RESIDENT & FELLOW RESEARCH

2023–24

University of Pittsburgh

School of Pharmacy

Our Mission

The School of Pharmacy develops pharmacists and pharmaceutical scientists as innovators and leaders to improve the health and well-being of the world around us.

Through inclusive excellence, innovation, and leadership, we achieve pioneering and exemplary:

- Pharmacy and pharmaceutical sciences education,
- Research and scholarship, and
- Patient care and service.

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Message from the Dean

Amy L. Seybert, PharmD

Dear Members of the Resident and Fellowship Class of 2024,

Thank you for your dedication and hard work this year! On behalf of the University of Pittsburgh School of Pharmacy, congratulations! You are completing a residency or fellowship program at one of the country's finest and largest programs. What an intensive year you have had—gaining practice expertise and mastering elements of teaching and research.

We are proud of your achievements. The environment created through our program provides the best that the academic and practice worlds have to offer. This excellence can only be achieved with strong collaborations between the School of Pharmacy and each of its partners — The UPMC hospitals including Children's Hospital of Pittsburgh, Magee-Womens Hospital, McKeesport, Mercy, Presbyterian, Shadyside, St. Margaret, Harrisburg, and Western Psychiatric Hospital, UPMC Health Plan, UPMC Chartwell and CarepathRx, RxPartners, plus Allegheny County Health Department, Pennsylvania Pharmacist Care Network, Pitt Vaccination & Health Connection Hub, and CVS Caremark.

Your commitment to learning and demonstrating clinical research and scholarship skills will serve you well during your career as you solve clinically important questions. These skills create a foundation to become tomorrow's leaders and innovators. Additionally, as alumni of our Pitt Pharmacy Residency and Fellowship Program, you will forever be a part of our collaborative alumni network. It is my sincere hope that you carry with you the rich experiences of the past year and a network of colleagues and friends as you launch the next phase of your career.

We are so proud of you! Congratulations, good luck, and keep in touch!

Amy L. Seybert, PharmD
Dean, School of Pharmacy

Valuing Our Partners

The University Pittsburgh School of Pharmacy values our partnerships. UPMC Presbyterian, UPMC Shadyside, UPMC Magee-Womens Hospital, UPMC Harrisburg, UPMC McKeesport, UPMC Mercy, UPMC St. Margaret, UPMC Children's Hospital of Pittsburgh, and UPMC Western Psychiatric Hospital participate in our residency programs. UPMC is consistently ranked among the nation's top hospitals according to the U.S. News and World Report rankings and is one of the leading integrated health care delivery systems in the US. Other valued partners include UPMC Health Plan, UPMC Chartwell and CarepathRx, RxPartners, and CVS Caremark. It is through these partnerships that the Residency Program has grown in national reputation.

Our pharmacy fellowship partners have also grown and include UPMC Presbyterian with our Clinical Pharmacogenomics, Implementation Science & PharmacoAnalytics, Infectious Diseases, PharmacoAnalytics & Outcomes, and Pharmacy Administration and Leadership fellowship programs. Additionally, we partner with Pfizer and Sandoz on PharmacoAnalytics fellowships in addition to our Pitt Pharmacy fellowships in Natural Product-Drug Interactions, and Medication Safety & Nephrotoxin Stewardship. Finally, we partner with the Pennsylvania Pharmacists Care Network for our Community Practice Development fellowship, and with the Allegheny County Health Department for our Public Health Pharmacy fellowship.

Pharmacy Residency Research Program

Kim C. Coley
PharmD, FCCP; Coordinator, Pharmacy Residency Research Program

The Residency Research Program at the University of Pittsburgh School of Pharmacy incorporates a structured research educational series with longitudinal research working groups. This approach provides a foundation for performing research, gives appropriate mentorship, fosters interactive discussions, allows peer critiques, and individual accountability for each resident project. Within the framework of the Residency Research Program, residents are responsible for the completion of all aspects of their project, from conceptualization to final manuscript preparation.

The program requires residents to be certified in research fundamentals through the University of Pittsburgh and the Collaborative Institutional Training Initiative, participate in valuable interactive lectures geared toward the scientific development and management of their projects. They also learn to effectively communicate their project results in both verbal and written formats. Overall, the Pharmacy Residency Research Program contributes to the diversity of residency training with our partners in collaboration with the University of Pittsburgh School of Pharmacy, which ultimately results in well-rounded candidates eligible for a wide range of career opportunities.

Our research training program is highly successful with publication rates for our residents exceeding the national average. Working group facilitators contribute to the success of this program. A special thank you to this years working group facilitators: Lucas Berenbrok, Renee Bogdan, Allison Dittmer, Leita Frey, Taylor Miller, Cody Moore, Ryan Rivosecchi, Andreea Temelie, and Heather Sakely. I'd also like to thank those who helped with the planning of Research Day: Roberta Farrah, Ed Horne, Pam McCormick, and Christine Ruby-Scelsi. Of course, none of this would be possible without the administrative contributions of Tiarra Gordon, Matt Mraz, and Rhea Bowman. The efforts of the program directors and research mentors are also greatly appreciated. Finally, Amy Seybert, Dean of the School of Pharmacy and Sandra Kane-Gill, Interim Chair of the Department of Pharmacy and Therapeutics, must also be recognized for their dedication to the program.

Most importantly, this program is successful because of the diligence and commitment of our outstanding residents and fellows!

The impact of medication-assisted therapy compared to chronic opioid therapy on gabapentinoid dosing

Abbs M, Farrah R

BACKGROUND: High doses of gabapentinoids can lead to euphoria, disassociation, and sedation which has led to reports of abuse and misuse. A 2017 study conducted by Gomes and colleagues showed that patients on both opioid analgesics and gabapentinoids were 50% more likely to experience an opioid-related death compared to those on opioids alone. In addition, a recent 2023 study showed that approximately 31% of persons who received gabapentin had at least one drug-related poisoning after initiating buprenorphine treatment. This compares with 14.5% among persons who did not receive gabapentin, indicating that gabapentinoid use in opioid use disorder (OUD) may pose potential danger. The purpose of this study is to determine the average daily dose of gabapentinoids in patients on medication-assisted therapy compared to those on chronic opioid analgesics in an outpatient family medicine setting.

METHODS: This study was a multi-site, retrospective cohort study. This study included patients that had been seen at one of the Family Health Centers within the period of January 2022 to July 2023 and were currently on a gabapentinoid medication. Patients were separated into subgroups indicating if they were on medication-assisted therapy, chronic opioid therapy, or no opioid-related therapy for analysis. Total daily doses of gabapentinoids for each subgroup were collected, analyzed, and compared using descriptive statistics to determine if opioid use or medication-assisted therapy had an impact on gabapentinoid dosing. Additional analysis of the data will include assessment of concomitant behavioral health conditions, use of additional neuropathic agents, and analysis of gabapentinoid dose in relation to current renal function.

RESULTS: Data analysis is ongoing.

CONCLUSION: We anticipate that patients on medication-assisted therapy will, on average, be taking higher doses of gabapentinoids than those on chronic opioids, and those without an opioid-related pain regimen. The results of this study will further inform educational efforts on dosing of gabapentinoids.

This research is pending acceptance for presentation at the ACCP Virtual Poster Symposium and UPMC Altoona Family Medicine Altoona Day

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Madison Abbs, PharmD

Madison is originally from the Pittsburgh area. She went to Westminster College to receive her undergraduate degree in biochemistry and then to Northeast Ohio Medical University to receive her doctor of pharmacy degree. Madison completed her PGY1 residency at UPMC St. Margaret and is currently the PGY2 resident in ambulatory care at UPMC St. Margaret Lawrenceville Family Health Center. Her professional interests include chronic care management, opioid use disorder, and mental health management. After residency, Madison is looking for a career in ambulatory care and is planning to stay in the Pittsburgh area.

Mentors: Roberta Farrah, PharmD, BCPS, BCACP

Impact of scheduled acetaminophen on opioid administration in critically ill trauma patients

Chao EY, Chiappelli AL, Darby JM, Gunn SR, McGinnis CB

BACKGROUND: Pain is an important symptom to treat in patients who have experienced a traumatic injury, due to the risk of long-term consequences such as chronic pain that may adversely affect quality of life. A common practice to limit the use of opioids in trauma patients is administering acetaminophen in a scheduled regimen. However, one disadvantage of this practice is the possibility of exposure to higher amounts of acetaminophen, which has hepatotoxicity potential. The goal of this study is to evaluate the use of scheduled compared to as-needed (PRN) acetaminophen in critically ill trauma patients and the effect on in-hospital and discharge morphine milligram equivalents (MME), pain scores, and liver injury.

METHODS: Patients who were admitted to UPMC Presbyterian to surgical-trauma and neurotrauma intensive care units (ICU) from January to July 2023 after traumatic injury and ordered acetaminophen for pain in either a scheduled or PRN regimen during the first 24 hours of admission were included. Data was collected by a retrospective chart review of the electronic health record and included baseline characteristics, traumatic injury classifications, concomitant analgesics, acetaminophen use, pain scores and MME use during admission and discharge. The primary outcome was cumulative MME use on days one through five. Secondary outcomes included median pain score on days one through five, MME prescribed at discharge, and incidence of acetaminophen induced liver injury.

RESULTS: There were 878 patients evaluated during the study period with 116 meeting inclusion criteria. In the total cohort median age was 68.5 (IQR 54.8-79) years and 55% of patients were male. Patients in the PRN group had a longer median hospital length of stay (11 (IQR 4-18) vs. 7 (IQR 4-13 days) and higher inpatient mortality (16% vs 10%). More patients in the scheduled group received surgical intervention (33% vs. 29%) and mechanical ventilation (36% vs. 21%). More patients in the scheduled group received ketamine (36% vs. 16%), muscle relaxants (41% vs. 17%), peripheral nerve blocks (5% vs. 2%), neuropathic pain medications (48% vs. 16%), non-steroidal anti-inflammatory drugs (19% vs. 7%) and topical analgesics (55% vs. 26%). Differences in cumulative MME use, pain scores and discharge MME are pending analysis. There were no instances of acetaminophen induced liver injury in either group.

CONCLUSIONS: A multivariate analysis to determine risk factors for increased MME use will be completed. This will help inform practice and identify patients who potentially need better multimodal pain control. There was no liver injury in our cohort, confirming the safety of the scheduled acetaminophen practice.

Edward Chao, PharmD

Edward graduated from Ohio Northern University, Raabe College of Pharmacy, Ada, OH in 2023 and is currently a PGY1 Acute Pharmacy Residency at UPMC Presbyterian. His practice areas of interest include critical care and emergency medicine. Upon completion of the residency, he plans to pursue clinical pharmacist opportunities in the Boston area.

Mentors: Cory McGinnis, PharmD, BCCCP; Abby Chiappelli, PharmD, BCCCP

Evaluation of pediatric cannabis-drug interaction reports

Chapin MR, Kane-Gill SL, Li X, Abanyie, K, Taneja SB, Egbert S, Paine MF, Boyce RD

BACKGROUND: Cannabis use among children and young adults poses risks of neurologic complications, including memory impairments, psychosis, and cannabis use disorder. Despite legal restrictions, recreational cannabis use among pediatric individuals remains prevalent. Data about potential interactions between cannabis/cannabinoids and pharmaceutical drugs in pediatric populations are also lacking. The objective of this study is to increase knowledge and awareness of potential cannabis- or cannabinoid-drug interactions in pediatric individuals due to the high risk of harm.

METHODS: Our study encompassed two main approaches: a literature review and analysis of adverse event reports in the FDA Adverse Event Reporting System (FAERS) database. In the literature review, we established stringent inclusion criteria, limiting our analysis to case reports available in English where the individual was under 18-years-old and where a potential adverse event resulting from a cannabis or cannabinoid interaction was discussed. Pediatric case reports detailing interactions between cannabis and other drugs were further analyzed. To evaluate the causality of these interactions, the Drug Interaction Probability Scale (DIPS) was utilized by two pharmacists. Within the FAERS database, we focused on voluntarily reported pediatric cases involving cannabis or cannabinoids. Utilizing both Latin binomials and common names while accommodating character variations, adverse drug reactions (ADRs) associated with cannabis or cannabinoids reported between January 2004 and June 2022 were extracted. To ensure data integrity, a four-step algorithm to remove duplicates from the ADR reports was employed. A comprehensive descriptive analysis on the cannabis- or cannabinoid-related cases was conducted, examining various facets including patient demographics, associated drugs, nature of the ADRs, outcomes, professions of the reporters, and reporting timelines. Notably, FAERS reports explicitly stating "drug interaction" as the preferred term were closely examined in our analysis.

RESULTS: Our literature search identified seven case reports meeting inclusion criteria, highlighting potential interactions between cannabinoids and pharmaceutical drugs such as methadone, everolimus, fluoxetine, and paroxetine. FAERS analysis revealed 404 reports related to cannabis and 17 to cannabinoids, with common cannabis ADRs including drug abuse, suicide, and cardiac/respiratory arrest. Notably, seven cannabis FAERS reports indicated "drug interaction" as the preferred term.

CONCLUSIONS: Pediatric cannabis/cannabinoid-drug interactions can lead to serious adverse events, emphasizing the need for caution. Methadone, everolimus, fluoxetine, and paroxetine were involved in potential drug interactions. Further research is essential to elucidate mechanisms and develop guidelines for managing these interactions, addressing the current knowledge gap, and ensuring safer medication practices in pediatric populations.

Maryann Chapin, PharmD

Maryann received her PharmD from Wilkes University in Wilkes-Barre, Pennsylvania. She is currently completing a 2-year pharmacoanalytic/pharmacovigilance fellowship focusing on natural product-drug interactions at the University of Pittsburgh School of Pharmacy, Department of Pharmacy & Therapeutics. Her professional interests include pharmacovigilance and medical information. Upon completion of her fellowship in June, Maryann hopes to pursue a career within pharmacovigilance and medication safety.

Mentors: Sandra Kane-Gill, PharmD, MS, FCCM, FCCP; Richard D. Boyce, PhD

Evaluation of ketamine versus propofol monotherapy in maintaining intensive care unit sedation in mechanically ventilated patients.

Cochran A, Miller T, Ganchuk S, McCormick P, Gionfriddo M

BACKGROUND: Propofol is used extensively in the intensive care unit (ICU) setting for sedation. Unfortunately, propofol has a high rate of adverse effects, which include hypotension, propofol-related infusion syndrome (PRIS), QT prolongation, bradycardia, and hypertriglyceridemia. Ketamine is an analgesic and sedative agent that has a different side effect profile including hypertension, emergence delirium, nausea, and vomiting. In certain settings, ketamine would be a preferable sedative monotherapy alternative. Currently, there are studies that have evaluated ketamine as an adjunctive agent in maintaining sedation in the ICU setting. These studies have shown that adjunctive ketamine promotes dose sparing sedation and analgesia. Ketamine is not approved by the Food and Drug Administration (FDA) for use in providing monotherapy sedation in the ICU. There are limited studies that have evaluated intravenous ketamine as a monotherapy agent in maintaining ICU sedation in mechanically ventilated patients. This study aims to evaluate if ketamine is a safe and efficacious monotherapy alternative agent for maintaining sedation in the ICU.

METHODS: This is a retrospective chart review of invasive mechanically ventilated patients receiving monotherapy of ketamine or propofol for sedation while in an ICU at UPMC Mercy from July 2022-December 2023. Patients were excluded if they were <18 years old or received both ketamine and propofol infusions concomitantly. The primary outcome is time until extubation. The secondary outcomes are time until Riker's score goal is met, dose at first Riker's score goal, total time at Riker's score goal, ICU length of stay, infusion duration of sedative, adjunctive use of a vasopressor, adjunctive use of a benzodiazepine, adjunctive use of an opioid bolus and infusion, presence of delirium, and ICU mortality.

RESULTS: A total of 115 charts were reviewed: 25 were in the ketamine group, 50 were in the propofol group, and 40 patients were excluded. There was no significant difference in time until extubation (p=0.15), time until Riker's score goal is met (p=0.85), ICU length of stay (p=0.1), infusion duration of sedative (p=0.58), presence of delirium (p=0.39), or total time at Riker's score (p=0.57) between the propofol and ketamine groups. There was a difference in mortality rates between groups (p=0.02) in favor of the ketamine group.

CONCLUSIONS: Ketamine is an alternative agent to propofol for maintaining sedation in mechanically ventilated patients in the ICU. There is no difference in time to Riker's goal and time at Riker's goal which shows patients maintained adequate sedation while on both agents. Though a secondary outcome reported a mortality difference between both groups, additional studies will need to be performed to confirm this.

Abigail Cochran, PharmD

Abigail is from Columbus, OH and received her PharmD from Ohio Northern University, Ada, OH. She is completing her PGY-1 pharmacy residency at UPMC Mercy, Pittsburgh, PA. After completing her PGY-1, she will be starting her PGY-2 in critical care at UPMC Presbyterian, Pittsburgh, PA. Her clinical interests include trauma, surgical, and general medical ICU.

Mentors: Pamela McCormick, PharmD, BCPS, BCEMP; Steven Ganchuk, PharmD; Taylor Miller, PharmD

Impact of addiction medicine consult service on inpatient initiation of medications for opioid use disorder

Dillen MG, Schulman JA, Proddutur SR, Taylor AM, Baumgartner, MA

BACKGROUND: Total overdose deaths rose by 60% between 2019 and 2021 with a predicted 82,998 opioid overdose deaths occurring in 2022. Medications for opioid use disorder (MOUD) have been associated with reduced overdoses and serious opioid-related hospitalizations compared to detoxification or behavioral health interventions. Hospital addiction medicine consult services (AMCS) have been shown to reduce all-cause 90-day mortality post-discharge through various methods including MOUD initiation and other harm reduction measures (e.g., access to naloxone, behavioral health services). This study's objective was to evaluate the impact of inpatient AMCS on initiation of MOUD in hospitalized patients.

METHODS: This was a retrospective cohort study including two hospitals. The first hospital, site 1, is an urban 520-bed hospital with an in-house AMCS that began in July 2020. Site 2 is a suburban 249-bed hospital with no AMCS available. The primary outcome was the impact of an in-house AMCS on the rate of initiation of MOUD in patients admitted with untreated OUD. Secondary outcomes included time to initiation of MOUD, rate of self-directed discharges, and frequency of AMCS consults. Patients included were identified using ICD-10 codes related to opioid use. Adults 18 years or older with a history of OUD not currently receiving outpatient treatment were included. Patients were excluded if they were prescribed MOUD as an outpatient within 30 days of inclusion, were younger than 18 years old, or used opioids for cancer-related pain. Patients were collected in two periods: a pre-period and post-period for each site. Univariate statistical tests were used. The primary outcome was assessed using a Mantel-Haenzel Chi-square test.

RESULTS: A total of 504 patients were assessed with 126 patients in each group. The rate of MOUD initiation for site 1 was 6.4% (8/126) for the pre-period and 20.6% (26/126) for post-period (difference in proportions = 0.143; 95% CI 0.057-0.224; p=0.01). Rate of MOUD initiation for site 2 was 4.8% (6/126) for the pre-period and 6.4% (8/126) for the post period (difference in proportions = 0.016; 95% CI -0.043-0.75; p=0.582). Demographic results and results of secondary outcomes are pending.

CONCLUSIONS: Availability of a hospital AMCS was associated with increased rates of MOUD initiation in inpatients with untreated OUD.

Madeline Dillen, PharmD

Madeline received her PharmD from the University of Pittsburgh School of Pharmacy. She is a PGY1 Pharmacy Resident at UPMC St. Margaret Hospital and a Faculty Development Fellow at UPMC St. Margaret. She will be completing a PGY2 in geriatric pharmacy next year. Madeline is interested in outpatient geriatric care and hopes to pursue a position in ambulatory care after residency. Her areas of interest include medication affordability, deprescribing, and maintaining independence for older adults.

Mentors: Megan Baumgartner, PharmD, BCPS, Alexandria Taylor, PharmD, BCPS

Evaluation of dexmedetomidine bolus administration in pediatric patients

Domínguez Arocho G, Stramara L

BACKGROUND: Dexmedetomidine, a selective alpha-2 receptor agonist, is widely used for intensive care sedation, anxiolysis, and as an adjunct to anesthesia in pediatric patients. The 2022 Society of Critical Care Medicine Clinical Practice Guidelines on Prevention and Management of Pain, Agitation, Neuromuscular Blockade and Delirium in Critically Ill Pediatric Patients with Consideration of the ICU Environment and Early Mobility (PANDEM) recommend alpha-2 agonists as the primary sedative for mechanically ventilated and post-operative cardiac surgical patients, while minimizing benzodiazepine-based sedation to reduce ICU delirium. However, little is known regarding dose-dependent adverse effects with repeated intravenous bolus administration of dexmedetomidine. The objective of this study is to assess the efficacy and safety of dexmedetomidine bolus doses for intensive care sedation and anxiolysis.

METHODS: This is a single-center, retrospective, observational, cohort study, conducted in an 11-bed pediatric intensive care unit. Participants include pediatric patients who received dexmedetomidine bolus doses between August 1, 2021, and November 30, 2023. The primary outcome of this study is to assess safety of bolus dose administration in pediatric patients by assessing the development of bradycardia and hypotension. Assessment of bradycardia and hypotension were determined in accordance with the pediatric advanced life support (PALS) standards. Confounding factors that were assessed include concomitant use of dexmedetomidine infusion, analgesics, sedatives, neuromuscular blocking agents, albuterol, and terbutaline. Additional safety endpoints include the development of hypertension and tachycardia two hours after bolus dose administration.

RESULTS: Research is in progress. Data collection is ongoing.

CONCLUSIONS: Conclusions will follow after data analysis is complete.

Gabriela Domínguez Arocho, PharmD

Gabriela is currently a PGY-1 Pharmacy Resident at UPMC Harrisburg. She received her Doctor of Pharmacy from the University of Maryland School of Pharmacy and will complete a PGY-2 in Thrombosis and Hemostasis Management at Henry Ford Hospital in Detroit, Michigan. She plans to practice as a clinical pharmacist in the cardiac critical care setting after completing her training.

Mentors: Amanda Ferguson, MD; Sam Edelman, DO; Laura Watkins, MD; Rebecca Smith, MD; Lindsey Stramara, PharmD

Evaluation of intravenous acyclovir with order-set directed fluids compared to a pre-intervention patient population

Dorazio J, Groetzinger L, Smithburger PL, Rivosecchi R

BACKGROUND: Use of intravenous acyclovir can result in the precipitation of acute kidney injury (AKI) due to acyclovir's tendency to crystalize in the urine, equating to a post-renal AKI. General prevention strategies for this adverse drug event have focused on adequate hydration using intravenous fluids. As a result of this concern, UPMC updated the intravenous acyclovir PowerPlan in 2021 to recommend the use of continuous intravenous fluids while on intravenous acyclovir. However, continuous intravenous fluids are not without risk as patients can develop fluid accumulation leading to the development of pulmonary edema and in worst circumstances the requirement of mechanical ventilation for pulmonary support. The goal of this research was to evaluate and compare the current intravenous acyclovir PowerPlan to that of a pre-intervention patient population, focusing on rates of AKI and new requirement of pulmonary support.

METHODS: This was a retrospective, single center study at UPMC Presbyterian compromising patients from October 20, 2020 to March 22, 2022 (pre-intervention) and from May 1, 2022 to July 1, 2023 (post-intervention). Patients ordered IV acyclovir during the predefined time points were identified via drug administration charges. To be included, patients had to be 18 years of age or older and received at least two doses of IV acyclovir for a duration of at least 48 hour of drug therapy. Patients were excluded if they had been admitted to an outside hospital for greater than 24 hours prior to admission to our facility. Data collection consisted of demographics, duration of intravenous acyclovir therapy, IVF product selection and duration (if ordered), and Sequential Organ Failure Assessment score within 24 hours of starting intravenous acyclovir. Intravenous fluid collection was defined as total amounts received in 24 hours as well as net fluid status corresponding to the first 3 days of acyclovir therapy. If patients experienced an AKI or escalation in pulmonary support while on intravenous acyclovir, an adverse drug assessment was performed using the Naranjo Adverse Drug Reaction Probability Scale, Kramer algorithm, and the Jones Criteria. Definition of AKI followed the designations by the Kidney Disease Improving Global Outcomes guidelines. Escalation in pulmonary support was defined as a need for greater oxygen demand. Escalation occurred any time patients went to a device that provided additional respiratory resources with positive radiographic imaging. If all the drug adverse assessments agreed that the event was related to acyclovir/intravenous fluid utilization, the severity of the event was determined with the National Cancer Institute's Common Terminology Criteria for adverse effects.

RESULTS: Data analysis is ongoing.

CONCLUSIONS: Results of this research will allow for the evaluation of the intravenous acyclovir PowerPlan regarding its impact on AKI rates and potential for respiratory compromise due to continuous intravenous fluids. This information will aid future PowerPlan adjustments aimed at decreasing complications associated with the current iteration of the intravenous acyclovir PowerPlan.

Joshua Dorazio, PharmD

Josh is the current PGY2 Critical Care Pharmacy Resident at UPMC Presbyterian. His current interests are in surgical, cardiology, and medicine-based patient populations. Following graduation from his PGY2 program, Josh plans to pursue a critical care position.

Mentors: Lara Groetzinger, BCCCP; Pamela Smithburger, BCCCP; Ryan Rivosecchi, BCCCP

Overdose prevention strategies in high-risk youth populations: Impact of pharmacist-driven intervention and interprofessional collaboration

Dorvè-Lewis P, Temelie A, Fabian T, Bero K, Winkeller V, Jaworski A, Korenoski A

BACKGROUND: In 2018-2019, 18.8% of adolescents aged 12-17 years seriously considered attempting suicide, 15.7% made a suicide plan, and 8.9% attempted suicide. Intentional overdoses are on the rise in the United States, especially among the child and adolescent population; and a 94% increase in overdose related deaths was seen from 2019 to 2020 alone. Much of the current evidence around overdose harm reduction involves opioids or illicit substances, with limited data available on prescription, over the counter medications, or non-drug substances. In addition to public medication disposal bins, the Centers for Disease Control and Prevention (CDC) has evidence-based strategies for medication safety and opioid overdose prevention, but their utilization is not well known. The objectives of this study were to develop and implement pharmacist-driven provider education and interventions to reduce overdose harm in high-risk youth, and to gain provider insight into the utility and effectiveness of overdose education and harm reduction strategies.

METHODS: This was a prospective study conducted at an outpatient behavioral health clinic for children and adolescents at risk for suicidal behavior from February to May 2024. A baseline survey of providers was conducted to assess current harm reduction practices followed by targeted education on state overdose trends in addition to a review of harm reduction strategies. Survey responses were answered on a Likert scale, with 1 point assigned for strongly disagree and 5 points assigned for strongly agree. The next phase of the intervention included distribution of overdose harm reduction kits containing medication disposal packets and written patient/caregiver education on medication safety in the home. Finally, we will administer post-intervention provider surveys to assess the overall impact of the intervention. The primary outcome of this study is to assess change in provider awareness regarding overdose trends and harm reduction strategies pre-and post-intervention. Secondary outcomes will assess utilization and perceived benefit of overdose harm reduction resources.

RESULTS: A total of 16 providers completed the baseline survey, and 15 providers completed the post-education survey. Provider roles included clinical supervisors, nurses, physicians, and therapists. Post-education survey responses showed an increase in awareness of local overdose trends by 0.4 points, an increase in comfortability in discussing safe medication storage and disposal by 0.7 points, and an increase in understanding of medication disposal packets by 0.8 points. Next steps include a post-intervention survey completed after 1-2 months of distribution of medication disposal kits to patients to assess provider perceived utility.

CONCLUSIONS: In these surveys of providers at an outpatient behavioral health clinic for children and adolescents at risk for suicidal behavior, a pharmacist-driven intervention led to increase in awareness and understanding of overdose trends and harm reduction strategies, despite high baseline knowledge. Final conclusions are pending results of the post-intervention survey.

Presented at the American Association of Psychiatric Pharmacists 2024 Annual Meeting; Orlando, FL on April 9, 2024

Paige Dorvè-Lewis, PharmD

Paige is a PGY-2 psychiatric pharmacy resident at UPMC Western Psychiatric Hospital. She is from Inverness, FL, and earned her PharmD from the University of Florida College of Pharmacy. She completed her PGY-1 pharmacy residency at UPMC Western Psychiatric Hospital. Her areas of professional interest include child and adolescent psychiatry and substance use disorders. In her spare time, Paige enjoys gardening, watching professional soccer, and playing with her dog Wednesday.

Mentors: Andreea Temelie, PharmD, BCPP; Tanya Fabian, PharmD, PhD, BCPP; Kelsey Bero, LPC, NCC; Victoria Winkeller, MD, FAAP; Anthony Jaworski, PharmD, BCCCP, DABAT; Amanda Korenoski, PharmD, MHA, BCCCP

Incidence of serotonin syndrome caused by tedizolid and concomitant serotonergic agents

Fang Y, Shah S, Clarke LG, Smith BJ

BACKGROUND: Tedizolid is an oxazolidinone antibiotic that exhibits reversible inhibition of monoamine oxidase (MAO) suggesting a possible risk of serotonin syndrome. However, Phase 2 and 3 clinical trials excluded patients receiving serotonergic agents. The objective of this study is to identify the incidence of serotonin syndrome in patients receiving tedizolid and concomitant serotonergic agents.

METHODS: This was a multi-center, retrospective study of patients ≥ 18 years old who received tedizolid for treatment or suppression from January 2015 to July 2023. The Hunter Serotonin Toxicity Criteria, Sternback's criteria, and documented diagnosis were used to identify the occurrence of serotonin syndrome. Concomitant therapy was defined as using any serotonergic agent within 2 weeks before/after, and if fluoxetine, 5 weeks before/after tedizolid initiation. The primary outcome was the incidence of serotonin syndrome caused by concomitant use of tedizolid and serotonergic agents. Adverse drug events resulting in tedizolid discontinuation were the secondary endpoint.

RESULTS: There were 597 unique patients that received tedizolid, with 378 patients (63.3%; 378/597) receiving concomitant serotonergic agents. Two patients developed suspected serotonin syndrome: one on tedizolid and sertraline for 402 days and one on tedizolid and trazodone for 35 days. There were 148 patients (24.8%; 148/597) that received linezolid in the past and two patients developed serotonin syndrome while on linezolid and fentanyl patch. The number of patients who received concomitant 1, 2, 3, 4, and 5 serotonergic agents while on tedizolid were 243 (40.7%), 98 (16.4%), 31 (5.2%), 4 (0.67%), and 2 (0.3%), respectively. The most common serotonergic agent was sertraline (n=85). In patients receiving tedizolid for treatment (96.0%; 573/597), the median duration therapy was 6 days (IQR 3-8). Eleven patients (1.9%; 11/573) discontinued tedizolid for treatment due to adverse drug events: thrombocytopenia (5/11), skin reaction (3/11), and nausea (2/11). In patients receiving tedizolid for suppression (24/597, 4.0%), the median duration of concomitant therapy was 98 days (IQR 19-330), and 1 patient discontinued tedizolid for thrombocytopenia.

CONCLUSION: This large cohort reports an incidence of serotonin syndrome that appears consistent with that of linezolid. Further study is warranted to determine causality given concomitant serotonergic agents were commonly used.

Will be presented at: 34th ECCMID 2024 – European Congress of Clinical Microbiology and Infectious Diseases, Apr 27-30 2024, Barcelona, Spain

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Yingsi Fang, PharmD

Vincy graduated from Binghamton University School of Pharmacy and Pharmaceutical Sciences in upstate New York in 2023. She is the current PGY-1 acute care pharmacy resident at UPMC Presbyterian and will pursue PGY-2 training in infectious diseases at Beth Israel Deaconess Medical Center in Boston, MA after PGY-1. Her research interests include infectious diseases, psychiatry, and rural and underserved health.

Mentor: Sunish Shah, PharmD, BCIDP

Patient access in primary care: A novel approach to quantify the pharmacist role

Fine, Jason T; Friedlander, Mary P; Sakely, Heather

BACKGROUND: The number of unique patients a provider can care for in one year is an important metric for determining staffing, funding, and promoting appropriate patient access. Recent studies have demonstrated that a primary care physician would need 26.7 hours per day to provide care to a panel of 2500 patients. Pharmacists have been shown to help improve patient outcomes and share physician workload of chronic disease management in primary care. Quantifying patient-pharmacist interactions can help to better advocate for the expansion of embedded clinical pharmacist services in primary care to mitigate primary care provider shortages. This study aims to evaluate the current impact pharmacists have on access to primary care using patient interaction metrics and patient complexity scores.

METHODS: This six-week, multi-center, prospective cohort evaluated pharmacist patient interactions from January 22, 2024 through March 1, 2024. Data was collected utilizing a demographic survey and pharmacist-driven data collection procedure. Twenty pharmacist participants completed a survey describing their role, the practices where they have full time equivalents (FTE) devoted to patient care, whether the practice site is a teaching site with physician and pharmacy learners, and the percent of time that learners are present. Participants documented a reason for each patient interaction as well as the number of medications the patient takes, and the number of disease states addressed during that interaction. Together these values of disease states and medications represented patient complexity. Participants were provided with a data collection protocol and virtual training prior to the data collection period. For each patient interaction including telephone encounters, in person visits, and curbside consults, the phrase *Clinical Pharmacy* was documented under the reason for visit/chief complaint field in the electronic medical record (EMR). After a six-week period this data was collected using EMR reports. The report, Encounters – Past 90 Days, provided information including the provider that opened and closed the encounter, the number of disease states addressed, number of medications the patient was taking, as well as the patient age and zip code.

RESULTS: Out of 20 participants that completed the demographic survey, 4 were excluded. Of those 16 pharmacist participants practicing across 14 distinct primary care clinics 1,501 patient interactions were recorded for 1,163 unique patients over the six-week period. Data analysis is ongoing.

CONCLUSION: Pharmacists fill an important role in primary care providing pharmacotherapy, chronic disease state care, and preventative care services. As part of the team-based model of patient care, pharmacists are positioned to increase patient access to these primary care services.

Jason T. Fine, PharmD

Jason received his Bachelor of Science from The University of Vermont in Burlington. He attended Albany College of Pharmacy and Health Sciences in Colchester, VT. Jason is currently a PGY1 pharmacy resident at UPMC St. Margaret. He is interested in improving patient access to affordable healthcare and medications. Jason looks forward to starting his PGY2 Ambulatory Care residency with UPMC St. Margaret in July 2024.

Mentor: Heather Sakely, PharmD, BCPS, BCGP

Assessment of hypoglycemia as a risk factor for mortality for ICU patients receiving CRRT

Fleming MK, McCormick P, Miller T, Gionfriddo M

BACKGROUND: Intensive care unit (ICU) patients requiring continuous renal replacement therapy (CRRT) are at increased risk for infection, electrolyte disturbances, and with extended CRRT durations, increased risk of mortality. Additionally, there is an increased risk of mortality associated with hypoglycemic events in ICU patients. Previous literature has evaluated risk factors for early mortality in CRRT patients including hypoglycemic events in the first 24 hours after CRRT initiation. However, more data, including events beyond the first 24 hours are needed to determine impacts on patient survival outcomes. The main objective of this study was to evaluate if ICU patients experiencing hypoglycemic events while on CRRT are at increased risk of mortality compared to patients who remain euglycemic or hyperglycemic.

METHODS: This was a retrospective chart review, which included patients older than 18 years receiving CRRT for renal indications in ICUs at UPMC Mercy from 06/01/2021- 06/30/2023. Patients were identified for inclusion based on medication charges and service date. The primary outcome was hospital mortality. Secondary outcomes evaluated days alive in the ICU and patients alive to discharge.

RESULTS: Results are pending.

CONCLUSIONS: Conclusions are pending.

Maura Fleming, PharmD

Maura is a graduate of the PharmD program at Duquesne University in Pittsburgh, PA. She is a current PGY-1 resident at UPMC Mercy. Her interests include medication safety, pharmacy informatics, and infectious disease. After completing her PGY-1 Maura will pursue a PGY-2 in Medication-Use Safety and Policy at Thomas Jefferson University Hospital in Philadelphia, PA.

Mentors: Taylor Miller, PharmD, Pamela McCormick, PharmD, BCPS, BCEMP

Investigating cardiac toxicity in breast cancer patients undergoing capecitabine therapy with and without DPYD mutations

Hanini AM, Kreider MS, Patel A, Dulak D, Levenson JE, Brenner TL, Empey PE, Bastacky, ML

BACKGROUND: The highly polymorphic DPYD gene encodes the rate-limiting enzyme, dihydropyrimidine dehydrogenase (DPD), which is responsible for the catabolism of over 80% of fluoropyrimidines like capecitabine. Deficiencies in DPD can cause severe or potentially fatal toxicities, including myelosuppression, mucositis, and neurotoxicity. Despite known risks, guidance for genetic DPYD testing before treatment vary, emphasizing a notable discrepancy in recommendations for clinical practice. Moreover, cardiotoxic events such as angina, arrhythmias, myocardial infarction, and heart failure occur in 3-9% of patients, but the link between specific DPYD mutations and these risks is not well understood. This study aims to compare the incidence of cardiac events in capecitabine-treated breast cancer patients with and without DPYD mutations and to identify predictive clinical and sociodemographic factors associated with capecitabine-induced cardiac toxicity.

METHODS: This retrospective, single-center study was approved by the University of Pittsburgh IRB and utilized data from the UPMC electronic health record from January 1, 2016, to August 31, 2022. The study included patients diagnosed with breast cancer based on ICD-10 codes who had received capecitabine treatment. A cardiology fellow, blinded to genotype, identified and graded capecitabine-induced cardiac toxicity events according to CTCAE v5.0 definitions. Samples were obtained from the Pitt Biospecimen Core and genotyped using PharmacoScan by ThermoFisher Scientific, Santa Clara, CA. Descriptive statistics, Fisher's exact tests, and t-tests were used for comparative analyses of clinical and sociodemographic factors, while Kaplan-Meier analysis with log-rank tests estimated the time to cardiac toxicity events and facilitated group comparisons.

RESULTS: Of 136 evaluable patients, cardiac events occurred in 14% (n=19) of patients during capecitabine treatment. Of these, 5.1% (n=7) had a DPYD variant. Among the DPYD intermediate metabolizers (IM), 43% (n=3) experienced cardiac events. DPYD IMs were found to have a statistically significantly shorter time to cardiac toxicity event (p=0.01851) compared to DPYD normal metabolizers (NM). Statistically significant risk factors for cardiac events included prior anthracycline exposure (p=0.0057), past cardiac history (p=0.0349), and older age (p=0.02985). The most common cardiac events observed were exacerbation of existing cardiac conditions (17%), cardiomyopathy (17%), atrial fibrillation (13%), and heart failure (13%). Interestingly, no individuals with a DPYD variant who experienced a cardiac toxicity event had a previous cardiac history.

CONCLUSION: This study observed a 14% incidence of cardiac toxicity events during capecitabine treatment, which is higher than reported in existing literature, possibly due to more inclusive criteria. Significant predictors of cardiac toxicity included prior anthracycline exposure, existing cardiac history, and older age, with DPYD intermediate metabolizers showing a statistically significant shorter time to event. These findings underscore the need for further research to validate the genetic influence on toxicity risk and to guide more personalized treatment strategies.

Presented at the Hematology Oncology Pharmacy Association Annual 2024 conference in Tampa, Florida.

Anas Hanini, PharmD, MBA

Anas is a PGY2 Oncology Pharmacy Resident at UPMC Presbyterian Shadyside Hospital in Pittsburgh, PA. He completed his pharmacy education at Oregon State University / Oregon Health and Science University College of Pharmacy. Following this, he completed a PGY1 Residency at MedStar Washington Hospital Center in Washington D.C. Anas' areas of interest include genomics, cardio-oncology, and malignant hematology. He has accepted a post-residency position as an oncology clinical pharmacy specialist at Cleveland Clinic in Abu Dhabi, specializing in bone marrow transplantation and malignant hematology.

Mentors: Melissa Bastacky, PharmD, BCOP; Timothy Brenner, PharmD, BCOP; Philip Empey, PharmD, PhD, FCCP; Joshua Levenson, MD

Use of vasoactive agents in donation after circulatory death heart transplantation

Hannibal LA, Rivosecchi R, Palmer B, Kaczorowski D, Keebler ME, Horn E

BACKGROUND: Outcomes of donation after circulatory death (DCD) heart transplantations have been described by existing literature and have comparable 6-month and 1-year survival rates to transplants utilizing donation after brain death (DBD) heart transplantations. Although survival, primary graft dysfunction, and rejection rates did not differ, the additional cellular damage incurred by DCD hearts during ischemic time is hypothesized to impact the perioperative management and require higher levels of vasoactive support. This is a single center retrospective cohort study that compares DCD and DBD heart transplant recipients' post-operative course through the analysis of a vasoactive inotropic score (VIS). Secondary outcomes assessed include survival, primary graft dysfunction, ICU and hospital length of stay, use of mechanical circulatory support, and use of renal replacement therapy.

METHODS: Heart transplant recipients at University of Pittsburgh Medical Center Presbyterian Hospital with index surgery date between January 2021 to December 2023, who were 18 years or older at the time of transplant will be included in the study. Patients were grouped according to receipt of a DCD or DBD heart transplant. Patients were excluded if they were prior transplant recipients or multi-organ recipients. The primary outcome is the difference of post-operative vasoactive support between DCD and DBD heart transplants. The use of a VIS, as outlined in ISHLT practices, was used to quantify pharmacologic cardiocirculatory support. The VIS was compared upon admission to the intensive care unit (ICU), and at 24, 48, 72 and 96-hours post-transplant. The VIS was calculated by taking the highest dose of each agent within a 6-hour window surrounding the specified time point (3 hours before and 3 hours after). The doses for each agent were ascertained through review of charted rates of administration in the electronic medical record. In determining survival outcomes, patients were only included in analysis if they had reached the specified timeframe. Primary graft dysfunction was assessed using the ISHLT definition. Length of stay was defined as a 24-hour period without readmission to the ICU or hospital. Use of renal replacement therapy included both intermittent hemodialysis and continuous veno-venous hemodialysis.

RESULTS: During the study time, 101 patients underwent heart transplantation; 13 patients were excluded due to multi-organ transplant (10) or previous transplant (3). DCD transplants were less likely to be on MCS prior to transplant when compared to DBD transplants (24% vs 50%) and had a lower UNOS status at the time of transplant, all other demographics were similar between groups. It was found that DCD transplants when compared to DBD transplants had a higher VIS from the time of transplant through 72 hours ($p<0.05$). All other outcomes assessed showed no differences between groups.

CONCLUSIONS: DCD heart transplantations required more postoperative support with vasoactive medications when compared with hearts obtained from DBD. This difference became non-significant at 96 hours. Further research is needed to determine impact on patient outcomes.

Presented at the American College of Cardiology 73rd Annual Scientific Session & Expo April 7, 2024.

Lindsey Hannibal, PharmD

Lindsey is the current PGY-2 Cardiology Pharmacist Resident. She earned her a Doctor of Pharmacy from Roseman University in South Jordan, UT. She then went on to complete a PGY-1 Pharmacy Residency at the George E. Wahlen VA Medical Center in Salt Lake City, UT. Lindsey's professional interest include heart failure, general cardiology, and heart transplant. Upon completion of her PGY-2 Pharmacy Residency, she plans to pursue cardiology board-certification (BCCP). Lindsey hopes to practice at an institution with opportunities to precept residents and students.

Mentors: Ed Horn, PharmD, BCCCP, Ryan Rivosecchi, PharmD, BCCCP

Characterizing ambulatory psychiatric pharmacist services for individuals with autism and developmental disorders

Harrison M, Temelie A, Goulding H, Fabian T

BACKGROUND: Previous studies have highlighted the role of the psychiatric pharmacist services caring for individuals with autism and developmental disorders. These roles include reducing medication-related problems, appropriately deprescribing, patient and family education, mitigating drug-drug interactions and interactions with complementary and alternative medicines, optimizing medication adherence, and improving metabolic monitoring. Clinical pharmacy services were expanded to the ambulatory child/adolescent psychiatry service line, which includes clinics for individuals with autism and developmental disorders. Services were designed to include direct patient care (pharmacist visits for established patients, new patients, and transitions of care or joint pharmacist-provider visits) and indirect patient care (drug information or comprehensive medication review consultations). This project aimed to evaluate the impact of an integrated psychiatric pharmacist services within a subset of specialty hospital-based clinics for autism and developmental disorders.

METHODS: The embedded psychiatric pharmacist tracked services provided in two specialty psychiatric clinics between September 1, 2021 and August 31, 2023. A retrospective chart review was conducted of patients referred for pharmacist consultation. Patient and encounter information including age, sex, zip code, diagnoses, referring provider, referral reason, appointment duration, and pharmacist interventions were collected. Interventions were analyzed and categorized into drug therapy problems (DTP) as established in Pharmaceutical Care Practice by Cipolle, Strand, & Morley. Data analysis was completed using descriptive statistics.

RESULTS: A total of 1,091 referrals were made to the psychiatric pharmacist within the first two years of psychiatric pharmacist integration into specialty clinics for autism and developmental disorders. Of those, 662 (62.5%) resulted in direct patient care encounters, including comprehensive medication management (CMM, n=288), new patient medication intakes (n=199), joint provider visits (n=42), and transition of care medication reviews (n=133). During CMM, the most common pharmacist-identified DTP categories were adherence, adverse drug reaction, dosage too high, and dosage too low.

CONCLUSIONS: Integrated psychiatric pharmacist services were highly utilized in two specialty psychiatric clinics for autism and developmental disorders. Pharmacist interventions were targeted to drug therapy problems across all categories. Furthermore, medication education was identified as a key role for psychiatric pharmacists, providing patients and caregivers with knowledge to achieve their treatment goals. Results of this study can inform identification of high-priority patients who may benefit from psychiatric pharmacist services.

Michael Harrison, PharmD

Michael is originally from Pittsburgh, PA and received his PharmD from The Ohio State University College of Pharmacy in 2023. He is a PGY-1 pharmacy resident at UPMC Western Psychiatric Hospital. His professional interests include acute psychosis and child and adolescent psychiatry. Michael will continue his training at UPMC Western Psychiatric Hospital as a PGY-2 pharmacy resident in psychiatric pharmacy.

Mentors: Andreea Temelie, PharmD, BCPP; Hannah Goulding, PharmD, BCPP; Tanya Fabian, PharmD, PhD, BCPP

Comparison of CNI-free vs CNI-containing regimens in lung transplant recipients

Herrmann BN, Moore CA, Sacha LM, Iasella CJ

BACKGROUND: Calcineurin inhibitors (CNIs) are first-line immunosuppressive agents for prevention of rejection in lung transplant recipients. Among the available CNIs, tacrolimus is typically preferred to cyclosporine for this indication. Adverse reactions to CNIs such as kidney injury, tremors, seizures, or vascular thrombosis are not uncommon and may lead to discontinuation of these agents. Alternative immunosuppressants which may be used in place of CNIs include belatacept, everolimus, or sirolimus. The purpose of this study was to evaluate outcomes between patients able to stay on CNI after lung transplantation compared to those who required a change to an immunosuppressive regimen without a CNI.

METHODS: This retrospective study included lung transplant recipients who were followed at UPMC Presbyterian from January 1, 2015 through December 31, 2023. Patients were excluded if they received a multiorgan transplant. All patients on CNI-free immunosuppression were included. If a patient received multiple lung transplants, only data from their first transplant was included. CNI-free patients were matched to controls in a 1:1 ratio. The primary endpoint was new or worsening chronic lung allograft dysfunction (CLAD). Secondary endpoints included freedom from CLAD or death, and incidence of rejection between cohorts.

RESULTS: There were 36 patients who met inclusion criteria for the CNI-free cohort. These cases were matched 1:1 to controls for a total of 72 patients for the final analysis. Data analysis is ongoing and final results are pending.

CONCLUSIONS: Findings from this research will provide further data about the role of CNI-free immunosuppressive regimens in lung transplant recipients. Additional analysis will help guide optimal CNI-free immunosuppressive regimens in patients unable to tolerate CNI therapy.

Benjamin N. Herrmann, PharmD

Ben is a current PGY-2 pharmacy resident at UPMC Presbyterian. He received his PharmD from the University of Pittsburgh School of Pharmacy in 2022 and completed his PGY-1 residency at UPMC Presbyterian. His professional interests include treatment of antibody-mediated rejection and pre-transplant desensitization.

Mentors: Carlo Iasella, PharmD, MPH, BCTXP, BCPS; Cody Moore, PharmD, MPH, BCTXP, BCPS; Lauren Sacha, PharmD, BCTXP, BCPS

Deep vein thrombosis prophylaxis timing and impact on bleeding for peripheral nerve block catheter removal

Hohmann, SM, Pursglove, M, McCormick, P

BACKGROUND: The current American Society of Regional Anesthesia and Pain Medicine (ASRA Pain Medicine) guidelines recommend a 4-6 hour hold between administration of subcutaneous unfractionated heparin and the removal of peripheral nerve block catheters due to significant anticoagulant effects. However, these guidelines recommend holding enoxaparin for deep vein thrombosis (DVT) prophylaxis 12 hours prior to catheter removal. Overall, compliance with these guidelines has not been examined before. This study will aim to compare occurrence of bleeding during peripheral nerve block removal between patients who have their anticoagulant held and those whose anticoagulant was not held.

METHODS: This is a retrospective cohort study evaluating the effect of holding DVT prophylaxis prior to catheter removal in patients receiving a peripheral nerve block at UPMC Mercy from 2022-2023. Patients were identified using Cognos to pull drug charges for peripheral nerve blocks. Patients were included if they received any peripheral nerve block and DVT prophylaxis. Exclusion criteria consisted of inherited or acquired thrombophilia, missing documentation of peripheral nerve block catheter removal, or being less than 18 years of age. The primary outcome is bleeding at the catheter removal site. No secondary outcomes were measured.

RESULTS: Data collection and analysis are ongoing.

CONCLUSION: Pending.

Samantha Hohmann, PharmD

Samantha is a PGY-1 Pharmacy Resident at UPMC Mercy. She is from Pittsburgh, PA. She received both her B.S in pharmaceutical science and PharmD degrees from the University of Pittsburgh School of Pharmacy. Upon completion of her PGY-1, Samantha hopes to pursue a hospital pharmacy career within the UPMC network.

Mentors: Pamela McCormick, PharmD, BCPS, BCEMP, Marci Pursglove, PharmD

Implementation of an addiction medicine pharmacy consult service at an inpatient psychiatric hospital

Holloway H, Thacker E, Park T, Fabian T

BACKGROUND: In 2021, SAMHSA's National Survey on Drug Use and Health reported that 46.3 million individuals met substance use disorder (SUD) criteria, with only 6% of patients receiving SUD treatment. Previous data within our psychiatric hospital indicated that only 14% of patients with an SUD diagnosis admitted to a unit other than addiction medicine were discharged with evidence-based SUD pharmacotherapy. To better support providers and increase access to medications for SUD, a novel, pharmacist-led addiction medicine consult service was implemented. The purpose of this project was to increase awareness and utilization of the consult service and assess provider satisfaction with the ultimate goal of increasing access to SUD pharmacotherapy.

METHODS: The Addiction Medicine Pharmacy Consult Service was launched in August of 2023, with a phased implementation approach. Several strategies were employed to increase utilization of the new consult service including identifying physician champions, educating physicians and resident physicians, use of digital message boards, and promotional communications from leadership. In addition, targeted outreach and consultation was offered to providers based on frequency of opioid and alcohol withdrawal PowerPlan orders. Pharmacy consults were prospectively recorded by the pharmacist including method and source of referral, reason for consult, and patient outcome. Provider satisfaction was assessed at quarterly meetings and via an 8-question survey. Data were evaluated using descriptive statistics.

RESULTS: To date, consult service utilization has increased from less than 1 consult/month to up to 4 consults/month. At the launch of the service, 100% of consults were identified by the pharmacist. Current trends indicate increased utilization of the consult service with 56% of consults being physician initiated. Preliminary data indicates 86% of patients who received a pharmacy consult were discharged with evidence-based SUD pharmacotherapy. Provider feedback has been overwhelmingly positive during quarterly meetings and utilization of the service has continued to increase. Results of the provider satisfaction survey are pending.

CONCLUSIONS: Given the increase in completed consults, positive provider feedback, and promising patient outcomes, we anticipate continued growth of the Addiction Medicine Pharmacy Consult Service. Future research will focus on patient specific outcomes, including access to evidence-based pharmacotherapy and long-term treatment engagement.

Hannah Holloway, PharmD

Hannah is from Tifton, GA and received her PharmD from the University of Georgia School of Pharmacy in 2023. She is one of the PGY1 pharmacy residents at UPMC Western Psychiatric Hospital. Her professional interests include psychiatry, with particular interest in acute psychosis and substance use disorders. Hannah will continue at UPMC Western Psychiatric Hospital next year to complete a PGY2 in psychiatric pharmacy.

Mentors: Emily Thacker, PharmD, Tanya Fabian, PharmD, PhD, BCPP

Bactrim prophylaxis for Pneumocystis jirovecii in kidney transplant recipients

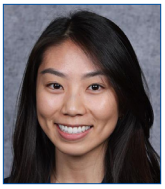
Kim JP, Shimko KA

BACKGROUND: Solid organ transplant recipients are at risk for many opportunistic infections including Pneumocystis jirovecii (PJP). The current guidelines recommend Bactrim or trimethoprim-sulfamethoxazole (TMP-SMX) as the preferred agent of choice for prophylaxis against PJP. TMP-SMX is renally dose adjusted and can cause side effects such as allergic reactions due to sulfa, hyperkalemia and bone marrow suppression. These known allergies and/or reactions can cause prescribers to adjust the TMP-SMX dosing regimen, hold therapy and/or initiate an alternative prophylactic agent (APA) such as dapsone, atovaquone, and pentamidine. However, these APAs are considered second-line agents due to drug intolerances, higher cost, and less favorable efficacy data. The purpose of this study is to assess the tolerability of TMP-SMX, appropriateness of APA initiation, and the impact on the incidence of PJP.

METHODS: This is a single centered, retrospective study evaluating adult kidney transplant recipients at UPMC Presbyterian Hospital who received transplant in 2021. This study includes all adult patients, 18 years and older, who received a kidney transplant between January 1, 2021 – December 31, 2021, followed for one-year post-transplant up to December 31, 2022.

RESULTS: A total of 190 patients are included in the final analysis. Final results are pending.

CONCLUSIONS: Final conclusions are pending.



Jean Kim, PharmD

Jean is a PGY1 Pharmacy Resident at UPMC Presbyterian. She is originally from Houston, Texas and received her Doctor of Pharmacy from the University of Houston College of Pharmacy. She is pursuing a specialty in solid organ transplant and upon completing her training in Pittsburgh, will begin a PGY2 Solid Organ Transplant residency at Tampa General Hospital in Tampa, Florida.

Mentor: Kristen Shimko, PharmD, BCTXP

Gaps in care for COPD management to determine if adverse SDOH impact use of guideline-directed medical therapy

Korte LM, Miller TA, Demoise D

BACKGROUND: Chronic obstructive pulmonary disease (COPD) is associated with abnormalities in the airways and/or alveoli that cause persistent and often progressive airflow obstruction. Risk factors for COPD development and exacerbations include advanced age, female sex, racial and ethnic minority groups, low socioeconomic status, presence of childhood disadvantage factors, history of asthma, and physical inactivity. Guideline-directed medical therapy (GDMT) is based on presence of dyspnea and exacerbations, history of asthma, and blood eosinophil counts. The primary objectives were to identify what, or if, gaps in care for COPD management exist at UPMC Shea Medical Center and determine if those gaps disproportionately affect patients with adverse social determinants of health (SDOH). The secondary objectives were to assess if gaps in care for recommended vaccinations and routine follow-up visits were disproportionately higher in those with adverse SDOH and to identify areas for education to lessen these gaps.

METHODS: Adult patients with COPD followed by a primary care physician at Shea Medical Center were identified for this single-center quality improvement project if they had a COPD-related visit at Shea between 9/1/22 and 9/1/23. Participants were excluded if they were deceased at project initiation, lived outside Allegheny County, required supplemental oxygen, had interstitial lung disease or cystic fibrosis, or were no longer a patient at Shea at project initiation. Other patient data collected included patient demographics, patient-provided SDOH, vaccination history, active prescriptions related to COPD management, dates and diagnoses for emergency department (ED) and hospital visits, and blood eosinophil count. Types of gaps in care related to COPD management included having no prescribed therapy, no rescue therapy, presence of inhaled corticosteroid (ICS) without indication, undertreated asthma (absence of ICS), absence of long-acting bronchodilator (LABA) or muscarinic antagonist (LAMA) with indication for therapy. Descriptive statistics were used to analyze the data.

RESULTS: Out of the 152 patients included in this project, 93 patients (61.2%) had a gap in care related to COPD management. COPD exacerbation requiring ED or hospital stay was significantly higher in the gap population at 17.2% as compared to 1.7% of non-gap population. Further data analysis is ongoing.

CONCLUSIONS: The conclusions from this project are pending completion of data analysis.

Leah Korte, PharmD

Leah received her PharmD degree from Southern Illinois University Edwardsville. She completed her PGY-1 training at Columbia VA Health Care System in South Carolina and is a current PGY-2 Ambulatory Care Pharmacy Resident at UPMC Presbyterian Shadyside. Her professional interests include underserved care and health disparities; population health; and primary care with a focus on diabetes, hypertension, smoking cessation, hepatitis C, and fibromyalgia. Upon completion of residency, Dr. Korte plans to work in primary care with underserved populations.

Mentors: Deanne Hall, PharmD, CDE, BCACP; Trisha Miller, PharmD, MPH, BCACP; Carly Gabriel, PharmD, BCACP

Implementation and outcome of a pharmacist-driven proton-pump inhibitor deprescribing protocol in a primary care setting

Kurochka I, Pater K, Hall D

BACKGROUND: Proton pump inhibitors (PPIs) reduce acid secretion in the stomach and are available by prescription or over-the-counter. Long-term use of PPIs increases the risk of side effects, such as diarrhea, hypomagnesemia, pneumonia, hip fractures, impaired B12 absorption, and *Clostridium difficile* infection. Although PPIs are not suggested for long-term use, many individuals take a PPI longer than prescribed or recommended due to lack of reassessment of symptoms and patient education. Around 25-70% of patients are inappropriately prescribed a PPI. The objective is to evaluate the implementation of a pharmacist-driven PPI deprescribing protocol in a primary care setting.

METHODS: This is a prospective quality improvement project conducted at a single academic family medicine clinic. Baseline needs assessment at this site identified patients that have a PPI documented on the electronic health record (EHR) medication list. Inclusion criteria is patients who are 18 years old or older with a PPI on medication list. Patients were excluded if they had any of the following: Barrett's esophagus, chronic NSAID usage with bleeding risk, or severe esophagitis (Grade C and D). Physician providers were notified of patient eligibility for de-prescribing and provided approval if they agreed. The deprescribing guidelines from the Canada Family Physicians were used as guidance for PPI tapering/discontinuation. Identified patients were provided information on long-term PPI use, de-prescribing of PPI and non-pharmacologic options to manage GERD. Patients were provided transition options from a PPI via three pathways. Pathway 1: Transition from PPI to H2RA or TUMS along with lifestyle modifications. Follow-up with patient in 4 weeks. If patient was unsuccessful, pathway 2 was recommended for further discontinuation options. Pathway 2: Taper PPI dose by intervals. Follow-up with patient every 4 weeks until discontinuation. If patient is unsuccessful, pathway 1 was recommended to patient. Pathway 3: Complete discontinuation of PPI alongside lifestyle modifications. Follow-up with patient in 4 weeks. If patient is unsuccessful, pathways 2 and 3 were recommended for further discontinuation options. Patients could decline de-prescribing as well. Descriptive statistics were used to characterize the data.

RESULTS: Out of 200 patients on a PPI, 108 were excluded and 92 met the inclusion criteria or were not approved for de-prescribing by the provider. Out of these 92 patients, 37 were contacted to date. Thirteen patients did not return three outreach attempts, 9 patients were no longer taking a PPI, 8 patients transitioned from PPI to an H2RA and/or TUMs with one successful 4-week follow-up, and 7 patients declined to stop taking PPI. Out of 15 patients with a successful outreach attempt that indicated continued PPI use, there was a 53% success rate of stopping PPI use. Implementation is ongoing.

CONCLUSIONS: Preliminary results show that PPI de-prescribing by a pharmacist has 53% success rate. Medication lists were also updated to reflect accurate PPI usage. These preliminary results show that slightly over half of patients are open to discontinuing a PPI. Further research should be conducted to address patients that declined to discontinue.

Iryna Kurochka, PharmD

Iryna completed her PGY-1 Community Residency with Virginia Commonwealth University. She is the current PGY-2 Ambulatory Care Resident at UPMC Presbyterian-Shadyside.

Mentors: Karen Pater, PharmD, CDCES, BCACP, Deanne Hall, PharmD, CDCES, BCACP

Effect of peripheral nerve blocks on narcotic utilization in lung transplants

Lakic J, Sanchez PG, Rivosecchi RM

BACKGROUND: Lung transplantation is a complex surgical procedure associated with postoperative pain, frequently necessitating narcotic utilization. Peripheral nerve blocks with lidocaine are a promising modality for pain management in lung transplant recipients, but their impact on narcotic use remains unexplored.

METHODS: This retrospective cohort study included adult patients who received a double lung transplant at UPMC Presbyterian Hospital between January 2008 and November 2023. In 2020 there was a programmatic shift towards the use of peripheral nerve blocks in the peri-extubation period. Patients were excluded if they met any of the following criteria: multi-organ transplant, transplanted from extracorporeal membrane oxygenation (ECMO) and/or mechanical ventilation, or required chronic opioid therapy prior to transplant. Patients prior to this shift were labeled as the "pre" group while those after were defined as the "post" group. Demographic information, narcotic utilization, pain scores, and post operative outcomes such as pain management and time on mechanical ventilation were collected. Data was collected throughout a four-day post-operative period. Time zero was defined as block placement and data was collected from t-24 hours to t+72 hours. Clinical outcomes included comparisons of narcotic utilization and pain scores over four days and time to liberation from mechanical ventilation between the two groups. Statistical analysis is pending.

RESULTS: Research in progress. Data collection for the pre-group is ongoing. In the post group, 220 patients were identified by admission diagnosis code for double lung transplant and a medication charge for lidocaine and/or bupivacaine. One hundred and eighty-seven patients were included in the analysis of the post-group. Median morphine milligram equivalents (MME) dropped from t-24 requirements daily through post block day number with 2,472 mg, 250 mg, 27.1 mg, 15 mg respectively. Daily median pain scores remained unchanged through post block day number with scores of 3, 4.2, 4.44, and 4.6 respectively. Twenty-seven patients (14.4%) received a post-operative ileus diagnosis following ICU stay. Median duration of intubation was 2.2 days.

CONCLUSIONS: Final conclusions are pending. The findings of this study have the potential to optimize postoperative pain management in lung transplant recipients by demonstrating the effectiveness of peripheral nerve blocks in reducing narcotic utilization and improving patient outcomes, ultimately enhancing the quality of care for these complex surgical patients.

Jelena Lakic, PharmD

Jelena is a PGY-1 Acute Care Pharmacy Resident at UPMC Presbyterian. She received her PharmD from Ohio Northern University in 2023. Her professional interests include critical care and academia. Upon completion of PGY1, she will complete a PGY2 in critical care at Penn State Milton S. Hershey Medical Center in Hershey, PA.

Mentors: Ryan Rivosecchi, PharmD, BCCCP

Pharmacist-led intervention to improve osteoporosis treatment rates after hip fracture

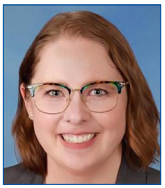
Marker EM, Grimes AE, Leman KM

BACKGROUND: Hip fractures are a common occurrence among older adults, with about 300,000 patients hospitalized each year. Serious consequences include up to 36% excess mortality at one year, approximately 20% of patients requiring long-term nursing home care, and 60% unable to return to their prior level of independence. The Bone Health and Osteoporosis Foundation's 2022 guidelines recommend pharmacotherapy for patients with a history of hip, spine, or wrist fracture. A recent study reported only 14.5% of U.S. patients received anti-resorptive therapy within one year after hip fracture, confirming treatment rates remain low in this population. Our study attempts to improve treatment rates by raising awareness and providing a comprehensive treatment algorithm for responsible providers to use post-hip fracture.

METHODS: This pre-post quality improvement project was conducted at a 250-bed community teaching hospital which houses a pharmacy residency, family medicine residency, and geriatric fellowship program; and is also staffed by a hospitalist service. A guideline-based algorithm was developed to guide providers towards initiating IV zoledronic acid while inpatient, oral alendronate upon discharge, or a referral to primary care or rheumatology. The algorithm remained available to all services on a shared drive and through email. The osteoporosis treatment rate was assessed pre-intervention for patients discharged between January 1, 2022 and February 28, 2023. Then an educational intervention was performed which hospitalists received during an online meeting, and medical residents received after rounds during the first week of each rotation block. It included a brief introduction to the issue of poor treatment rates and discussion of the benefits of anti-resorptive treatment after hip fracture, and instructions for using the prescribing algorithm. Post-intervention treatment rates were then assessed from December 2023 through March 2024. Analysis included adults 50 years or older admitted for hip fracture. Exclusion criteria include patients currently treated for low BMD verified by prescription fill history or other medical record, fill history unavailable, or patients who elected comfort measures only or died. The primary outcome was the percentage of patients starting treatment within 90 days after hip fracture as defined by external prescription fill records or documented administration of parenteral therapy. Secondary outcomes were the incidence of zoledronic acid ordered, incidence of oral bisphosphonates ordered, and referrals to rheumatology service.

RESULTS: A total of 76 patients were included in the pre-intervention cohort and 20 patients were included from the shorter post-intervention period. Data collection on the primary outcome is ongoing. Preliminary data show that during the pre-intervention period treatment rate was approximately 12% (n=76), whereas post-intervention treatment rate is currently 50% (n=12) with eight patients still pending.

CONCLUSIONS: Preliminary results show a pharmacy education intervention increased in patients receiving treatment for osteoporosis after hip fracture. Data from this study may be useful in supporting further geriatric pharmacy service initiatives.



Elisabeth Marker, PharmD, BCPS

Elisabeth is a PGY-2 Geriatric Pharmacy Resident at UPMC St. Margaret Hospital. She is originally from Minneapolis, Minnesota and received her Pharm.D. from Virginia Commonwealth University in Richmond, Virginia. She completed her PGY-1 Pharmacy Practice Residency at UPMC St. Margaret as well. Her professional interests include deprescribing, diabetes management, and osteoporosis. Upon completing her PGY-2, she is excited to continue working in the primary care setting caring for patients in the Willamette Valley of Oregon.

Mentor: Amy Grimes, PharmD, BCPS, BCGP

Comparison of albumin and crystalloid fluids for the management of perioperative volume resuscitation in esophagectomies

Martinez MA, Pursglove ML, McCormick PJ, Gionfriddo MR

BACKGROUND: Esophagectomies are high-risk procedures associated with significant morbidity and mortality. Appropriate perioperative fluid management is critical in maintaining adequate perfusion, limiting vasopressor requirements, and preventing anastomotic leak complications that often result in surgical failure. There is a traditional preference among surgeons to utilize colloid solutions, such as albumin, over crystalloids for volume resuscitation, despite a gap in the existing literature showing improved outcomes. This strategy was disrupted when albumin was placed on national shortage in September 2022. Considering albumin's unstable supply coupled with its historically high expense, the purpose of this cohort study was to evaluate differences in morbidity and mortality outcomes between patients who received albumin or crystalloids during esophagectomies.

METHODS: This was a multi-center, retrospective chart review investigating the perioperative medical management of patients undergoing esophagectomies at UPMC Mercy and UPMC Passavant Hospitals between August 2020 and December 2023. Patients were included if they were 18 years or older, underwent their first esophagectomy, and received albumin solution or crystalloid fluids. This study focused on volume resuscitation strategies before and after the albumin shortage, splitting patients into two cohort groups. Patients were identified from a list of surgeries and included if esophagectomy or esophagectomy laparoscopic was their primary procedure during the specified time frame. The primary endpoint was the rate of anastomotic leak between groups. Secondary endpoints included rate of in-hospital mortality, length of stay, time on ventilator, total volume requirements both intraoperatively and postoperatively, rate of acute kidney injury, continuous renal replacement therapy requirements postoperatively, vasopressor push and drip requirements, and loop diuretic push requirements.

RESULTS: Final analysis and results are pending.

CONCLUSIONS: The results of this study will provide insight into the optimal therapeutic and economic approach to fluid resuscitation in esophagectomies following the albumin shortage.

Mario Martinez, PharmD

Mario is originally from Pittsburgh, Pennsylvania and received both his Bachelor of Science in Pharmaceutical Sciences and PharmD from The Ohio State University College of Pharmacy. He is currently a PGY1 resident at UPMC Mercy. Upon completion of his PGY1, Mario will further his training as a PGY2 Oncology resident at UPMC Shadyside as he explores interests in bone marrow transplant, oncologic emergencies, and academia.

Mentors: Marci Pursglove, PharmD; Pamela McCormick, PharmD, BCPS, BCEMP; Michael Gionfriddo, PharmD, PhD; Mohamed Yassin, MD, PhD; Brian Lohr, PharmD, BCCCP

Describing pharmacist-led nutrition support interventions under a collaborative practice agreement in the home infusion setting

Masri SM, Szabo KJ, Tokarski RM

BACKGROUND: The nutrition support pharmacist (NSP) is recognized by the American Society for Parenteral and Enteral Nutrition (ASPEN) as a crucial member of the multidisciplinary team for the specialized care of patients receiving parenteral nutrition (PN). Despite this recognition, there is a lack of data describing the role of the NSP within the home parenteral nutrition (HPN) setting. Further, pharmacist management of HPN within the scope of a Collaborative Practice Agreement (CPA) has not yet been investigated. The objective of this quality improvement study was to characterize the NSP interventions in HPN management under a CPA, to inform continuous quality improvement efforts.

METHODS: This single-center, observational, retrospective study was submitted to the Quality Review Board for approval. The estimation of patient cases included in this study was based on a preliminary analysis of electronic medical records from March 1, 2023, to August 31, 2023. This time frame was selected to ensure an adequate sample size to provide meaningful insights into the types and frequencies of pharmacist-led interventions. The electronic medical record was queried to identify patients who were receiving HPN or custom hydration in the home setting and had documented encounters by NSPs during the study period. All documented encounters for patients who were receiving HPN or custom hydration in the home setting were included in the study. Encounters that lacked patient review or interaction were excluded from the study analysis. Data related to the following interventions was collected: laboratory monitoring, home parenteral nutrition or custom hydration formula management, other intravenous medication therapy management, patient counseling and education, IV-line monitoring, new therapy recommendations, and, when applicable, escalations to a higher level of care.

RESULTS: A total of 58 patients made up 270 encounters that met eligibility resulting in 721 identified interventions conducted by the NSPs. Overall, 263 (97.4%) encounters consisted of at least 1 intervention made by the NSP. One hundred thirty-three (49.3%) encounters consisted of 2 interventions made by the NSP. One hundred twenty-six (46.7%) encounters involved 3 or more pharmacist-led interventions. Parenteral nutrition (PN) adjustments constituted 21.6% (156) of all interventions conducted. Changes to electrolytes were the most frequent accounting for 41.0% (64) of all formula-related adjustments. Short bowel syndrome (SBS) was the most common primary indication for HPN accounting for 325 interventions among 41.4% (24) of patients across 121 encounters. Limitations included a small sample size, single-center retrospective observational design, and inclusion of a small number of encounters that were reviewed by a pharmacist but lacked direct patient interaction.

CONCLUSIONS: In our study, the role of the home infusion pharmacist was expanded under a CPA to support the independent management of HPN patients. The findings of this study not only contribute to current practice recommendations but also identify the need for continuous quality improvement efforts in managing HPN patients. Given the high-risk, complicated, and costly nature of PN therapy, our innovative CPA model can provide a basis for providing specialized care and optimizing patient outcomes.

Presented at the ASHP 2023 Midyear Clinical Meeting, Anaheim, CA and NHIA 2024 Annual Conference, Austin, TX.

Sarah Masri, PharmD

Sarah received her PharmD in 2022 from the Wegmans School of Pharmacy in Rochester, New York. She is currently a PGY-1 Pharmacy Resident at CarepathRx where she is focusing on home infusion and specialty pharmacy. Her professional interests include ambulatory care, medication therapy management technology, and home infusion.

Mentors: Kayla Szabo, PharmD, BCNSP; Rebecca Tokarski, PharmD, BCNSP

Evaluation of the perceptions surrounding intranasal naloxone (Narcan) use and accessibility in a population dealing with homelessness

Maurer J, Connor S, Solosky B, Okwamba J, Abbott J, Foo I, Huynh L, White A, Leon-Jhong A, Hurwitz M

BACKGROUND: Homelessness and the drug overdose epidemic are both considered public health emergencies. Drug overdose is currently the leading cause of unintentional death in the United States. Studies suggest that people experiencing homelessness are at higher risk of overdose. Narcan is a medication that reduces death from opioid overdose as it can rapidly reverse the effects of an opioid. Despite the steps taken to increase community accessibility of Narcan, opioid overdose deaths continue to occur at alarming rates. Providers report they are often declined when offering take-home Narcan. In populations experiencing homelessness, there have been few studies surrounding Narcan, mostly evaluating various educational interventions. The purpose of this study is to describe the perceptions surrounding the use of and accessibility of Narcan among members of a population experiencing homelessness.

METHODS: This was a qualitative study using semi-structured interviews. Subjects included adults who met the definition of homelessness according to the McKiney-Vento Act. The interview questions were developed using the Health Belief Model framework and interviews were conducted from November 2023 to May 2024. Subjects were recruited through the Second Avenue Commons, a low barrier shelter with an in-house medical clinic and during street rounds with the Street Med at Pitt team. Interviews were audio recorded and transcribed verbatim and coded. The principles of Grounded Theory were used to identify themes.

RESULTS: Twelve interviews were conducted with subjects from the Second Avenue Commons Shelter. Seven subjects identified as male and five as female. Eleven were Caucasian and one was African American. Preliminary thematic analysis of the interview transcripts identified several common themes. Themes include feelings of fear or unpredictability of behavior surrounding substance use and Narcan use, and subjects report worry about supportive actions needed during overdose (ex. CPR). Subjects describe having a great deal of experience with substance use disorder (SUD) situations and perceive Narcan as being available in the community but wonder if those who use substances want Narcan or if it is even helping. Subjects also expressed a desire for classes/training describing the innerworkings of Narcan and how to safely use it in event of an overdose.

CONCLUSIONS: Persons experiencing homelessness are aware of SUD and reported wide Narcan availability. Subjects were conflicted about SUD, addiction, and the use of Narcan. Results of this study will be used to develop programs targeted to persons experiencing homelessness to address the barriers surrounding Narcan use and to enhance awareness about the disease process in chronic addiction.

Julena Maurer, PharmD

Julena is currently a PGY-2 pharmacy resident with the UPMC Ambulatory Care Global Health program. She earned her Doctor of Pharmacy degree from the University of Buffalo School of Pharmacy and Pharmaceutical Sciences in Buffalo, NY and completed her PGY-1 residency at UPMC Shadyside Hospital. Her professional interests include underserved care and global health. Outside of residency, Julena enjoys traveling, spending time with friends and family, and exploring Pittsburgh.

Mentor: Sharon Connor, PharmD

Outpatient antibiogram effect on rates of bug-drug mismatch

Meaney DT, Pickering AJ

BACKGROUND: Outpatient antimicrobial stewardship is an essential part of patient care. Approximately 60% of US antibiotic expenditures come in the outpatient setting. In this setting, practitioners rely on inpatient antibiograms to make informed treatment decisions regarding empiric antimicrobials. These antibiograms may not accurately reflect the susceptibilities of outpatient cultures and therefore may lead to bug-drug mismatches (inappropriate drug for a resistant organism). How often these bug-drug mismatches are occurring at our three family health centers is unknown. This project serves to determine the rate of bug-drug mismatches before and after the creation of an outpatient antibiogram and associated provider education.

METHODS: We conducted a prospective observational study at three outpatient family health centers. Cultures obtained at any of the included primary care clinics from April 2023-March 2024 were included in antibiogram creation. The primary outcome was to evaluate bug-drug mismatch rates before and after the introduction of an outpatient antibiogram. The antibiogram was compiled using an Epic antibiogram report. Prescribers were educated virtually and in-person on the antibiogram in February 2024. Bug-drug mismatch was evaluated pre-antibiogram (September-October 2023) and post-antibiogram release (February-March 2024).

RESULTS: There were 468 individual cultures assessed for inclusion in the outpatient antibiogram, of which 93 cultures (8 different organisms) were included. The outpatient antibiogram found that cultures growing E. coli were 76% susceptible to trimethoprim-sulfamethoxazole, below 80% cutoff, unlike the inpatient antibiogram (83% susceptibility). Prescribers were educated on the antibiogram via email communication, during a monthly staff meeting, and individually in clinic. Bug-drug mismatch pre-antibiogram was 15.1% (n=33), while post-antibiogram mismatch was 20.0% (n=15) ($p = 0.76$; 95% CI: 0.21-2.76).

CONCLUSIONS: The outpatient antibiogram was similar to the inpatient antibiogram. There was no difference in the rate of bug-drug mismatches before and after the creation of an outpatient antibiogram and associated provider education. Potential reasons for no difference in bug-drug mismatch rate post-antibiogram included 45% of antibiotics selected post-speciation, limiting mismatch, as well as possible inadequate provider education. While this study was limited by a paucity of available culture data beyond 6 months previous, outpatient antibiograms remain an area of future research to mitigate bug-drug mismatch.

This research was accepted for presentation at the 2024 Annual STFM (Society of Teachers of Family Medicine) Conference

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Drake Meaney, PharmD, BCPS

Drake is a PGY2 ambulatory care pharmacy resident at UPMC St. Margaret. His primary practice site this past year was the UPMC Bloomfield-Garfield Family Health Center. He received his Doctor of Pharmacy degree from the University at Buffalo. Drake completed his PGY1 pharmacy residency at UPMC St. Margaret. After residency, he plans to join Great Lakes Integrated Network in Buffalo, NY as an ambulatory care pharmacist.

Mentor: Aaron Pickering, PharmD, BCPS

Barriers and facilitators in the provision of fentanyl test strips in the community pharmacy setting

Nguyen TQ, Smith BE, Foo I, Chaves MJ, Coley KC, Carroll JC

BACKGROUND: In the United States, over 100,000 deaths due to accidental fentanyl overdose were reported in 2022. Harm reduction is an evidence-based approach that helps to engage with people who use drugs and equip them with life-saving tools and information to make informed decisions about their drug use. Fentanyl test strips are a harm reduction tool that can be used to detect fentanyl commonly found in illicitly manufactured drugs. In January 2023, they were decriminalized in Pennsylvania. The research objective is to identify barriers and facilitators from pharmacists, pharmacy team members, and harm reduction specialists on the provision of fentanyl test strip services in community pharmacies.

METHODS: Multi-phase, qualitative focus group discussions were utilized to gather thoughts from diverse groups of pharmacy team members and harm reduction specialists across Pennsylvania. Phase 1 discussion consisted of homogeneous groups of participants who are either pharmacy team members or harm reduction specialists. Phase 2 discussion will be a heterogeneous group of participants from Phase 1 who will be invited back and asked to utilize aggregate Phase 1 data to develop strategies pharmacists can use for fentanyl test strip provision in community pharmacies. Phase 1 focus groups were conducted via teleconference, audio recorded, and transcribed. Rapid qualitative analysis methods utilizing a data matrix was conducted after Phase 1. At least two members of the research team independently coded each focus group transcript. Focus group discussion questions were informed by The Consolidated Framework for Implementation Research and The Principles of Harm Reduction from the National Harm Reduction Coalition. Funding for this research was provided by an American Pharmacist Association New Practitioner Grant. This research was approved by the University of Pittsburgh institutional review board.

RESULTS: Four focus groups consisting of fourteen participants (seven harm reduction specialists and seven pharmacy team members) were conducted between December 2023 and March 2024. Preliminary results demonstrate participants generally support community pharmacies providing fentanyl test strips and think that it can increase access. Participants remarked the provision of this product needs to be implemented thoughtfully or it may perpetuate stigma instead of lessening it. Preliminary strategies include: (1) pharmacies should involve people with lived experience or harm reduction organizations in implementation and education; (2) pharmacy team members should minimize asking invasive or personal questions of those receiving the service; (3) lower the cost barrier and prominently display fentanyl test strips in pharmacies; (4) bundle fentanyl test strips with other services (e.g. naloxone, wound care, syringe access); and (5) buy-in from all pharmacy team members involved in the service provision is needed for successful implementation. Additional strategies are currently being refined.

CONCLUSIONS: Community pharmacies may provide valuable access points for people with substance use disorders to receive harm reduction supplies such as fentanyl test strips. These strategies can help facilitate the implementation of fentanyl test strip provision in Pennsylvania community pharmacies and may be transferable to pharmacies in other states.

Presented at Pitt Health Disparities and Social Justice Poster Competition, APhA Institute on Substance Use Disorders, PPA Annual, and APhA Annual

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Thai Nguyen, PharmD

Thai is a Public Health Fellow at the University of Pittsburgh School of Pharmacy and a pharmacist at the Allegheny County Health Department. His research focuses on meeting public health needs by harnessing the accessibility, knowledge, and trust of pharmacists. Some of his most recent efforts center around promoting vaccination equity and increasing access to sexually transmitted infections and harm reduction services in community pharmacies. When not at work, he enjoys camping, cycling, and snuggling with his two cats Gus and Moo. Thai is a graduate from University of Pittsburgh School of pharmacy, Class of 2021.

Mentors: Joni Carroll, PharmD, BCACP, TTS; Kim Coley, PharmD, FCCP

The impact of a revised diabetic ketoacidosis protocol

Parisi MK, Trisler MJ, Heisel RW

BACKGROUND: Recent literature suggests early initiation of basal insulin in diabetic ketoacidosis (DKA) may hasten DKA resolution with reduced risk of complications such as rebound hyperglycemia and hypoglycemia during acute management. In April 2022, UPMC Shadyside implemented an updated DKA treatment protocol that was designed to facilitate ease of order placement for providers and order verification by pharmacists. The protocol updates involving early basal insulin initiation and adjustment of intravenous fluid choices corresponded with recent literature evidence. A subphase within this protocol allows providers to order subcutaneous bolus insulin in patients who are stable and have the ability to tolerate oral intake without an ICU admission requirement. This QI project aims to assess the impact of basal insulin glargine initiation on the time to DKA resolution while evaluating appropriate initiation of the subcutaneous bolus insulin subphase of the protocol.

METHODS: This was a retrospective cohort analysis of adult patients who received an intravenous insulin infusion at UPMC Shadyside between June 2021 and June 2023. Patients were excluded if they were <18 years old, received an insulin infusion for a non-DKA diagnosis (i.e., cardiothoracic surgery patient), or were transferred from an outside hospital while receiving an insulin infusion. Patient demographics (age, gender, weight), and patient characteristics/laboratory values (home basal insulin dose, the use of basal insulin upon DKA diagnosis, IV fluids utilized, the use of vasopressors or renal replacement therapy) were collected. Patient admission characteristics included hospital and ICU admission/discharge date, length of stay, date of DKA diagnosis/resolution, and date of anion gap closure. The use of basal insulin at diagnosis and patient eligibility for the subcutaneous bolus insulin subphase were also recorded. The primary endpoint was the time to DKA resolution and will be compared between cohorts prior to and after implementation of the DKA protocol. The secondary endpoint was appropriate use of the updated institutional DKA ordering protocol. Appropriate use of this ordering protocol was characterized by the initiation of basal insulin upon DKA diagnosis and/or initiation of the subcutaneous insulin subphase in patients with mild – moderate DKA. Descriptive statistics were utilized to characterize the data. This project was approved by the UPMC QI Review Committee.

RESULTS: A total of 52 patient encounters met inclusion/exclusion criteria: 31 patients received insulin infusion prior to the protocol updates and 21 patients after the updated protocol. Data collection is complete and data analysis is ongoing.

CONCLUSIONS: The results of this analysis will be used to inform provider, nurse, and pharmacist education of proper usage of this institutionalized DKA protocol.

Marissa Parisi, PharmD

Marissa is from Pittsburgh, PA and earned her PharmD from Duquesne University in 2023. She is currently a PGY-1 Pharmacy Resident at UPMC Shadyside Hospital. Her primary professional area of interest is internal medicine. Upon completion of her residency, Marissa intends to work as a pharmacist in the acute care setting.

Mentors: Ronald Heisel, PharmD, BCCCP, Michael Trisler, PharmD, MPH, BCIDP

Utilization trends of medications used as single maintenance and reliever therapy for asthma exacerbations

Patel H, Jose A, Hospodar A, Clarkson B, Patel J, Korde P

BACKGROUND: Asthma affects approximately 25 million people in the United States (US) and results in an estimated burden of $50 billion yearly. It is characterized by chronic inflammation and bronchoconstriction leading to its hallmark features of episodes of wheezing, breathlessness, and coughing. Traditionally, guidelines recommended the use of an as-needed short-acting beta agonist (SABA) for reliever therapy along with a low dose inhaled corticosteroid inhaler (ICS) for maintenance. In a pivotal shift, the Global Initiative for Asthma (GINA) updated its clinical guidelines in 2019, now advocating for single maintenance and reliever therapy (SMART). This approach leverages a combination inhaler with an inhaled corticosteroid and a long-acting beta agonist (ICS-LABA) to relieve both chronic and acute symptoms. The results of this study will assess utilization trends of select medications used as single maintenance and reliever therapy and provide insight into the adoption of the SMART therapeutic approach in a commercially insured population.

METHODS: To assess utilization trends of select medications used as single maintenance and reliever therapy, a retrospective observational analysis was completed on prescription claims data from a cohort of a commercial population. Utilization was measured before and after the GINA guidelines updates in April 2019. Medications used included those that contain inhaled corticosteroids and long-acting beta agonists within a single inhaler. The study period ranged from 06/01/2017 to 05/31/2023. The pre-GINA guideline period is defined as 06/01/2017 to 05/31/2019 and the post period is 06/01/2019 to 05/31/2023. One fiscal year (FY) will be defined as June 1 to May 31 of the following year. The primary outcome in this study identified utilization trends for selected medications before and after the 2019 GINA guideline updates. Overall utilization was measured by the number of inhalers dispensed per unique utilizer per year (PUPY). Secondary outcomes analyzed the average fill interval year over year and the number of utilizers with greater than one ICS-LABA combination inhaler per month (30 days). Average fill interval is defined as the aggregated mean duration between consecutive prescription refills for each unique member within the population.

RESULTS: The number of dispensed ICS-LABA inhalers PUPY had the greatest increase from FY 2020 to FY 2021 (+28%). The average fill interval for ICS-LABA inhalers showed a gradual decline year over year with the greatest decrease occurring from FY 2021 to FY 2022 (-26%). When shown as a percentage of all ICS-LABA utilizers, the number of utilizers who received greater than one ICS-LABA inhaler per month increased from FY 2017 to FY 2020 (22% to 25%). From FY 2019 to FY 2022, a decrease in percentages is shown (25% to 21%).

CONCLUSIONS: When adjusted for total membership size and normalized to PUPY, the utilization rates have remained steady throughout the study time frame and the change in quantity does not seem consequential. This slow adoption of the SMART therapeutic approach may stem from contradictory guidelines and the lack of FDA approval for this indication. Further research is needed to evaluate the impact of the GINA guideline updates on ICS-LABA inhaler utilization.

Presented at the Academy of Managed Care Pharmacy Annual Clinical Meeting, New Orleans, LA. April 17, 2024.

Harsh Patel, PharmD

Harsh is originally from Scranton, Pennsylvania and earned his PharmD from the University of Pittsburgh School of Pharmacy in 2023. Harsh is a PGY-1 managed care pharmacy resident at CVS Health. Upon completion of his managed care program, he will pursue a clinical pharmacist role in a managed care organization.

Mentors: Abraham Jose, PharmD; Alexa Hospodar, PharmD; Bradley Clarkson, PharmD; Jay Patel, PharmD; Prajakta Korde, PharmD, BCPS

Evaluation of unnecessary dual anaerobic coverage in patients with pelvic inflammatory disease

Pavasko NM, Musco J, Oakes A, Wiesenfeld H

BACKGROUND: Pelvic inflammatory disease (PID) is defined as inflammation of the upper genital tract due to an infection. The most common cause of PID is the sexually transmitted infections C. trachomatis and N. gonorrhoeae. The CDC guideline recommendations for the inpatient treatment of PID are either cefoxitin plus doxycycline, or ceftriaxone plus metronidazole plus doxycycline. Although these are the 2021 STI guideline recommendations, providers continue to order cefoxitin plus metronidazole for the treatment of PID which results in unnecessary duplicative anaerobic coverage and increased risk of adverse effects. The objective of this study was to provide teaching to different services throughout the hospital to improve antibiotic prescribing for PID.

METHODS: This study was a retrospective chart review quality improvement project that took place at UPMC Magee Womens Hospital (MWH). Patients were included in this study during two different time periods. The first set of patients were collected for a pre-educational medication use evaluation between the dates of July 1, 2023 and September 30, 2023. Teaching took place on January 31, 2024 for pharmacists, February 20, 2024 for OBGYN residents, and March 14, 2024 for emergency department staff. The second set of patients were collected for a post-educational medication use evaluation between the dates of February 25, 2024, and May 25, 2024. All persons with a PID diagnosis code admitted to MWH in the specified time frame that received an antibiotic for PID were included in the study. Descriptive statistics were used to quantify the outcome measures and are reported as percentages. The primary endpoint was to assess whether a teaching intervention would improve antibiotic prescribing and pharmacist interventions for the treatment of PID.

RESULTS: Research in progress with results pending.

CONCLUSIONS: Research in progress with conclusions pending.

Nicole Pavasko, PharmD

Nicole is from Pittsburgh, Pennsylvania where she earned her Doctor of Pharmacy degree from the University of Pittsburgh. She is currently a PGY1 pharmacy resident at UPMC Magee Womens Hospital. Her professional interests include infectious diseases, critical care and internal medicine. Upon completion of her PGY1 residency, she will pursue a pharmacist position in a hospital setting.

Mentors: Justin Musco, PharmD, BCPS, Amber Oakes, PharmD, BCPS, Harold Wiesenfeld, MD

Evaluating the impact of pharmacist-driven type 2 diabetes management on guideline-directed medications in older adults

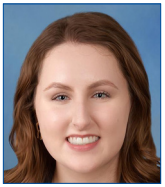
Reigh AV, Grimes AE, and Proddutur B

BACKGROUND: Almost one third of adults ≥65 years have type 2 diabetes mellitus (T2DM). The American Diabetes Association recommends either metformin, a sodium-glucose cotransporter-2 inhibitor (SGLT2i), or a glucagon-like peptide-1 receptor agonist (GLP-1 RA) as first-line T2DM pharmacotherapy in older adults. Use of thiazolidinediones, sulfonylureas, and complex insulin regimens is not recommended in older adults due to risk of hypoglycemia. The involvement of a pharmacist in the management of T2DM is associated with improved glycemic control, increased frequency of diabetes health maintenance screening, and reduction in physician workload. Therefore, the objective of this project was to assess the impact of pharmacist-driven management on guideline-based prescribing of glucose-lowering agents in patients ≥65 years with T2DM.

METHODS: This is a multi-site, retrospective chart review of patients ≥65 years with T2DM who had a primary care provider (PCP) visit at one of two outpatient geriatric clinics between January 1, 2023 and December 31, 2023. The primary outcome is the number of guideline-based glucose-lowering agents prescribed when T2DM is managed by a pharmacist versus not managed by a pharmacist. Pharmacist-managed T2DM is defined as one or more diabetes-focused touchpoints (telephonic or in-person) with a pharmacist during the study period. Baseline measures collected include age, sex, and PCP. Clinical measures collected include last body mass index (BMI), last hemoglobin A1c (HbA1c), renal function, number of pharmacist-driven diabetes touchpoints, and current glucose-lowering agents. Secondary outcomes include number of potentially inappropriate glucose-lowering agents (e.g. sulfonylurea, thiazolidinediones, and complex insulin regimens) when T2DM is managed versus not managed by a pharmacist, number of patients with controlled (HbA1c <8%) versus uncontrolled (HbA1c≥8%) T2DM, number of guideline-based glucose-lowering agents versus potentially inappropriate glucose-lowering agents prescribed when T2DM is controlled, and number of guideline-based glucose-lowering agents versus potentially inappropriate glucose-lowering agents prescribed when T2DM is uncontrolled. Data will be analyzed using descriptive and inferential statistics.

RESULTS: Data analysis is ongoing.

CONCLUSIONS: The conclusions from this project are pending completion of data analysis.



Abigail Reigh, PharmD

Abigail is a PGY-2 Geriatric Pharmacy Resident and Faculty Development Fellow at UPMC St. Margaret. She received her Doctor of Pharmacy in 2022 from the University of Pittsburgh School of Pharmacy and completed her PGY-1 pharmacy residency at UPMC St. Margaret. After completing her residency training, Abigail will be a Palliative Medicine/Supportive Oncology Clinical Pharmacist at Atrium Health Levine Cancer Institute in Charlotte, NC. Her professional interests include geriatrics and palliative care.

Mentors: Amy E. Grimes, PharmD, BCPS, BCGP and Brittany Proddutur, MD

Evaluation of a comprehensive antimicrobial stewardship initiative for gram-negative bacteremia in UPMC facilities

Rogers TM, Trisler M, Ours R, Pickering A, Stewart W, Welch J, Salata H, Heffern M, Wein M, Abad C, Oakes A, Ergen H, Jawanda J, Trzebucki A, Shah S, Angelo S, Khadem T, Ludwig J, Yakemowicz C, Woodworth C, Shields RK, McCreary E

BACKGROUND: Duration of therapy is a key target of antimicrobial stewardship (AMS) efforts. Studies demonstrate that shorter courses of therapy (e.g., 7 days) are non-inferior to prolonged courses of therapy (e.g., 14 days) in patients with uncomplicated gram-negative bacteremia (GNB). Moreover, shorter courses of therapy are associated with reduced risk of colonization with multi-drug resistant organisms (MDRO), and decreased hospital length of stay and antibiotic-associated adverse events. In December 2022, UPMC implemented an AMS initiative to help pharmacists identify patients with GNB using a clinical decision support software (CDSS, ILÚM Insight, Infectious Diseases Connect, Inc.) alongside an evidence-based treatment algorithm. The goal was to recommend short course therapy for patients with uncomplicated GNB and promote de-escalation to oral antibiotics whenever possible. The primary objective of this study is to determine the impact of a clinical decision support software alert for GNB combined with antimicrobial stewardship prospective audit and intervention on total duration of antibiotic therapy for GNB.

METHODS: This is a retrospective cohort study of patients ≥18 years old who had a CDSS alert for a positive blood culture containing one or more Enterobacterales species during the pre-intervention (March 1, 2022 to August 31, 2022) or post-intervention (March 1, 2023 to August 31, 2023) study periods. Patients were excluded if they had complicated bacteremia, polymicrobial infection, were admitted ≤24 hours or died ≤72 hours after blood culture result, had the index blood culture drawn outside of a UPMC facility, or had a severe immunocompromising condition on admission. The primary outcome is total antibiotic days of therapy (inpatient and post-discharge). Secondary outcomes include antibiotic- or infection-related readmission within 30 days, C. difficile infection within 60 days, development of multi-drug resistant infection within 60 days post-discharge, and percentage of patients who complete antibiotic course of therapy on an oral antibiotic.

RESULTS: There were 1,573 patients from 21 UPMC facilities that met inclusion criteria (755 pre- and 818 post-intervention). Of these, 425 and 432 patients were included in the final pre- and post-intervention analyses, respectively. Primary reasons for exclusion were complicated infection (36.4%), polymicrobial infection (7.3%), or culture drawn at non-UPMC facility (1.7%). Data collection is complete and analysis is ongoing.

CONCLUSIONS: The results of this study will guide the future care of patients with GNB across UPMC and will help the UPMC system antimicrobial stewardship program assess the progress of this pharmacist-driven UPMC initiative. Subgroup analyses can help target future stewardship efforts to certain UPMC facilities or patient populations.

Tara Rogers, PharmD

Tara is a current PGY-1 resident at UPMC Shadyside originally from Youngstown, OH. She graduated with a B.S. in Molecular & Cell Biology from Kent State University in 2019 and a PharmD from the University of Pittsburgh in 2023. Tara has professional interests in clinical research, quality improvement, and teaching. Upon completion of her PGY-1, she will stay on as an inpatient pharmacist at UPMC Shadyside.

Mentors: Erin McCreary, PharmD, BCPS, BCIDP and Michael Trisler, PharmD, MPH, BCIDP

Standardizing the workflow process of a pharmacist-led continuous glucose monitoring (CGM) service in the primary care setting

Shih BJ, Ballard SL.

BACKGROUND: Continuous glucose monitors (CGM) are wearable devices that provide real-time blood glucose data intended to be used for management of diabetes mellitus. Some drawbacks of using CGM are delays in utilization after CGM is prescribed, difficulty of data integration into the electronic health record, and barriers to revenue generation for clinician practices. This quality improvement project implemented a pharmacist-led CGM workflow to reduce delays in CGM utilization, improve CGM documentation, and initiate pharmacist billing of CGM services. The aim was for at least 80% of patients with CGMs who are actively managed by pharmacists to have optimized workflow including chart documentation of CGM data in a format that enables tracking over time and is eligible for billing.

METHODS: Participants in the study were active patients with diabetes mellitus and CGM ordered from January 1st, 2023 and onward at a family health center. A pharmacist-led CGM service workflow protocol was implemented including guidance on referrals from providers, scheduling parameters, documentation tools for the electronic health record, and billing requirements. Implementation included physician training on ordering CGM and instructions to administrative staff on scheduling visits. The primary outcome was the percentage of patients with CGM data documented after a CGM device was ordered. Process measures included pharmacist time spent on CGM data documentation; percentage of encounters submitted for billing compared to encounters eligible for billing; monthly service utilization; amount and type of pharmacist interventions; time from initial CGM training to first CGM data review; and CGM visit frequency. Data will be analyzed using descriptive statistics and statistical process control with run charts.

RESULTS: Data collection is ongoing. A standardized clinic workflow for pharmacist-led CGM services was launched in March 2024. As of April 2024, there is a panel of 26 patients actively followed by pharmacists at the family health center for CGM services. Billing for CGM services was first implemented in March 2024 and is ongoing.

CONCLUSIONS: Conclusions are pending completion of project. This project aims to show the implementation of a pharmacist-led CGM workflow to improve CGM data chart documentation and the ability to bill for CGM services. This project is anticipated to contribute sharable resources for CGM services and billing for other practice sites.

This quality improvement project will be presented at the UPMC Family Medicine Scholarship Day and the UPMC Quality and Safety Improvement Fair.

Brenda Shih, PharmD

Brenda received her Doctor of Pharmacy from the University of Michigan College of Pharmacy. She completed her PGY-1 community pharmacy residency with Duquesne University and Giant Eagle Pharmacy in Pittsburgh, PA. She is currently a PGY-2 ambulatory care pharmacy resident at UPMC Shadyside Family Health Center. She has interests in chronic disease management, preventative care, and community public health.

Mentor: Stephanie Ballard, PharmD, BCACP

Identifying clinical inertia during the titration phase of GLP-1 agonist management for the treatment of type 2 diabetes in outpatient clinics- A Retrospective Review

Slaven B, Rebitch C

BACKGROUND: Studies have reviewed predictors of delay in treatment intensification and worsening of A1c control when it comes to first-line diabetes treatment including metformin and insulin. These studies have shown the value of pharmacist involvement for diabetes management and improving time to treatment initiation. However, there is limited data on patterns for delay in treatment intensification during the titration phase for GLP-1 agonists for the treatment of type 2 diabetes. The objective of this project was to identify clinical inertia during titration phase involving appropriate timeline to targeted optimal dose and side effect management with Glucagon like peptide 1-recpetor (GLP-1) agonist usage.

METHODS: Single-center retrospective study of patients with the diagnosis of type 2 diabetes at UPMC Matilda H. Theiss Health Center. Patients 18 years or older with the diagnosis of type 2 diabetes and prescribed a GLP-1 agonist for at least 30 days or greater within the timeframe of January 2018 – January 2023 were included. Patients were considered optimized if they reached maximum dose or maximum tolerated dose within 120 days.

RESULTS: Following data collection, 37 patients out of 80 were excluded, 43 unique patients were identified and 55 unique medication trials. Of these patients, medication trials were: Ozempic (19), Trulicity (25), Byetta (2), Victoza (4), and Rybelsus (5). The average number of days to reach optimization after GLP-1 agonist initiation was 293 days. Results to be collected include identifying factors that may contribute to patients not reaching optimization within 120 days.

CONCLUSIONS: Pending final data analysis.

Brianne Slaven, PharmD

Brianne is from Aurora, CO and received her B.A. in Neuroscience at the University of Colorado, Boulder followed by her PharmD from the Medical University of South Carolina College of Pharmacy located in Charleston, SC. She completed her PGY1 pharmacy residency at UPMC Presbyterian and is now a current PGY2 Ambulatory Care/Global Health resident at UPMC Presbyterian-Shadyside. Her professional interests are medication therapy management/ chronic disease management within underserved populations and global health.

Mentor: Catherine Rebitch, PharmD, BCACP

Impact of emergency department antibiotic prescribing on inpatient treatment of community-acquired cholecystitis

Snyder BR, McCormick PJ

BACKGROUND: In the setting of community-acquired cholecystitis of mild-moderate severity, the Infectious Diseases Society of America does not support empiric pseudomonas coverage. The purpose of our research project is to assess the impact of antibiotic prescribing for community-acquired cholecystitis in the emergency department (ED) on inpatient antimicrobial use. Additionally, we analyzed the impact of the emergency medicine (EM) pharmacist on appropriate antibiotic selection.

METHODS: A single-site, retrospective chart review was conducted at a tertiary care academic medical center. Patients 18 years and older, who presented to UPMC Mercy from 2020-2022, and were continued on antibiotics for cholecystitis in the inpatient setting were eligible. The primary outcome was the frequency of identical antibiotic continuation in the inpatient setting. Secondary outcomes included: antibiotic duration, inpatient mortality, hospital length of stay, anti-pseudomonal antibiotic frequency, EM pharmacist involvement, and 30-day readmission rate. This study was approved by the institutional review board.

RESULTS: A total of 580 patients were diagnosed with cholecystitis and 50 met inclusion criteria for review. Subjects were classified into pseudomonal (n=36) and non-pseudomonal (n=14) coverage groups. All findings are preliminary. No significant differences in baseline demographics were observed. The majority of the patients received the same antibiotic coverage that was initiated in the ED (no change= 56%, full change= 28%, partial change= 16%). EM pharmacist involvement was highest in the cases where antibiotics were not changed. The inpatient mortality rate was zero and 30-day readmission rates were less than 10%. Data analysis is ongoing.

CONCLUSIONS: This retrospective chart review found that patients were numerically more likely to receive inpatient pseudomonas coverage when it was empirically started in the ED. Additionally, we found that EM-trained pharmacists were involved in the majority of the antibiotics initiated in the ED, and their involvement helped promote antibiotic consistency in the inpatient setting. Future studies can further elucidate the need for pseudomonas coverage for cholecystitis and the impact of EM pharmacy involvement.

Brett R. Snyder, PharmD

Brett is from Grove City, Pennsylvania. He received his PharmD from Duquesne University in Pittsburgh. He worked as a staff pharmacist at UPMC Altoona then completed his PGY1 at UPMC Mercy. Brett is the first PGY2 Emergency Medicine pharmacy resident at UPMC. His favorite part of PGY2 was developing his own practice in the emergency department and critical care units, as well as interacting with patients and family members during their time of need. In his free time, Brett enjoys fly fishing, skiing and spending time with loved ones in Grove City, Buffalo and Uniontown.

Mentor: Pamela J. McCormick, PharmD, BCPS, BCEMP

Timing of hydrocortisone initiation relative to vasopressor dose in septic shock

Stachler E, Ordons B, Dittmer A, Pickering A, Lohr B, Posey T, Zou R

BACKGROUND: According to the 2021 Surviving Sepsis Guidelines, intravenous (IV) corticosteroids should be started once a dose of 0.25 mcg/kg/min of norepinephrine (NE), or an equivalent vasopressor, has been reached for at least four hours after initiation. This is an upgrade from their previous weak recommendation in 2016 to initiate IV corticosteroids with ongoing vasopressor requirements. Current literature primarily focuses on mortality and reversal of shock, which can introduce several confounding variables outside of shock reversal. Our objective is to provide additional evidence for the timing of hydrocortisone initiation and its impact on duration of vasopressors in septic shock.

METHODS: Retrospective chart review of adult patients in the intensive care unit (ICU) at UPMC St. Margaret, East, and Passavant hospitals, diagnosed with septic shock receiving first-line vasopressors (norepinephrine or phenylephrine) and hydrocortisone from January 1, 2021, to January 1, 2023. Patients were excluded if they were under 18 years, initiated epinephrine as the primary vasopressor, or received long-term corticosteroid therapy for at least 6 months before their index admission. Patients were analyzed in two groups, early initiation of hydrocortisone prior to primary vasopressor dose achieving 0.25mcg/kg/minute and recommended initiation group of hydrocortisone starting on or after a vasopressor dose of 0.25mcg/kg/minute. The primary outcome is the total length of time on vasopressors. Secondary outcomes include length of hydrocortisone therapy, length of hospital stay, maximum vasopressor dose and adverse event rates.

RESULTS: There were 89 patients included in the early initiation group and 88 patients in the recommended initiation group. The medians for the primary endpoint of primary vasopressor duration were 72.1 hours in the early initiation group and 58.8 hours in the recommended initiation group (absolute difference 13.3; P-value 0.93). Median hydrocortisone duration was 53.9 hours in the early initiation group and 46.2 hours in the recommended initiation group (absolute difference 7.7 hours; P-value 0.76). Median length of stay was longer with earlier initiation at 15 days versus 7 days in the recommended initiation groups (absolute difference 8 days; P-value 0.01). Median maximum vasopressor dose was significantly higher in the recommended initiation group (1 mcg/kg/min) compared to the early initiation group (0.2 mcg/kg/min) (absolute difference 0.8 mcg/kg/min; P-value <0.001). Adverse events related to vasopressors included extravasation requiring medication intervention in 4 patients (4%) of early initiation group compared to 1 patient (1%) in the recommended initiation group. Rates of hypernatremia and hyperglycemia during hydrocortisone therapy were similar between groups.

CONCLUSIONS: Among patients admitted to the ICU for septic shock, timing of hydrocortisone initiation relative to a vasopressor dose ≥0.25mcg/kg/min NE did not confer a statistically significant difference on overall vasopressor duration. Although the initiation of hydrocortisone after vasopressor dose of 0.25 mcg/kg/min had statistically significant higher maximum vasopressor dose and longer hospital stay. Length of hydrocortisone therapy and adverse events were similar between the two groups. Therefore, in patients with septic shock in the medical ICU, earlier hydrocortisone initiation prior to vasopressor dose achieving 0.25mcg/kg/min may be appropriate.

Presented at the Society for Teachers of Family Medicine, Los Angeles, CA, May 5, 2024.

Eva Stachler, PharmD

Eva is a graduate from the Purdue University College of Pharmacy in West Lafayette, IN. She is currently a PGY-1 Pharmacy Resident and Faculty Development Fellow at UPMC St. Margaret's Hospital in Pittsburgh, PA. Following her first year of pharmacy residency, Dr. Stachler has been accepted into the PGY-2 Geriatric Pharmacy Residency at UPMC St. Margaret's Hospital. Her professional interests include geriatric medicine and teaching. As such, she plans to pursue a clinical faculty role post-residency to combine her patient care skills with academia.

Mentor: Brianna Ordons, PharmD, BCPS, BCCCP

Evaluation of a diabetes best practice alert for pharmacist consult

Stanko M, Osborne M, Camp G, Difilippo A, Sakely H

BACKGROUND: A best practice alert (BPA) is an electronic alert received by clinicians during patient care visits and is designed to guide evidence-based decisions such as referrals to pharmacists. This study evaluated a BPA across four primary care clinics. The aim was to identify patients with diabetes who would benefit from a pharmacist consult early on, before A1C rises and complications worsen.

METHODS: This study was a multi-site, pre/post quality improvement project from January 2023 – November 2023. Data was obtained through electronic health record reports. Inclusion criteria is age 18-75 years old with an A1C ≥ 8.5 % or patients aged 76+ years old with an A1C ≥ 9 %. Exclusion criteria for the post-BPA group were patients who have already been referred for a pharmacist consult for diabetes in the pre-BPA period and patients who were referred to a pharmacist consult at an A1C below the BPA threshold. Individual patient chart reviews were performed to include specific elements of pharmacist consult visits. The primary outcome is to identify the number of patients receiving a pharmacy consult as a result of the BPA. Secondary outcomes are to identify improvements in A1C, demonstrate an improvement in the patient's diabetes regimen, and quantify additions of continuous glucose monitors (CGM) for eligible patients. This study captured patients with a wide area of deprivation index (ADI), meaning it included patients with socio-economic disadvantages based on their geographical area, who may have reduced access to a pharmacist. Inferential simple statistics and one-way descriptive frequency tables will be used to display the pre and post data.

RESULTS: As a result of the BPA, 45 patients received pharmacist consults. The average patient ADI was between six and seven, indicating that more vulnerable patients were reached throughout the study. In the pre/post analysis, average A1C at the time of pharmacist consult reduced by 1.3% (pre-BPA: 11.2% vs. post-BPA: 9.9%), indicating that patients received initial management at a lower A1C. Improvements in A1C within three to six months post-consult improved in the post-BPA period (pre-BPA: 25 vs. post-BPA: 31). Patients who reached goal A1C increased in the post-BPA period (pre-BPA: 13 vs. post-BPA: 16). Guideline directed medical therapy (GDMT) additions and titrations reduced by an average of one medication in the first two to three pharmacist visits (pre-BPA: 2 [1 – 4] vs. post-BPA: 1 [0 – 4]), indicating that pharmacists were able to intervene earlier in the treatment process. CGM additions increased in the post-BPA period (pre-BPA: 16 vs. post-BPA: 20). More patients received planned decision making on lifestyle in the post-BPA period (pre-BPA: 20 vs. post-BPA: 29). When eligible, planned decision making on smoking cessation was achieved by more patients in the post-BPA period (pre-BPA: 5 vs. post-BPA: 7).

CONCLUSIONS: Best practice alerts for diabetes increase number of patients receiving a pharmacist consult. Pharmacist consults, as a result of a best practice alert, improve patient-related outcomes such as A1C reduction, addition of GDMT, and addition of CGMs when applicable.

Madeline Stanko, PharmD

Madeline received her Doctor of Pharmacy from Purdue University in 2023. She is currently a PGY1 Pharmacy Resident and Faculty Development Fellow at UPMC St. Margaret. Her professional interests include high-quality patient care in the ambulatory setting, community outreach, and academia. This upcoming year, she plans to continue her experience as a learner with St. Margaret as a PGY2 Ambulatory Care Pharmacy Resident.

Mentor: Heather Sakely, PharmD, BCPS, BCGP

Comparison of psychiatric readmission rates for pediatric and adolescent patients on long-acting injectable antipsychotics vs. oral antipsychotics

Sun CN, Temelie A, Goulding H, Clark C, Yabs M, Fabian TJ.

BACKGROUND: Long-acting injectable antipsychotics (LAIAs) are an effective treatment option for adult patients with schizophrenia, schizoaffective disorder, and bipolar disorder. Current literature shows increased adherence rates, reduced hospitalizations, and an overall reduction in healthcare costs when LAIAs are utilized in these patients. However, information regarding LAIA use in pediatric and adolescent patients with psychiatric disorders is sparse, as there are currently no LAIAs FDA-approved in patients less than 18 years of age. This study aimed to evaluate the rates of psychiatric readmissions in pediatric and adolescent patients on a LAIA compared to those prescribed an oral antipsychotic.

METHODS: This was a retrospective chart review of patients ≤ 18 years of age discharged from an acute psychiatric hospital between 10/1/2015 and 10/31/2022. Patients were included if they had an inpatient or day-of-discharge order for a LAIA or were prescribed an oral antipsychotic at discharge. LAIAs included aripiprazole lauroxil, aripiprazole monohydrate, olanzapine pamoate, paliperidone palmitate, risperidone microspheres, risperidone subcutaneous, haloperidol decanoate, and fluphenazine decanoate. Corresponding oral antipsychotics included aripiprazole, olanzapine, paliperidone, risperidone, haloperidol, and fluphenazine. Baseline demographic information (age, sex, race) and hospital encounter information (length of stay, readmission data) were collected. Propensity matching will be utilized to match patients based on factors such as age, sex, primary diagnosis, antipsychotic, and concomitant psychotropic medications. The primary outcome is the 3-month psychiatric readmission rates. Secondary outcomes include 6-month and 12-month readmission rates and hospital length of stay.

RESULTS: There were 54 patients with an inpatient or day of discharge order for a LAIA that were included in the LAIA group. The average age in the LAIA group was 15.7 years (range 10-17 years), with a greater percentage of male patients (n=32, 59.6%) than female patients (n=22, 40.7%). LAIAs included paliperidone palmitate (n=21, 38.9%), aripiprazole monohydrate (n=20, 37.0%), aripiprazole lauroxil (n=8, 14.8%), haloperidol decanoate (n=3, 5.6%) and risperidone microspheres (n=2, 3.7%). The 3-month readmission rate in this group was 16.7% (n=9 patients readmitted), followed by a 6-month and 12-month readmission rate of 24.1% (n=13 patients readmitted) and 27.8% (n=15 patients readmitted), respectively. Full results, including demographic information and readmission data for patients prescribed an oral antipsychotic, to follow.

CONCLUSIONS: Results from this research project will provide insight into how long-acting injectable antipsychotic use affects clinical outcomes in pediatric and adolescent patients with psychiatric disorders.

Christina Sun, PharmD

Christina obtained her PharmD from the University of Pittsburgh School of Pharmacy in 2022. She completed her PGY1 pharmacy residency at UPMC Western Psychiatric Hospital and is currently specializing in psychiatry as a PGY2 psychiatric pharmacy resident at UPMC Western Psychiatric Hospital. Her professional interests include psychiatry (specifically acute psychosis and long-acting injectable antipsychotic use) and pharmacogenomics. Upon completion of her residency, Christina will be moving to Boston and will practice as a clinical psychiatric pharmacist at McLean Hospital. Outside of work, Christina enjoys hanging out with her pet cats, going to spin classes, and writing calligraphy.

Mentors: Andreea Temelie, PharmD, BCPP, Hannah Goulding, PharmD, BCPP, Christine Clark, PharmD, BCPP, Melanie Yabs, PharmD, MS, BCPP, Tanya J. Fabian, PharmD, BCPP, PhD

Evaluation of venous thromboembolism prophylaxis in patients with low body weight

Thompson T, D'Amico F, Miller T, Ordons B, Rivosecchi R, Taylor A

BACKGROUND: Venous thromboembolism (VTE) is a potential complication in acutely ill hospitalized patients. Enoxaparin and unfractionated heparin (UFH) are commonly used to prevent VTE in at-risk medically ill hospitalized patients. There is little guidance on the appropriate dose of enoxaparin or UFH to prevent VTE in patients with low body weight. There is concern for higher drug concentrations in low body weight individuals, which may result in higher risk of bleeding. The study objective is to evaluate the safety and efficacy of reduced dose enoxaparin (30 mg SC once daily), standard dose enoxaparin (40 mg SC once daily), reduced dose UFH (5000 units SC twice daily), and standard dose UFH (5000 units SC three times daily) for VTE prophylaxis in medically ill hospitalized patients with low body weight.

METHODS: This is a multi-hospital, retrospective cohort study evaluating low body weight patients that received either standard or reduced dose enoxaparin or UFH for VTE prophylaxis. Adult patients with low body weight (≤ 55 kg) that were hospitalized at one of four hospitals within the UPMC health system from 2020 to 2022 were considered for inclusion. Patients had to meet the following criteria to be included: admitted to a medicine or hospitalist service; weight ≤ 55 kg; and received prophylactic doses of enoxaparin or UFH. Patients were excluded if any of the following criteria were met: any surgical intervention; any trauma; diagnosis of COVID-19; disruption in prophylactic anticoagulation therapy for > 72 hours; pregnancy; creatinine clearance < 30 mL/min and/or CKD stage 4-5; body mass index (BMI) of 40 or greater; received therapeutic doses of any anticoagulant medication. The primary safety outcome was major bleeding. Secondary outcomes included clinically relevant non-major (CRNM) bleeding and VTE.

RESULTS: Six hundred patients were included in the study: 375 (62.5%) received enoxaparin 40 mg SC daily, 53 (8.8%) received enoxaparin 30 mg SC daily, 90 (15%) received UFH 5000 units SC twice daily, and 82 (13.7%) received UFH 5000 units SC three times daily. One hundred and forty-five patients met criteria for major bleeding, with only 12 being documented symptomatic bleeds. There was no significant difference in the rates of major bleeding between all groups, P > 0.05. When comparing enoxaparin (at all doses) to UFH (at all frequencies), the rate of major bleeding was not significantly different (ARR 0.07 [95% CI -0.01 - 0.15], P=0.07). CRNM bleeding occurred in 5 patients. VTE events occurred in 3 patients. Statistical analyses were not performed on these outcomes as differences were negligible.

CONCLUSIONS: There was no significant difference in major bleeding, CRNM bleeding, or VTE when comparing enoxaparin 30 mg SC once daily, enoxaparin 40 mg SC once daily, UFH 5000 units SC twice daily, and UFH 5000 units SC three times daily. Further, there was no significant difference in major bleeding when comparing enoxaparin to UFH. Prospective studies are needed to confirm the safety and efficacy of reduced doses of enoxaparin and UFH for VTE prophylaxis in medically ill patients weighing ≤ 55 kg.

Taylor C. Thompson, PharmD, MBA, BCPS

Taylor is a PGY-2 Ambulatory Care Resident and Faculty Development Fellow at UPMC St. Margaret. Her primary practice site is the UPMC St. Margaret New Kensington Family Health Center. Taylor also completed her PGY-1 Pharmacy Residency at UPMC St. Margaret. She attended West Virginia University (WVU) in Morgantown, WV to complete a dual degree program, including a PharmD and MBA. After residency, Taylor will start her career as a Clinical Assistant Professor at the WVU School of Pharmacy with a secondary appointment in the School of Medicine, Department of Family Medicine.

Mentors: Frank D'Amico, Ph.D.; Taylor J Miller, PharmD; Brianna Ordons, PharmD, BCPS, BCCCP; Ryan Rivosecchi, PharmD, BCCCP; Alexandria Taylor, PharmD, BCPS

Reasons for nonactionable alerts from a clinical decision support system generated by artificial intelligence in a clinical trial

Tran TL, Amatullah N, Stottlemyer BA, Kane-Gill SL

BACKGROUND: The "Multi-Hospital Electronic Decision Support for Drug-Associated Acute Kidney Injury" (MEnD-AKI) clinical trial utilizes a machine learning generated system that evaluates over 200 variables to produce alerts for pharmacist driven nephrotoxin stewardship interventions. The incorporation of artificial intelligence (AI) to generate clinical decision support (CDS) alerts in patient care may be a turning point in the prevention of adverse drug events. Like rule based CDS, developed by human knowledge, machine learning generated CDS also produces nonactionable alerts. Identifying reasons for nonactionable alerts with AI CDS are key for streamlining functionality. We aim to quantify and describe nonactionable alerts associated with AI-generated CDS.

METHODS: In MEnD-AKI, actionable alerts were those that met the inclusion criteria of the trial, while nonactionable alerts were those that did not meet the inclusion criteria because of the patient's location, care status, or incorrect information. For one month, pharmacists responding to alerts for patients admitted to a non-intensive care unit setting as part of the MEnD-AKI trial documented actionability of the alert and reasons for nonactionable alerts. Nonactionable alerts were categorized into 1) data that was not accessible for retrieval by algorithm due to the structure of the hospital system's electronic health record (EHR); 2) change in information/data from the time of running the AI algorithm to the time the pharmacists received the alert; 3) coding issues; and 4) miscellaneous.

RESULTS: There were 843 alerts generated with several of the alerts categorized as nonactionable [77.6% (654/843)]. Unstructured data included alerts with an estimated baseline serum creatinine but missed a patient's historic serum creatinine value [11.6% (76/654)], documentation of end-stage renal disease unavailable in the problem and diagnoses tab of the EHR [1.4% (9/654)], and patient's status as comfort measures only [1.2% (8/654)]. Information changes involved alerts that populated information that was no longer correct such as the attending physician listed on the patient profile was not included in the study [13.8% (90/654)] and patients discharged before a pharmacist could respond [2.3% (15/654)]. Coding problems, not related to the AI, included patients admitted to a critical care unit [22.8% (149/654)], alert generated for renally dosed medications that were already dose adjusted and no nephrotoxin to intervene on [17.9% (117/654)], patients admitted to hospitals not of inclusion [6.7% (44/654)], and alert misfiring [0.9% (6/654)]. Lastly, the miscellaneous category of alerts [21.4% (140/654)].

CONCLUSIONS: Nonactionable alerts are produced by CDS alerts utilizing AI. Improvement is possible in AI-generated CDS alerts with EHR information standardization, an ability to include unstructured data, shortening the time to communication between data extraction and alert generation, and refining code to address limitations.

Tiffany Tran, PharmD

Tiffany is currently a clinical research fellow for medication safety and nephrotoxin stewardship at the University of Pittsburgh School of Pharmacy. She received her PharmD at the Virginia Commonwealth University School of Pharmacy. Tiffany's professional area of interest is in the field of pharmacovigilance.

Mentor: Sandra Kane-Gill, PharmD, MSc, FCCM, FCCP

Early versus delayed administration of insulin glargine in diabetic ketoacidosis

Tsvetkova M, Hand S, McCormick P, Gionfriddo M

BACKGROUND: Diabetic ketoacidosis (DKA) is a life-threatening complication of diabetes that imposes a significant risk of morbidity and mortality. The American Diabetes Association (ADA) guidelines currently recommend continuous IV administration of regular insulin until DKA resolution with a dose of basal insulin administered 2-4 hours prior to the discontinuation of the drip. There is evidence, however, to support administration of basal insulin at the initiation of IV insulin therapy. In February 2022, UPMC Mercy's acute DKA Powerplan was updated to include an initial dose of basal insulin at the start of IV insulin infusion, aiming to reduce the time on the insulin drip and shorten the time to DKA resolution.

METHODS: This retrospective cohort study included patients with a diagnosis of DKA at UPMC Mercy from 2020-2023. Patients were included if they were 18 or older at the time of the encounter and if they had a diagnosis of DKA on presentation. Patients were excluded if they were treated with rapid-acting SQ insulin instead of the IV infusion, had documented history of intolerance to insulin glargine, were hemodynamically unstable requiring pressors, or were diagnosed with euglycemic DKA. The primary outcome measured was time to DKA resolution, and secondary outcomes were hospital and ICU length of stay, incidences of hypoglycemia, rebound hyperglycemia, and hypokalemia, and IV insulin drip duration.

RESULTS: Data analysis is ongoing.

CONCLUSIONS: The conclusions from this project are pending completion of data analysis.

Maya Tsvetkova, PharmD

Maya is from Saint Petersburg, Russia and received her PharmD from the University of Pittsburgh. She is a PGY-1 resident at UPMC Mercy, and her interests include emergency medicine, toxicology, and working with the underserved patient populations. Upon completion of her residency, Maya will be continuing her training with the UPMC Ambulatory Care Global Health program as a PGY-2 resident. Outside of pharmacy she enjoys knitting, gardening, hiking, and camping.

Mentors: Sydney Hand, PharmD and Pamela McCormick, PharmD, BCPS, BCEMP

Piloting a medication discharge program for residents transitioning from a skilled nursing facility to home

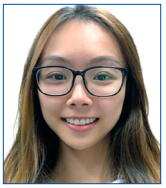
Van C, Ruby CM, Dessoye JJ, Carlock PB, Aspinall MB.

BACKGROUND: Transition between hospitals, skilled nursing facilities (SNF) and home represent high-risk periods for medically complex and vulnerable patient populations. During such process, medication discrepancies can occur. There are various care models that guide transition from hospital to home or from SNF to hospital. Few pathways have addressed the gap in models for SNF to home. The purpose of this project is to assess the feasibility of a pharmacist-driven pilot aimed to improve the discharge process from two UPMC-affiliated SNFs to home utilizing RxPartners, LTC's At-Home medication management services.

METHODS: The study included residents at least 18 years of age who were admitted to the SNFs from November 1, 2023 to January 31, 2024. We collaborated with members of the interdisciplinary team including providers, nurses, social workers, and physical/occupational therapists to identify potential candidates for this pilot. For enrollment into At-Home, the residents completed an intake form with the pharmacist and subsequently had their medications transferred to and managed by RxPartners, LTC upon discharge. The primary endpoint was resident and staff satisfaction. Secondary endpoints included pharmacist conducted medication education during the process. Additional outcomes included total number of residents enrolled with At-Home's services, total number of residents who will continue to utilize At-Home services upon the 30-day follow up, as well as medication-related 30-day rehospitalizations and/or emergency room visits. A 30-day post-discharge follow-up was conducted in February 2024 to assess both resident and staff satisfaction regarding the services provided. This project was approved by the UPMC QI Committee.

RESULTS: A total of 39 residents were recruited. The population was 20/39 (51%) female, 27/39 (69%) White, median age of 70, and an average length of stay of 36 stays. The average number of chronic and pro-re-nata (PRN) medications were 12.7 and 6.9, respectively. A total of 2/39 (5%) residents were officially enrolled with At-Home services. The most common reasons for declining services included continuing with the current medication management system and absence of the power of attorney to make the decision. Of the two residents enrolled with At-Home, both reported excellent (the highest rating) across all domains of care on the satisfaction survey upon the 30-day follow up. For staff satisfaction, the results showed mixed rating. Pharmacist education focused on anticoagulation, opioid usage, and bowel regimen. One of the two residents had a 30-day rehospitalization not related to medication use.

CONCLUSION: Pharmacists play an important role in the transitions of care for patients, particularly older adults, across different settings. Determining the right pharmacy provider for SNFs remains a challenge due to the unique needs of this patient population. This pilot highlighted the potential feasibility of a medication discharge program before broader implementation in the larger, long-term care setting.



Cindy Van, PharmD

Cindy is from Queens, NY and attended St. John's University College of Pharmacy and Health Sciences. She completed her PGY-1 residency at Mount Sinai Queens/The Mount Sinai Hospital and is now the PGY-2 geriatric pharmacy resident with UPMC Presbyterian/Shadyside and RxPartners. Her interests include transitions of care, geriatric primary care, and health policy. Upon graduation, Cindy will be starting a new position as a Geriatric Pharmacotherapy Fellow at the University of Maryland School of Pharmacy.

Mentors: Monica Aspinall, PharmD, BCGP; Christine Ruby-Scelsi, PharmD, BCPS, BCGP, FASCP; Joshua Dessoye, PharmD; Paula Carlock, RPh, COO.

Assessment of decentralized obstetrics pharmacy service implementation at UPMC Magee-Womens Hospital

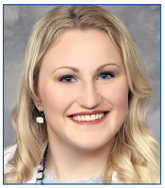
Voithofer MJ, Christner J, Nero JV

BACKGROUND: Obstetric-specific pharmacy services are rare in the United States, but they are becoming more necessary as high-risk pregnancies and maternal complication rates rise. UPMC Magee-Womens Hospital (MWH) delivers over 10,000 babies yearly and cares for many women with complicated pregnancies. About 20% of those babies are cared for in MWH's Neonatal Intensive Care Unit, often as a result of complicated pregnancies. Clinical pharmacists optimize and improve patient care, especially in those with comorbidities, like diabetes, hypertension, or infections. By stationing a decentralized clinical pharmacist on an obstetric unit that cares for both antepartum and postpartum patients, there is an opportunity to assess the benefit of having a pharmacist readily available to intervene on drug-related problems, answer medication questions, and coordinate patient care with a multidisciplinary team. The objective of this study was to assess how the quantity and variety of pharmacy interventions changed in the six-month period after implementation of the decentralized service.

METHODS: Reports of documented pharmacy interventions were reviewed for applicable units for dates ranging from 3/27/23 - 9/26/23 (pre-implementation period) and compared to the pharmacy interventions documented for applicable units for dates ranging from 9/27/23 - 3/26/24 (post-implementation period). Due to the initial uncertainty of when the service was consistently scheduled, an interim period was not assessed, and post-implementation data simply started on the first day the service was scheduled (9/27/23). Inclusion criteria were clinical inventions on obstetric units within the specific time frame outlined. Exclusion criteria were interventions documented outside of the specified time frame or interventions documented on units other than the obstetric units. Data was analyzed using descriptive analysis. The number of pre- and post-implementation interventions was compared in terms of quantity and variety. Data was appropriately sorted into sub-categories of drug-related problems (further sub-categorized into types of drug-related problems), operational issues, and coordination of care to identify where pharmacists have the most opportunity to help this patient population. For further in-depth assessment of the data, pharmacy interventions were also categorized based on the following maternal disease states: Cardiac or Hematology-Related, Endocrine-Related, Psychiatric and Neurological-Related, Antimicrobial Stewardship, Pain Management, and Miscellaneous/Other.

RESULTS: Implementation of decentralized pharmacy services on the obstetric units at UPMC MWH resulted in more than a 30% increase in documented pharmacy interventions. A significant increase in the quality of interventions was also represented in the post-implementation period, including in-depth coordination of care, optimized allergy documentation and antimicrobial stewardship efforts, and inter-disciplinary population-specific medication education. Further in-depth analysis of data is pending.

CONCLUSIONS: Having a decentralized pharmacy service available on the obstetric units at UPMC MWH resulted in a significant increase in the quantity, variety, and quality of documented pharmacy interventions. This significant increase was seen when the service was available up to 3 days per week, suggesting that full-time availability of the service would only continue to improve cost savings, medication safety, and patient satisfaction. Further conclusions can be made upon completion of data analysis.



Morgan Voithofer, PharmD

Morgan graduated in May 2023 from Duquesne University School of Pharmacy. She is currently a PGY-1 pharmacy resident at UPMC Magee-Womens Hospital. Her professional interests include internal medicine, women's health, and pediatrics. Morgan plans to pursue a career in clinical pharmacy that caters to her interests upon completion of her residency.

Mentors: Jenna Christner, PharmD, BCPS & Jessica Nero, PharmD, BCPS

Stratifying VTE risk in patients undergoing orthopedic surgeries

Wardoclip AM, Dittmer AL, Grimes AE, D'Amico F

BACKGROUND: Venous thromboembolism (VTE) prophylaxis is an important aspect of medical care for many hospitalized patients as well as patients undergoing major orthopedic surgery. UPMC St Margaret performs approximately 1,000 total hip and total knee arthroplasty (THA/TKA) surgeries per year warranting VTE prophylaxis post-operatively. In the past, large studies have been performed to create a stratified list of risk factors for VTE in this patient population. In addition to patient-specific risk factors, the efficacy of the specific VTE prophylaxis regimen may also be a factor in VTE development. At this hospital, aspirin is the most used regimen for prophylaxis, which is supported by current guidelines, but with an overall low quality of evidence. The goal of this project is to investigate risk factors for VTE development and their implication on rate of VTE development postoperatively. This study's objective is to investigate both established patient-specific risk factors and components of care at our local institution in relation to VTE risk.

METHODS: This is a retrospective case-control study conducted at a 200-bed teaching hospital in the Pittsburgh, Pennsylvania area. Participants include adult patients who underwent THA or TKA from January 1, 2019 to September 30, 2023. The primary outcome is to determine if risk factors including advanced age, obesity, current or history of malignancy, aspirin regimen as VTE prophylaxis, and history of VTE increased risk for VTE development postoperatively. Secondary outcomes include time to development of VTE between prophylactic regimens, if utilizing postoperative standardized order sets for VTE prophylaxis impacts choice of agent, and if VTE prophylaxis regimen influence rates of VTE. Case-control matching will be conducted using a 2:1 ratio of patients without VTE diagnosis to approximately 60 patients identified with a diagnosis of VTE during the 30-day postoperative period. Patients will be matched on sex and age. Exclusion criteria are patients undergoing an urgent, emergent, or revision procedure, and an orthopedic surgery other than THA or TKA. After retrospective chart review and data collection, data will be analyzed using an encrypted Microsoft Excel document. Univariate paired tests for comparing risk factors between cases and controls will be performed. These may include either paired t-tests for continuous variables, McNemar's test for dichotomized data, or signed rank tests for ordinal variables. Further multivariate type analyses may be performed depending on results from the univariate tests and/or the sample sizes for individual cells within combinations for the risk factors.

RESULTS: Research in progress; Data collection is ongoing.

CONCLUSIONS: Pending. The compilation of risk factors for orthopedic surgery patients at this teaching hospital will aid in provider education and protocol improvement for proper VTE prophylaxis.

Alexa Wardoclip, PharmD

Alexa is a PGY1 Resident and Faculty Development Fellow at UPMC St Margaret Hospital. She received her Doctor of Pharmacy degree in 2023 from the University of Pittsburgh in Pittsburgh, PA. Alexa is currently on track to complete a PGY2 residency in ambulatory care at UPMC St. Margaret. Her clinical interests include ambulatory care, diabetes management, cardiology, and transplant.

Mentors: Alison Dittmer, PharmD, BCCCP, Amy Grimes, PharmD, BCPS, BCGP, Pamela Kennedy, MSIHM, RRT, CPHQ, Frank D'Amico, PhD

Epidemiology of patients receiving continuous infusion ketamine for sedation at a large, quaternary, academic medical center

Yaeger KN, Sullinger D, Groetzinger LM, Rivosecchi R, Barbash I

BACKGROUND: Ketamine is used for sedation in mechanically ventilated patients due to both its sedative and analgesic properties. Several studies have investigated the utility of ketamine as an adjunctive agent and have shown its safety and efficacy. Additionally, ketamine has been noted to have neuroprotective properties that can make it an appealing agent in conditions like seizures and anoxic brain injuries. However, there is sparse literature describing the types of patients where ketamine is utilized earlier within standard sedation regimens. The purpose of this study assesses ketamine utilization patterns in mechanically ventilated patients at University of Pittsburgh Medical Center (UPMC) Presbyterian.

METHODS: This retrospective study was conducted from January 1, 2021, through December 31, 2023. Individuals were identified for screening through medication charge data for ketamine infusions. Patients were included if located in an intensive care unit (ICU) at time of ketamine initiation and received continuous infusion ketamine for 12 hours or more. Those screened were excluded if they had died or transitioned to comfort measures only (CMO) within 24 hours of admission or received ketamine for more than 7 days. Demographic data included age, gender, height, weight, and ICU location. To describe which patient populations had received ketamine, admission diagnosis and indication for ketamine were collected. Ketamine duration, starting and maximum infusion rates, and concomitant sedative agents within 48 hours of ketamine start were also recorded. Impact on hemodynamics was assessed with cardiac sequential organ failure assessment (SOFA) scores within 24 hours of ketamine initiation while impact on delirium was assessed with intensive care delirium screening checklist (ICDSC) scores within 48 hours of ketamine start.

RESULTS: Data collection has been completed and data analysis is pending. Of the 350 patients screened, 225 were included for analysis. The main reasons for exclusion included patients receiving ketamine for less than 12 hours or having ketamine on for more than 7 days.

CONCLUSIONS: Conclusions and findings of this study are to be completed after data analysis. Pending our results, potential guidance can be provided on how to best utilize ketamine within our institution.

Kayleigh Yaeger, PharmD

Kayleigh is a PGY1 pharmacy resident at UPMC Presbyterian. She is from Munster, IN and received her PharmD from Purdue University College of Pharmacy in West Lafayette, IN. Her professional interests include critical care medicine and neurology. Upon completion of her PGY1, Kayleigh will be staying with UPMC Presbyterian to pursue a PGY2 specializing in critical care medicine.

Mentors: Danine Sullinger, PharmD, BCCCP; Lara Groetzinger, PharmD, BCCCP

Evaluation of capping initial dose of intravenous heparin for the treatment of venous thromboembolism

Zamberlan KM, Szymkowiak AM

BACKGROUND: Intravenous heparin is a mainstay of therapy for the treatment of venous thromboembolism (VTE). Gold-standard heparin dosing for VTE treatment includes 80 units/kg bolus followed by 18 units/kg/hr infusion. Some institutions implement dose capping of 10,000 units for bolus and 1600 units/hr for maintenance infusion. Therefore, patients greater than 88 kg will not receive full weight-based treatment dosing. This project's main objective is to determine if initial dose-capping of heparin based on weight impacts the time to therapeutic anti-Xa level.

METHODS: This is a retrospective cohort study that evaluated patients from October 1, 2022 through January 15, 2023 who were ordered a heparin drip at a large, tertiary, academic medical center. Patients were eligible for inclusion if they were at least 18 years of age and were treated for VTE with a heparin drip for at least 48 hours. Patients were excluded if 1) a heparin drip was ordered for other indications (i.e. stroke, atrial fibrillation, unstable angina), 2) heparin DOAC-interference PowerPlan was ordered, 3) heparin was given for less than 48 hours, 4) transferred from an outside hospital already on a heparin drip. The primary endpoints were time to first therapeutic anti-Xa and time to second consecutive therapeutic anti-Xa. This project was approved by the institution's Quality Review Committee.

RESULTS: Of 429 patients, 122 patients met inclusion criteria for analysis. Patients were separated into two groups: 87 (71.3%) received full weight-based dosing while 35 (28.7%) patients were dose-capped. Data collection is complete and analysis is ongoing.

CONCLUSIONS: Results from this project can guide future heparin protocols for VTE treatment or confirm current dosing strategies.

Kenzie Zamberlan, PharmD

Kenzie received her PharmD from Duquesne University and is currently a PGY1 Acute Care Pharmacy Resident at UPMC Presbyterian. Her professional interests include cardiology, internal medicine, and academia. Upon residency completion, Kenzie plans to practice as a clinical pharmacist in the hospital setting.

Mentor: Adrienne Szymkowiak, PharmD, BCCP

Implementation and Assessment of Oncology and Infusion Dose Rounding

Zukosky EJ, Bogdan RL, Jong FT, and Lozanoff JM

BACKGROUND: Outpatient infusion medications including chemotherapy represent one of the fastest growing costs in healthcare. Dose rounding to the nearest vial size is a strategy that reduces healthcare expenditures, minimizes drug waste, and improves accuracy of drug preparation. Collectively, national organizations endorse specific guidance for dose rounding within specified thresholds of vial sizes to ensure efficacy and safety are not compromised. Objectives for this study are to develop and recommend a dose rounding strategy for our organization, to calculate anticipated cost savings and waste minimization, to implement updates into the electronic health record, and to assess the cost savings and waste minimization post-implementation.

METHODS: A dose-rounding strategy was proposed based upon literature review and identification of optimal medications. A retrospective chart review of patients who received the selected medications during the calendar year of 2023 was performed to allow for calculation of anticipated cost savings and drug waste minimization. The approved rounding strategy was built into the electronic health record, with initial implementation limited to the ten medications identified as having the largest cost savings impact. Data will be retrospectively collected from a post-implementation period of April 1st through April 30th, 2024 to validate the actual cost savings and waste minimization.

RESULTS: Annual cost savings of approximately one million dollars were calculated using one year's baseline data for selected medications. Post-implementation results pending.

CONCLUSIONS: Final conclusions are pending. Results from research will validate the benefits of dose rounding of select outpatient infusion medications including chemotherapy on cost savings and drug waste minimization.

Emily Zukosky, BS, PharmD

Emily received her Doctor of Pharmacy degree at Albany College of Pharmacy and Health Sciences in Albany, New York. She is currently completing her PGY1 residency at UPMC Harrisburg in Harrisburg, Pennsylvania. Her professional interests are oncology and pediatrics. After PGY1, Emily will transition to a PGY2 in Oncology at Providence Alaska Medical Center in Anchorage, Alaska.

Mentors: Renee L. Bogdan, PharmD, BCPS, Fuh Tzer Jong, PharmD, and Jeanine M. Lozanoff, BSPharm

Residency Program Contact Information

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Pharmacy Residency Programs

Post Graduate Year 1 (PGY1)

Managed Care at CVS Caremark
Director: Prajakta Korde, PharmD, BCPS

Managed Care at UPMC Health Plan
Director: Molly McGraw, PharmD, BCPS

Pharmacy at CarepathRx
Director: Johanna Bezjak, PharmD, BCNSP

Pharmacy at UPMC Children's Hospital of Pittsburgh
Director: Jennifer Shenk, PharmD, BCPPS

Pharmacy at UPMC Hamot
Director: Christine Zdaniewski, PharmD, BCPS

Pharmacy at UPMC Harrisburg
Director: Renee Bogdan, PharmD, BCPS

Pharmacy at UPMC Magee-Womens Hospital
Director: Jessica Nero, PharmD, BCPS

Pharmacy at UPMC McKeesport
Director: Nicole Likar, PharmD, BCPS

Pharmacy at UPMC Mercy
Director: Taylor Miller, PharmD

Pharmacy at UPMC Presbyterian Shadyside
Director: Heather Johnson, PharmD, BCPS

Pharmacy at UPMC Shadyside
Director: Michele F. Hebda, PharmD, BCPS, CTTS

Pharmacy at UPMC St. Margaret
Director: Alexandria Taylor, PharmD, BCPS

Pharmacy at UPMC Western Psychiatric Hospital
Director: Matthew Joseph, PharmD, BCPS

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PGY1/PGY2 Health-System Pharmacy Administration and Leadership

UPMC Presbyterian Shadyside
Director: Thomas Hebert, PharmD

Post Graduate Year 2 (PGY2)

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Director: Deanne Hall, PharmD, CDCES, BCACP

Ambulatory Care Global Health at UPMC Presbyterian Shadyside
Director: Karen Pater, PharmD, CDCES, BCACP

Ambulatory Care Family Medicine at UPMC Shadyside
Director: Stephanie Ballard, PharmD, BCPS

Ambulatory Care at UPMC St. Margaret
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Cardiology at UPMC Presbyterian Shadyside
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Emergency Medicine at UPMC Mercy
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Geriatrics at UPMC St. Margaret
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Director: Kristine Schonder, PharmD

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Clinical Pharmacogenomics Fellowship at the University of Pittsburgh
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Community Pharmacy Leadership and Research at the University of Pittsburgh
Director: Kim C. Coley, PharmD, FCCP

Health Economics and Outcomes Research at the University of Pittsburgh
Director: Kangho Suh, PharmD, PhD

Health System Pharmacy Administration and Leadership at UPMC
Director: Thomas Hebert, PharmD

Implementation Science and PharmacoAnalytics at the University of Pittsburgh
Director: James Coons, PharmD, FCCP, FACC, BCCP

Infectious Diseases at UPMC
Director: Rachel Marini, PharmD, BCIDP

Medication Safety and Nephrotoxin Stewardship
Director: Sandra L. Kane-Gill, PharmD, MS, FCCM, FCCP

Pharmacoanalytics of Natural Product-Drug Interactions at the University of Pittsburgh
Director: Sandra L. Kane-Gill, PharmD, MS, FCCM, FCCP

PharmacoAnalytics and Outcomes at the University of Pittsburgh
Director: Amy L. Seybert, PharmD, FCCP, FASHP

Public Health Pharmacy
Director: Joni C. Carroll, PharmD, BCACP, TTS