first therapeutic level

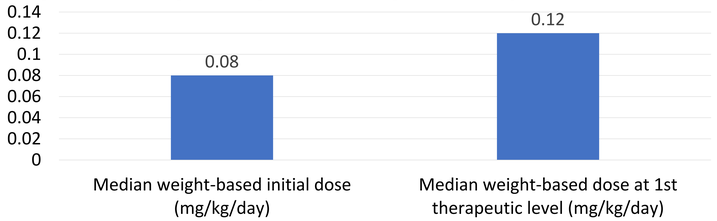
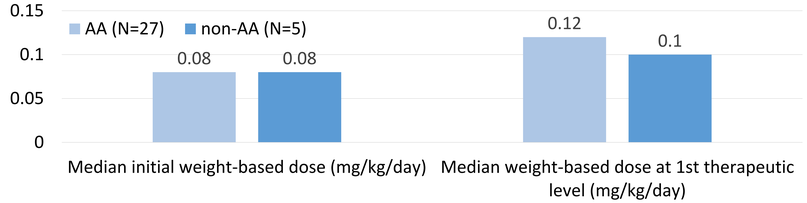


Table 3. Time to therapeutic level and follow up levels (N = 32)

Days on therapy until first therapeutic level	8 (2, 16.5)
Therapeutic prior to discharge	12 (37.5%)
Supratherapeutic level within first 30 days	16 (50%)

Values listed as median (IQR) or No. (%)

Figure 2: Initial weight-based dosing and weight-based dosing at first therapeutic level based on race



- None of the measured outcomes were significantly different based on race

CONCLUSIONS

- Although the package insert recommendation for de novo LCP-tacrolimus is 0.14 mg/kg/day, we found patients required approximately 0.12 mg/kg/day to achieve a therapeutic level
- Half of the patients experienced a supratherapeutic level within the first 30 days after transplant even on lower than recommended dosing
- Our initial dosing strategy may need to be reassessed, as it took patients a median of 8 days to achieve a therapeutic level
- Weight-based dosing, time to therapeutic level, therapeutic level prior to discharge and supratherapeutic levels were not different between African American and non-African American patients, but we were not powered to detect a significant difference

CLINICAL IMPLICATIONS

- While our data supports our strategy of using less than the package insert recommended dosing to avoid supratherapeutic levels, we should consider adjusting the initial dose to achieve therapeutic levels more quickly
- It would be worthwhile to investigate dosing differences based on race with a larger sample size

REFERENCES

1. Envarsus XR [package insert]. Edison, NJ: Veloxis Pharmaceuticals, Inc.; 2015.
2. Prograf [package insert]. Deerfield, IL: Astella Pharma US, Inc.; 2012.
3. Astagraf XL [package insert]. Northbrook, IL: Astellas Pharma US, Inc.; 2015.

DISCLOSURES

The authors of this presentation have no 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.

Impact of Pharmacist Intervention on the Appropriate Prescribing of Fentanyl Patches

Reem M. Ghandour, Pharm.D., Ambra Hannah, Pharm.D. BCPS, Kimm Freeman, Pharm.D. BCPS, CPE

Wellstar Health System, Marietta, Georgia

BACKGROUND

Institute for Safe Medication Practices (ISMP) highlighted fentanyl patch prescribing as an area of focus for hospitals

- Recommended best practices to ensure appropriate prescribing of fentanyl patches

Wellstar Opioid Stewardship Program initiatives

- Defaulting opioid orders to the lowest starting dose possible
- Checking the Prescription Drug Monitoring Program (PDMP) for prescription history
- Removing fentanyl patches from acute care areas such as the ED and surgery

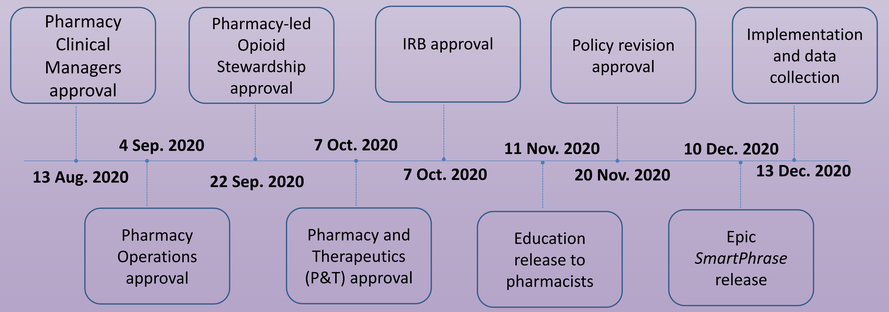
Pharmacist play an important role in ensuring proper dispensing of medications

- They conduct a final check before opioids are dispensed to patients and help intervene on inappropriate opioid prescribing
- Workflow change (Dec. 2020) pharmacist verify and document the appropriateness of fentanyl patch

Definitions

- ***Pharmacist Intervention***
  - ✓ Verification and Documentation in the EMR
  - ✓ Opioid status
  - ✓ Type of pain
  - ✓ PDMP history
- ***Appropriate Prescribing***
  - ✓ Opioid-tolerant
  - ✓ Chronic pain
  - ✓ MOSS score <3
  - ✓ No reversal agent & medication errors

Research Timeline



PATIENT SCREENING CRITERIA

Inclusion Criteria

- Age ≥ 18 years
- Fentanyl patch order (initiation)
- All inpatient areas including critical care, surgical, medical surgical, and medical areas
- Emergency department

Exclusion Criteria

- Patients receiving hospice or palliative care services
- Indications: sickle cell and cancer pain

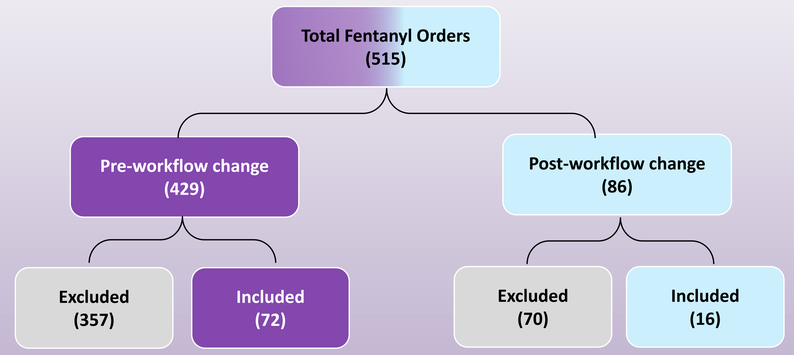
RESEARCH QUESTIONS

1. ***Efficacy****: Are pharmacist interventions associated with more appropriate prescribing?*
2. ***Safety****: Did appropriate prescribing of fentanyl patches increase post-workflow change?*
3. ***Compliance****: Did pharmacist interventions increase post-workflow change?*

DATA COLLECTION

- Retrospective chart review from January 2020 through January 2021 for all patients who were initiated on fentanyl patch
- Patients identified using fentanyl patch order records

Sample Composition



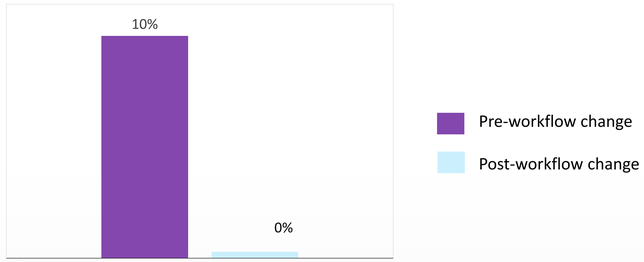
Subject Demographics

	Pre-workflow change	Post-workflow change	*p*-value
Average age (years)	62	61	0.25
Average weight (kg)	79.69	76.85	0.79
Average fentanyl patch strength (mcg/hr)	32.83	40.56	0.31
Average oral morphine equivalents received in the 24 hours prior to patch initiation (mg)	289.31	278.37	0.45

RESULTS

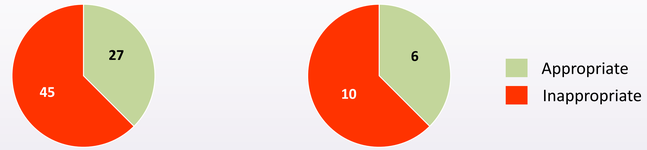
Primary Endpoint

- **Efficacy**: Percentage of appropriate fentanyl patch orders that had pharmacist intervention*: 10% vs. 0%



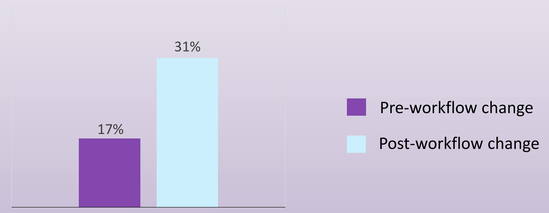
Secondary Endpoints

- **Safety**: Percentage of appropriate fentanyl patch orders: 38% vs. 38%



Pre-workflow change **Post-workflow change**

- **Compliance**: Percentage of pharmacists verifying and documenting: 17% vs. 31%



*Fisher Exact Test ; p-value = 0.0934
*Chi-square = 2.6667 ; p-value = 0.1024

REFERENCES

1. Institute for Safe Medication Practices (ISMP). ISMP Targeted Medication Safety Best Practices for Hospitals; 2020. https://www.ismp.org/guidelines/best-practices-hospitals.
2. Poirier RH, Brown CS, Baggenstos YT, Walden SG, Gann NY, Patty CM, Sandoval RA, McNulty JR. Impact of a pharmacist-directed pain management service on inpatient opioid use, pain control, and patient safety. Am J Health Syst Pharm. 2019 Jan 01; 76(1):17-25.
3. Tilli T, Hunchuck J, Dewhurst N, et al. Opioid stewardship: implementing a proactive, pharmacist-led intervention for patients coprescribed opioids and benzodiazepines at an urban academic primary care centre. BMJ Open Quality 2020;9:e000635
4. Soto R, Yaldou B. The Michigan Opioid Safety Score (MOSS): A Patient Safety and Nurse Empowerment Tool. J Perianesth Nurs. 2015;30(3):196-200

Reem Ghandour, Pharm.D.: Nothing to disclose
Ambra Hannah, Pharm.D., BCPS: Nothing to disclose
Kimm Freeman, Pharm.D., BCPS, CPE: Nothing to disclose

Fluid Stewardship and the ROSE Model: Pharmacy Recommendations in the Treatment of Critically Ill Adults with COVID-19

Critical Care Collaborative
College of Pharmacy
UNIVERSITY OF GEORGIA

Rachel Rikard, PharmD Candidate; W. Anthony Hawkins, PharmD, BCCCP; Ryan Bok, PharmD Candidate; Diana Dang, PharmD Candidate; Susan E. Smith, PharmD, BCCCP, BCPS

BACKGROUND

- Intravenous fluids (IVFs) are the most commonly administered drug in critically ill adult patients
- Fluid optimization may be particularly important in COVID-19 patients based on the risk of acute respiratory distress syndrome (ARDS) and fluid overload
- The ROSE model of fluid therapy includes four stages: Rescue, Optimization, Stabilization, and Evacuation

Purpose: Identify and categorize pharmacy recommendations related to the four ROSE phases

Hypothesis: At least 20% of pharmacy recommendations would be related to fluid stewardship in COVID-19 patients

OUTCOMES

Primary

- Percentage of pharmacy recommendations related to fluid stewardship (FS)

Secondary

- Number and percentage of recommendations stratified by the stages of the ROSE model

STUDY DESIGN

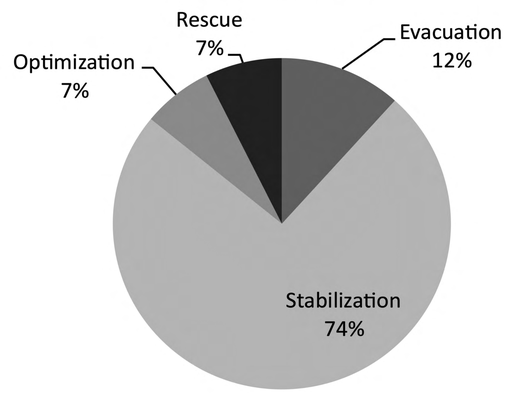
- **Design**: IRB approved, single-center, retrospective study
- **Time Frame**: May 19, 2020 through September 30, 2020
- **Setting:** Community hospital ICU
- **Inclusion Criteria**:
  - All COVID-19 positive adults admitted to the medical ICU and followed by the academic rounding team
- **Statistical Plan**:
  - Descriptive statistics were used to report all outcomes

Table 1. Fluid Stewardship Definitions Classified by the ROSE Model

Rescue	Optimization	Stabilization	Evacuation
• Initiate bolus IVF NOT based on fluid responsiveness • Discontinue bolus IVF NOT based on fluid responsiveness	• Initiate bolus IVF based on fluid responsiveness • Discontinue bolus IVF based on fluid responsiveness • Recommend to assess volume responsiveness • Initiate albumin • Discontinue albumin • Change albumin concentration • Change type of bolus IVF • Change the fluid that bicarbonate is diluted in • Add stop date/time for bolus IVF • Concentrate infusions of sodium bicarbonate, vasopressors, or antibiotics	• Initiate maintenance IVF • Discontinue maintenance IVF • Initiate enteral water • Discontinue enteral water • Change type of maintenance IVF • Convert maintenance IVF to enteral fluid or oral diet • Initiate parenteral nutrition • Discontinue parenteral nutrition • Convert parenteral nutrition to enteral route • Adjust dose of enteral fluid • Adjust dose of maintenance IVF • Adjust volume of parenteral nutrition • Add stop date/time for maintenance IVF • Convert route of medication from IV to non-IV route (direct or indirect)	• Initiate diuretic (loop or thiazide; NOT spironolactone) • Discontinue diuretic (loop or thiazide; NOT spironolactone) • Adjust dose of diuretic (loop or thiazide; NOT spironolactone) • Adjust timing of diuretic administration (loop or thiazide; NOT spironolactone) • Initiate spironolactone (ONLY if cirrhosis/liver disease/ascites) • Discontinue spironolactone (ONLY if cirrhosis/liver disease/ascites) • Adjust dose of spironolactone (ONLY if cirrhosis/liver disease/ascites)

RESULTS

Figure 1. Recommendations Categorized by the ROSE Model



RESULTS CONTINUED

Table 2. Most Common Recommendations Made	
Rescue	
Initiate bolus IVF NOT based on fluid responsiveness	11
Optimization	
Recommend to assess volume responsiveness	4
Stabilization	
Convert route of medication from IV to non-IV route	59
Adjust dose of enteral fluid	16
Discontinue maintenance IVF	14
Initiate enteral water	8
Evacuation	
Initiate diuretic (loop or thiazide; NOT spironolactone)	8

CONCLUSIONS

- Of all pharmacy recommendations in critically ill COVID-19 positive patients, 13.2% were related to fluid stewardship
- The majority of recommendations (68.4%) fell into the stabilization phase
- It is suggested that COVID-19 patients with ARDS benefit from conservatively managed IVFs
- However, dehydration in these patients can also lead to poor outcomes
- Pharmacists have an important role to play in regard to fluid stewardship in COVID-19 positive patients
- The limitations of this study include the single-center design and lack of comparator group

Future research should compare FS recommendations in critically ill patients with and without COVID-19

REFERENCES

Hawkins, W. A., Smith, S. E., Newsome, A. S., Carr, J. R., Bland, C. M., & Branan, T. N. (2019). Fluid Stewardship During Critical Illness: A Call to Action. Journal of Pharmacy Practice. https://doi.org/10.1177/0897190019853979.

Characterization of Loading Dose Strategies for Phenytoin/Fosphenytoin in Obese Patients at an Academic Medical Center

Rachel Shelley, Pharm.D. Candidate[1,2], Latia Jones, Pharm.D. Candidate[2], Amanda Sweat, Pharm.D. Candidate[2], Lindsey Sellers Coppiano, Pharm.D., BCCCP[1], Kelli Keats, Pharm.D., MPA[1,2]
[1]AU Medical Center, Department of Pharmacy, Augusta, Georgia
[2]University of Georgia College of Pharmacy, Augusta, Georgia

INTRODUCTION

- Fosphenytoin is recommended as an urgent control therapy for management of status epilepticus.[1]
- The Neurocritical Care Society Guidelines for management of status epilepticus recommend a 20mg PE/kg fosphenytoin or 20 mg/kg phenytoin loading dose, however the ideal dosing strategy in patients at extremes of body weight is unknown.[1]
- A small pharmacokinetic study found that patients greater than 120% of their ideal body weight (IBW) have a higher phenytoin volume of distribution (Vd) and half-life and recommended capping fosphenytoin/phenytoin loading doses at 2000mg.[2]
- At our institution, providers use their discretion when selecting which weight to use (actual versus adjusted body weight) for fosphenytoin/phenytoin loading doses, and there is no dose capping protocol.

OBJECTIVES

1) To characterize fosphenytoin/phenytoin loading dose strategies in overweight patients at an academic medical center
2) To describe prevalence of fosphenytoin/phenytoin dose capping of 2000mg

METHODS

- **Design:** This was a single-site, retrospective chart review of overweight patients admitted to Augusta University Medical Center (AUMC) between January 2005 and December 2020 who received a loading dose of fosphenytoin or phenytoin and compared those who received a loading dose of 20mg/kg based on actual body weight (ABW) to those who received a 20mg/kg loading dose based on adjusted body weight (AdjBW).
- **Inclusion Criteria:** Patients were included if they received a loading dose of fosphenytoin or phenytoin of at least 10mg/kg based on ABW, were ≥18 years old, and had an ABW >120% of their IBW.
- **Exclusion Criteria:** Patients were excluded if they were taking phenytoin prior to loading dose, had no phenytoin level obtained within 6 hours of dose, or received intramuscular (IM) phenytoin.
- **Data Collected:** Demographic data included age, sex, actual body weight, height, date of dose, drug, and dose.

RESULTS

Table I. Demographic Information

Demographics	ABW cohort (n=66)	AdjBW cohort (n=152)	p-value
Age, years – mean (SD)	61.3 (15.5)	55.2 (17)	0.01
Sex, male – n (%)	27 (40.9)	64 (42.1)	0.87
Height, cm – mean (SD)	165.6 (11.4)	168.2 (9.3)	0.08
Actual Body Weight, kg – mean (SD)	90.8 (17.1)	95.9 (19.4)	0.07
BMI, kg/m^2 – mean (SD)	33.2 (6.2)	33.9 (6.7)	0.44

ABW = actual body weight, AdjBW = adjusted body weight, BMI = body mass index, SD = standard deviation

Table II. Dosing Characteristics

	ABW cohort (n=66)	AdjBW cohort (n=152)	p-value
Dose, mg/kg - mean (SD)	19.3 (1.2)	14 (1.9)	<0.001
Drug – n (%) Fosphenytoin Phenytoin	 59 (89.4) 7 (10.6)	 119 (78.3) 33 (21.7)	0.05
Loading Dose, mg – mean (SD)	1744 (302.8)	1335 (298.6)	<0.001
Eligible for dose >2000mg based on ABW – n (%)	19 (28.8)	47 (30.9)	0.75
Received dose >2000mg – n (%)	7 (10.6)	0 (0)	<0.001

ABW = actual body weight, AdjBW = adjusted body weight, SD = standard deviation

Figure I. Distribution of Weight-Based Doses Using ABW

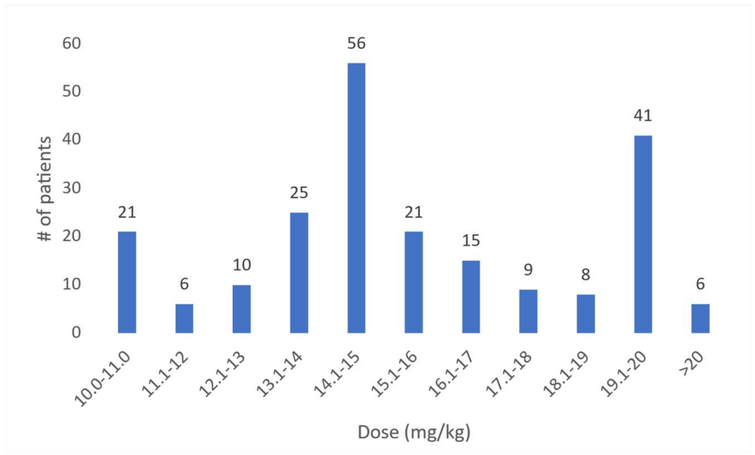
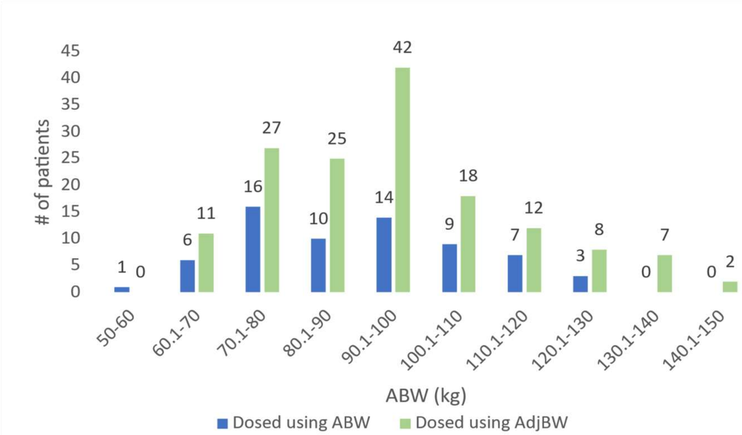


Figure II. Dosing Scheme by Weight



ABW = actual body weight, AdjBW = adjusted body weight

CONCLUSIONS

- Patients >120% of their IBW who received loading doses of fosphenytoin/phenytoin were more likely to be dosed based on adjusted body weight (AdjBW) than ABW.
- Patients dosed based on ABW received higher doses in both milligrams and milligrams/kilogram.
- A high number of patients were eligible for a dose exceeding 2000mg based on a 20mg/kg loading dose using their actual body weight (n=66, 30.3%); however, few patients received a dose above 2000mg (n=7, 3.2%).
- Providers at our institution tend to utilize AdjBW for calculation of loading doses of fosphenytoin/phenytoin. Further research is needed to address the efficacy and safety of this approach.

DISCLOSURES

The 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: Rachel Shelley, Latia Jones, Amanda Sweat, Lindsey Sellers Coppiano, Kelli Keats: Nothing to Disclose

REFERENCES

1. Brophy GM, et al. *Neurocrit Care*. 2012;17:3–23.
2. Abernethy D, Greenblatt D. *Arch Neurol*. 1985;42:468–4.

Evaluation of Hypoglycemia Causes and Treatment at a Community Hospital

Kristina Carbone, PharmD Candidate; Sarah Murphy, PharmD, BCPS

Mercer University College of Pharmacy, Atlanta, Georgia; Northside Hospital Atlanta, Georgia

INTRODUCTION

- Hypoglycemia: dangerously low blood glucose levels < 70 mg/dL requiring action, such as administration of glucose, to raise the blood glucose levels to target range
- Serious concern and severe adverse drug event for hospitalized patients due to life-threatening potential
- Complications: falls, confusion, injuries, seizures, coma, death
- Seeking to analyze hypoglycemic episodes to determine most common causes of hypoglycemia, assess treatment, and identify areas for improvement
- Assess amending hypoglycemia protocol to improve patient outcomes by decreasing occurrence of the adverse event of hypoglycemia.

PURPOSE

- To evaluate what types of insulin most often cause hypoglycemia at Northside Hospital
- To determine appropriateness of blood glucose monitoring and its effect on hypoglycemia
- To determine the appropriateness of Northside's treatment protocol for hypoglycemia

METHODS

- **Study design**: Retrospective Chart Review from January 2020 – December 2020
- **Sample Size:** 120 patients

Inclusion Criteria	Exclusion Criteria
• Patients ≥18 years of age • Experienced hypoglycemic event defined as blood glucose < 70 mg/dL	• Obstetrical patients • Patients < 18 years of age

RESULTS

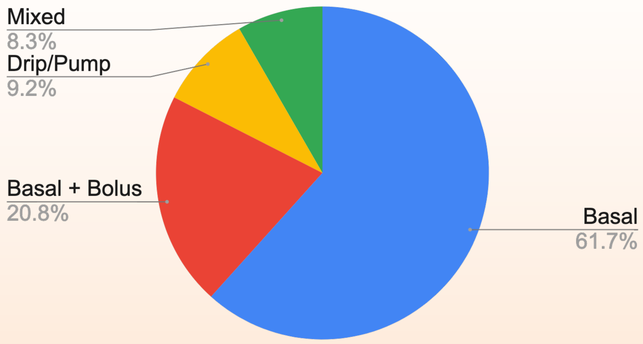
Insulin Timing Events	Time
Median Time from Basal Dose to Hypoglycemia	9 hours and 54 minutes

Treatment Timing Events	Result
Average Time from Hypoglycemic Event to Treatment	14 minutes
Average Time of Glucose Rechecks	25 minutes

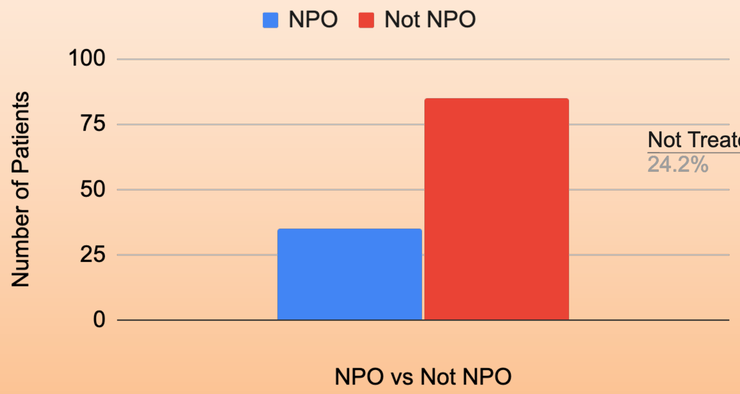
Blood Glucose Levels:

Low: 13 mg/dL	Median:59 mg/dL	High: 69 mg/dL

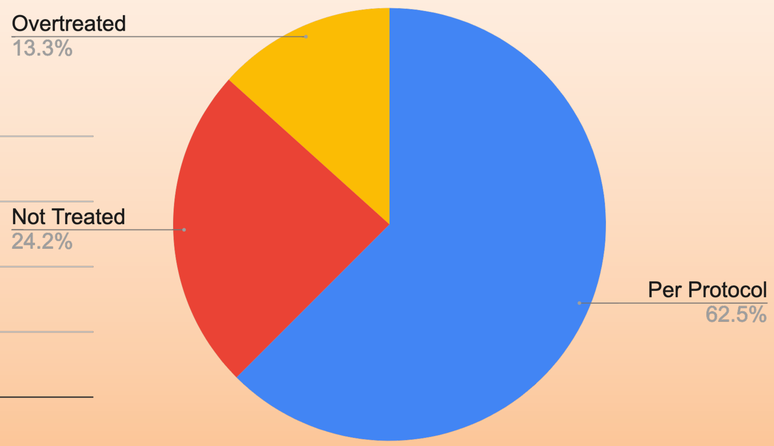
Insulin Breakdown



Feeding Status



Percentage of Patients Treated Per Protocol



CONCLUSION

- Most common causes of hypoglycemia were long-acting basal insulin and minimal feeding (NPO or low food intake <50%)
- Only 19.2% of events include blood glucose <50 mg/dL.
- Most hypoglycemic events occur ~10 hours from last basal insulin dose to hypoglycemia.
- 24.2% of patients have not been treated per protocol due to not receiving any treatment for their hypoglycemic event.
- On average, patients receive treatment and glucose rechecks within an appropriate time of ~15 minutes.
- Consider more frequent blood glucose checks (ACHS & 3AM) to prevent morning hypoglycemia.

REFERENCES

1. Classen DC, Jaser L, Budnitz DS. Adverse drug events among hospitalized Medicare patients: epidemiology and national estimates from a new approach to surveillance. Jt Comm J Qual Patient Saf. 2010;36:12-21
2. Hellman R. A systems approach to reducing errors in insulin therapy in the inpatient setting. Endocr Pract. 2004;10(suppl 2):100-108
3. Hypoglycemia (Low Blood Glucose) | ADA. Diabetes.org. https://www.diabetes.org/diabetes/medication-management/blood-glucose-testing-and-control/hypoglycemia. Published 2020. Accessed August 10, 2020.
4. Milligan P, Bocox M, Pratt E, Hoehner C, Krettek J, Dunagan W. Multifaceted approach to reducing occurrence of severe hypoglycemia in a large healthcare system. *American Journal of Health-System Pharmacy*. 2015;72(19):1631-1641. doi:10.2146/ajhp150077
5. Sinha Gregory, N., Seley, J., Ukena, J., Shah, S., Fred, M., Dargar, S., Mauer, E. and Kim, R., 2017. Decreased Rates of Inpatient Hypoglycemia Following Implementation of an Automated Tool in the Electronic Medical Record for Identifying Root Causes. *Journal of Diabetes Science and Technology*, 12(1), pp.63-68.
6. Smith W, Winterstein A, Johns T, Rosenberg E, Sauer B. Causes of hyperglycemia and hypoglycemia in adult inpatients. *American Journal of Health-System Pharmacy*. 2005;62(7):714-719. doi:10.1093/ajhp/62.7.714

Predictability of social determinants of health on linkage to and receipt of HIV care

Kennedy Crosby PharmD, Candidate, Kenric B. Ware PharmD, MBA, AAHIVP
Presbyterian College School of Pharmacy - Clinton, South Carolina
South University School of Pharmacy - Columbia, South Carolina

Background

- New human immunodeficiency virus (HIV) diagnoses are associated with both challenges for the patient and expectations of the provider.
- Per the Center for Disease Control's 2015 guidelines on HIV Infection Detection, Counseling, and Referral, patients with a new HIV diagnosis "should be linked promptly to a health-care provider or facility experienced in caring for patients with HIV" and informed of the importance in initiating medical care.[1]
- In an effort to standardize HIV data collection amongst service providers and institutions, the U.S. Department of Health and Human Services developed an implementation guidance to outline a set of uniform standards. The DHHS emphasized the importance of using this data to identify, understand, and monitor progress in reducing racial and ethnic health disparities.[2]
- The Centers for Disease Control and Prevention (CDC) defines health disparities as "differences in the incidence, prevalence, and mortality of a disease and the related adverse health conditions that exist among specific population groups. These groups may be characterized by gender, age, race or ethnicity, education, income, social class, disability, geographic location, or sexual orientation."[3]
- Although minimization is the goal, these disparities have and continue to produce substantial, quantifiable differences in both the linkage to and receipt of care following a new HIV diagnosis.

Objectives

- The primary objective was to assess the impact of the pre-described social determinants of health on linkage to HIV care.
- The secondary objective was to assess the impact of the pre-described social determinants of health on subsequent receipt of HIV care.

Methods

- Data for all variables were collected retrospectively from 2018 AIDSVu depictions, described as an "interactive online mapping tool that visualizes the impact of the HIV epidemic on communities across the United States."[3]
- States were excluded from AIDSVu linkage to care analysis due to incomplete data reporting to the CDC. These states were subsequently excluded from this study's receipt of care analysis. Criteria for completeness included:
  - The jurisdiction has laws/regulations requiring all CD4 and viral load tests to be reported to the state or local health department.
  - Laboratories that perform HIV testing for the jurisdiction reported at least 95% of all HIV related test results to the state or local health department.
  - The state reported at least 95% of all CD4 and viral load tests to the CDC.
- Of the 11 social determinants of health determined by the CDC and reported by AIDSVu, the six were chosen based on a greater perceived connection to HIV care considerations and favorable arrangements to perform statistical analysis. These six included: percent uninsured, median household income, percent living in poverty percent high school education, percent unemployed, and percent living with food insecurity.
- Multivariate linear regression was used to determine the predictability of the described social determinants, both individually and collectively, on the primary and secondary outcome.
- Statistical significance was set at a p value < 0.05.

Results

Nine states were excluded from AIDSVu linkage to care analysis. These states were: Arizona, Arkansas, Connecticut, Idaho, Kansas, Kentucky, New Jersey, Pennsylvania, and Vermont. The map pictured to the left exhibits the geographic distribution of those states.

Linkage to Care

Descriptive Statistics

	Mean	Std. Deviation	N
Linkage to Care Percentage	82.5238	6.58249	42
Percent Uninsured	9.6833	3.72349	42
Median Household Income	62235.1429	10477.1364	42
Percent Living in Poverty	12.9071	2.8369	42
Percent High School Education	89.2357	2.89658	42
Percent Unemployed	3.8048	0.85965	42
Percent Living with Food Insecurity	11.6405	2.30239	42

ANOVA

	Sum of Squares	Mean Square	Sig.
Regression	584.043	97.34	0.023
Residual	1192.453	34.07	
Total	1776.496		

Coefficients*

	Beta Coefficient	Sig.	95% CI
Constant	91.757	0.166	(-39.784, 223.297)
Percent Uninsured	-0.421	0.186	(-1.053, 0.212)
Median Household Income	0	0.196	(-0.001, 0.000)
Percent Living in Poverty	-0.524	0.563	(-2.347, 1.299)
Percent High School Education	0.296	0.588	(-0.803, 1.394)
Percent Unemployed	2.417	0.156	(-0.966, 5.800)
Percent Living with Food Insecurity	-1.519	0.088	(-3.275, 0.236)

*The Beta coefficient is a statistical measure of the strength of the relationship between two variables. Positive coefficient values indicate that for every 1 unit/percentage change in independent variable, the social determinant of health, there was an increase in the dependent variable, linkage to care. Negative coefficient values indicate that for every 1 unit/percentage change in the independent variable, the social determinant of health, there was a decrease in the dependent variable.

Receipt of Care

Descriptive Statistics

	Mean	Std. Deviation	N
Receipt of Care Percentage	78.4524	5.85513	42
Percent Uninsured	9.6833	3.72349	42
Median Household Income	62235.1429	10477.1364	42
Percent Living in Poverty	12.9071	2.8369	42
Percent High School Education	89.2357	2.89658	42
Percent Unemployed	3.8048	0.85965	42
Percent Living with Food Insecurity	11.6405	2.30239	42

ANOVA

	Sum of Squares	Mean Square	Sig.
Regression	484.538	80.756	0.016
Residual	921.047	26.316	
Total	1405.585		

Coefficients*

	Beta Coefficient	Sig.	95% CI
Constant	83.322	0.152	(-32.284, 198.928)
Percent Uninsured	-0.12	0.664	(-0.676, 0.436)
Median Household Income	-0.001	0.005	(-0.001, 0.000)
Percent Living in Poverty	-1.159	0.151	(-2.761, 0.443)
Percent High School Education	0.499	0.301	(-0.466, 1.465)
Percent Unemployed	3.136	0.039	(0.163, 6.109)
Percent Living with Food Insecurity	-1.1	0.157	(-2.643, 0.443)

*The Beta coefficient is a statistical measure of the strength of the relationship between two variables. Positive coefficient values indicate that for every 1 unit/percentage change in independent variable, the social determinant of health, there was an increase in the dependent variable, linkage to care. Negative coefficient values indicate that for every 1 unit/percentage change in the independent variable, the social determinant of health, there was a decrease in the dependent variable.

Discussion

- Various factors impact patients' linkage and receipt of HIV care.
- Social determinants of health have been independently implicated in patients' abilities to access important health care functions.
- In this study, it was shown that the six social determinants of health identified were collectively predictive of both linkage and receipt of HIV care.
- However, median household income (p = 0.005) and percent unemployed (p = 0.039) were individually predictive of receipt of HIV care.
- There figures to be substantial overlap between median household income and percent unemployment considerations.
- Therefore, there are numerous public and private income-based programs that facilitate receipt of HIV care for patients with financial insecurities.
- The availability of these resources at little to no cost to patients may help to explain the significant relationship observed between less financial freedom and greater receipt of HIV care.

Limitations

- Identification of the six social determinants of health for analyses in this project was not performed based upon guidance from the literature or in a randomized fashion. Therefore, selection bias may have impacted the generated results.
- The data displayed centered on one point in time, 2018, being cross-sectional in nature. As trends in HIV care and health care in general remain fluid, the results produced here would need to be revisited on an ongoing basis.
- Explanations of how the social determinants of health populated by AIDSVu were calculated are not readily accessible. An inability to determine this information may impact any abilities to reproduce this study evaluation using a different database source.
- Linkage to HIV care and Receipt of HIV care may be captured as a single reporting item among some health service organizations, limiting the utility of the findings shown here to impacting daily therapeutic care considerations.

Conclusions

- Relationships between social determinants of health and linkage to along with receipt of HIV care may be substantial.
- Certain social determinants of health might be more indicative of HIV care considerations.
- Pharmacists and pharmacy students have the training and expertise to advocate for persons living with HIV to have improved access to the healthcare system with an emphasis on retention in care to foster optimal health outcomes.

References

1. HIV Infection: Detection, Counseling, and Referral - 2015 STD Treatment Guidelines. Centers for Disease Control and Prevention. https://www.cdc.gov/std/tg2015/hiv.htm. Published June 4, 2015. Accessed April 9, 2021.
2. Implementation Guidance on Data Collection Standards for Race, Ethnicity, Sex, Primary Language, and Disability Status. U.S. Department of Health and Human Services. https://aspe.hhs.gov/basic-report/hhs-implementation-guidance-data-collection-standards-race-ethnicity-sex-primary-language-and-disability-status. Published October 31, 2011. Accessed April 9, 2021.
3. AIDSVu. https://aidsvu.org/. Published December 9, 2020. Accessed April 9, 2021.

Disclosures

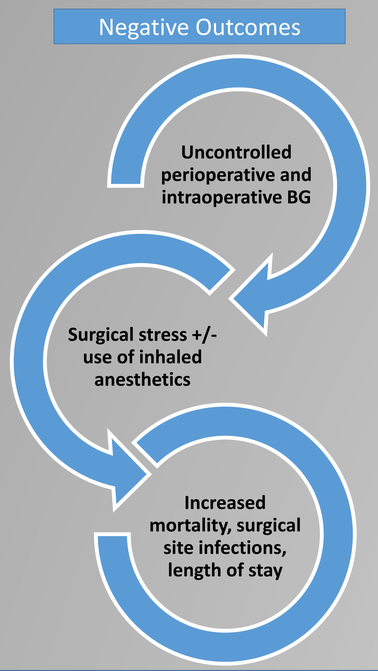
Authors of this presentation have the following to disclose concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation.
-Kennedy Crosby: Nothing to disclose
-Kenric B. Ware: Nothing to disclose

DEVELOPMENT AND IMPLEMENTATION OF A PERIOPERATIVE AND INTRAOPERATIVE GLYCEMIC MANAGEMENT PROTOCOL IN A COMMUNITY HOSPITAL

Kevin Hsieh, Pharm.D.; Sarah Murphy, Pharm.D.; BCPS Megan Freeman, Pharm.D., BCPS; Amy Noonkester, Pharm.D.; Mary Beth Marandola-Kenvin, Pharm.D.
Northside Hospital Department of Pharmaceutical Services

NORTHSIDE HOSPITAL

BACKGROUND



- Poor glycemic management in perioperative and intraoperative surgical phases has been reported in 20 – 40% of patients undergoing general surgery
- Results in increased mortality, rates of infection and length of stay
- Guidelines recommend maintaining blood glucose (BG) between 140 – 180 mg/dL in the perioperative and intraoperative phases of care

OBJECTIVE

- Determine prevalence of perioperative hyper- and hypoglycemia
- Development of a standardized process for glycemic management in the perioperative setting

METHODS

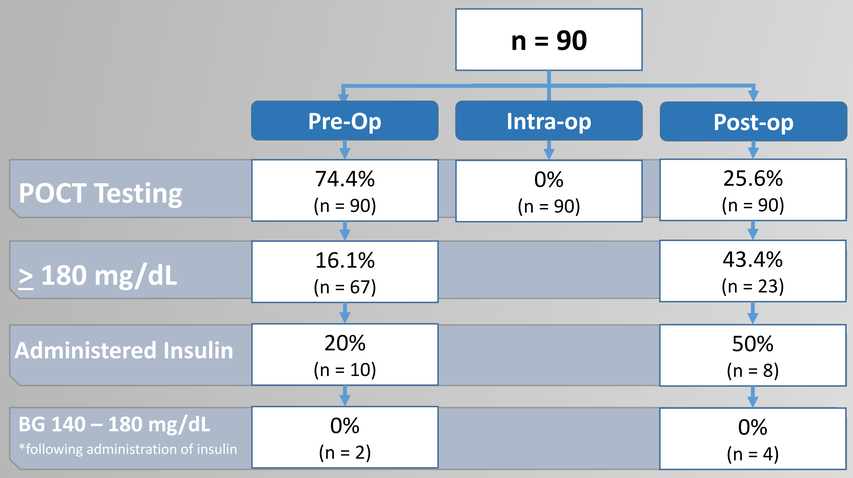
- Retrospective chart review of 90 adult patients diagnosed with diabetes undergoing surgical procedure and 40 adult patients identified by insulin administration in perioperative setting between July 2019 – July 2021
- Analyzed perioperative and intraoperative BG levels for each group
  - Determine if point of care BG testing (POCT) was performed throughout surgical phases of care
  - Incidence of BG ≥ 180 mg/dL
  - Insulin administration (dosage and timing of administration)
  - Incidence of patients who met glycemic target of 140 – 180 mg/dL following insulin administration

DISCUSSION

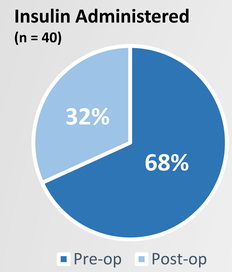
- Data evaluation demonstrates several areas where perioperative and intraoperative BG management can be improved
- Areas for improvement include
  - Identification of candidates for regular BG monitoring
  - Optimizing BG monitoring and follow-up
  - Standardization of insulin dosing strategies
  - Guidance for insulin product selection
- Implement a new order set to optimize perioperative glycemic monitoring and insulin administration

RESULTS

Patients with Diabetes Diagnosis



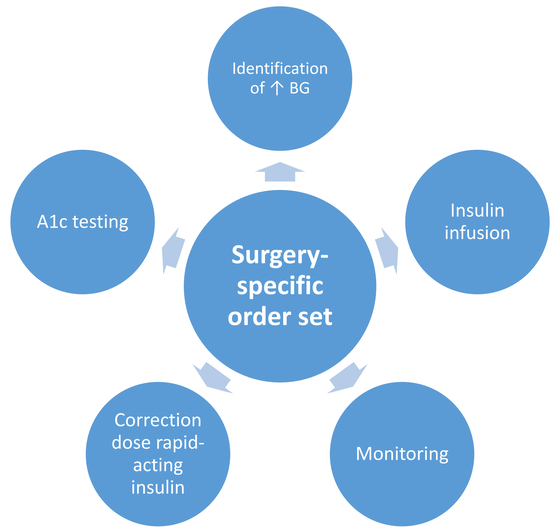
Patients Administered Insulin



Blood Glucose Results	Pre-op (n = 40)	Post-op (n = 40)
Median BG (mg/dL)	281	235
Pretreatment BG ≥ 180 mg/dL	90%	87.5%
Post-treatment at goal (after insulin administration)	0%	7.5%

NEXT STEPS

- New order set to include
  - Surgery-specific blood glucose monitoring frequencies
  - Updated correction dose insulin parameters
  - Insulin infusion parameters
  - A1c testing for patients who meet appropriate criteria
- Implementation of BG testing on every patient undergoing surgical procedure
- Identification of undiagnosed/pre-diabetic patients
- Guidance for selection of correctional dose insulin based on patient-specific factors
- Post-implementation evaluation to assess effectiveness of interventions



Implementation of an Oral Amoxicillin Challenge Program for Medical ICU Patients to De-Label Unnecessary Penicillin Allergies

Kelli R. Keats, PharmD, MPA[1,2], Christy C. Forehand, PharmD, BCCCP[1,2]

[1]AU Medical Center, Department of Pharmacy, Augusta, Georgia

[2]University of Georgia College of Pharmacy, Augusta, Georgia

INTRODUCTION

- Approximately 8-15% of the U.S. population has a reported penicillin (PCN) allergy; however, less than 5% of these patients can be verified as having a true allergy upon re-challenge[1]
- Patients with reported penicillin allergies have increased usage of vancomycin, clindamycin, and fluoroquinolones as well as have increased rates of resistant infections, including methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant enterococcus (VRE), and *Clostridioides difficile*[2,3,4]
- Patients with reported PCN allergies also have prolonged hospital length of stay and increased readmission rates compared to those without a PCN allergy[2,4,5]
- A direct oral amoxicillin challenge in an intensive care unit is effective in removing unnecessary penicillin allergies and does not cause undue burden on healthcare providers[6]

OBJECTIVES

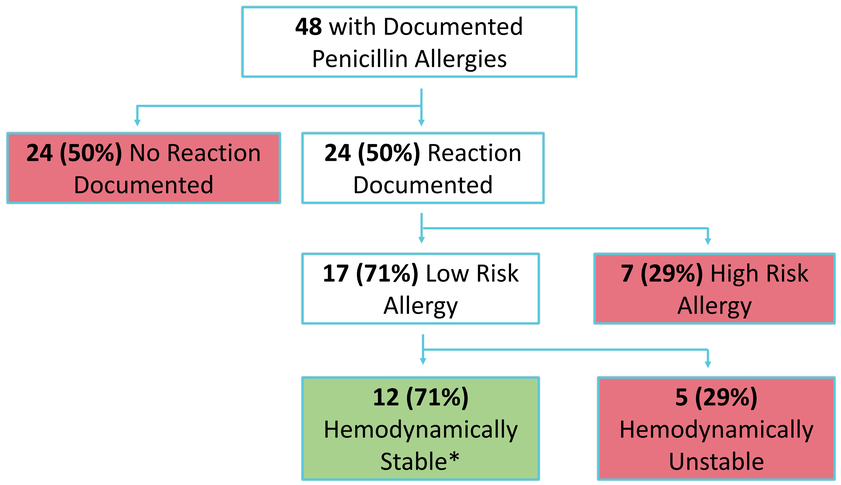
1) To conduct a retrospective review of patients admitted to the medical intensive care unit (MICU) with reported penicillin allergies and determine how many patients would be eligible for an oral amoxicillin challenge based on hemodynamic stability and a history of a low-risk allergy to a penicillin antibiotic
2) To institute an oral amoxicillin challenge program for MICU patients with low-risk penicillin allergies to de-label unnecessary allergies and improve patient outcomes as a multidisciplinary project with support from Infectious Disease, Allergy & Immunology, and Pulmonary physician colleagues

METHODS

- **Design:** A single-site retrospective chart review was conducted of patients admitted to the MICU from April 2020 – July 2020 to determine how many would be eligible for the amoxicillin challenge program
- **Inclusion Criteria:** Patients were included if they were admitted to the MICU with a reported PCN allergy
- **Exclusion Criteria:** None
- **Data Collected:** Hemodynamic stability, allergic reaction, if the patient received penicillins, carbapenems, and/or cephalosporin antibiotics after original documentation of PCN allergy

RETROSPECTIVE REVIEW

Figure I. Flowchart of Patients Included in Retrospective Review

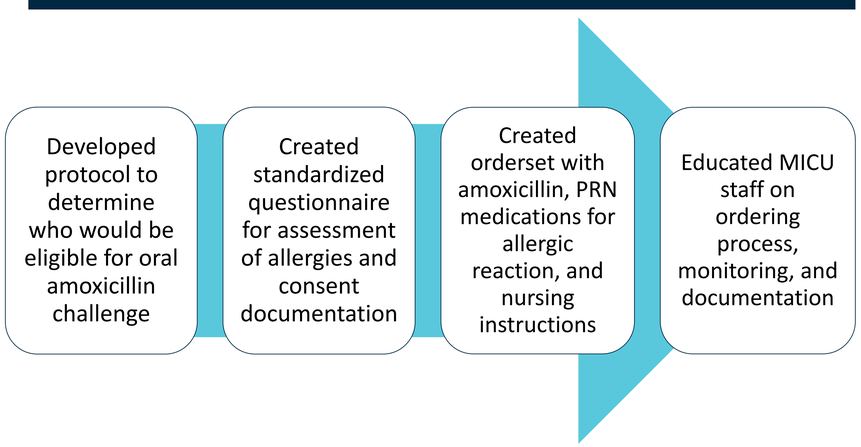


*Mean Arterial Pressure (MAP) >65 and not on vasopressor therapy

Table I. Low vs. High-Risk Allergic Reactions

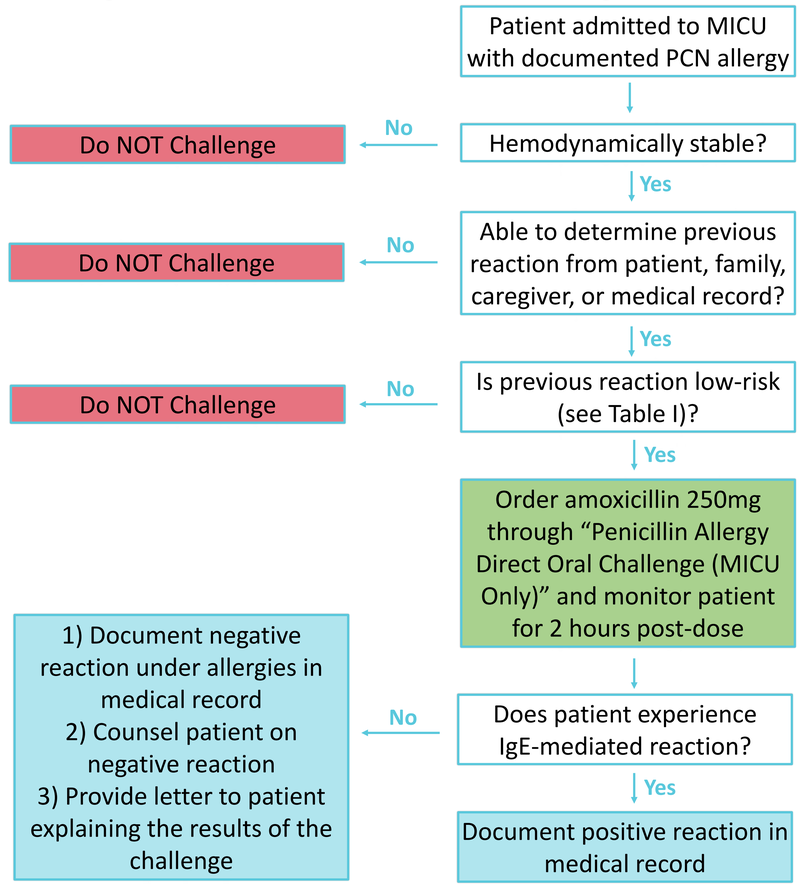
Low-Risk Allergy	High-Risk Allergy
Non-severe rash at any time point	Angioedema
Rash with urticaria > 5 years ago	Anaphylaxis
Gastrointestinal symptoms	Swelling of the throat or face
Remote childhood reaction	Shortness of breath
Family history of PCN allergy	Shock/Loss of consciousness
Non-allergic symptoms	Serum sickness
Thrush	Toxic epidermal necrolysis (TEN) or Stephens-Johnson syndrome (SJS)
	Acute generalized exanthematous pustulosis (AGEP)

PILOT PROGRAM DEVELOPMENT



AMOXICILLIN CHALLENGE PROTOCOL

Figure II. AU Medical Center Amoxicillin Challenge Protocol



CONCLUSIONS

- At least 36 patients/year would be eligible for an oral amoxicillin challenge in the MICU based on allergy risk/stability
- Oral amoxicillin challenge program is live in the MICU at AU Medical Center and is actively recruiting patients
- Follow-up assessment of this program will be conducted in spring of 2021 with a possible expansion to other inpatient settings

DISCLOSURES

The 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:

Kelli Keats, Christy Forehand: Nothing to Disclose

REFERENCES

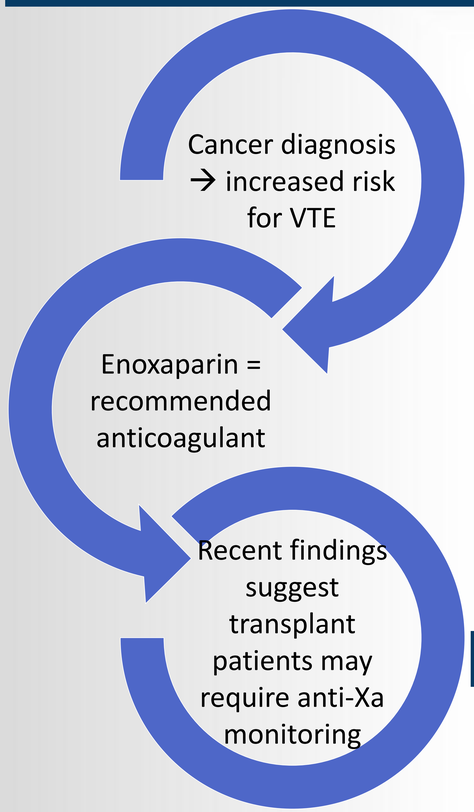
1. Trubiano J, et al. *JAMA* 2017;318:82-83
2. Macy E, et al. *J Allergy Clin Immunol* 2014;133:790-796
3. Jeffres MN, et al. *J Allergy Clin Immunol* 2016;137:1148-1153
4. Blumenthal KG, et al. *BMJ* 2018;261:k2400-k2400
5. MacFadden DR, et al. *Clin Infect Dis* 2016;63:904-910
6. Stone CA, et al. *Am J of Respir and Crit Care Medicine* 2020; 201(12):1572-1575

Evaluating Anticoagulation From Low Molecular Weight Heparin In Hematopoietic Stem Cell Transplant Recipients

Kelli Travis, PharmD; Justin LaPorte, PharmD, BCOP; Sarah Murphy, PharmD, BCPS
Northside Hospital Department of Pharmaceutical Services

NORTHSIDE HOSPITAL

BACKGROUND



- Appropriate dosing of therapeutic anticoagulation for patients undergoing hematopoietic stem cell transplants (HSCT) remains uncertain.
- Enoxaparin is drug of choice to treat venous thromboembolism (VTE) diagnosed in oncology patients.
  - Activity is monitored by anti-Xa levels
  - Typically, linear and predictable pharmacokinetics, not requiring monitoring in most patients

A recent study, found that 67% of solid organ transplant recipients receiving enoxaparin had supratherapeutic anti-Xa[1]

→ May be a patient population that requires anti-Xa monitoring

→ Proposed a theoretical drug-drug interaction between enoxaparin & tacrolimus

OBJECTIVE

- Identify anti-factor Xa level trends in patients receiving therapeutic doses of enoxaparin who have received a hematopoietic stem cell transplant.

METHODS

- Monitor anti-Xa levels for HSCT recipients and patients with a leukemia or lymphoma diagnosis who are receiving enoxaparin for a therapeutic indication from December 2020 to April 2021.
- Therapeutic anti-Xa ranges and enoxaparin dose adjustments are based on standard adjustments adapted from Nutescu et al. and Ng, V.[2,3]
- Peak levels drawn 4 hours after subcutaneous doses at steady state conditions will be drawn to adjust enoxaparin doses.
- Review data to determine how many patients have supratheraeptuic anti-Xa levels on 1 mg/kg dosing.
- Examine patients requiring < 1 mg/kg of enoxaparin to achieve therapeutic levels in order to determine what factors may be contributing to unconventional dosing.

Nomogram for Monitoring Enoxaparin – <u>1mg/kg every 12 hours dosing</u>
(Peak Therapeutic Range: 0.6 – 1.0 IU/mL)

Peak Anti-Xa Level (IU/mL)	Hold Next Dose	Dose Change	Repeat Anti-Xa Level
< 0.35	No	↑ by 25%	4 hours after 3rd dose
0.35 – 0.59	No	↑ by 10%	4 hours after 3rd dose
0.6 – 1.0	No	No change	Next day, then 1 week, then monthly
1.1 – 1.5	No	↓ by 20%	4 hours after 3rd dose
1.6 – 2.0	No	↓ by 30%	4 hours after 3rd dose
> 2.0	Until Anti-Xa level ≤ 1.0 IU/mL	↓ by 40%	Before next dose, if not < 1.0 IU/mL, then repeat every 12 hours

RESULTS

Patients who received therapeutic anticoagulation
N=14

- Supratherapeutic anti-Xa requiring dose reduction
  N=7, 50%
  → Average (mg/kg) dosing = 0.6 mg/kg
- Therapeutic anti-Xa
  N= 6, 43%
- Therapeutic anti-Xa requiring dose escalation
  N=1, 7%
  → Average (mg/kg) dosing = 1.3 mg/kg

History of HSCT
N=5, 71%
→ Treated with enoxaparin & tacrolimus n=0
BMI > 40 kg/m^2 n=1

Patient Characteristics

Characteristic	Number of patients (n, %)
History of HSCT	n=9, 64%
Allogeneic	n=6, 43%
Autologous	n=3, 21%
≤ 180 days post-HSCT	n=2, 14%
CrCl < 30 mL/min	n=0, 0%
Extremes in weight	
BMI > 40 kg/m^2	n=1, 7%
<45kg (female) or <57kg (male)	n=0, 0%

DISCUSSION

- Data supports the notion that traditional 1 mg/kg enoxaparin dosing may cause supratherapeutic anti-Xa levels in patients who have received a HSCT.
- Data collection is ongoing as more data is needed to draw any formal conclusions.

REFERENCES

[1]Singer, J. P., Huang, M.-Y., Hui, C., Blanc, P. D., Boettger, R. F., Golden, J., et al. Supratherapeutic anticoagulation from low-molecular-weight heparin in lung transplant recipients. The Journal of Heart and Lung Transplantation. 2010;29(9), 1009–1013.

[2]Nutescu EA, Spinler SA, Wittkowsky Aj, and Dager WE. Low-Molecular-Weight Heparins in Renal Impairment and Obesity: Available Evidence and Clinical Practice Recommendations Across Medical and Surgical Settings. The Annals of Pharmacotherapy. June 2009;43:1064-1083.

[3]Ng, V. L. Anticoagulation Monitoring. Clinics in Laboratory Medicine. 2009;29(2), 283–304.

Evaluation of pharmacist-driven remote patient monitoring (RPM) in a primary care setting within a community health system during COVID-19

Kristen Pierce, PharmD
Allison Presnell, PharmD, BCACP, BC-ADM
Kelsey Martin, PharmD Candidate 2021
Beth Clements, PharmD, BCACP
Ashley Woodhouse, PharmD, BCACP, CACP
Melissa Johnson, PharmD, BCACP

Background

- Remote Patient Monitoring (RPM) uses digital interfaces and interactive communication between patient and provider to optimize clinical outcomes
- RPM allows an opportunity for patient care when patients are unable to come to provider's office
- In March 2019, pharmacists gained ability to bill incident-to physician or non-physician practitioner[1]
- Supervision requirements changed from direct to general in early 2020 after the physician fee schedule aligned with the PHE (public health emergency)[2]
- When face to face patient care decreased due to the PHE, RPM services were expanded by the health system
- Pharmacists in the health system began using RPM to provide patient care in 2020

Purpose

- Evaluate the impact of utilization of pharmacists for chronic disease state management using remote patient monitoring

Methods

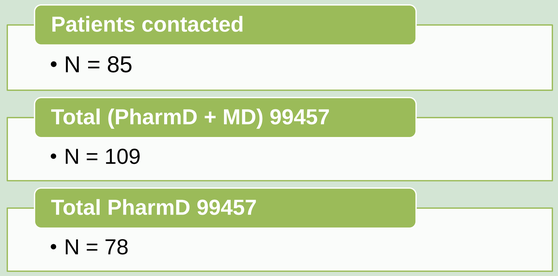
- Retrospective, observational analysis
- Subjects identified through St. Joseph's/Candler outpatient clinic software, eClinicalWorks (eCW)
- Evaluated patients at three primary care clinics from April 1 - September 30, 2020
- Inclusion criteria: Adult patients contacted for remote patient monitoring using code 99457
- Exclusion criteria: Patients not contacted for RPM
- A predetermined average reimbursement of $49.50 was assumed per each 99457 encounter
- Chart reviews were performed to evaluate disease states encountered, interventions made, and financial impact

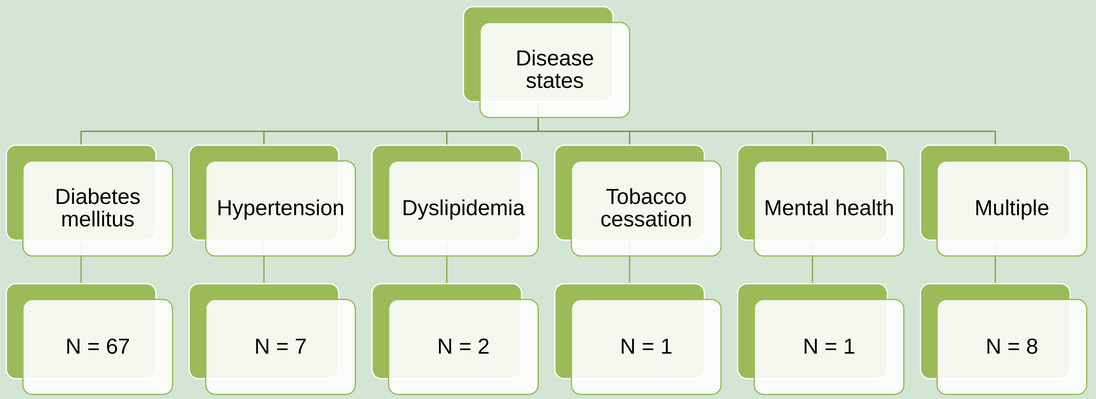
Outcomes

- Primary: Number of RPM codes (99457) billed by pharmacists and the financial effect of these encounters
- Secondary: Disease states encountered and pharmacist interventions made

Results

- 109 total RPM encounters over specified time period billed 99457
- $3,861 potential revenue generated from 109 encounters
- Total pharmacist encounters - 78
- Diabetes most common disease state encountered N=67 (86%)
- Medication initiations and dose increases were most common interventions made during pharmacist encounters (N=14,15)
- PharmD performed 78 of total encounters, MD performed 31





	Encounters	Potential average revenue
Total	109	$5,396
PharmD	78	$3,861
MD	31	$1,535

Medication intervention	Occurrence
Initiation	14
Discontinuation	12
Dose increase	15
Dose decrease	2

Discussion

- Pharmacists performed over twice as many RPM as providers
- Increased potential revenue generation as pharmacist assistance with RPM opened up physician schedule availability
- Allowed patients to be monitored despite COVID-19 pandemic
- Potential for missed revenue due to billing procedures
- Slight variance between reports generated from electronic medical record and administration

Conclusions

- Pharmacists increased revenue for the health system during PHE through RPM
- RPM billing now limited by stricter requirements requiring data transmission as of early 2021[3]
- Chronic Care Management services may be viable option moving forward

References

1. Notification of enforcement discretion for telehealth remote communications during the COVID-19 nationwide public health emergency. Department of Health & Human Services. 2020. https://www.hhs.gov/hipaa/for-professionals/special-topics/emergency-preparedness/notification-enforcement-discretion-telehealth/index.html.
2. Increased reimbursement for remote patient monitoring. (2021, January 26). Retrieved February 05, 2021, from https://telehealth.org/reimbursement-for-remote-patient-monitoring/
3. Centers for Medicare & Medicaid Services (CMS), HHS. (2020). *Final Policy, Payment, and Quality Provisions Changes to the Medicare Physician Fee Schedule for Calendar Year 2021*

Disclosures

The authors of this research have no potential conflicts of interest to disclose

Impact of transitioning IV ceftriaxone to an oral antibiotic in the treatment of urinary tract infections in the inpatient setting

Kelsey Rensing, PharmD, Emilee Robertson, PharmD, BCPS, Geneen Gibson, PharmD, BCIDP, Maggie McCarty, PharmD Candidate, Joey Crosby, PhD, RPh

Background

- Urinary tract infections account for over 6 million patient visits to physicians each year in the United States
- Intravenous (IV) antibiotics are associated with increased complications, length of stay, and cost
- Ceftriaxone is commonly prescribed empirically for the treatment of UTI in the inpatient setting
- A study by Tamma, et al found that patients with urosepsis were discharged from the hospital approximately 2 days earlier if they were transitioned to oral therapy from IV therapy
- Research showing that the conversion from ceftriaxone to an oral antibiotic is safe and effective could mean new practice protocols for pharmacy

Purpose

- To determine if the hospital length of stay was shorter as a result from a transition of antibiotic therapy from IV ceftriaxone to an oral antibiotic in adult patients with urinary tract infections

Methods

- ICD-10 codes indicating UTI diagnosis and patients initially treated with IV ceftriaxone were used to identify patients
- Patients were excluded for: Inability to receive oral therapy at 48 hours, antibiotic for a source of infection other than UTI, pregnancy, three or more organisms present in urine culture
- Length of stay, length of antibiotic treatment, positive bacterial culture, presence or urinary catheter and eligibility for existing IV to oral transition criteria were recorded

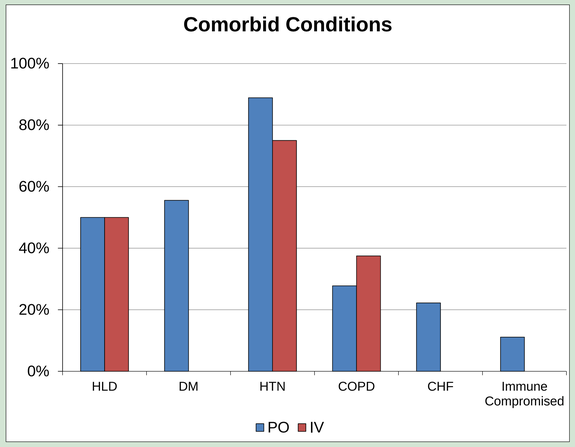
Outcomes

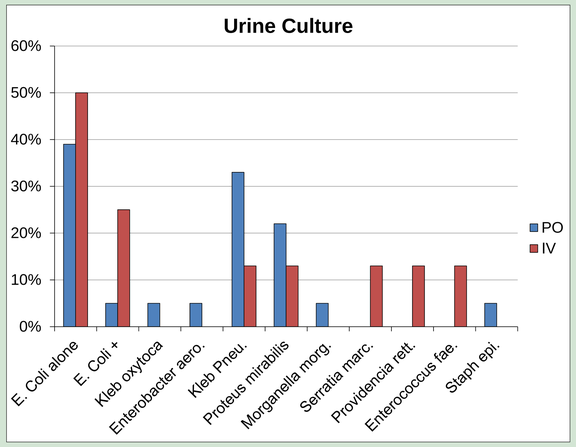
- Of the 101 patients in the report who were given intravenous ceftriaxone for a urinary tract infection over a five-year span, only 27 met our inclusion/exclusion criteria
- Out of 27 patients, 1 was transitioned from intravenous ceftriaxone to an oral antibiotic during their stay inpatient
- Of the 26 patients that remained on intravenous ceftriaxone, 18 could have been switched to an oral antibiotic therapy, possibly shortening their length of stay inpatient
- 8 patients were appropriately left on intravenous ceftriaxone due to allergies and susceptibilities

Results

Demographic	PO (n=18)	IV (n=8)	P-value
Sex (male)	33.33%	12.5%	0.269
Average Age	81	76	-
Crcl <30 mL/min	37.84%	49.31%	0.946
No Allergies	72.22%	37.5%	0.093
QTc >450 ms	38.89%	25%	0.492

Allergies	PO (n=18)	IV (n=8)
Penicillin	2	5
SMX/TMP	3	1
Ciprofloxacin	0	2
Levofloxacin	0	2
Nitrofurantoin	0	1
Cephalexin	0	1
None	13	3





Susceptibility	PO (n=18)	IV (n=8)
Pan sensitive	4	0
Ciprofloxacin	7	0
Levofloxacin	7	0
Cefazolin*	11	3
Ampicillin/Sulbactam	4	2
Nitrofurantoin	7	4
SMX/TMP	9	0
None	0	3

Resistance	PO (n=18)	IV (n=8)
Ciprofloxacin	7	8
Levofloxacin	7	8
Cefazolin	3	4
Ampicillin/Sulbactam	9	4
Nitrofurantoin	7	4
SMP/TMP	5	8
None	4	0

Discussion

- Due to this small sample size, we were unable to determine any link between length of stay and the switch from intravenous to oral antibiotics
- Different methods of finding patients who met our inclusion criteria may have been beneficial in obtaining a larger sample size
- Further studies are needed to evaluate the relationship between transitioning from intravenous to oral antibiotics for the treatment of urinary tract infections in the inpatient setting

Conclusion

- Additional studies with larger group sizes needed to evaluate any significant differences in LOS for patients transitioned to oral therapy
- Converting patients with UTI from IV to oral antibiotics is an opportunity for stewardship within our institution
- Consider using MedMined data surveillance system to capture patients by culture and ceftriaxone for future projects

References

1. Sæterdal, I. (2010). Antibiotic therapy in hospital, oral versus intravenous treatment. https://www.fhi.no/en/publ/2010/antibiotic-therapy-in-hospital-oral-versus-intravenous-treatment/
2. Kalpana Gupta, et al, International Clinical Practice Guidelines for the Treatment of Acute Uncomplicated Cystitis and Pyelonephritis in Women, Clinical Infectious Diseases, Volume 52, Issue 5, 1 March 2011, Pages e103–e120, https://doi.org/10.1093/cid/ciq257
3. Tamma PD, Conley AT, Cosgrove SE, et al. Association of 30-Day Mortality With Oral Step-Down vs Continued Intravenous Therapy in Patients Hospitalized With Enterobacteriaceae Bacteremia JAMA Intern Med. 2019;179(3):316-323. doi:10.1001/jamainternmed.2018.6226
4. Mercuro NJ, Stogsdill P, Wungwattana M. Retrospective analysis comparing oral stepdown therapy for Enterobacteriaceae bloodstream infections: fluoroquinolones versus β-lactams. Int J Antimicrob Agents. 2018;51(5):687-692. doi:10.1016/j.ijantimicag.2017.12.007PubMedGoogle ScholarCrossref

Evaluation of blood pressure following alteplase administration for acute ischemic stroke

Michael K. Long, Jr., PharmD; Betsy A. Gillenwater, PharmD; Joseph P. Morris, PharmD, BCCCP | HCA Healthcare

Introduction

- Blood pressure (BP) management plays a vital role in the management of acute ischemic stroke patients following alteplase administration
- 2019 AHA/ASA Guidelines for the Early Management of Acute Ischemic Stroke recommend a BP of < 185/110 mmHg before administration of alteplase and < 180/105 mmHg following alteplase administration[1]
- The optimal blood pressure is not known surrounding alteplase administration
- Some studies show an association between lower blood pressures and poor outcomes secondary to reduced perfusion[2,3]
- Other studies suggest that the risk of hemorrhage after administration of alteplase is greater in patients with higher blood pressures[4,5]
- On December 10, 2019 Memorial Health University Medical Center (MHUMC) implemented blood pressure goal ranges in the Stroke Thrombolytic Pre and Post Alteplase Administration order set
- The previous order set offered no guidance on low BP during antihypertensive administration

Order set
SBP < 180
DBP < 105

→ Order set update 12/10/2019 →

Order set
SBP 165-180
DBP 90-105

Objective

- Evaluate BP management after alteplase administration for acute ischemic stroke before and after the implementation of blood pressure goal ranges in the MHUMC Stroke Thrombolytic Pre and Post Alteplase Administration order set
- **Goal:** determine order set compliance, identify needs for nursing education, and investigate correlations between order set adherence and clinical outcomes

Methods

- IRB approved, single-center, prospective chart review
- Adult patients admitted to a 622-bed comprehensive stroke center from June 1, 2019 to June 30, 2020 and administered alteplase for acute ischemic stroke were included
- Patients were excluded if they were already inpatient for either alteplase administration or for code stroke activation
- Patients were also excluded if death occurred within 24 hours of alteplase administration
- Data were collected prior to the order set update and after the update to assess for order set adherence
- Data were analyzed using descriptive statistics

Results

Table 1. Patient Inclusion and Characteristics (N = 64)

Characteristics	Pre-Order Set Update (n = 33)	Post-Order Set Update (n = 31)
Age ± SD (yrs)	68 ± 15	65 ± 14
Race, n (%)		
Caucasian	21 (64)	21 (68)
African American	11 (33)	9 (29)
Other	1 (3)	1 (3)
Male, n (%)	23 (70)	21 (68)
Female, n (%)	10 (30)	10 (29)
Mean door to needle time (mins)	38	37
Mean symptom onset to treatment time (mins)	141	136
Median NIHSS		
Pre-alteplase	9	8
Post-alteplase	1	3
Mean total time in ER (hrs)	5.2	5.9
Mean total time in ER post alteplase (hrs)	3.4	4.9
Mean total time in ER post alteplase (hrs) for infusions not stopped for BP < 165/90	2.1	12.1
Symptomatic ICH, n (%)	4 (12)	3 (10)
Mean time from infusion to CT-confirmed bleed (hrs)	12.3	29.1
Patients requiring BP intervention, n (%)	17 (52)	19 (61)
Mortality, n (%)	6 (18)	2 (6)

Figure 1. Comparison of Infusions Stopped for BP < 165/90 mmHg

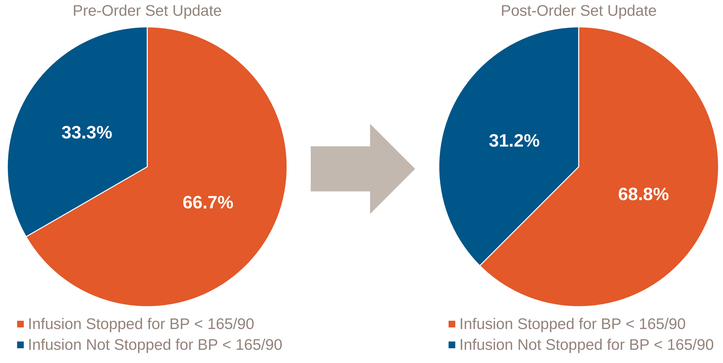


Figure 2. Opportunity for Improvement

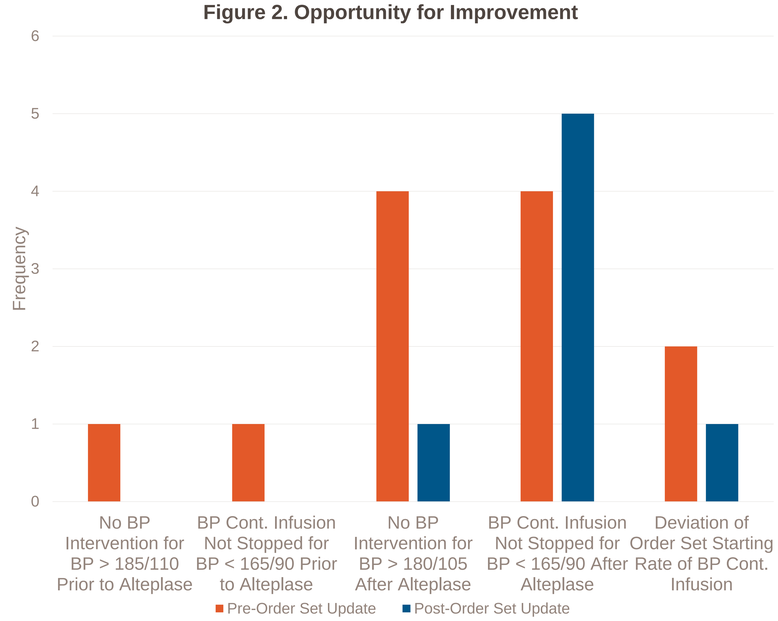


Table 2. Intervention with Blood Pressure Lowering Medications (N = 36)

Patients requiring intervention prior to alteplase administration, n (%)	**n = 19**
As needed antihypertensive	18 (50)
Continuous infusion	5 (14)
Patients requiring intervention after alteplase administration, n (%)	**n = 34**
As needed antihypertensive	16 (44)
Continuous infusion	28 (78)

Discussion & Conclusions

- Following the order set update, the initiation rate of BP management infusions based off high diastolic BP improved
- The most common deviation was not stopping infusions based off low blood pressure
- Before the order set update, 8 of 12 (66.7%) of infusions were stopped for a BP < 165/90 mmHg compared to 11 of 16 (68.8%) after the order set update
- The average time in the emergency department after alteplase infusion for those infusions that were continued for a BP of < 165/90 mmHg was 7.7 hours
- Next steps: educate on the blood pressure goal ranges within the order set that provide for guidance during antihypertensive adjustment

References

1. Powers WJ, Rabinstein AA, Ackerson T, et al. AHA/ASA Guidelines for the Early Management of Patients with Acute Ischemic Stroke: 2019 Update to the 2018 Guidelines for the Early Management of Acute Ischemic Stroke. *Stroke*. 2019;50:e344-e418.
2. Wohlfahrt P, Krajcoviechova A, Jozifova, et al. Low blood pressure during the acute period of ischemic stroke is associated with decreased survival. *J Hypertens*. 2015;33:339-345.
3. Castillo J, Leira R, García MM, et al. Blood pressure decrease during the acute phase of ischemic stroke is associated with brain injury and poor stroke outcome. *Stroke*. 2004;35:520-526.
4. Butcher K, Christensen S, Parsons M, et al; for the EPITHET Investigators. Postthrombolysis blood pressure elevation is associated with hemorrhagic transformation. *Stroke*. 2010;41:72-77.
5. Perini F, De Boni A, Marcon M, et al. Systolic blood pressure contributes to intracerebral hemorrhage after thrombolysis for ischemic stroke. *J Neurol Sci*. 2010;297:52-54.

Disclosures: The authors have nothing to disclose.

This research was supported (in whole or in part) by HCA Healthcare and/or an HCA Healthcare affiliated entity. The views expressed in this publication represent those of the author(s) and do not necessarily represent the official views of HCA Healthcare or any of its affiliated entities.

Impact of Pharmacist Integration in a Primary Care Setting on Transitional Care Management Outcomes

Mackenzi Meier, PharmD;
Grace Simpson, PharmD, BCACP
Savannah Eason, PharmD Candidate 2021
Chelsea Keedy, PharmD, BCACP

Background

- Transitions of care is defined as the movement of a patient from one setting to another[1]
- Transitional Care Management (TCM) services address the period of time between the inpatient and outpatient settings
- Requirements to bill for TCM services include a clinical staff member attempting to make contact with patient within two business days of discharge, an office visit with within 14 days of discharge, medication reconciliation, patient education, and lab orders/referrals as needed[2]
- CPT codes used for TCM services
  1. 99495 – moderate medical complexity requiring a face-to-face visit within 14 days of discharge
  2. 99496 – high medical complexity requiring a face-to-face visit within seven days of discharge
- Although pharmacists are not able to independently bill for the office visit, they can participate in all other responsibilities of TCM services and optimization of billing

Purpose

- To determine the financial and clinical impacts of ambulatory care pharmacists on transitional care management

Methods

- Retrospective, observational analysis
- November 1, 2019 to March 31, 2020
- Population: adult patients discharged from St. Joseph's Hospital or Candler Hospital who were established with St Joseph's/Candler Primary Care - Eisenhower

Outcomes

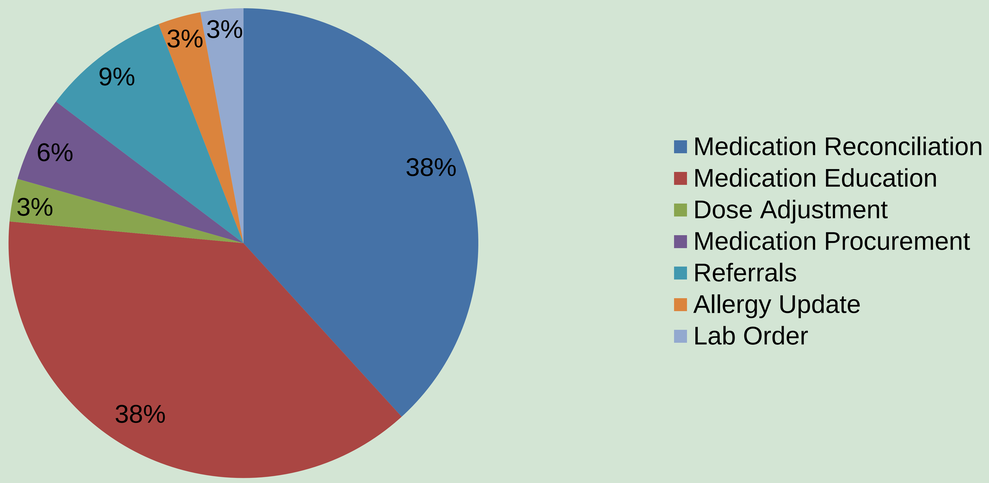
- Primary outcome:
  - Potential revenue generated during hospital follow-up visit with provider when pharmacists make the initial contact versus non-pharmacist staff
- Secondary outcomes:
  - Readmission rates
  - Number of interventions made during the post-discharge initial contact

Results

Table 1: Patients Contacted by Telephone Post Discharge

Patient Called By	Pharmacist	Non-Pharmacist Staff
Calls Made	24	25
Appointments Scheduled	20	23
Billing Codes Charged		
99496	12	2
99495	8	1
99214	--	20
Potential Revenue (average revenue/visit)	$4,220.00 ($211/visit)	$2,445 ($106/visit)
Readmission Rates	2/24 (8%)	3/25 (12%)
Interventions	33	1

Graph 1: Pharmacist Intervention Type



Analysis

- Patient contacted by a pharmacist post-discharge led to and increased number of appropriate TCM codes and more interventions
- Of the 23 patients that were contacted by a non-pharmacist staff member, 4 were considered clinical staff
  - Three of the four appointments made led to TCM billing codes
- Limitations
  - Data is limited to patients discharged from SJCHS facilities

Discussion

- Without nationally recognized pharmacist provider status, it remains difficult to establish reproducible service lines
- Primary Care Pharmacist involvement in TCM services allow for:
  - Optimization of TCM billing opportunities
  - Decreased readmissions
  - Increased referrals within the health-care system
  - Identification of medication related errors and therapy optimization
- TCM services may provide a sustainable means for pharmacists to become integrated into the primary care setting

Disclosures

- The authors of this project have nothing to disclose

References

1. Cavannaugh, J., et al. Advancing Pharmacy Practice through an Innovative Ambulatory Care Transitions Program at an Academic Medical Center. *Pharmacy*. 2020;8(20).
2. Transitional Care Management. American Academia of Family Physicians. 2020:78-84.

Evaluation of Thromboembolic Events After SARS-CoV-2 Infection

Samuel Pavlichek, PharmD; John Carr, PharmD, BCCCP, BCPS; Susan Smith, PharmD, BCPS, BCCCP
Dylan Daniels, PharmD Candidate; Bruce M. Jones, PharmD, FIDSA, BCPS

Background

- COVID-19 induces a known hypercoagulable state via thromboxane A-2 mediated platelet aggregation[1,2]
- Currently unknown if COVID-19 treatment results in reduced hypercoagulability
- Background rates of venous thromboembolism (VTE) are 0.1%.[3] Reports of VTE incidence are as high as 31% during COVID[4]
- Guideline recommendations conflict on post-discharge anticoagulation[1,5,6]

Purpose

- The purpose of this study was to evaluate readmissions for thromboembolic events within 90 days in patients who were admitted with COVID-19

Methods

- Single Center, Retrospective analysis
- The study period: admitted 1/1/2020 through 10/2/2020, followed with 90-day period for readmission
- Inclusion criteria: adult inpatients diagnosed with an ICD-10 code for COVID-19 (U07, B97, and B34)
  - 738 patients met inclusion criteria
- Exclusion criteria: history of thromboembolism prior to COVID or receipt of anticoagulation prior to admission
  - 88 patients excluded for anticoagulation
  - 64 patients excluded for history of VTE
- Stratified into VTE and No VTE groups
- Data was analyzed using SPSS Version 26, with Chi-square used for nominal data and T-test used for interval data

Outcomes

Primary outcome

- Hospital readmission within 90-days for thromboembolism after admission for COVID-19

Key secondary outcomes

- The effect of COVID-19 therapeutics on thromboembolism, incidence of any thromboembolic event within 90-days of COVID-19 diagnosis, and 90 day mortality

Results

Outcomes			
	No VTE (n=592)	VTE (n=58)	P-value
Primary Outcome			
Readmission within 90 days for thrombosis	0	4 (0.6%)	0.527
Secondary Outcomes			
Convalescent plasma	81 (13.7%)	16 (27.6%)	0.006
Dexamethasone	439 (74.1%)	39 (67.2%)	0.301
Remdesivir	249 (42.1%)	28 (48.3%)	0.371
Hydroxychloroquine	30 (5.1%)	4 (6.9%)	0.952
90-day all cause mortality	113 (19.1%)	19 (32.8%)	0.007

Interventions			
	No VTE (n=592)	VTE (n=58)	P-value
Anticoagulation			
Prophylactic	501 (84.6%)	10 (17.2%)	
Advanced	49 (8.2%)	13 (22.4%)	<0.001
Treatment	3 (0.5%)	32 (55.2%)	
None	39 (6.6%)	3 (5.2%)	
Mechanical ventilation	74 (12.5%)	18 (31%)	<0.001
Vasopressor	77 (13.0%)	20 (34.5%)	<0.001
Sequential compression devices	369 (62.3%)	25 (43.1%)	0.028

Discussion

Strengths

- Included 80% of all COVID patients admitted within the study period

Limitations

- Single center, retrospective analysis
- Pharmacotherapeutic standard of care changed frequently throughout the study period

Conclusion

- We observed a low rate of VTE after discharge. This may indicate a reduction in hypercoagulability after treatment of COVID19
- The high incidence of thromboembolic events while inpatient, and its association with increased mortality, highlights the need for effective inpatient prophylactic anticoagulation
- Patients who received convalescent plasma had a higher risk of VTE versus those who did not. Dexamethasone, remdesivir, and hydroxychloroquine use were not associated with a change in VTE risk
- Vasopressor and mechanical ventilation use were associated with an increase in VTE risk. Sequential compression devices was associated with a decreased risk of VTE

References

1. COVID-19 Treatment Guidelines Panel. Coronavirus disease 2019 (COVID-19) treatment guidelines. National Institutes of Health website. https://covid19treatmentguidelines.nih.gov/. Accessed August 13, 2020.
2. Rico-Mesa JS, Rosas D, Ahmadian-Tehrani A, White A, Anderson AS, Chilton R. The Role of Anticoagulation in COVID-19-Induced Hypercoagulability. Curr Cardiol Rep. 2020;22(7):53. Published 2020 Jun 17. doi:10.1007/s11886-020-01328-8
3. Klok FA, Kruip MJHA, van der Meer NJM, et al. Incidence of thrombotic complications in critically ill ICU patients with COVID-19. Thromb Res. 2020;191:145-147. doi:10.1016/j.thromres.2020.04.013
4. Heit JA. Epidemiology of venous thromboembolism. Nat Rev Cardiol. 2015;12(8):464-474. doi:10.1038/nrcardio.2015.83
5. Bassam Atallah, Saad I Mallah, Wael AlMahmeed, Anticoagulation in COVID-19, European Heart Journal - Cardiovascular Pharmacotherapy, Volume 6, Issue 4, July 2020, Pages 260–261, https://doi.org/10.1093/ehjcvp/pvaa036. Accessed August 13, 2020
6. Kreuziger L, Lee A, Garcia D, Cuker A, Cushman M, DeSancho M, Connors. COVID-19 and VTE/Anticoagulation: Frequently Asked Questions. American Society of Hematology website. https://www.hematology.org/covid-19/covid-19-and-vte-anticoagulation. Accessed August 13, 2020.

Antimicrobial Stewardship in Medical Oncology

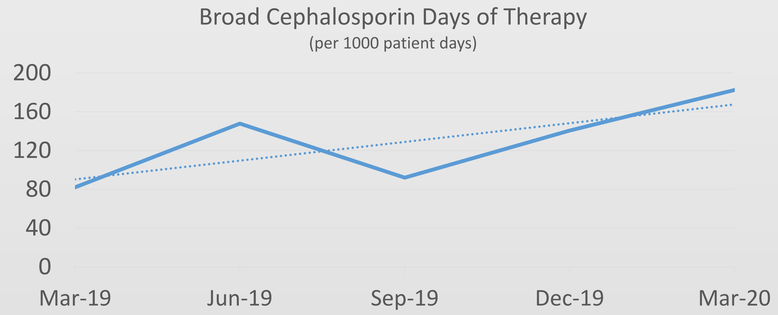
Sarah Sheahon, PharmD; Sarah Murphy, PharmD, BCPS; Megan Freeman, PharmD, BCPS; Victoria Woolley, PharmD, BCIDP, BCPS
Northside Hospital Department of Pharmaceutical Services

NORTHSIDE HOSPITAL

BACKGROUND

Cancer therapy is closely involved with antimicrobial use. However, antimicrobial stewardship efforts in immunocompromised patients are challenging due to complexity of cases, difficulty with accurate and timely diagnoses, and increased mortality related to invasive infections. During retrospective chart review and revealing increases in broad cephalosporin usage in medical oncology, opportunities for improvement to prevent antimicrobial resistance have been identified. Furthermore, a baseline was established that can be utilized to create an appropriate prospective intervention to help optimize antimicrobial usage in this complex population.

Figure 1. Antibiotic Usage Trend



OBJECTIVES

- Evaluate appropriate empiric antibiotic selection, duration and de-escalation
- Evaluate antibiotic days of therapy
- Intervene prospectively to provide appropriate guideline recommendation

METHODS

- Performed retrospective chart review focusing on antimicrobial interventions
  - Empiric selection, duration and de-escalation
- Provided feedback and recommendations based on clinical guidelines prospectively during medical oncology rounds
- Pre and post-intervention data to be analyzed for improvements in optimal antimicrobial usage

Table 1. Inclusion/Exclusion Criteria

Inclusion	Exclusion
Inpatient medical oncology patient ≥ 18 years old	Non-cancer diagnosis
Admitted to medical oncology internal medicine service (IMS)	Mixed infections
Diagnosed with pneumonia, UTI or culture negative febrile neutropenia	Antibiotics for surgical prophylaxis

RESULTS

Table 2. Definition of Terms

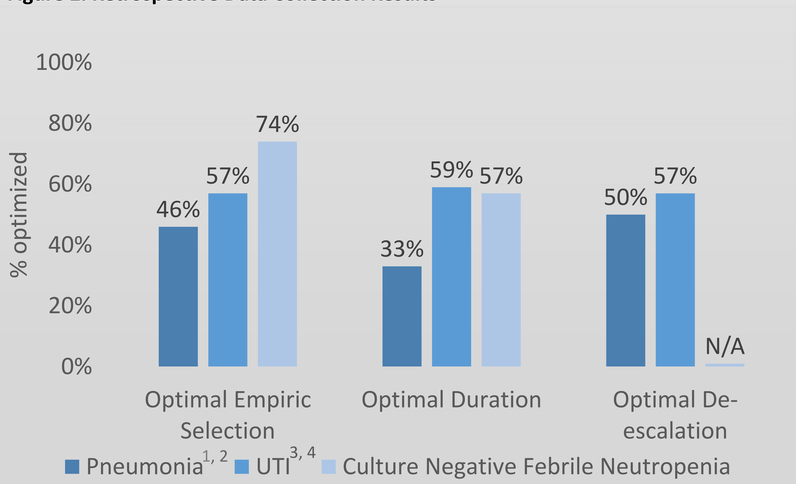
Optimal Empiric Selection	Empiric antibiotic selection according to guideline[1,2,3] recommendation in setting of true infection
Optimal Duration	Per guideline recommendations
Optimal De-escalation	Per guideline recommendations in addition to cultures and susceptibilities, remarkable microbiology diagnostic and lab parameters

[1]: Infectious Disease Society of America
[2]: National Comprehensive Cancer Network
[3]: American Society of Clinical Oncology

Table 3. Demographics

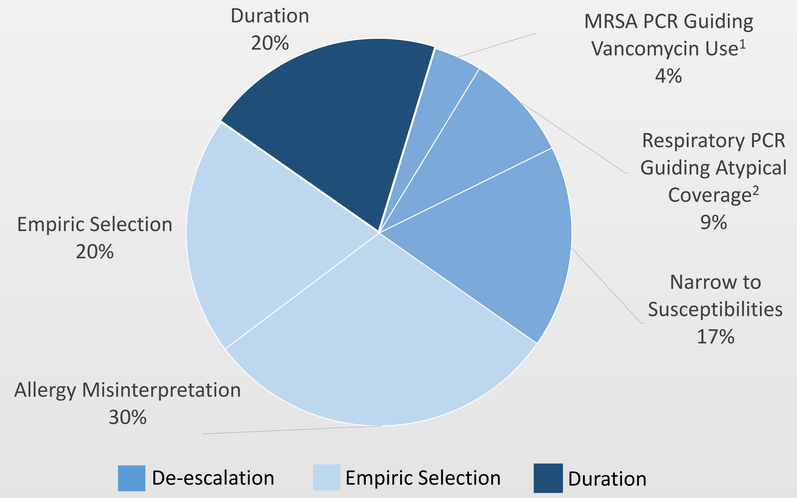
Characteristic	Retrospective Audit Group (n = 105)
Gender	
Female	70 (66%)
Age	
<70	33 (32%)
≥70	72 (68%)
Type of Cancer	
Breast	20 (20%)
Colon	21 (20%)
Hematologic	18 (17%)
Other	46 (43%)
Documented Allergy	
Beta Lactam	17 (16%)
Sulfa	11 (10%)
Other	16 (15%)
ID Consult	21 (20%)

Figure 2. Retrospective Data Collection Results



N = 35 in each diagnosis
1: CAP; n= 24(69%): defined as presence of new lung infiltrates plus clinical evidence that the infiltrate is of infectious origin which includes new onset of fever, purulent sputum, leukocytosis, and decline in oxygenation
2: HAP; n = 11(31%): defined as above occurring >48 hours after hospital admission
3: Complicated UTI; n=14 (40%): pregnant, postmenopausal, males, or those with urological abnormalities with presence of bacteriuria (≥ 10^5 CFU/mL of a uropathogen) with or without pyuria
4: Uncomplicated UT; n=21 (60%): defined by nonpregnant premenopausal woman with symptoms of cystitis, presence of bacteriuria (≥ 10^5 CFU/mL of a uropathogen) with or without pyuria

Figure 3. Retrospective Opportunities for Pharmacy Interventions

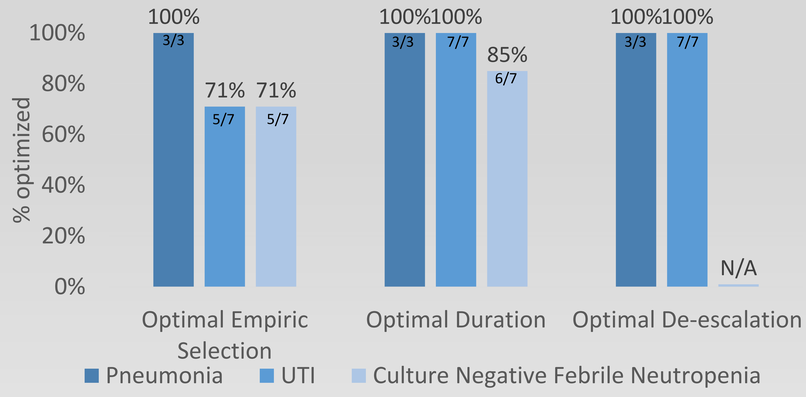


1: Discontinuing use of vancomycin when MRSA PCR results not detected
2: Discontinuing use of atypical agent when respiratory PCR results as negative

DISCUSSION/FUTURE STEPS

- Retrospective data collection and broad cephalosporin usage for March 2019 – March 2020 show increasing trends demonstrating the need for prospective interventions
- This research project is currently active and pending results from the post intervention phase
- During the intervention phase, education will be provided to physicians on new guideline changes
- Data will be presented at Northside Hospital's Antimicrobial Stewardship meeting with the goal to help optimize empiric selection, duration and de-escalation

Figure 4. Preliminary Prospective Data Collection Results



A Retrospective Evaluation of a Standardized Multimodal Hyperkalemia Treatment Protocol at a Tri-Campus Community Hospital System

Sara Black, Pharm.D. Candidate 2021
Mercer University College of Pharmacy, Atlanta, Georgia
Wayne Conrey, Pharm.D., BCPS
Northside Hospital Forsyth, Cumming, Georgia

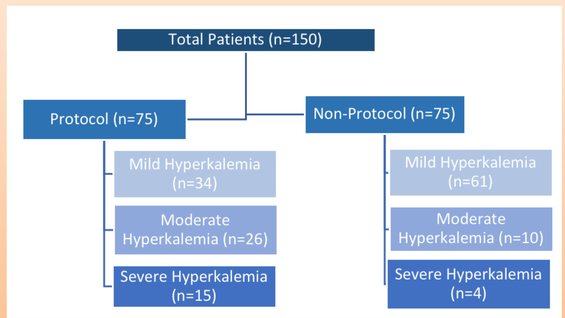
INTRODUCTION

- Hyperkalemia is a common electrolyte abnormality detected in the inpatient setting. Reported prevalence is variable among adult patients but appears to range from 7% to 73%, with higher occurrence in patients with renal disease. Untreated hyperkalemia may result in muscle weakness, paralysis, electrocardiogram abnormalities, and ultimately poor patient outcomes.
- Northside Hospital has developed a standardized hyperkalemia treatment protocol to ensure adequate evaluation and treatment based on published scientific literature and expert opinion.
- The primary objective of this study is to evaluate the efficacy of a standardized treatment plan for hyperkalemia in a tri-campus hospital system.

Category	Medications to be Ordered
Mild	Elimination • Furosemide 40 mg IV Push injection, once GI Potassium Binder • Lokelma 10 g oral powder-recon, TID for 48 hours
Moderate	***Same as Mild +*** Redistribution • Insulin regular 5 or 10 units IV push injection, once • Dextrose 50% injection, IV push injection, once Elimination • Sodium bicarbonate 50 mEq IV push injection, once
Severe	***Same as Moderate +*** Membrane Stabilization • Calcium gluconate or chloride 1 g, IV push injection, once Redistribution • Albuterol 0.5% inhalation solution 20 mg, NEB, once, diluted with 4 mL NS

METHODS

- Retrospective Chart Review
- Primary endpoint: comparative utilization of a standardized treatment protocol to assess for potassium lowering effects in patients with hyperkalemia (time to normokalemia)
- Secondary endpoint: completeness & timeliness of therapy
- Safety endpoints: follow-up lab monitoring of blood glucose levels if insulin & dextrose were administered & if hypokalemia (serum potassium <3.5 mmol/L) occurred status-post treatment
- Data collection period: December 2019 to December 2020
- Sample size=150 patients from Northside Hospital's tri-campuses
- Each patient was first stratified into 2 groups (protocolized treatment vs non-protocolized treatment), then was further stratified into groups based on baseline serum potassium (K+) level drawn at initiation of treatment (mild, moderate, or severe)
    - **Mild:** serum level 5-6 mmol/L
    - **Moderate:** serum level ≥6-7 mmol/L
    - **Severe:** serum level ≥7 mmol/L or any ECG changes regardless of level
- Statistical analysis conducted with two-sample unpaired t-test and two-tailed p-value



RESULTS

- Primary endpoint: *Mean Time to Normokalemia*

	Protocol vs No Protocol (relative reduction)	Standard deviation	Two-tailed p-value
Mild	50.1%	Protocol: 16 Non-protocol: 20.72	p=0.0002*
Moderate	27.4%	Protocol: 16.24 Non-protocol: 23.83	p=0.6
Severe	16.7%	Protocol: 25.01 Non-protocol: 29.86	p=0.63

*=statistically significant

- Secondary endpoint: *Completeness of Therapy*

	Protocol vs No Protocol (Relative Increase in Completeness) for Medications Ordered	Protocol vs No Protocol (Relative Increase in Completeness) for Medications Given
Mild	70.9%	3.4%
Moderate	71%	36%
Severe	24.2%	0%

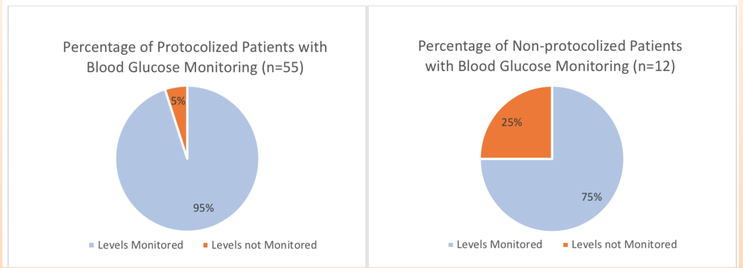
Most common medications not ordered were nebulized albuterol in the protocolized group & IV furosemide in the non-protocolized group
Most common medications not given were oral Lokelma & IV furosemide in all groups

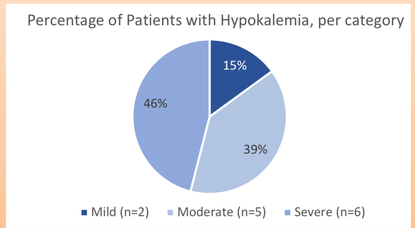
	Protocol vs No Protocol (relative reduction)	Standard deviation	Two-tailed p-value
Mean Time to Calcium for stabilization treatment*	52%	Protocol: 1.29 No protocol: 0.96	0.5994

*Calcium gluconate or chloride given for membrane stabilization in the setting of hyperkalemia

- Safety endpoints: *Blood Glucose Monitoring & Hypokalemia*

Percentage of patients with blood glucose level monitoring at 1 & 4 hours after insulin administration for hyperkalemia treatment





8.6% of patients experienced hypokalemia, all patients in protocolized treatment group

CONCLUSION

The results of this study demonstrate the value of protocolized treatment when available. Protocolized hyperkalemia treatment resulted in shorter time to normokalemia, more complete treatment, quicker timeliness to emergent treatment with calcium for membrane stabilization, and more consistent lab monitoring. There was an overall trend in all categories of patient's receiving protocolized treatment for having better outcomes, even though all of our data did not reach statistical significance. We found a positive correlation between more severe hyperkalemia and protocol utilization by providers . The small, but non-significant increased risk of hypokalemia may be attributed to administration of severe category medications regardless of baseline serum potassium level. There were also more patients with severe levels in the protocolized group. Limitations of our study include inconsistent serum potassium lab monitoring in patients who did not receive protocolized treatment. Overall, this retrospective study demonstrated more favorable patient outcomes & that protocols are beneficial not only to the provider, but to the patient and can have an impact on time to treatment and resolution of abnormalities.

REFERENCES

1) Hayes J., Kalantar-Zadeh K., Lu J.L. Association of hypo- and hyperkalemia with disease progression and mortality in males with chronic kidney disease: the role of race. Nephron Clin Pract. 2012;120:c8–c16
2) Palmer B.F. Managing hyperkalemia caused by inhibitors of the renin-angiotensin-aldosterone system
3) Sarafidis P.A., Blacklock R., Wood E. Prevalence and factors associated with hyperkalemia in predialysis patients followed in a low-clearance clinic. Clin J Am Soc Nephrol. 2012;7:1234–1241.
4) Einhorn L.M., Zhan M., Hsu V.D. The frequency of hyperkalemia and its significance in chronic kidney disease. Arch Intern Med. 2009;169:1156–1162
5) Simon LV, Hashmi MF, Farrell MW. Hyperkalemia. [Updated 2020 Jul 20]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2020 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK470284/
6) Mount DB. Fluid and Electrolyte Disturbances. In: Jameson J, Fauci AS, Kasper DL, Hauser SL, Longo DL, Loscalzo J. eds. *Harrison's Principles of Internal Medicine, 20e*. McGraw-Hill; Accessed September 28, 2020. https://accesspharmacy.mhmedical.com/content.aspx?bookid=2129&sectionid=192013179
7) Vanden Hoek TL, Morrison LJ, Shuster M, Donnino M, et al. 2010 AHA Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science. *AHA: Circulation*. 2 Nov 2010. 122 (18): S829-S861). https://doi.org/10.1161/CIRCULATIONAHA.110.971069

Rifaximin (Xifaxan™) Medication Use Evaluation

Stephen Djanor, PharmD Candidate; Joy Peterson, PharmD BCPS BCIDP

Mercer University College of Pharmacy, Atlanta, Georgia

INTRODUCTION

Background

- Rifaximin is a rifamycin analogue that exhibits bactericidal and bacteriostatic activity through the inhibition of transcription by β-subunit of bacterial DNA-dependent RNA polymerase.[1] Rifaximin is a rifamycin analogue that has seen expanding use in gastrointestinal conditions since its FDA approval in 2004.[1-3] It is associated with a low incidence of the development and persistence of spontaneous bacterial resistance and exhibits limited cross-resistance with other antibiotics.[3]

Purpose

- In the WellStar Health System, its use is restricted to infectious disease (ID)0 and gastroenterology (GI) services. Specifically for hepatic encephalopathy, ID or GI consultation is necessary for initiation of therapy, but continuation of home therapy can be ordered by any provider. Rifaximin has been identified as one of WellStar Kennestone Hospital's highest expenditure antibiotics. This MUE was performed to assess the appropriateness, safety, efficacy, and cost of rifaximin use at WellStar Kennestone Hospital.

METHODS

A drug utilization report was be generated of patients that received treatment with rifaximin at WellStar Kennestone Hospital from July 1, 2019 to June 30, 2020. Patient charts were reviewed for appropriateness of use, and efficacy as defined by treatment failure resulting in change to a different antibiotic regimen. Data collection and analysis using descriptive statistics was conducted using Microsoft Excel®. Cost data was calculated using average wholesale prices (AWP).

Elements of appropriateness include:

- Patient demographics
- Indication for use
- Discipline of ordering provider

Elements of efficacy

- Treatment failure resulting in a change to a different antibiotic regimen

Safety

- Documented adverse event

Cost

- Cost of alternative medications was calculated using same length of stay

RESULTS

Elements of appropriateness

Demographics	
Characteristic	
Patient Age – year	59.8 ± 12.4
Female sex	45%
Hepatic encephalopathy related indication	88%
Documented inability to obtain outpatient prescription	6%
Discipline of ordering provider	
ID or GI	24%
Other	76%

Software limitation

- The report found 176 patients were administered 2,901 tablets. Manual review of all patients revealed an additional 632 tablets were not captured by the reporting software.

Efficacy

- No patients were documented as having experienced treatment failure.

Safety

- Two patients had documented adverse events: ascites and headache.

Cost

Rifaximin Tablet Strength	Tablets Administered	Total Cost	Estimated Rifaximin Cost per Formular Restriction	Estimated Cost of Mainstay Alternative Therapy	Estimated Cost Savings
550 mg	3,483	$ 176,380.61	$ 127,722.29	$ 4,979.99	$ 43,576.11
200 mg	50	$ 1,340.50	$ 1,340.50	$ 0.00	$ 0.00
Total	3,533	$177,721.11	$129,062.79	$ 4,979.99	$ 43,576.11

CONCLUSION

- At WellStar Kennestone Hospital, rifaximin use was found to be appropriate, safe, and effective during the 2020 fiscal year.
- More stringent application of existing formulary restriction guidelines could have reduced cost without negatively impacting patient outcomes.
- Due to the inability of the software to capture all doses administered to identified patients in the specified time frame, it is unclear if any patients who received rifaximin were not included.

References

1) XifaxanTM [package insert]. Bridgewater, NJ: Salix Pharmaceuticals; 2017.
2) Vilstrup H, Amodio P, Bajaj J, Cordoba J, Ferenci P, Mullen KD, Weissenborn K, Wong P. Hepatic encephalopathy in chronic liver disease: 2014 practice guideline by the American Association for the Study of Liver Diseases and the European Association for the Study of the Liver. Hepatology. 2014; 60(2): 715-735.
3) Shayto RH, Mrad RA, Sharara AI. Use of rifaximin in gastrointestinal and liver diseases. World J Gastroenterol. 2016; 22(9): 6638-6651.

Evaluation of hypersensitivity reactions with the use of paclitaxel

Sarah Kemerer, PharmD; Ryan Hoffman, PharmD | HCA Healthcare

Introduction

- Paclitaxel is an alkaloid that exhibits cytotoxic effects through antimicrotubule activity[1] (FDA approved 2005)
- Intravenous formulation infused over 1 or 3 hours depending on dose[1]
- Commonly used at Memorial Health University Medical Center (MHUMC) for gynecologic cancers and non-small-cell lung carcinoma (NSCLC)
- The most widely used formulation of paclitaxel contains polyoxyethylated castor oil (Cremophor EL) which has been associated with an induction in histamine release leading to hypersensitivity[3]
- Black box warning for hypersensitivity reactions
  - Premedication with corticosteroids, diphenhydramine, and histamine H2-recepetor antagonists[2]
  - Incidence of hypersensitivity reactions with pre-medications ranges from 1-3%[2]
- Recently an increase in incidence of hypersensitivity reactions at MHUMC has been observed
- MHUMC has purchased all paclitaxel products from the same manufacturer
- The manufacturer has not made any changes to their formulation since July 2015

Objectives

- Evaluate the incidence and severity of hypersensitivity reactions with paclitaxel at MHUMC
- Investigate potential causes for the increase in reactions

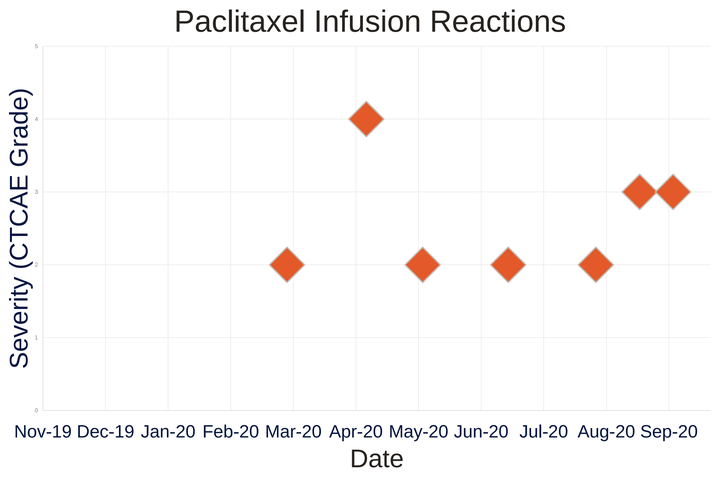
Methods

- Retrospective chart review approved by the Institutional Review Board
- Inclusion Criteria
  - Paclitaxel infusions from 11/11/2019 – 09/18/2020
  - Both inpatient and/or outpatient infusions
- Data collected
  - Type of malignancy
  - BSA (body surface area)
  - Number of infusions the patient received
  - Timing of premedications
  - Dose and infusion rate of paclitaxel
  - Manufacturer and lot number of paclitaxel
  - Grade of reaction as defined by the Common Terminology Criteria for Adverse Events Version 4 (CTCAE v4.0)
  - Time to reaction
  - Other chemotherapy received

Results

Baseline characteristics (N=190)	
Age, years, median [IQR]	59 [30-81]
Male, n (%)	24 (12.60)
Female, n (%)	166 (87.40)
BSA, m², median [IQR]	1.75 [1.39-2.37]
TBW, kg, median [IQR]	67.54 [41.40-116.80]

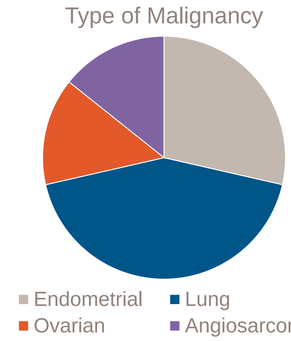
BSA = body surface area; TBW = total body weight

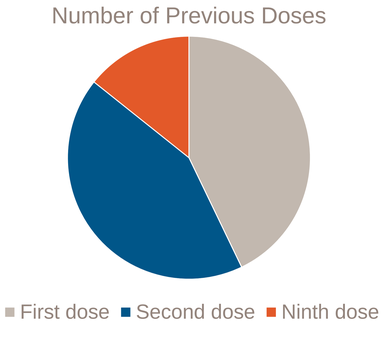


Date	CTCAE grade	Time to reaction	Dose	Infusion time	Change to therapy
03/17/20	Grade 2 skin reaction	10 min	80 mg	1 hr	Restarted at decreased rate
04/24/20	Grade 4 cardiac arrest	10 min	60 mg	1 hr	Hospice
05/21/20	Grade 2 pruritus	24 hr	130 mg	1 hr	Restarted at decreased rate
07/01/20	Grade 2 pruritus	24 hr	80 mg	1 hr	Held next dose
08/12/20	Grade 2 allergic reaction	34 min	315 mg	3 hr	Restarted at decreased rate
09/02/20	Grade 3 anaphylaxis	9 min	315 mg	3 hr	Switched to liposomal doxorubicin
09/18/20	Grade 3 anaphylaxis	5 min	240 mg	3 hr	Switched to protein-bound paclitaxel

Results

Hypersensitivity reactions (N=190)	
Total, n (%)	7 (3.68)
First 5 months (n=95), n (%)	1 (1.05)
Second 5 months (n=95), n (%)	6 (6.32)





Discussion

- This evaluation looked at the past 10 months paclitaxel infusions
  - First 5 months 1.05% of patients had a reaction to paclitaxel
  - Second 5 months the rate of reactions increased to 6.32%
- Based on the data collected, there is no clear indication explaining this marked increase in hypersensitivity reactions
- There are no consistencies in patient specific factors who had reactions including type of malignancy, BSA, and other chemotherapy received
- Dose and rate of infusion of paclitaxel were appropriate
- Timing of administration of premedications was appropriate
- Alternative therapies such as protein-bound paclitaxel or docetaxel could be considered to avoid the Cremophor EL component
- Paclitaxel could be rechallenged at a slower rate
- Although the cause remains unclear, this increase in incidence of reactions is undeniably crucial and requires further investigation

References

1. Farrar MC, Jacobs TF. Paclitaxel. [Updated 2020 May 7]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2020.
2. Kloover JS, den Bakker MA, Gelderblom H, van Meerbeeck JP. Fatal outcome of a hypersensitivity reaction to paclitaxel: a critical review of premedication regimens. *Br J Cancer*. 2004;90(2):304-305.
3. Surapaneni MS, Das SK, Das NG. Designing Paclitaxel drug delivery systems aimed at improved patient outcomes: current status and challenges. *ISRN Pharmacol*. 2012;2012:623139.

This research was supported (in whole or in part) by HCA Healthcare and/or an HCA Healthcare affiliated entity. The views expressed in this publication represent those of the author(s) and do not necessarily represent the official views of HCA Healthcare or any of its affiliated entities.

Evaluating different regular insulin doses for the treatment of hyperkalemia

Sarah Lopez, PharmD, Joseph Crosby, Ph. D, RPh, Amanda Bass, PharmD Candidate 2021, Sabrina Croft, PharmD, BCPS

lopezsa@sjchs.org

Background

- Regular insulin is a critical component of the treatment regimen for patients experiencing hyperkalemia
- Several factors and comorbidities must be considered when determining a patient's risk for experiencing hypoglycemia[1]
- Studies have shown that upwards of 25% of patients receiving standard insulin doses experience hypoglycemia within 6 hours of administration[2,3]
- Additional studies have determined that having an order set to guide physicians helped reduce the risk of hypoglycemia[4]

Purpose

- Determine if there is a difference in treatment efficacy and safety outcomes when using ≥ 10 units and < 10 units regular insulin dosing for hyperkalemia treatment

Methods

- Retrospective, observational, review of patients between August 2018-July 2020
- Eligibility criteria
  - Inpatient
  - ≥ 18 years of age
  - Not pregnant
  - No hypoglycemia from other causes

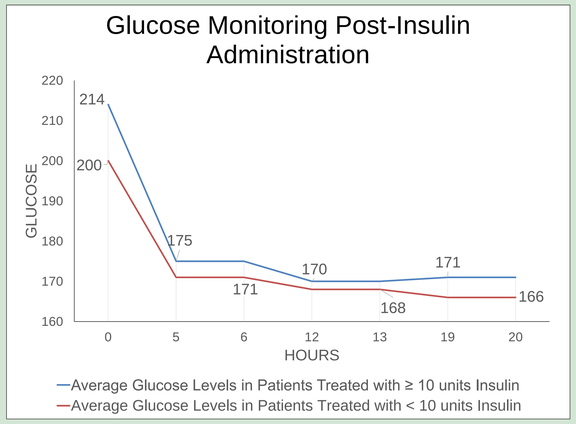
Outcomes

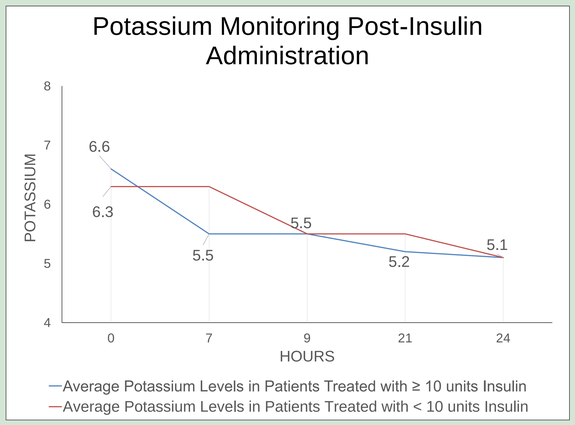
- **Primary Efficacy:** ≥ 10 units or < 10 units of regular insulin in hyperkalemia treatment
- **Primary Safety:** Frequency of hypoglycemia
- **Secondary**
  - Amount and timing of dextrose administration in patients who develop hypoglycemia
  - Occurrence and frequency of potassium and blood glucose checks post-insulin administration

Results

Baseline Characteristics (n=403)	≥ 10 units insulin received (n=345)	< 10 units insulin received (n=58)	P-Value (p <0.05)
Age, years (range)	68 (23-104)	67 (30-93)	0.395
Sex, male (%)	190 (55)	27 (47)	1.451
Comorbidities (%)			
Heart Failure	91 (26)	16 (28)	0.847
COPD	70 (20)	12 (21)	0.944
Diabetes	191 (55)	34 (59)	0.644
Hypertension	283 (82)	44 (76)	0.267
Hyperlipidemia	136 (39)	17 (29)	0.142
Serum Creatinine (%) (1.2mg/dL or higher)	305 (88)	53 (91)	0.506
Potassium at insulin administration (range)	6.5 (5.4-10.8)	6.3 (5.4-8)	0.109
Blood glucose at insulin administration (range)	213.6 (64-1248)	199.6 (72-1046)	0.301
Dialysis during hospital admission (%)	70 (20)	11 (19)	0.816

Efficacy	≥10 units insulin (n=345)	<10 units insulin (n=58)	P-Value (p<0.05)
Potassium <5.4mg/dL	237 (68.7%)	44 (75.8%)	0.272
Safety	**≥10 units insulin (n=345)**	**<10 units insulin (n=58)**	**P-Value (p<0.05)**
Blood Glucose ≤70mg/dL	38 (11%)	4 (6.9%)	0.342





Protocol Step	Incidence	Time after Insulin Dose
Dextrose Administration	85.6%	1.5 minutes
Blood Glucose Check	100%	5 hours
Serum Potassium Level	100%	11 hours
Hypoglycemia after Dextrose	**≥10 Units Insulin (n=38)**	**<10 Units Insulin (n=4)**
25 grams	35 (92.1%)	2 (50%)
12.5 grams	1 (2.6%)	2 (50%)
0 grams	2 (5.3%)	0 (0%)

Analysis

- Univariate Chi-square model was used to evaluate efficacy and safety of using ≥ 10 units and < 10 units regular insulin dosing for the treatment of hyperkalemia

Discussion

- Like in previous studies, efficacy in treating hyperkalemia was not influenced by doses ≥ 10 units or < 10 units of regular insulin
- Unlike previous studies which showed hypoglycemia occurred less frequently in patients who were treated with lower doses, blood glucose was minimally impacted by insulin doses in patients in this study
- Consistent glucose administration with insulin and post-administration blood glucose monitoring helps to minimize hypoglycemic events

Conclusion

- The insulin treatment dose for hyperkalemia should be driven by a physician's clinical determination of patient status and need for treatment
- Blood glucose monitoring through the first 6 hours post-insulin administration can help identify patients with hypoglycemia

References

1. Pei-Feng H, Shih-Hsein S, Hao-Ming C, et al. "Association of clinical symptomatic hypoglycemia with cardiovascular events and total mortality in Type 2 Diabetes." *Diabetes Care*. 2013;36(4):894-900.
2. Jacob BC, Peasah SK, Chan HL et al. "Hypoglycemia associated with insulin use during treatment of hyperkalemia among emergency department patients." *Hospital Pharmacy*. 2019;54(3):197-202.
3. Griffing KL. "Hypoglycemia prevention in hospital patients: A quality improvement project to prevent severe and recurrent hypoglycemia." *Clinical Diabetes.* 2016;34(4):193-199.
4. Tran AV, Rushakoff RJ, Prasad P, et al. "Decreasing hypoglycemia following insulin administration for inpatient hyperkalemia." *Journal of Hospital Medicine.* 2020;15(2):81-86.

Impact of SGLT2 Inhibitors on Metabolic Parameters and Healthcare Utilization in Patients with Type 2 Diabetes Mellitus

MERCER UNIVERSITY COLLEGE OF PHARMACY

Sin Yeong Kim, Student Pharmacist, Che Eun Song, Student Pharmacist, Jennifer Elliott, PharmD, BCACP, CDE, Sweta M. Patel, PharmD, BCPS, and Lydia Newsom, PharmD, BCPS

Mercer University College of Pharmacy, Atlanta, Georgia

Mercer Health Sciences Center

BACKGROUND

- Patients with type 2 diabetes mellitus (T2DM) are at higher cardiovascular (CV) risk, which can be decreased with medications and lifestyle changes.[1]
- Evidence shows that sodium-glucose cotransporter-2 inhibitors (SGLT2i) lower systolic blood pressure after 1 month and diastolic blood pressure after 6 months by approximately 5 mmHg, lower hemoglobin A1c (HbA1c) by 0.8-1%, and increase LDL. [2, 3, 4] These drugs have been associated with adverse events such as diabetic ketoacidosis and amputations. [2]
- SGLT2i has been associated with serious, but rare side effects such as diabetic ketoacidosis and amputations.
- The impact of SGLT2 inhibitors on metabolic parameters may differ in a real-world patient population as compared to patients in clinical trials. The goal of this study is to determine the impact of SGLT2 inhibitors on metabolic parameters in a real-world patient population.

METHODS

- A retrospective, single-center chart review for patients diagnosed with T2DM and prescribed as SGLT2i for the first time between July 1, 2016 to December 31, 2017 at The Emory Clinic.
- Patient demographics, past medical history, medications, HbA1c, weight, blood pressure (BP) and lipids were collected at baseline, 6 months, and 12 months following the medication initiation. Healthcare utilization was also assessed.
- Results were analyzed using descriptive statistics.

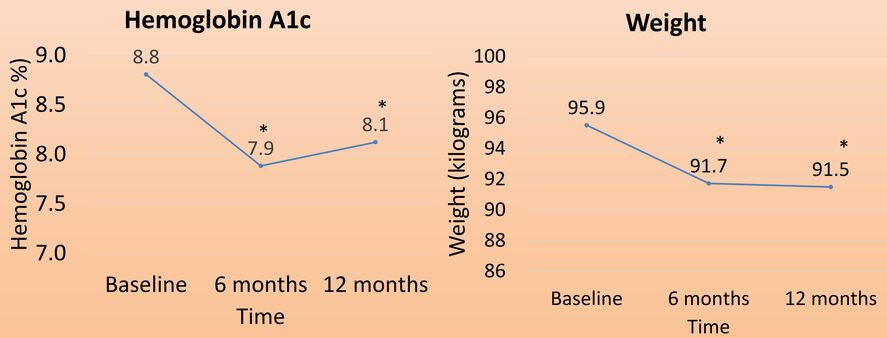
RESULTS

- A total of 473 patients were reviewed. Most common reasons for exclusion were: receiving an SGLT2i prior to study start date (162 patients, 44.6%), discontinuing the SGLT2i during the study period (85 patients, 23.4%), insufficient data (61 patients,16.8%). Patients were also excluded if they received two SGLT2i concomitantly, received glucagon-like peptide-1 receptor agonist with SLGT2i therapy, or if an SGLT2i was never prescribed. A total of 363 patients were excluded.

Table 1: Baseline Demographics (n = 108)

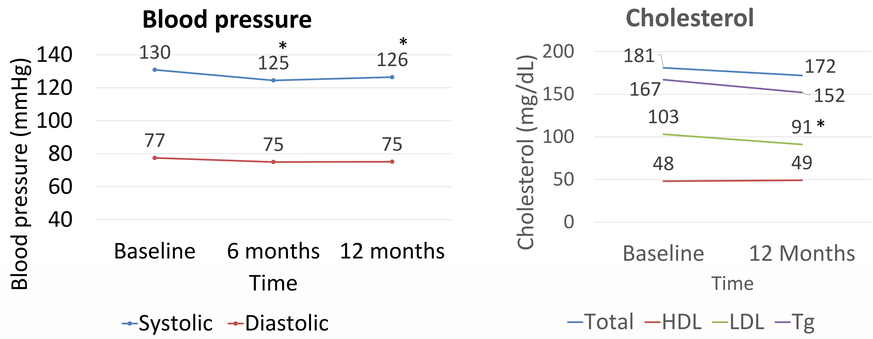
Characteristic	n (%)	Characteristic	n (%)
Gender		**Insurance Status**	
Female	60 (55.6)	Private insurance	80 (74.1)
Race		Medicare	18 (16.7)
Caucasian	47 (43.5)	Medicaid	5 (4.6)
African American	46 (42.6)	Uninsured	3 (2.8)
Hispanic	1 (0.9)	Other, unable to obtain	2 (1.8)
Asian	9 (8.3)	**Education**	
Other	5 (4.6)	High school or less	11 (10.2)
Hypertension history	76 (70.4)	College	36 (33.3)
Heart failure history	6 (5.6)	Professional degree	12 (11.1)
Statin at baseline	76 (70.4)	Unable to obtain	49 (45.4)

Figure 1: Impact of SGLT2 Inhibitors on Hemoglobin A1c and Weight (n = 108)



*p < 0.05 when compared to baseline

Figure 2: Impact of SGLT2 Inhibitors on Blood pressure and Cholesterol (n = 108)



*p < 0.05 when compared to baseline

HDL: high density lipoprotein
LDL: low density lipoprotein
Tg: triglycerides

Table 2: Healthcare Utilization (n = 108)

	n (%)
Emergency department (ED) visit	4 (3.7)
Hospital admission	9 (8.3)
Diabetes-related hospital admission	4 (3.7)

- There were no instances of amputations, diabetic ketoacidosis, or genital or urinary infections requiring hospitalization identified during the study period.
- No hospital admissions or ED visits were attributed to SGLT2i therapy

CONCLUSION

The use of SGLT2 inhibitors resulted in significant but less reduction in HbA1c, weight, and systolic blood pressure compared to previous studies. In contrast to previous studies, LDL was decreased at 12 months. Limitations of this study include its retrospective nature, limited time frame, and single-center focus. Factors such as medical compliance, medication cost, and patient lifestyle may impact metabolic parameters in a real-word patient population.

REFERENCES

1. Kannel WB, McGee DL. Diabetes and cardiovascular disease. The Framingham study. JAMA. 1979;241(19):2035-2038. doi:10.1001/jama.241.19.2035
2. Neal B, Perkovic V, Mahaffey KW, et al. Canagliflozin and Cardiovascular and Renal Events in Type 2 Diabetes. N Engl J Med. 2017;377(7):644-657. doi:10.1056/NEJMoa1611925
3. Zinman B, Wanner C, Lachin JM, et al. Empagliflozin, Cardiovascular Outcomes, and Mortality in Type 2 Diabetes. N Engl J Med. 2015;373(22):2117-2128. doi:10.1056/NEJMoa1504720
4. Wiviott SD, Raz I, Bonaca MP, et al. Dapagliflozin and Cardiovascular Outcomes in Type 2 Diabetes. N Engl J Med. 2019;380(4):347-357. doi:10.1056/NEJMoa1812389

Benefits Paid for Home or Outpatient INR Monitoring versus Facility INR Monitoring

Tatyana Givens, PharmD

Ricky Chan, 2021 PharmD candidate

Ashley Woodhouse, PharmD, BCACP, CACP, CDTM

Background

- St. Joseph's/Candler's Center for Medication Management (CMM) provides facility INR monitoring and home and outpatient INR monitoring services
- Criteria for billing and scope of supervision surrounding facility or home/outpatient INR monitoring services are different, but evidence supports that clinical outcomes are similar[1]

Purpose

- Compare the healthcare dollars benefit paid for patients receiving facility INR monitoring to home/outpatient INR monitoring to highlight economical options

Methods

Study Design

- Single-center, retrospective study

Study Population

- 18 years of age
- Receiving chronic warfarin therapy management at the CMM with facility INR monitoring or home and outpatient INR monitoring

Excluded Patients

- Less than 18 years of age
- Not enrolled at the CMM anticoagulation monitoring program

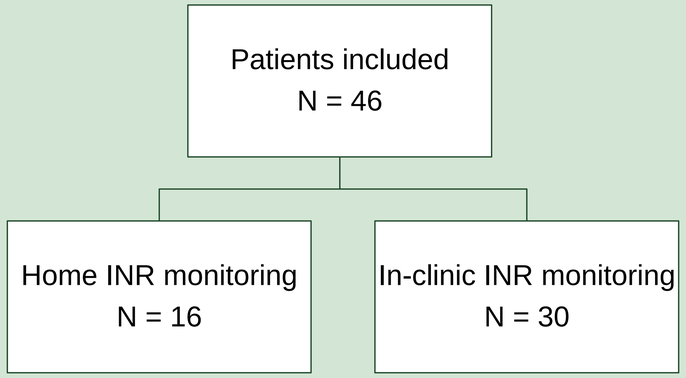
- Data assessed by final claims analysis for total healthcare dollars benefit paid and total out of pocket costs
- INR results for September 2019 through September 2020 were collected to calculate time in therapeutic range (TTR) and validate current evidence outcomes

Outcomes

Primary objective: Compare healthcare dollars benefit paid for patients with home/outpatient INR monitoring to facility INR monitoring to highlight economical options for equivalent anticoagulation management

Secondary objectives: Identify patient out of pocket costs for home/outpatient INR monitoring and facility INR monitoring, and identify time in therapeutic range (TTR) for home/outpatient INR monitoring and facility INR monitoring

Results



Primary Outcome	Home INR monitoring	In-clinic INR monitoring
Healthcare dollars paid (average/visit)	$5.91	$94.20

Secondary Outcomes	Home INR monitoring	In-clinic INR monitoring
Patient out of pocket cost (each visit)	$0.71[a]	$25.33[b]
Time in therapeutic range (percent)	70%	71%

[a]:One of the 16 patients had a co-payment cost
[b]:Four of the 30 patients had co-payment costs

Analysis

- Reimbursement for clinic INR monitoring is 18-fold higher compared to reimbursement for monitoring INR values at home
- The average co-payment cost was higher for patients receiving INR monitoring in the anticoagulation clinic
- Time in therapeutic range was similar between intervention groups at ~71%
  - Both higher than the national average of 65% (according to ORBIT-AF registry[2])

Limitations

- Small sample size
- Home and INR monitoring requires frequent telehealth appointments

Discussion

- Reimbursement rates differ considerably for these two therapeutically equivalent interventions
- Results reveal that patients who monitor INR at home have reduced co-payment costs which may lead to enhanced quality of life

References

1. Matchar DB, Jacobson A, Dolor R, et al. Effect of home testing of international normalized ratio on clinical events [published correction appears in N Engl J Med. 2011 Jan 6;364(1):93]. N Engl J Med. 2010;363(17):1608-1620. doi:10.1056/NEJMoa1002617
2. Pokorney SD, Simon DN, Thomas L, et al. Patients' time in therapeutic range on warfarin among US patients with atrial fibrillation: Results from ORBIT-AF registry. *Am Heart J*. 2015;170(1):141-148.e1. doi:10.1016/j.ahj.2015.03.017

! "#$%#&'()*+,-./ ,-'&#)'01.2'()0$',(.3,-4&,.51)'$,)$06'$#7./ ,-'&#)'01.8$$0$(.'1.20(9')#7':,-.!#)',1)(.

!"#$%&'()&*%+", -!.&/+"0&*"#112)&*%+", -)&34*5!.&6+$7%#+ 8#9:2)&/ -".&;:<<:&!=&;+>?@)&/ -)&/5>".&A=&B<%9:2&;?$:<)&*%+", -)&34C-*!

! "#$%&' "(&)*+),-$%'$.")&0.$1)2"%30."45)6'*%7)8(03"%40&7)9*4#0&$1):0;&*<(=)>&1$(&$5)?"*%@0$=)"6'*%7)2.-**1)*+):";0.0("5)>&1$(&$5)?"*%@0$

62<.=0"0,<,)0

!"#$ %&'#()'(*+#(%, -./01 $')2%(3$"#4 4(*5)6' %#7$ '*)+%,8%') '") #74%6' *9 ./0 7)3#6%'#*&)((*($ %9')(#74,)7)&'%'#*& *9 % 4"%(7%6#$':,)3;8%,#'< #&#'#%'#+) #& "*$4#'%,#=)3 4%'#)&'$ 2#'" "87%& #7 78&*3)9#6#)&6< +#(8$ ->?01 %' @7*(< A&#+)($#'< >*$4#'%, B#3'*2& -@A>B1C

!"#$%&'()*

! !" #$%&'(%#) **+ ,- (.. /(%#"%$ 0(1# (% .#($% ,"# 2"&"%#"%&,"(. '#)&3(%&,")&$34#/("35 2/," 0,$/&%(.()'&$$&,"

! 6(%&#"%$ 7&%0 02'(" &' '2",)#-&3&#"35 1&42$ 89:;<(4#(% (" &"34#($#) 4&$= -,4 '#)&3(%&," #44,4$)2# %, %O#0&>0 3,'/.#?&%5 $244,2")&"> %O# 4(/&).5 #1,.1&"> -&#.) ,-("%&4#%4,1&4(.8!@;< %O#4(/5

! !@; '#)&3(%&," #44,4$ 3(" 4#$2.% &" ()1#4$#)42>4#(3%&,"$A &"34#($#) 0#(.%O3(4# 3,$%$A ("))(">#4,2$0#(.%O 3,"$#B2#"3#$A &"3.2)&"> 4#$&$%("% '2%(%&,"$ (")4#)23#) 1&4(.$2//4#$$&,"

! :"-#3%&,2$)&$#($#$ 8:C<D9:; /0(4'(3&$%$ 0(1#$/#3&(.&E#) %4(&"&"> (") #?/#4%&$# %,&)#"%&-5 (") 4#$,.1#!@; '#)&3(%&," #44,4$

! :" ,24 (3()#'&3 '#)&3(. 3#"%#4 3,"$&$%&"> ,-(.(4>#9:; /,/2.(%&,"A :CD9:; /0(4'(3&$% 4#$,243#$ (4#&"()#B2(%# %, 3,"$&$%#"%.5 #1(.2(%# !@;$&" (.. /(%&#"%$

6#02')/78,/0/.'9.:;")%,

G, #"$24# (3324(%# '#)&3(%&," 0&$%,4&#$ (") 30(4% 4#1&#7$-,4 (.. /(%&#"%$," !@;$A 3.&"&3(. /0(4'(3&$%$ (% KL9M 7#4#/4,1&)#)N

!" #$%&'$&%() *+, ()&'-$./0

! 9&>0.&>O%$ %O# &"34#($#) 4&$= -,4 '#)&3(%&,"#44,4$ &" 9:; /(%&#"%$ (") #'/0($&E#$ %O##$$#"%&(. 4,.# ,-/0(4'(3&$%$ &" /4#1#"%&"> %O#$##44,4$

1" #$-0)-%) /2(%-$.03 2%/'()&%(

! C#$34&H#$ %O# /4,3#)24# -,4 /#4-,4'&"> (3324(%#'#)&3(%&," 0&$%,4&#$

! O2%.&"#$ /0(4'(3&$% 4#$/,"$&H&.&%&#$ -,4 4#$,.1&">)&$34#/("3&#$ /4&,4%, !@; '#)&3(%&," 1#4&-&3(%&,"

! C#-&"#$ '&"&'2' #?/#3%(%&,"$ -,4 /0(4'(3&$%$ %,/#4-,4')(&.5 30(4% 4#1&#7$-,4 /(%&#"%$," !@;$

A,"/(&,/

! 64#F&"&%&(%&1# /#4&,)N WRDWRDXWRVFRXDURDXWRV

! 6,$%F&"&%&(%&1# /#4&,)N WRDWRDXWRTFRXDURDXWRT

7%.5-%C 4&$'/5(

! !@; '#)&3(%&," #44,4$ H#-,4# (") (-%#4 B2(.&%5&"&%&(%&1#

#('/0)-%C 4&$'/5(6

! 6(%&#"%$ 7&%0 (% .#($% ,"# !@; '#)&3(%&,"#44,4)24&"> 0,$/&%(.&E(%&,"

! !@; '#)&3(%&," #44,4$ (-%#4 /0(4'(3&$%1#4&-&3(%&,"

! !@; '#)&3(%&," #44,4$," $2H$#B2#"%)(5$(-%#4&"&%&(. 1#4&-&3(%&,"

! G5/# ,- !@; '#)&3(%&," #44,4$A &"3.2)&">,'&$$&,"A 3,''&$$&,"A &"3,44#3%)42>A&"(//4,/4&(%#),$&"> (") $30#)2.&">A (")42>F)42>&"%#4(3%&,"$

6#02')/78,/0/.'9.:;")%,

G, #"$24# (3324(%# '#)&3(%&," 0&$%,4&#$ (") 30(4% 4#1&#7$-,4 (.. /(%&#"%$," !@;$A 3.&"&3(. /0(4'(3&$%$ (% KL9M 7#4#/4,1&)#)N

!" #$%&'$&%() *+, ()&'-$./0

! 9&>0.&>O%$ %O# &"34#($#) 4&$= -,4 '#)&3(%&,"#44,4$ &" 9:; /(%&#"%$ (") #'/0($&E#$ %O##$$#"%&(. 4,.# ,-/0(4'(3&$%$ &" /4#1#"%&"> %O#$##44,4$

1" #$-0)-%) /2(%-$.03 2%/'()&%(

! C#$34&H#$ %O# /4,3#)24# -,4 /#4-,4'&"> (3324(%#'#)&3(%&," 0&$%,4&#$

! O2%.&"#$ /0(4'(3&$% 4#$/,"$&H&.&%&#$ -,4 4#$,.1&">)&$34#/("3&#$ /4&,4%, !@; '#)&3(%&," 1#4&-&3(%&,"

! C#-&"#$ '&"&'2' #?/#3%(%&,"$ -,4 /0(4'(3&$%$ %,/#4-,4')(&.5 30(4% 4#1&#7$-,4 /(%&#"%$," !@;$

4,95,#02')7>'55'?-(@

! @(%# ,- !@; '#)&3(%&," #44,4$ $&>"&-&3("%.54#)23#) ,"# 5#(4 (-%#4 &'/.#'#"%(%&," ,- (/0(4'(3&$%F.#) '#)&3(%&," 0&$%,45 &"&%&(%&1#

! 60(4'(3&$% &"%#41#"%&,"$ 3(" 0#./ 4#)23# !@;'#)&3(%&," #44,4$ (34,$$ (.. #44,4 %5/#$A 7&%0$&>"&-&3("% &'/(3% ,")42>F)42> &"%#4(3%&,"$A)42> ,'&$$&,"A (") &"(//4,/4&(%#),$&">

! GO# &"%#442/%#) %&'# $#4&#$ &")&3(%# %O(% %O#"2'H#4 ,- !@; '#)&3(%&,"$ #44,4$ (//#(4),7"%4#") ,1#4%&'# ($ /0(4'(3&$%$ H#3,'#',4# &"1,.1#) 7&%0 !@; '#)&3(%&," 0&$%,4&#$

! @#$2.%$,- %O&$!@; $%#7(4)$O&/ /4,I#3%)#',"$%4(%# %O(%)#)&3(%#) /0(4'(3&$% %4(&"&">(") 4#1&#7 ,- !@;$3(")#34#($# %O# "2'H#4,-'#)&3(%&," #44,4$ ($$,3&(%#) 7&%0 9:;D!:CJ

+&,-")*.+'/0-1)202"023,.4,/(50/

4&$'/5(6	7%(8.0.$.-$.9(0:;<<	7/6$8.0.$.-$.9(0:;<<	=.>>(%(0'(
G,%(.P",QP,-P!@;P'#)&3(%&,"P#44,4$AP"P8+<	RSTP8UTQV+<	RWXP8XSQS+<	FSYP8FRZQU+<
6(%&#"%$P7&%OP(%P.#($%PRP!@;P'#)&3(%&,"P#44,4AP"P8+<	RZVP8UYQW+<	RWWP8XWQW+<	FZVP8FRYQW+<
M#)&3(%&,"P#44,4$P(-%#4P/0(4'(3&$%P1#4&-&3(%&,"AP"P8+<	RRZP8XVQS+<	TRP8XXQV+<	FXUP8FSQY+<
M#)&3(%&,"P#44,4$P,3324&">P,"P$2H$#B2#"%P)(5$P(-%#4P&"&%&(.P1#4&-&3(%&,"AP"P8+<	ZSP8RRQU+<	RRP8XQV+<	FUZP8FVQS+<
G5/#P,-P!@;P'#)&3(%&,"P#44,4$AP"P8+< O'&$$&," [,''&$$&," :"3,44#3%P)42> :"(//4,/4&(%##P),$&">P :"(//4,/4&(%##P$30#)2.&"> C42>F)42>P&"%#4(3%&,"$	 USDRSTP8XXQW< *DRSTP8UQV< VDRSTP8SQW< XXDRSTP8RUQV< RTDRSTP8RRQT< *TDRSTP8ZUQZ<	 XUDRWXP8XXQS< XDRWXP8XQW< XDRWXP8XQW< RXDRWXP8RRQV< *DRWXP8*QT< SYDRWXP8SSQT<	 FRX FZ F* FRW FY FRX

Improving Inpatient Utilization of Oral Contrast

Victoria Urban, PharmD; Lucy Crosby, PharmD, BCPS; Erinn Rowe, PharmD, MS; Benjamin Coles, PharmD, MS, BCPS

AU Medical Center, Department of Pharmacy, Augusta, Georgia

BACKGROUND

- The Food and Drug Administration and The Joint Commission consider contrast media agents to be medications.
- Contrast is held to the same regulatory standards as other medications in a hospital, including formulary selection and procurement, storage, prescribing, dispensing, administration and documentation, monitoring, and evaluating.
- Contrast media agents are potential sources of medication errors, including drug-drug interactions, nephrotoxicity, allergic reactions, and potential for confusion among agents.
- Hospitals must implement safeguards to protect patients from these sources of error within the health system.

PRIMARY OBJECTIVE

- An evaluation of oral contrast media at AU Medical Center was conducted to identify opportunities for improvement in their related medication management standards.

METHODS

- A review of oral contrast practices was conducted from August-October 2020.
- Impacted departments included were nursing, radiology, fluoroscopy, pharmacy, and computerized tomography (CT).
- A process map was created to describe current practices and identify strategies to align with best practices.

RESULTS

Formulary Selection and Procurement

- Best Practice: The hospital should maintain a defined formulary of contrast agents, which will be utilized in procurement.
- Gaps Identified: Agents are not included in the institution's defined formulary and are ordered independently.

Storage

- Best Practice: Contrast should be stored in a secure location.
- Gaps Identified: In procedural areas, agents are stored within locked rooms or unlocked cabinets that can be accessed by anyone entering the department. Within patient care areas, the agents are stored at the patient's bedside.

Prescribing

- Best Practice: Oral contrast should be electronically prescribed to include all of the required elements of a medication order and to allow for appropriate safety alerts.
- Gaps Identified: The order is entered along with a test order, ie "Test with Contrast." This does not specify an agent.

Dispensing

- Best Practice: Contrast should be dispensed from a secure decentralized location or from pharmacy with appropriate dosing, instructions, and labels.
- Gaps Identified: Oral contrast is dispensed by a departmental technician and labels are hand modified, based on radiologist instructions.

Administration and Documentation

- Best Practice: Barcode medication administration should be utilized and be consistent with processes for all medications. Documentation should take place within the medication administration record.
- Gaps Identified: Nursing administers the contrast based on patient tolerance. Contrast does not populate in the MAR so it is not charted as "done".

Monitoring

- Best Practice: Monitoring parameters must be defined by the institution.
- Gaps Identified: Monitoring for patients is not defined.

Evaluating

- Best Practice: Institutions should practice quality improvement regarding oral contrast administration.
- Gaps Identified: Documentation to allow for quality improvement surrounding oral contrast is limited.

CONCLUSIONS

- There are opportunities to align oral contrast with existing medication policies.
- Opportunities exist in the following areas:
  - Standardized formulary selection
  - Electronic prescribing
  - MAR documentation
  - Barcode scanning

NEXT STEPS

- Meet with the departments of radiology, nursing, fluoroscopy, and computerized tomography to discuss our findings and areas for improvement
- Meet with information technology and informatics to build contrast within our system to be able to be scanned into the MAR
- Evaluate appropriate alerts for oral contrast
- Update existing policies for procurement, formulary addition, and medication administration to include oral contrast

DISCLOSURES

The authors for this project have nothing to disclose.