RESIDENT & FELLOW RESEARCH

2024–2025

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.

Table of Contents

Message from the Dean

Amy L. Seybert, PharmD

Dear Members of the Resident and Fellowship Class of 2025,

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, Hamot, Harrisburg, Horizon, Western Psychiatric Hospital, Matilda Theiss Health Center, UPMC Health Plan, UPMC CarepathRx, RxPartners, Allegheny County Health Department, Pennsylvania Pharmacist Care Network, Pitt Vaccination & Health Connection Hub, CVS Caremark, Comprehensive Medication Management employee benefit program, Novartis, Indivior, and the Grace Lamsam Pharmacy Program for the Underserved.

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
Dr. Gordon J. Vanscoy Endowed Chair 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 Hamot, 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 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 Novartis and Indivior on PharmacoAnalytics, Health Economics, Outcomes & Medical Affairs, and Health Economics & Outcomes fellowships in addition to our Pitt Pharmacy fellowships in Natural Product-Drug Interactions, Medication Safety & Nephrotoxin Stewardship, and Antiretroviral Clinical Pharmacology. 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 & Fellowship Research Program

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

The Pharmacy Residency and Fellowship Research Program at the University of Pittsburgh School of Pharmacy incorporates a structured research educational series with longitudinal research support touchpoints with research experts. This approach provides a foundation for performing research and gives additional opportunities for mentorship and feedback. Within the framework of the program, residents and fellows are responsible for the completion of all aspects of their project, from conceptualization to final manuscript preparation.

The program guides resident and fellow learnings in research fundamentals including developing research ideas, human subjects research requirements, quality improvement, study design, and data management. Participants also learn to effectively communicate their project results in both verbal and written formats. Overall, the Pharmacy Residency and Fellowship Research Program contributes to the diversity of residency and fellowship training and produces well-rounded candidates eligible for a wide range of career opportunities.

I would like to thank those who have helped make this program a success through contributions to the Research Discussion Series including Amy Donihi, Deanne Hall, Ryan Rivosecchi, Luke Berenbrok, Ravi Patel and Melanie Weltman. I'd also like to thank those who helped with the planning and implementation of Research Day: Christine Ruby-Scelsi, Deanne Hall, Tiarra Gordon, Chloe Spencer, Matt Mraz, Mike Grisetti, 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 Douglas Slain, 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!

Imposter Syndrome and Well-Being Among UPMC Pharmacy Residents

Achyutuni KG, Joseph MP, Cullen M, Goulding H, Temelie A, Fabian TJ

BACKGROUND: Imposter syndrome is a phenomenon that is defined as self-doubt of intellect, skills, or accomplishments that often leads to feelings of inadequacy, anxiety, and depression. Individuals may fear being exposed as a fraud or being compared to others. Imposter syndrome is common among pharmacy trainees with studies showing pharmacy students and residents experiencing higher imposter syndrome rates than other healthcare professional trainees. Additionally, imposter syndrome has been associated with burnout and fatigue among pharmacy residents. This study aims to characterize imposter syndrome and assess overall well-being among UPMC pharmacy residents and to determine what aspects of residency training contribute to imposter syndrome.

METHODS: This was a cross-sectional, survey-based, quality-improvement study of pharmacy residents. Participants were eligible if enrolled in a UPMC pharmacy residency program as either a PGY-1 or PGY-2. Participation was voluntary and anonymous. Consent was received from all participants prior to participation. Data was collected over a period of 6 weeks (2/17/25-3/31/25). A Redcap-based survey was administered to pharmacy residents via a personalized email link. The survey included non-identifying demographic questions, the Clance Imposter Syndrome scale, the World Health Organization-Five Well-Being Index (WHO-5), and questions assessing resident confidence with ASHP Residency Competency Areas. Data was analyzed using descriptive statistics.

RESULTS: There were a total of 27 survey responses. Two responses were incomplete and were excluded from data analysis. There were 16 PGY1s and 9 PGY2s. At baseline,13 respondents indicated a complete understanding of imposter syndrome while 12 respondents indicated a partial understanding. Mean overall score, and mean PGY1 and PGY2 scores on the Clance Imposter Syndrome Scale was 68/100, which indicates frequent imposter feelings. Mean overall score on the WHO-5 was 11.7/25. A raw score below 13 has been suggested as a cutoff for poor mental well-being. Mean PGY1 score was 11.5, and mean PGY2 score was 12.1. When assessing how often residents feel confident with patient care, research, leadership, and teaching, the most common response in each domain was "more than half the time."

CONCLUSIONS: Results show that imposter syndrome feelings are common among pharmacy residents at UPMC, and overall well-being is poor. On average, pharmacy residents are comfortable more than half the time in areas of patient care, research, leadership, and teaching. The results of this study will be used to help guide additional professional development initiatives and resources at UPMC.

Kavya Achyutuni, PharmD

Kavya obtained her PharmD from the University of California, San Francisco School of Pharmacy in 2024. She is completing her PGY1 pharmacy residency at UPMC Western Psychiatric Hospital and will specialize in psychiatry as a PGY2 psychiatric pharmacy resident at UPMC Western Psychiatric Hospital. Her professional interests include geriatric psychiatry, severe mental illness, and substance use disorders. Outside of work, Kavya enjoys exploring coffee shops, watching dramas, and going on long walks. Post residency Kavya hopes to continue working in an inpatient psychiatric hospital at an academic medical center specializing in one of her areas of interest.

Mentors: Matthew Joseph, PharmD, BCPS, Marissa Cullen, PharmD, BCPP, Hannah Goulding, PharmD, BCPP, Andreea Temelie, PharmD, BCPP, Tanya J. Fabian, PharmD, BCPP, PhD

Comparative analysis of prescribing patterns for narcolepsy in the U.S.: A focus on European guidelines

Bassir S, Jose A, Fuson A, Sharma P, Pieprzak A

BACKGROUND: The American Academy of Sleep Medicine U.S. guidelines emphasize only monotherapy as first-line options when treating Narcolepsy, while the European guidelines provide a broader scope, incorporating combination therapies which can address multiple symptom pathways. Combination therapies may potentially offer more comprehensive symptom control. Given the focus of monotherapy in the U.S. and the flexible approach in Europe, this study aims to analyze the extent of combination therapy use among members diagnosed with narcolepsy in the U.S. and explore how patterns align or diverge from European guidelines.

METHODS: This study is a retrospective, claims based observational analysis evaluating prescribing patterns for narcolepsy medications within the CVS Caremark commercial book of business, which includes both employer group and health plan type clients. The study evaluates claims data from 1-1-2022 to 12-31-2023. Eligible members must have at least one prescription fill for a narcolepsy related medication during this period. Primary endpoint: The proportion of members receiving combination therapy versus monotherapy. Secondary endpoint: Age-stratified analysis of monotherapy vs. combination therapy utilization. Monotherapy is defined as a member who had a single agent for ≥90 days during the study period. Combination Therapy is defined as a member who had at least two agents concurrently for ≥90 days within the same 90-day timeframe. Members taking either stimulants or antidepressants as single agents for 90 days or more were excluded in the monotherapy group, as these medications have multiple indications beyond narcolepsy.

RESULTS: Initial evaluation criteria identified a total of 1,150,958 members for narcolepsy treatment patterns during the study period. Of these, 73,031 (6.3%) members met the criteria for either monotherapy or combination therapy. Monotherapy utilization was observed in 56,284 (77%) members, while 16,747 (23%) members were prescribed combination therapy for at least 90 consecutive days. Monotherapy group: The highest number of utilizers was observed in older adults. Monotherapy was the preferred approach across all age groups, with a higher prevalence in older adults (40-60 years). Combination therapy group: Utilization was more evenly distributed across age brackets, with slightly higher rates among younger adults and middle-aged populations. Proportionally, combination therapy declined with increasing age, with its highest proportional utilization in younger patients.

CONCLUSIONS: This study provides insights into the prescribing patterns of narcolepsy treatments in the U.S., identifying a strong preference for monotherapy. Analysis revealed that monotherapy utilization increases with age. The low rate of combination therapy in the U.S. contrasts with European guidelines, which tend to favor dual or adjunctive treatment strategies. Future research should evaluate the effectiveness of different treatment strategies and explore whether aligning prescribing patterns with European guidelines improves patient outcomes and reduces overall healthcare expenditures.

Presented at the AMCP 2025 Annual Meeting in Houston, TX.

Shayan Bassir, PharmD

Shayan earned his Doctor of Pharmacy degree from the University of Florida and is a PGY-1 Managed Care Pharmacy Resident based in Pittsburgh, PA. Throughout his residency, Shayan has worked on utilization management, formulary administration, clinical program development, and analytical consulting. He aspires to pursue a role as a Clinical Advisor, where he can apply his clinical and analytical skills to support formulary strategy, drug coverage decisions, and cost-effective healthcare solutions.

Mentors: Abraham Jose, PharmD; Alexa Fuson, PharmD; Parag Sharma, DrPH, MPH

Cost-effectiveness analysis of second-generation antipsychotic long-acting injectables in patients with schizophrenia in the United States

Chan CM, Suh K

BACKGROUND: Schizophrenia is a complex psychiatric disorder with substantial economic and social burden. Compared to traditional oral medications, second-generation antipsychotic (SGA) long-acting injectables (LAIs) have shown promise in preventing relapses of schizophrenia, largely due to improved medication adherence achieved through long-acting formulations. However, the drug costs of SGA LAIs are significantly higher than oral dosage forms. Our objective was to compare the cost-effectiveness of four intramuscular SGA LAIs (aripiprazole, aripiprazole lauroxil, olanzapine pamoate, and risperidone) to paliperidone palmitate in patients with schizophrenia from the US health care sector perspective.

METHODS: A Markov model with 90-day cycles was developed to simulate the progression of 40-year-old adults transitioning among stable treated, stable non-treated, and relapse health states, and death over 5 years at a discount rate of 3%. Paliperidone was chosen to be the comparator as it was the most commonly used SGA LAI in the US. The base case utilized a 5-year time horizon due to uncertainty in long-term treatment changes, adherence, and schizophrenia progression. Patients transitioned to additional lines of therapy (another SGA LAI and then clozapine) when they experienced relapse or intolerance to side effects. Relapse transitional probabilities were estimated from an analysis using administrative claims. Other treatment related input parameters were derived from clinical trials and observational studies. Health state utilities and disutilities due to extrapyramidal symptoms, weight gain, and diabetes were obtained from published literature and applied to age-adjusted utility of the US population. Drug costs were estimated from Medicare Average Sales Price. All costs were standardized to 2024 US dollars. One-way and probabilistic sensitivity analyses were conducted.

RESULTS: Compared to paliperidone (3.22 quality-adjusted life-years [QALYs]), olanzapine resulted in the lowest QALY of 2.96 QALYs. The remaining 3 SGA LAIs had slightly lower to similar QALYs between 3.18 and 3.20. Aripiprazole and risperidone were dominated by paliperidone due to higher costs but similar QALYs. Olanzapine and aripiprazole lauroxil resulted in lower total healthcare costs but lower QALYs, with incremental cost-effectiveness ratios of $62,248 and $507,198, respectively. Probabilistic sensitivity analysis using 1000 simulations confirmed the base case findings. One-way sensitivity analyses showed that drug costs and relapse probabilities were the most influential inputs to the model.

CONCLUSION: Over a 5-year horizon, SGA LAIs demonstrated similar QALYs when compared with paliperidone but none outperformed paliperidone using commonly accepted cost-effectiveness thresholds. Paliperidone emerged as a consistently favorable LAI option, providing the highest QALY gains at costs that were comparable or lower than most alternatives.

Presented at the Professional Society for Health Economics and Outcomes Research (ISPOR) 2025 Annual Meeting; Montreal, QC, Canada on May 15, 2025

Cindy Chan, PharmD, MHI

Cindy is a first-year Health Economics and Outcomes Research (HEOR) Fellow at the University of Pittsburgh and UPMC Health Plan. Cindy received her bachelor's degree from University of California, Berkeley and her Doctor of Pharmacy and Master of Health Informatics from the University of Minnesota. Her current research projects include administrative claims analysis, economic modeling, and systematic review in oncology, dermatology, developmental disorder, and mental health. She is also working towards a Master of Science in PharmacoAnalytics as part of the fellowship. After completing this fellowship, she hopes to work in the HEOR field in the pharmaceutical industry.

Mentor: Kangho Suh, PharmD, PhD

Assessing the Infectious Burden in Heart Transplant Recipients: A Comparative Study of Allocation Status

Cianci CL, Shah S, Horn E, Rivosecchi RM

BACKGROUND: The number of adult heart transplants continues to rise, with a record 4,092 performed in the United States in 2024. Infections remain a major cause of prolonged hospitalization and increased healthcare costs and are a leading contributor to morbidity and mortality in heart transplant recipients. Despite advances in transplant care, infections continue to pose a significant risk to patient outcomes. The 2018 UNOS policy update prioritizes sicker patients for transplant, which has improved short-term survival but led to longer hospital stays. Risks of infection have been evaluated in the high allocation era, but not specifically based on allocation status. The aim of this study is to evaluate the infectious burden and antibiotic use within the first 90 days in heart transplant recipients based on their status at the time of transplant, comparing status 1 and 2 vs. status 3, 4, and 6.

METHODS: This was a single-center, retrospective study conducted at UPMC Presbyterian Hospital. Adult heart transplant recipients between February 2019 and June 2024 were included. Patients were grouped according to allocation status; status 1 and 2 were classified as high allocation, and status 3, 4, and 6 as lower allocation status. Status 5 heart transplant recipients and dual organ transplants were excluded. Data were retrieved from the electronic health record. Baseline characteristics were collected, including demographics, comorbidities, prior cardiac surgery, length of hospitalization, and mechanical circulatory support. The primary outcomes were the number and types of infections and total days of antimicrobial exposure within 90 days of the transplant date. Infections were identified through the review of all positive cultures based on charges to patient accounts. Positive cultures were assessed to confirm the presence of infection through chart review and then were further classified into bloodstream, respiratory, urinary tract, skin and soft tissue, intra-abdominal, *Clostridioides difficile* infections, and cases of mediastinitis. Total days of antimicrobial exposure following heart transplant were calculated through a review of inpatient antibiotic administration and outpatient antibiotic prescriptions.

RESULTS: A total of 148 patients met the inclusion criteria during the study timeframe. 70 patients were classified as group 1; status 1 and 2, and 78 as group 2; status 3, 4 and 6. Overall, preliminary results show there were 41 infections within 90 days of transplant. The most common types of infections were bloodstream and cases of mediastinitis, both occurring at a rate of 24.3%. Infection rate in group 1 was 28.6% and 26.9 % in group 2. The average number of days of antimicrobial exposure was 21.6 for group 1 and 18.2 for group 2.

CONCLUSIONS: Status 1 and 2 heart transplant recipients experienced a similar infectious burden to those in Status 3, 4, and 6. Further research is needed to determine the impact on long-term patient outcomes.

Courtney Cianci, PharmD

Courtney is a PGY-1 Pharmacy Resident at UPMC Presbyterian. She earned her Bachelor of Science in Biology from Grand Canyon University in Phoenix, Arizona, followed by a Doctor of Pharmacy degree from Midwestern University College of Pharmacy in Glendale, Arizona. Her professional interests include critical care, cardiology, and infectious diseases. Following her PGY-1 residency, she will pursue a PGY-2 Critical Care Residency at HCA TriStar Centennial Medical Center in Nashville, Tennessee.

Mentors: Ryan Rivosecchi, PharmD, BCCCP; Sunish Shah, PharmD, BCIDP; Ed Horn, PharmD, BCCCP

Comparison of cystatin C and serum creatinine-based renal function equations to predict beta-lactam levels

Cochran AR, Rivosecchi RM, McTee R, Shields RK, Smith BJ, Groetzinger LM

BACKGROUND: Beta-lactam antibiotics are at risk for both over- and under-dosing in critically ill patients due to unpredictable pharmacokinetics. Dosing cefepime and meropenem effectively while in the intensive care unit (ICU) is critical to both prevent toxicities such as encephalopathy, seizures, and altered mental status, while also ensuring appropriate drug levels stay above minimum inhibitory concentration (MIC) to prevent antimicrobial resistance. Patients who had discordance in glomerular filtration rates (GFR) based on cystatin C (CysC) and serum creatinine (SCr) may have higher medication related adverse events. Cystatin C based dosing for cefepime has been shown to decrease the risk of acute kidney injuries (AKI) and cefepime induced encephalopathy in comparison to Scr-based dosing. Retrospective research has shown that utilizing CysC for cefepime and meropenem dosing improves accuracy based on therapeutic drug monitoring (TDM). In critically ill patients, a discordance rate of 32.3% has been demonstrated between Cockroft-Gault and CKD-EPI$_{SCr\text{-}CysC}$ which can have a clinically significant impact on dosing antibiotics. The aim of this study is to determine the incidence of supratherapeutic cefepime and meropenem levels in critically ill patients with discordant GFR$_{CysC}$ compared to GFR$_{SCr.}$

METHODS: This was a prospective, single center study evaluating patients admitted to an ICU at UPMC Presbyterian Hospital who received meropenem or cefepime and had a CysC collected within 48 hours of TDM between 10/2024 and 4/2025. Patients were excluded if they were receiving renal replacement therapy, received a kidney transplant within one year, receiving continuous infusion cefepime, or had an AKI stage 2 or greater. Discordance was defined as greater than or equal to 30% difference between Cockroft-Gault and CKD-EPI 2021$_{SCr\text{-}CysC}$. Criteria for collecting TDM was included as well as initial regimen, dose appropriateness via TDM, and dose adjustments based on TDM. The secondary endpoints are to determine which eGFR (CysC or SCr) based calculation via Insight RX modeling most accurately predicts meropenem and cefepime therapeutic drug monitoring defined as true trough minus predicted trough and to determine the percentage of patients with discordant GFR$_{CysC}$ compared to GFR$_{SCr.}$

RESULTS: Data analysis is ongoing.

CONCLUSIONS: Final conclusions are pending data analysis. The results of this study have the potential to identify a patient population that would benefit from CysC based empiric dosing of cefepime and meropenem in the ICU.

Abigail Cochran, PharmD

Abigail is a PGY2 Critical Care Pharmacy Resident at UPMC Presbyterian and completed her PGY1 Pharmacy Residency at UPMC Mercy. She is from Columbus, OH and received her PharmD from Ohio Northern University. Her current interests are surgical/trauma and emergency medicine. After completion of her PGY2 program, she will work as an Emergency Medicine Clinical Pharmacist.

Mentors: Lara Groetzinger, PharmD, BCCCP, Ryan Rivosecchi, PharmD, BCCCP, Renee McTee, PharmD, BCCCP, Brandon Smith, MD, PharmD

Audit and feedback of urinary tract infections

Cyganowski AM, Marini RM, Shields RK

BACKGROUND: Urinary tract infections (UTI) are among the most common indications for antibiotics in the hospital setting. Despite this, the diagnosis and management among patients remains largely ill-defined leading to antibiotic overuse. Our goal was to develop a process for a targeted antibiotic stewardship intervention for UTI.

METHODS: Potential interventions were identified through three stepwise phases. First, 100 consecutive positive urine cultures were reviewed to determine the epidemiology and treatment characteristics at our center. Second, from September 2, 2024 through November 20, 2024, we implemented a broad, real-time electronic alert to conduct audit and feedback of positive urine cultures. Third, from January 15, 2025 through March 28, 2025 we refined the electronic alert with clinical decision-making software (CDM) for more targeted intervention to supplement existing stewardship efforts with additional audit and feedback performed.

RESULTS: 100 positive urine cultures were reviewed during phase 1. 27 were untreated asymptomatic bacteriuria (ASB), 16 were treated possible ASB, 35 were uncomplicated UTI (uUTI), and 22 were complicated UTI (cUTI). Additionally, 22 samples were contaminated. Overall, empiric therapy was active against a positive culture during phase 1 in 73% of cases (91% of patients with cUTI and 63% of treated possible ASB or uUTI). Most patients with cUTI received an anti-pseudomonal beta-lactam for empiric therapy (17/22, 77%) and had treatment deescalated (14/22, 63%). 298 inpatients with positive urine cultures and 146 inpatients with targeted-CDM alerts were reviewed prospectively during phase 2 and phase 3, respectively. 52 (17%) interventions during phase 2 and 16 (11%) interventions during phase 3 were attempted, with the majority (57/68, 83%) accepted outright or with modification. Additional data analysis is ongoing.

CONCLUSIONS: A key finding from our broad-scale approach to positive urine cultures was that a significant proportion are either not treated or contaminated, suggesting that urine is generally over-cultured among hospitalized patients. Over time, we narrowed our review criteria to enrich notifications for stewardship-actionable interventions. These data are now being used to develop system-wide criteria to improve the management of urine cultures.

Alexander Cyganowski, PharmD, BCPS, BCIDP, AAHIVP

Alex is the antimicrobial management program and infectious diseases (AMP/ID) pharmacy fellow at UPMC Presbyterian. He received his PharmD from Massachusetts College of Pharmacy – Boston. He started his pharmacist career in the Southwest US in both acute and ambulatory care settings prior to relocating to Pittsburgh. His clinical interests include treatment of resistant gram-negative infections, mycobacterial infections, the use of oral antibiotics to treat complicated infections, HIV treatment, and viral Hepatitis. He hopes to work as an acute care pharmacy ID specialist in the future.

Mentors: Rachel Marini, PharmD, BCIDP, Ryan Shields, PharmD, MS, Lloyd Clarke, BS

Pharmacist intervention on SGLT2i-eligible patients with heart failure

Dillen MG, Sakely H, Proddutur B

BACKGROUND: Based on the EMPORER-Reduced, EMPORER-Preserved, and DAPA-HF, patients with heart failure (HF) with both reduced and preserved ejection fraction, regardless of diabetes status, can have mortality and/or morbidity benefit from the addition of a sodium-glucose cotransporter 2 inhibitor (SGLT2i). Since the release of these trials, the 2022 update to the American Heart Association Heart failure guidelines recommend the addition of SGLT2i therapy to HF regimens. Since this is a major change in guidelines, there is concern that the patients who have had long-standing HF may not be initiated on an SGLT2i. This project aims to measure the benefit of pharmacist intervention within interprofessional geriatric on initiating updated guideline directed medical therapy (GDMT) in older adults with heart failure who are not on an SGLT2i.

METHODS: This prospective cohort study was performed between two teaching outpatient geriatric clinics. The primary intervention for this project was performed by a geriatric pharmacy resident. Patients who have their primary care physician at the associated clinics and who have a prior diagnosis of HF in their problem list were included. Patients were included if they were not on an SGLT2i at time of inclusion, had no contraindications for an SGLT2i, and have appropriate renal function. Once PCP consent was obtained, the pharmacist reached out to discuss with the patient and counsel them on the new medication. If the patient agreed to the therapy change, the new medication was prescribed. The intervention was considered complete when the patient either refused therapy, initiated therapy, or was lost to follow up. Data was analyzed using descriptive statistics given the number of patients was too few to perform more advanced statistics on. The rates of patients on SGLT2i's were calculated and compared for the pre-intervention period and post-intervention period.

RESULTS: Thirty-nine patients were included in the final patient pool. Of those 39 patients, 26 were reached to discuss initiation of an SGLT2i. Ten of the patients were started on a new SGLT2i at the completion of the intervention, which is about 26% of patients who were deemed eligible for intervention who agreed to treatment.

CONCLUSIONS: There is a benefit to having a clinical pharmacist presence within a geriatric teaching clinic to serve as leaders in medication-specific interventions to improve patient care, specifically in the initiation of SGLT2i's in appropriate patients with HF.

Presented at the Society for Teachers of Family Medicine Annual Spring Conference in Salt Lake City, UT and the American Geriatrics Society Annual Scientific Meeting in Chicago, IL.

Madeline Dillen, PharmD, BCPS

Madeline graduated from University of Pittsburgh School of Pharmacy and then went on to complete her PGY1 pharmacy residency at UPMC St. Margaret's. She is currently completing her PGY2 geriatric pharmacy residency and Faculty Development Fellowship with UPMC St. Margaret. She is particularly interested in geriatric care, primary care, and medication affordability. After residency, she has accepted a job working in Primary care with the MetroHealth system in Cleveland, OH.

Mentors: Heather Sakely, PharmD, BCPS, BCGP; Brittany Proddutur, MD

Cyclophosphamide for refractory ACR and CLAD in lung transplant recipients: a retrospective single-center chart review

Emmett GM, Moore CA, Johnson BA, Hage CA, Iasella CJ

BACKGROUND: Lung transplant recipients face higher rates of acute rejection compared to other solid organ transplant recipients. Incidence of chronic rejection, or chronic lung allograft dysfunction (CLAD), is high and is characterized by progressive deterioration that leads to graft failure and mortality. High grade and repeated episodes of acute cellular rejection (ACR) are risk factors for developing CLAD. Despite aggressive treatments and adjustments to maintenance immunosuppression regimens, ACR can persist and become refractory. There is limited evidence exploring cyclophosphamide as a rescue therapy for these indications. Cyclophosphamide is an alkylating agent that exerts lymphocyte-depleting effects, resulting in potent and prolonged immunosuppression. Despite its potential benefit in ACR and CLAD, adverse effects such as bone marrow suppression, hemorrhagic cystitis, gastrointestinal effects, and increased infection risk may limit its use. The objective of this study is to measure improvement of ACR, effect on CLAD progression, and incidence of adverse effects in lung transplant patients receiving cyclophosphamide rescue therapy.

METHODS: This retrospective single-center chart review included adult lung transplant patients at UPMC Presbyterian who received cyclophosphamide between May 2013 and June 2024 for recurrent or refractory ACR or CLAD. Recurrent ACR was defined as at least 2 treated episodes of ≥ grade A2 with return to A0 or A1 between episodes. Refractory ACR was defined as 3 consecutive treated episodes of ≥ grade A2 acute rejection without return to A0 or A1 between episodes. Known or suspected CLAD was defined by changes in pulmonary function tests (PFTs) per ISHLT's 2019 Consensus Report on CLAD. Primary outcomes for the ACR group were improvement in ACR score on transbronchial biopsy and functional improvement shown by FEV1 ≥ 10%. The primary outcome for the CLAD group was functional improvement shown by FEV1 ≥ 10%. All episodes of treated ACR and therapies used were collected. PFTs were analyzed and CLAD staging was calculated at specified time points pre- and post-cyclophosphamide. Secondary outcomes included incidence of bone marrow suppression, GI adverse effects, hemorrhagic cystitis, and infections. Baseline characteristics and secondary outcomes were analyzed using descriptive statistics. Primary outcomes were analyzed using Wilcoxon Signed-Rank test.

RESULTS: There were 33 patients included in this study; 6 patients were treated for CLAD, and 27 patients were treated for refractory ACR. Patients were 55% male with a median age of 54 years (IQR 42-63) at the time of cyclophosphamide dose. 12 patients (36.4%) were transplanted for idiopathic pulmonary fibrosis, 10 patients (30.3%) for COPD, 8 patients (24.2%) for other indications, and 3 patients (9.1%) for cystic fibrosis. For induction therapy, 17 patients (51.5%) received basiliximab, 14 patients (42.4%) received alemtuzumab, 1 patient (3%) received thymoglobulin, and 1 patient (3%) was unreported. Last PFTs prior to cyclophosphamide had a median FEV1 of 1.43L (IQR 1.12-2.1), median baseline FEV1 of 68% (IQR 48-86), and median FVC of 2.24L (IQR 1.8-2.69). Results are pending with continued data analysis.

CONCLUSIONS: The findings of this study will provide insight on the utility of cyclophosphamide rescue therapy in lung transplant patients with refractory ACR or CLAD.

Gianna M. Emmett, PharmD

Gianna is a PGY-2 Solid Organ Transplant Pharmacy Resident at UPMC Presbyterian. She received her PharmD from the University of Pittsburgh School of Pharmacy in 2022 and completed her PGY-1 residency at Thomas Jefferson University Hospital in Philadelphia. Gianna is passionate about managing alcohol use disorder in patients with liver disease pre- and post-transplant, transitions of care, and treating refractory acute cellular rejection.

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

Optimizing Digoxin Immune Fab Use: The Role of an Antidote Stewardship Program Led by Pittsburgh Poison Center

Esmaeili-Koosej M, Hobeck T, Korenoski A

BACKGROUND: Digoxin toxicity is a life-threatening condition that often requires the administration of digoxin immune fab (DIF), a costly and infrequently used antidote. Optimization of DIF use is crucial not only for patient safety and efficacy but also for the prudent management of resources. In 2022, the UPMC Executive Pharmacy & Therapeutics Committee, in collaboration with the Pittsburgh Poison Center (PPC), reclassified DIF as a restricted formulary agent, limiting its use to patients who met predefined criteria—life-threatening arrhythmia, hyperkalemia in acute overdose, or markedly elevated serum digoxin levels—and requiring a medical toxicology or poison center consult for repeat dosing. This project aims to evaluate the effectiveness of a stewardship program led by the poison center and medical toxicologists in improving adherence to established DIF use criteria.

METHODS: This retrospective chart review was conducted as a medication use evaluation (MUE) at UPMC Health-System hospitals using a shared charting system. PPC records were also queried. Patients were included if they were charged for at least one dose of DIF during their admission. Patients were excluded if DIF was not administered or if the administration date was outside the study window. The cohort was stratified into pre-stewardship (1/1/2020–12/31/2021) and post-stewardship (1/1/2022–12/31/2024) groups for comparison. Data collected included patient demographics, exposure type, DIF administration(s), digoxin and potassium serum concentrations, medical toxicology or poison center consultation, and patient outcome. Descriptive statistics were used for analysis.

RESULTS: A total of 34 patients were charged for DIF in the pre-stewardship period, but 1 was excluded as DIF was not administered. The remaining 33 patients had a mean age of 75 years, and 39.4% (13) were male. Stewardship criteria for DIF use were met in 11 cases (33.3%). Of the 3 cases (9.1%) in which toxicology/PPC consultations were made, 100% already met the criteria for use. A total of 28 patients were charged for DIF in the post-stewardship period, but 6 patients did not receive the dose, and 2 were retrospectively charged for the drug outside the study timeframe and excluded. Therefore, the post-stewardship cohort included 22 patients with a mean age of 77 years, and 36% (8) were male. DIF use met formulary criteria in 12 cases (54.5%). Of the 4 cases (18.1%) in which toxicology/PPC consults were made, 50% already met criteria for use. DIF use decreased by 33.3% in the post-implementation cohort. Overall adherence to formulary restrictions increased from 33.3% to 63.6%. Additional results are pending.

CONCLUSIONS: The implementation of a PPC- and toxicology-led antidote stewardship program improved adherence to DIF use criteria and was associated with decreased utilization of the antidote. These findings highlight the value of restricting DIF use to well-defined clinical indications. Beyond supporting safer and more cost-effective care, this model may help streamline the approval code process—ensuring timely access while preserving limited antidote supply. Ongoing evaluation will further assess clinical outcomes and uncover additional stewardship opportunities.

Marsa Esmaeili-Koosej, PharmD

Marsa earned her Doctor of Pharmacy from Midwestern University in Glendale, AZ. She pursued a combined PGY-1/PGY-2 Health-System Pharmacy Administration & Leadership residency, with the PGY-1 year centered on acute care practice, which enhanced her clinical knowledge. She is now completing the PGY-2 Administration year at UPMC Presbyterian Shadyside. Her interests focus on streamlining pharmacy operations, expanding investigational drug services, and strategic oncology administration. Post-residency, Marsa intends to lead a pharmacy department, integrating clinical insight and managerial expertise to advance innovative therapies, optimize workflows, and mentor the next generation of pharmacy professionals.

Mentor: Amanda Korenoski, PharmD, MHA, BCCCP

Impact of pre-checked empiric antibiotics for suspected sepsis in the emergency department

Fasth LM, Greenfield AC, D'Amico F, Jacobs M, Baumgartner MA

BACKGROUND: Greater than 1.7 million adults develop sepsis annually leading to more than 350,000 deaths in the United States alone. To improve these outcomes, the Surviving Sepsis Campaign emphasizes early identification and treatment with broad spectrum antibiotics within one hour of sepsis recognition. While sepsis care order sets containing pre-selected antibiotics may expedite care, consensus on which broad-spectrum antibiotic to include remains less known. Although empiric anti-pseudomonal coverage (e.g., cefepime) is appropriate for some high-risk or critically ill patients, it may provide unnecessary broad-spectrum coverage and contribute to increased antimicrobial resistance for patients without pseudomonal risk factors. The purpose of this study was to demonstrate how empiric antibiotic selection changed at a community hospital emergency department (ED) before and after cefepime became the pre-selected antibiotic in the ED sepsis care order set.

METHODS: This retrospective chart review included patients ≥ 18 years old admitted to a community hospital, initiated on an empiric antibiotic, and ordered the ED sepsis care order set over two four-month periods (i.e., "pre" and "post" September 2023, when the order set was modified to include pre-selected cefepime). Chi-square test was used to determine the difference in cefepime administration rates between the two periods. The primary outcome was the frequency of cefepime administration before and after order set modification. The secondary outcome evaluated the appropriateness of empiric cefepime, as determined by individual patient risk factors for multidrug resistant organisms (MDROs), microbiology cultures, and severity of illness.

RESULTS: 457 patients met inclusion criteria for the study (n=200 in the pre-group and n=257 in the post-group). Empiric cefepime use for suspected sepsis increased by 25% when pre-selected in the ED sepsis order set [95% CI, 0.18-0.33], with 16 patients (8%) receiving empiric cefepime in the pre-group and 85 (33.07%) receiving empiric cefepime in the post-group. Severity of illness and demographics were similar between the two groups. Among patients in the post-group who received cefepime, 35% had IV antibiotic use in the last 90 days (n=30), 16% had a history of *Pseudomonas* (n=14), and 12% had a history of another MDRO (n=10). Only 8% of these patients grew *Pseudomonas* in a blood or non-blood culture during this hospital admission.

CONCLUSIONS: Low rates of *Pseudomonas* on culture do not support the need for empiric coverage with cefepime for most patients in a community hospital setting. Data from this study may be used to support improved antimicrobial stewardship to identify patients with MDRO risk factors and need for broader empiric coverage.

Presented at UPMC Family Medicine Scholarship Day on April 25, 2025 in Altoona, PA.

Lauren Fasth, PharmD

Lauren received her PharmD from the University of North Carolina at Chapel Hill. She is a PGY1 Pharmacy Resident and a Faculty Development Fellow at UPMC St. Margaret. After completion of PGY1, she will complete a PGY2 in Geriatrics at UPMC St. Margaret. Her clinical interests include deprescribing, osteoporosis, transitions of care, and research. Following residency, she hopes to pursue a position in inpatient or outpatient geriatrics.

Mentors: Megan Baumgartner, PharmD, BCPS, Adam Greenfield, PharmD, BCIDP, Frank D'Amico, PhD, Micah Jacobs, MD

HIV pre-exposure prophylaxis (PrEP) education and referral for patients receiving medication for opioid use disorder (MOUD)

Fine JT, Proddutur S, Bruehlman A, Koenig M

BACKGROUND: HIV pre-exposure prophylaxis (PrEP) is highly effective with a grade A US Preventive Services Task Force recommendation to prescribe PrEP to adolescents and adults at risk for contracting HIV. Few randomized controlled trials enroll people who inject drugs (PWID) or those receiving MOUD, despite current data demonstrating a nearly 50% decrease in HIV acquisition when PWID use PrEP. The medication assisted treatment (MAT) clinic at the UPMC St Margaret Family Medicine Residency New Kensington Family Health Center (NKFHC) provides patients with substance use disorders with physical and mental health services. PrEP prescribing has not been routinely included prior to this study. This study aimed to evaluate the impact that a referral process connecting patients receiving MOUD with a clinical pharmacist has on rates of PrEP prescribing.

METHODS: This single center pre/post intervention analysis evaluated the impact of a pharmacist referral service on the rate of PrEP prescribing for patients receiving MOUD treatment. Attendings, residents, and students providing care to patients receiving MOUD treatment at the NKFHC were educated on a brief assessment tool within the electronic health record and a quick start guide aiding the identification of patients for whom harm reduction with PrEP is indicated. A referral was sent to the clinical pharmacist for counseling and initiation of evidence-based medication for PrEP, follow up lab testing, and comprehensive medication management. The rate of PrEP prescribing was assessed 12 weeks following the initial training and compared with the rate before the introduction of this referral-based treatment program.

RESULTS: Out of 145 patients meeting inclusion criteria, 124 had an appointment with the MAT clinic scheduled during the 12-week period. During this time, 5 patients were offered PrEP, 3 declined, and 2 were referred to pharmacy for follow-up. Additionally, one patient was already taking PrEP prescribed by an outside entity. Of the 100 patients meeting inclusion criteria with insurance information on file, 64% had Medicaid.

CONCLUSIONS: Social determinants of health and barriers to follow up with labs and appointments decrease access to PrEP. Multiple discussions are needed with patients to successfully engage in care with PrEP. Counseling opportunities for tobacco cessation and treatment of hepatitis C are areas for future improvement.

Presented at the 2025 Society of Teachers of Family Medicine Annual Conference in Salt Lake City, UT in May of 2025.

Jason T. Fine, PharmD, BCPS

Jason received his Bachelor of Science from The University of Vermont in Burlington, VT. He attended Albany College of Pharmacy and Health Sciences in Colchester, VT. Jason is currently a PGY2 Ambulatory Care Pharmacy Resident and Faculty Development Fellow at UPMC St. Margaret New Kensington Family Health Center. Jason is interested in improving patient access to affordable healthcare and medications. He looks forward to starting his new role as an Ambulatory Care Clinical Pharmacist at Renown Regional Medical Center in Reno, NV following residency.

Mentor: Marianne Koenig, PharmD, BCPS

Determination of the effect of letermovir drug-drug interactions on azole antifungals

Georgiades L, Shah S, Venkataramanan R, Vasudevan V, Rivosecchi RM

BACKGROUND: Letermovir has been gaining prevalence as a prophylactic agent against cytomegalovirus (CMV) infection in the solid organ and bone marrow transplant patient populations. An important consideration of this agent is its numerous drug-drug interactions, many of which have not been clearly defined. There is significant potential for letermovir to impact azole antifungal levels, which are routine prophylactic therapy for transplant patients. Due to the absence of clinical practice guidance, this study aimed to describe the impact of letermovir on azole drug concentrations and develop dose adjustment recommendations. The primary objective was to compare voriconazole and isavuconazonium trough concentrations between patients who received letermovir and those who did not after transplantation.

METHODS: This was a retrospective cohort study that evaluated all solid organ and bone marrow transplant recipients treated at UPMC Presbyterian and Shadyside Hospitals between 2020-2024 for inclusion. Patients were screened for administration of voriconazole or isavuconazonium during the study period and split into two groups based on concomitant letermovir use. Exclusion criteria included drug levels drawn prior to steady state of either letermovir and/or azole and patients with other major drug-drug interactions. Voriconazole and isavuconazonium levels were collected for patients who received either agent for fungal prophylaxis and did not receive letermovir and for those that concomitantly received one of these azole antifungals and letermovir. Drug levels drawn at least 1 hour outside of true trough time were modeled using pharmacokinetic software to determine corrected value. Data analysis is pending.

RESULTS: 67 azole levels have been collected for the concomitant group with 15 patients receiving isavuconazonium and 52 receiving voriconazole. The control group is currently being identified. Baseline demographics and outcomes are pending.

CONCLUSIONS: Pending.

Leah Georgiades, PharmD

Leah received her PharmD from The Ohio State University College of Pharmacy, located in Columbus, OH. She is a PGY1 pharmacy resident at UPMC Presbyterian. Following completion of this program, she will continue her training with the PGY2 solid organ transplant residency at UPMC Presbyterian.

Mentors: Ryan Rivosecchi, PharmD, BCCCP, Raman Venkataramanan, PhD, FACCP, FAAPS, Sunish Shah, PharmD, BCIDP

Implementation of a pharmacy to dose vancomycin protocol at a pediatric institution

Griffin YA, Crowley K, Ferguson E, Ordons K, Sheikh S, Shenk J

BACKGROUND: Vancomycin, a glycopeptide antibiotic, is primarily used to treat gram-positive infections, especially methicillin-resistant *Staphylococcus* aureus (MRSA). Its role in pediatric medicine is crucial due to the rising prevalence of resistant pathogens. Approximately 10-20% of pediatric patients experience vancomycin-associated nephrotoxicity, especially at high doses or prolonged use. Studies show 20-30% of pediatric patients receive inappropriate doses of vancomycin which lead to inadequate serum levels, increased nephrotoxicity and treatment failures. Given the unique pharmacokinetic and pharmacodynamic properties of vancomycin in children, there is a pressing need for standardized dosing protocols. Pharmacy-managed vancomycin dosing has become standard in many pediatric institutions, shown to reduce nephrotoxicity, shorten treatment duration, and decrease hospital stays. Pharmacists can individualize dosing based on age, weight, and renal function, improving both safety and efficacy. This study aims to implement a pharmacist-led vancomycin dosing protocol to ensure optimal therapeutic levels while minimizing toxicity through patient-specific dosing and therapeutic drug monitoring.

METHODS: This was a UPMC quality improvement committee-approved, retrospective chart review of pediatric patients < 18 years admitted to UPMC Children's Hospital of Pittsburgh receiving IV vancomycin therapy. The data was evaluated in 2 phases: a pre-implementation phase (July—December 2024), extensive education and training, and a six-month post-implementation phase. Patients were excluded if they were > 18 years of age and/or did not have a trough level collected during the time of IV vancomycin therapy. Pre-implementation data assessed the institutional vancomycin dosing and monitoring practices prior to protocol implementation. Post-implementation data includes utilization of pharmacy consults, protocol adherence, frequency of therapeutic trough levels, reduction in ordered trough levels and reported vancomycin adverse drug events.

RESULTS: In the pre-implementation phase, there were 103 patients who received at least one dose of IV vancomycin and had at least one trough level collected. The median dose administered was 15 mg/kg (IQR: 9-16) with a median length of therapy of 2 days (IQR: 1-10). Six patients (5.8%) developed an acute kidney injury. Of the 267 levels collected, 141 levels (52.8%) were within therapeutic range. Approximately 20% of the levels not in therapeutic range were not collected appropriately.

CONCLUSIONS: Pre-implementation data demonstrates a significant number of non-therapeutic trough levels and trough levels collected inappropriately. Post-implementation data is ongoing.

Yina A. Griffin, PharmD

Yina received her PharmD from Manchester University School of Pharmacy and Pharmaceutical Sciences in Fort Wayne, IN. She is currently a PGY-1 pediatric resident at UPMC Children's Hospital of Pittsburgh. Her professional interests include neonatal critical care, solid organ transplant, and medication safety. Following residency, Yina hopes to continue practicing in a pediatric clinical setting.

Mentors: Kelli Crowley, PharmD, BCPS, BCPPS; Elizabeth Ferguson, PharmD, BCPPS; Kevin Ordons, PharmD, BCCCP; Serene Sheikh, PharmD; Jennifer Shenk, PharmD, BCPPS

Impact of a five unit insulin dose on hypoglycemia rates in the management of hyperkalemia

Hair M, Madara H, Bader V, Trisler M, Lauver A, O'Brien C

BACKGROUND: Intravenous regular insulin is used to treat hyperkalemia by shifting potassium into cells and lowering serum levels. Because of the risk of hypoglycemia (blood glucose <70 mg/dL), glucose levels must be closely monitored after administration. Historically, the standard dose of regular insulin utilized for hyperkalemia is 10 units administered via IV push. More recent data have suggested that a lower dose of 5 units decreases the risk of hypoglycemia without compromising the potassium-lowering effect. With this new data, UPMC has updated the Hyperkalemia Management PowerPlan to provide 5 units as the default dose of IV regular insulin in place of 10 units. The primary objective of this project is to compare the incidence of hypoglycemia in patients who received 10 units versus 5 units of IV regular insulin in the management of hyperkalemia. The secondary objective is to compare the potassium lowering effects of 10-unit and 5-unit doses.

METHODS: Adult patients at UPMC Shadyside who received regular insulin via IV push for the management of hyperkalemia were included in either the pre-intervention (10-unit) group if between March 1, 2022 to August 31, 2022 or the post-intervention (5-unit) group if between March 1, 2024 to August 31, 2024. Patients were excluded if they were hypoglycemic prior to insulin administration, if pre-insulin or post-insulin glucose or potassium levels were not collected, if potassium levels prior to insulin administration were from hemolyzed samples, and if insulin doses administered were for indications other than hypoglycemia. Pre-/post-insulin glucose and potassium levels were collected for each patient, and it was noted if other potassium-lowering therapies were administered.

RESULTS: A total of 149 hyperkalemia treatments among 103 unique patients were included in the 10-unit group and 114 treatments among 102 unique patients were included in the 5-unit group. Fifteen episodes of hypoglycemia occurred in the 10-unit group and five episodes occurred in the 5-unit group (10.1% vs. 4.4%). Among patients who did not receive other potassium-lowering therapies, the average decrease in serum potassium levels for the 10-unit and 5-unit groups was 0.87 and 0.79 mMol/L (absolute difference, 0.08 mMol/L), respectively.

CONCLUSIONS: We observed less hypoglycemia and a similar amount of potassium-lowering with a 5-unit dose of insulin in comparison to a 10-unit dose. A 5-unit dose of regular insulin appears to be an equally efficacious and safer dose for the management of hyperkalemia.

Michael Hair, PharmD

Michael is from Hershey, Pennsylvania and received his PharmD from the Duquesne University School of Pharmacy in 2024. He is currently a PGY1 pharmacy resident at UPMC Shadyside. After completing his PGY1 residency, he will be starting a PGY2 in emergency medicine at UPMC Mercy. He plans to practice as a clinical pharmacist in an emergency department after his residency training.

Mentor: Casey O'Brien, PharmD, BCPS

Pharmacist-led psychotropic stewardship program to assess antipsychotic polypharmacy

Harrison M, Cullen M, Temelie A, Fabian T

BACKGROUND: Antipsychotics are the mainstay of treatment for schizophrenia; however, many patients exhibit only a partial response or fail to achieve remission with initial antipsychotic monotherapy. Clozapine, while demonstrating superior efficacy in treatment-resistant schizophrenia, requires intensive monitoring and is associated with significant metabolic side effects, limiting its suitability for some patients. In such cases, clinicians may resort to the use of multiple antipsychotic agents. Antipsychotic polypharmacy (APP), defined as the concurrent use of two or more antipsychotics, is observed in 30–50% of psychiatric inpatients despite limited supporting evidence for its efficacy. APP has been linked to increased risks of adverse effects, including dystonia, akathisia, pseudoparkinsonism, tardive dyskinesia, and metabolic syndrome, as well as elevated potential for drug-drug interactions, medication errors, and treatment nonadherence. According to The Joint Commission, potentially appropriate indications for dual antipsychotic therapy include patients with a documented history of at least three unsuccessful antipsychotic monotherapy trials, those undergoing cross-titration, clozapine augmentation, or cases with clearly documented therapeutic rationale. This study implemented a psychotropic stewardship program to identify patients prescribed APP, evaluated the appropriateness of therapy, provided recommendations to reduce polypharmacy, and assessed the inclusion of clinical justification in discharge documentation.

METHODS: Patients admitted to an inpatient psychiatric hospital who were prescribed two or more antipsychotics were prospectively identified over 12-weeks and referred to a pharmacist-led psychotropic stewardship service. The resident pharmacist within the stewardship program reviewed each patient's medical and psychotropic medication history to evaluate the rationale for antipsychotic polypharmacy and to identify opportunities for optimization of antipsychotic therapy. Recommendations were developed by the stewardship pharmacist and communicated to the unit clinical pharmacist and the interdisciplinary treatment team. Following discharge, documentation of the clinical rationale for continued antipsychotic polypharmacy will be assessed for completeness and appropriateness.

RESULTS: Nineteen patients were identified for psychotropic stewardship consultation based on predefined criteria. The mean age of patients was 44 years (range, 18–73), and 74% were female. Following pharmacist intervention, 42% of antipsychotic polypharmacy regimens were successfully transitioned to monotherapy. Notably, thirteen (68%) patients had not received a trial of clozapine monotherapy prior to the initiation of multiple antipsychotic agents. Of these, two were transitioned to clozapine monotherapy as a result of stewardship intervention. At discharge, documentation of clinical rationale for continued antipsychotic polypharmacy met The Joint Commission standards in 56% of cases.

CONCLUSIONS: A pharmacist-led psychotropic stewardship program was successfully implemented in an inpatient psychiatric hospital to support efforts in reducing antipsychotic polypharmacy. Final conclusions will be drawn upon study completion. Findings from this project are expected to provide valuable insight into the impact of pharmacist involvement on prescribing practices and the optimization of antipsychotic therapy.

Presented at the American Association of Psychiatric Pharmacists Annual Meeting, April 2025

Michael Harrison, PharmD

Michael obtained his PharmD from The Ohio State University College of Pharmacy in 2023. He completed his PGY1 pharmacy residency at UPMC Western Psychiatric Hospital and is currently completing a specialized psychiatric pharmacy residency at UPMC Western Psychiatric Hospital. His professional interests include acute mania and psychosis, transitions of care, and psychotropic stewardship. Outside of work, he enjoys coffee runs, biking, and going outdoors.

Mentors: Marissa Cullen, PharmD, BCPP; Andreea Temelie, PharmD, BCPP; Tanya J. Fabian, PharmD, BCPP, PhD

Epidemiology and treatment of endocarditis secondary to Enterobacterales other than *Serratia* spp.

Hausberger CF, Clarke LG, Shields RK, Shah S

BACKGROUND: We recently reported our experience with endocarditis secondary to *Serratia marcescens,* which demonstrated improved outcomes with combination therapy. While cases of endocarditis secondary to Enterobacterales other than *Serratia* are rare, they continue to be identified in our region. The objective of this study was to investigate the outcomes associated with non-*Serratia* Enterobacterales endocarditis by treatment strategy.

METHODS: This was a retrospective study of 14 hospitals within a single health system between January 2000 and December 2024 with definitive endocarditis by modified Duke criteria secondary to Enterobacterales other than *Serratia*. Patients were identified using Boolean search terms "endocarditis" and "Klebsiella," "Escherichia," "E. coli," "Enterobacter," "Citrobacter," "Morganella," "Providencia," "Salmonella," "Raoultella," "Hafnia," or "Proteus". Combination therapy was defined as receipt of ≥ 2 antimicrobial agents with documented *in vitro* activity against the primary pathogen for ≥ 72 hours. Clinical failure was defined as a composite of all-cause 42-day mortality or treatment-emergent resistance.

RESULTS: Seventy-five patients met the inclusion criteria. The median (IQR) age was 67 (51-78), 16% (12/75) were patients who inject drugs and 15% (11/75) had pacemaker endocarditis without valve involvement. The most common pathogens were *E. coli* (n=31) and *K. pneumonia* (n=17). There were 21 patients who received combination regimens which consisted of a beta-lactam and an aminoglycoside (n=9), a beta-lactam and a fluoroquinolone (n=6) or another combination regimen (n=6). The clinical failure rates for patients who received monotherapy and combination therapy were 26% (14/54) and 19% (4/21) (P=0.764) and in-hospital mortality rates for were 20% (11/54) and 14% (3/21) (P=0.147), respectively. After excluding patients with pacemaker endocarditis, in-hospital mortality rates for patients who received monotherapy and combination therapy were 28% (11/39) and 15% (3/20) (P=0.333) and 42-day failure rates for patients who received monotherapy and combination therapy were 33% (13/39) and 20% (4/20) (P=0.370), respectively. Categorical variables were compared by Fisher's exact test, while continuous variables were compared using a Wilcoxon rank-sum test. A stepwise multivariate logistic regression analysis will be performed to assess predictors of clinical failure. Statistical significance for multivariable analyses was defined by a two-tailed P value of <0.05.

CONCLUSIONS: *E. coli* and *K. pneumonia* were the most common causes of endocarditis secondary to Enterobacterales other than *Serratia*. Use of combination therapy was not associated with improved outcomes overall, but additional analysis is being performed to determine factors that may favor the use of combination therapy.

Presented at ESCMID (European Society of Clinical Microbiology and Infectious Diseases) Global in Vienna, April 11-15.

Clayton Hausberger, PharmD

Clayton received his BS in Biochemistry and Molecular Biology and BA in Music at Rhodes College, and his BS in Pharmaceutical Science and PharmD at the University of Tennessee Health Science Center College of Pharmacy, both of which are in Memphis, TN. He is currently a PGY-1 Acute Care Pharmacy resident at UPMC Presbyterian. He is interested in inpatient psychiatric pharmacy and will be a PGY-2 Psychiatric Pharmacy resident at the Cincinnati VAMC next year.

Mentor: Sunish Shah, PharmD, BCIDP

Comparison of efficacy and safety of heparin versus enoxaparin for pulmonary embolism treatment

Hess D, Grimes A, Dittmer A, Zou RH, Ordons B

BACKGROUND: Pulmonary embolism (PE) is the third leading cause of cardiovascular mortality and is associated with substantial long-term morbidity that requires prompt anticoagulation therapy. The most common parenteral treatment options include unfractionated heparin (UFH, heparin) and low molecular weight heparin (LMWH, enoxaparin), with UFH being widely utilized in clinical practice due to its rapid onset of action, laboratory monitoring and ease of reversal. The benefits of LMWH include ease of subcutaneous administration, more predictable pharmacokinetic parameters, and a reduced need for monitoring. The study objectives are to compare length of stay (LOS) and adverse effects [heparin-induced thrombocytopenia (HIT), major bleed, death] between the patients diagnosed with PE who received UFH and LMWH.

METHODS: This was an IRB approved multicenter, retrospective cohort study that evaluated patients ≥18 years of age diagnosed with PE with an initial hospitalization between June 2022 and May 2024 at two hospitals located in Pittsburgh, Pennsylvania. Patients were excluded if interchanged between parenteral therapies, tested positive for COVID at admission, or had >24-hour interruption of parenteral therapy. The primary outcome was LOS difference in the treatment of PE between UFH and LMWH subgroups. The secondary outcomes were major bleeds, HIT, and all-cause inpatient mortality between UFH and LMWH subgroups.

RESULTS: The study population included 187 UFH patients and 58 LWMH patients who were hospitalized with PE. Baseline characteristics included mean age of 64.3 +/- 18.1 years and 45% male sex. Comorbidities included 10% heart failure, 21% active malignancy, and 29% chronic lung disease. There was no difference in the incidence of elevated biomarkers [elevated BNP (B-type natriuretic peptide) and/or HS troponin (high sensitivity troponin)] between UFH and LMWH subgroups (56% v. 48%, p=0.29). Compared with the LMWH subgroup, the UFH subgroup had higher incidence of right heart strain (56% v. 35%, p<0.01). The LMWH subgroup had a shorter LOS compared to the UFH subgroup (3.5 days, IQR 1.9-5.8 days v. 1.9 days, IQR 1.3-3.3 days, p<0.01). Compared with the LMWH subgroup, the UFH subgroup has a greater incidence of major bleeds (8% v. 0%, p=0.03). There was no difference in the incidence of HIT (<1% v. 0%, p=0.58) and all-cause inpatient mortality (7% v. 3%, p=0.33) between the subgroups.

CONCLUSIONS: For the treatment of PE, LMWH was associated with a shorter LOS and lower incidence of major bleeds when compared to UFH. There were no differences in the incidence of HIT or all-cause inpatient mortality between these treatment groups. This study suggests that LWMH in the hospitalized treatment of PE is preferred based on LOS and lower incidence of major bleeds.

Presented at the Society of Teachers of Family Medicine (STFM) Annual Conference in Salt Lake City, Utah in May 2025.

Devon Hess, MBA, PharmD

Devon completed their Bachelor's in Mathematics, Master of Business Administration in Healthcare Management, and Doctor of Pharmacy degrees from High Point University in High Point, North Carolina. Currently, they are a PGY1 resident at UPMC St. Margaret and Faculty Development Fellow. Their professional interests include population health, chronic care management, and academia. Devon has early committed to the PGY2 Ambulatory Care residency at UPMC St. Margaret.

Mentors: Amy Grimes, PharmD, BCPS, BCGP; Alison Dittmer, PharmD, BCCCP; Richard H. Zou, MD, MS; Brianna Ordons, PharmD, BCPS, BCCCP

Evaluating the impact of targeted interventions on a pharmacy-initiated transitions of care process

Holloway H, Fabian T, Birikorang A, Clark C, Temelie A

BACKGROUND: Medication discrepancies occur in 40% of patients at discharge and are associated with increased rates of adverse events and overall healthcare utilization. Western Psychiatric Hospital initiated a pharmacy-led, transitions of care (TOC) process in October 2023 to promote patient safety. The TOC service prioritizes medication education, medication reconciliation, and facilitation of care coordination at patient discharge. These opportunities are identified by completing a TOC patient review for all patients at discharge. However, initial data indicated limited pharmacy documentation and intervention within the TOC process. The primary objective of this project was to create and assess the impact of targeted interventions on improving the utilization and documentation within the pharmacy-initiated TOC process. Secondary objectives include assessing the number of TOC patient reviews completed, number of TOC patient reviews completed prior to discharge, and number and types of TOC interventions.

METHODS: A retrospective chart review was completed for patients discharged from Western Psychiatric Hospital from 10-1-2023 to 9-30-2024. This data showed TOC patient reviews were completed for 89.6% of the 4,931 patients. During this time, 374 TOC interventions were documented in 296 unique patient encounters. Only 6.6% of patients had a documented TOC intervention. A variety of targeted strategies were implemented in December 2024 to increase TOC documentation including a department-wide re-education session to review the TOC process as well as individualized, quarterly reports for each pharmacy staff member detailing completed TOC patient reviews and documented interventions. Documented TOC interventions were analyzed and categorized by reviewer. Descriptive data analysis will be used to assess the effect of these interventions on improving the utilization and documentation within the TOC process.

RESULTS: Preliminary data from January and February have shown an increase in TOC process engagement. The majority of discharged patients during this time had a TOC patient review completed (N=784, 92%). Documented TOC interventions increased from an average of 31 interventions per month to 74 and 55 in January and February, respectively. The most common types of pharmacy documented interventions involved medication reconciliation errors (N=59) and discharge coordination/insurance claims (N=28). The majority (67%) of TOC patient reviews were completed within 72 hours of discharge.

CONCLUSIONS: Interventions, including a department-wide re-education session and individualized quarterly reports for pharmacy staff, increased engagement in a pharmacy-initiated TOC process. Preliminary data indicates an increase in documentation and high completion rates of TOC patient reviews for all discharged patients. Medication discrepancies identified on discharge underscore the importance of pharmacy involvement in discharge planning and coordination. Future initiatives should aim to increase the number of patient reviews completed prior to discharge to ensure safe transitions of care.

Presented at the American Association of Psychiatric Pharmacists (AAPP) Conference, April 2025, in Salt Lake City, Utah.

Hannah Holloway, PharmD

Hannah is originally from Tifton, GA and received her PharmD from the University of Georgia College of Pharmacy in 2023. She previously completed her PGY1 pharmacy residency and is currently the PGY2 pharmacy residency in psychiatry at UPMC Western Psychiatric Hospital. Hannah will be joining Geisinger Health Systems as an ambulatory care behavioral health and pain management pharmacist.

Mentors: Abigail Birikorang, PharmD, Christine Clark, PharmD, BCPP, Andreea Temelie, PharmD, BCPP, Tanya Fabian, PhD, PharmD, BCPP

Exploring social determinants of health in primary immunodeficiency patients undergoing immunoglobulin replacement therapy

Howard EEG, Frey LC, White MP, Ring TCM Zielke MK

BACKGROUND: Primary immunodeficiency disorder (PIDD) is marked by absent or dysfunctional antibodies, impairing the body's ability to fight infections and increasing the risk of autoimmune, autoinflammatory, and malignant conditions. The standard treatment, immunoglobulin replacement therapy (IRT), requires lifelong administration but primarily addresses immune deficiency. Individuals with PIDD also face challenges affecting physical, mental, academic, and social well-being. Social determinants of health (SDOH), including socioeconomic conditions, access to care, and environment, shape outcomes and influence treatment adherence. This study explores how SDOH impacts long-term care for PIDD patients undergoing IRT, assessing factors like insurance, education, and social support.

METHODS: This was a cross-sectional, descriptive study. Eligible participants were identified through electronic health records and included adults diagnosed with specific immunodeficiencies based on ICD-10 codes. Patients who were <18 years old, deceased, or did not have a qualifying immunodeficiency diagnosis were excluded. Recruitment was conducted via telephone, and informed consent was obtained. Each patient was contacted up to two times. There were 193 patients assessed for eligibility and assigned a randomized order for contact. Data collection occurred from 2-24-2025 to 3-3-2025. Descriptive statistics were used to characterize the data.

RESULTS: Of the patients assessed, 116 responded (60%): 81 (42%) agreed to participate and 35 declined. Among the respondents, 56 (69%) fully completed the survey, while 25 (31%) provided incomplete responses (omitting questions related to household income, employment, or insurance status). The survey took approximately 5–7 minutes to conduct. Primary insurance coverage was 35 (43%) private, 18 (22%) Medicare, and 14 (17%) Medicaid. Social support appeared strong, with 41 (51%) participants indicating they spoke with loved ones at least six times per week, 19 (23.5%) three to five times per week, and 14 (17%) up to twice weekly. Transportation barriers were minimal, with 3% of participants reporting a lack of overall access to transportation, while 1% lacked transportation for medical appointments. Nineteen (23.5%) participants experienced difficulty obtaining essential resources such as medical supplies, utilities, or food. Stress levels were generally low to moderate, with 32% reporting "a little bit of stress" and 28% indicating they were "somewhat stressed." Employment status varied, with 46 (57%) of respondents unemployed and not actively seeking work, while 23 (28%) reported full-time employment. Regarding education, 61 (73%) respondents had attained education beyond high school, while 18 (22%) were high school graduates.

CONCLUSIONS: This study highlights the impact of SDOH on PIDD patients receiving IRT. Integrating SDOH surveys into routine care may help identify barriers earlier and support more proactive, personalized care for patients with PIDD.

Presented at the National Home Infusion Association (NHIA) Conference, Washington, D.C., March 2025.

Erika Howard, PharmD

Erika earned her PharmD from St. John's University in Queens, NY, and is currently completing her PGY1 residency at CarepathRx Pharmacy Services in Oakdale, PA. She has a strong interest in social determinants of health and aims to contribute to collaborative research with a focus on minority participation to enhance healthcare inclusivity. After residency, she plans to pursue a career in home infusion pharmacy in Philadelphia.

Mentors: Leita Frey, PharmD, BCPS; Michael White, PharmD, CSP; Tanya Ring PharmD, IgCP; Megan Zielke PharmD, BCCCP

A retrospective evaluation of belatacept as salvage immunosuppression in lung transplant recipients

Ismail G, Moore C, Sasha L, Johnson B, Iasella C

BACKGROUND: Calcineurin inhibitors (CNIs) have significantly improved graft survival in solid organ transplant recipients but are associated with substantial toxicities, particularly in lung transplant recipients. Prolonged CNI exposure contributes to neurologic, hematologic, and renal complications, including chronic kidney disease (CKD). Belatacept, a selective T-cell co-stimulatory blocker, offers a potential renal-sparing alternative, but its role in lung transplant remains unclear.

METHODS: This retrospective study at UPMC evaluated the long-term efficacy and safety of Belatacept-containing regimens in lung transplant recipients. Adult lung transplant recipients who were initiated on Belatacept since 2012 were included. These patients were previously on a CNI and either transitioned entirely to Belatacept or received it as an adjunct. Data collection included baseline demographics, immunosuppressive regimens, and key post-transplant outcomes. Graft survival, renal function, acute rejection, chronic lung allograft dysfunction incidence, and serious infections were analyzed. Kaplan-Meier survival analysis was used for statistical evaluation.

RESULTS: A total of 72 patients were included from April 4, 2012, to December 31, 2024. The median age was 58 years, with 44 patients being male. The most common indication for lung transplant was interstitial lung disease 34 (47.2%). The primary reasons for Belatacept initiation included CKD 22 (30.5%), thrombocytopenia 20 (27.8%), Posterior Reversible Encephalopathy Syndrome 12 (16.7%), rejection 4 (5.6%), and other reasons 14 (19.4%). The mean survival from the date of transplant was 6.14 years, while the mean survival from the time of Belatacept initiation was 4.21 years. At the time of Belatacept initiation, 15 (20.8%) patients were on renal replacement therapy (RRT), which increased to 26 (36.1%) after five years, though 6 (8.3%) discontinued RRT post-initiation. Within five years of Belatacept initiation, 30 (41.6%) patients developed at least one A1 or higher acute cellular rejection (ACR), while 6 (8.3%) patients were treated for antibody-mediated rejection (AMR). Over five years following Belatacept initiation, FEV1 declined by an average of 0.011 L, while FVC increased by 0.024 L.

CONCLUSIONS: Belatacept-based regimens were associated with relatively stable lung function, with minimal changes in FVC and FEV1. There was a notable incidence of ACR and AMR although the ACR rate observed was consistent with post-transplant rates in lung transplant recipients. While Belatacept was primarily used in patients with CKD concerns, the progression to renal replacement therapy suggests that previous regimens may have caused delayed or irreversible renal damage. However, RRT discontinuation after Belatacept initiation in some patients indicates potential renal recovery and underscores the importance of early detection of kidney dysfunction. Future studies should explore the optimal timing of Belatacept initiation to maximize renal benefits while minimizing rejection risk.

Ghaleb Ismail, PharmD

Ghaleb received his Doctor of Pharmacy degree from the Lebanese American University School of Pharmacy in Byblos, Lebanon. He completed his PGY1 residency at Henry Ford Wyandotte Hospital in Michigan and is currently a PGY2 Solid Organ Transplant Pharmacy Resident at UPMC. His professional interests include transplant immunology, infectious diseases in solid organ transplant, and patient education. After residency, he will be joining the transplant pharmacy team as a pharmacist specialist at Henry Ford Hospital in Detroit, Michigan, where he plans to continue advancing clinical care for transplant recipients and engaging in research.

Mentor: Carlo Iasella, PharmD, MPH, BCPS

Evaluation of proton pump inhibitor dosing in patients with upper gastrointestinal bleeding due to peptic ulcer disease

Jamison HR, Kim CH, Rivosecchi RM

BACKGROUND: Non-variceal upper gastrointestinal hemorrhage is one of the most common GI causes of hospitalization, with peptic ulcer disease being the leading etiology. Current guidelines recommend high-dose proton pump inhibitor (PPI) therapy given continuously or intermittently for 3 days following successful endoscopic hemostasis. However, the guidelines do not specify dosing for the intermittent regimen, and in clinical practice, total daily doses typically range from 80 to 160 mg. The varying potencies of different PPIs can influence both drug selection and dosing in the treatment of peptic ulcer bleeding. Pantoprazole is considered the least potent PPI, meaning higher doses may be necessary to effectively maintain gastric pH. This study aims to evaluate whether one of the commonly used high-dose pantoprazole regimens -40 mg twice daily (BID) versus pantoprazole 80 mg BID- is associated with reduced rebleeding rates.

METHODS: We performed a retrospective review of patients with an upper gastrointestinal bleed (UGIB) admitted to UPMC Presbyterian Hospital from January 2023 to September 2024. Adult patients (≥18 years) were included if they underwent esophagogastroduodenoscopy (EGD) and received at least 3 days of intravenous (IV) high-dose pantoprazole during their hospital stay. Patients were excluded if their UGIB was caused by conditions other than peptic ulcer disease. Eligible patients were categorized into two cohorts based on PPI regimen: IV pantoprazole 40 mg BID versus 80 mg BID. The primary endpoint was the incidence of rebleeding within 7 days following endoscopic hemostasis. For statistical analysis, the Student's t-test was used for normally distributed continuous variables, while the Mann-Whitney U test was applied for non-normally distributed data. Rebleeding rates between groups were compared using the Fisher's exact test.

RESULTS: Of the 10,734 screened patients, 135 met the inclusion criteria. Among these, 108 patients (80%) received IV pantoprazole 40 mg BID, while 27 patients (20%) received IV pantoprazole 80 mg BID during their hospitalization. A total of 12 patients experienced rebleeding within 7 days of initial EGD. In the IV pantoprazole 40 mg BID group, 7 patients (6.5%) experienced rebleeding, compared to 5 patients (18.5%) in the 80 mg BID cohort. Data analysis is ongoing.

CONCLUSIONS: The study observed an increased rebleeding rate in patients treated with IV pantoprazole 80 mg BID compared to IV pantoprazole 40 mg BID. Preliminary findings suggest that IV pantoprazole 40 mg BID may be an adequate high-dose PPI regimen to prevent rebleeding events. Further studies are warranted to evaluate the effects of various PPI regimens on patient outcomes.

Hanna Jamison, PharmD

Hanna is a current PGY1 Acute Care Pharmacy Resident at UPMC Presbyterian Hospital. She received her Doctor of Pharmacy degree from Duquesne University in Pittsburgh, PA. Hanna's professional interests include oncology and infectious disease. Upon completion of her PGY1 residency, she will pursue a PGY2 Oncology Pharmacy Residency at UPMC Shadyside Hospital.

Mentors: Catherine Kim, PharmD, BCCCP; Ryan Rivosecchi, PharmD, BCCCP

Effect of age-adjusted procedural sedation dosing on respiratory events

Jansen K, McCormick P

BACKGROUND: Procedural sedations are regularly performed within emergency departments (ED)to increase the tolerability of unpleasant procedures while preserving the patient's ability to maintain oxygenation and airway control. Previous studies have shown that geriatric patients typically require lower doses of sedative medications, likely due to lower volumes of distribution and decreased drug metabolism. Older adults are also at increased risk of side effects, including respiratory depression, compared to younger adults. In 2021, UPMC Mercy developed age-adjusted dosing guidelines for procedural sedation of geriatric patients in the ED. The objective of this study was to evaluate the effect of age-adjusted sedative dosing for procedural sedation on the risk of respiratory events in geriatric patients in the ED.

METHODS: This was a retrospective chart review, including patients 65 years and older who underwent procedural sedation with propofol, ketamine, or etomidate within UPMC Mercy's emergency department between February 1, 2019, and September 1, 2024. Patients were identified for inclusion by pre-procedural sedation notes within the electronic record and assigned to either the age-adjusted or unadjusted group based on the initial sedative utilized. The primary outcome was a composite endpoint of respiratory events, including a respiratory rate ≤ 8 breaths per minute, oxygen desaturation, increased supplemental oxygen requirements, assisted ventilation, and/or intubation. Secondary outcomes included the use of reversal agents, hemodynamic instability, physiologic recovery, and disposition.

RESULTS: Of the 157 patients identified for review, 113 were included in this analysis: 62 in the unadjusted dosing group and 51 in the age-adjusted dosing group. The respiratory event composite occurred in 33.9% of patients in the unadjusted dosing group compared to 31.4% in the age-adjusted dosing group ($p = 0.778$). Numerically, more patients in the unadjusted group required assisted ventilation (14.5% vs 3.9%; $p = 0.108$) and experienced oxygen desaturation (16.1% vs 7.8%; $p = 0.183$) compared to the age-adjusted group, but the difference failed to meet significance. There was no difference in the incidence of bradycardia or hypotension between groups, and disposition was similar. Among patients sedated with ketamine, those in the age-adjusted group required a significantly lower cumulative total dose of sedative medications than those in the unadjusted group ($p < 0.001$).

CONCLUSIONS: This study demonstrated no statistically significant difference in the rate of respiratory events among patients who received age-adjusted procedural sedation dosing compared to unadjusted dosing. There was a significant decrease in the total sedative dose required among patients sedated with ketamine in the age-adjusted group.

Kyle Jansen, PharmD

Kyle is a PGY2 Emergency Medicine pharmacy resident at UPMC Mercy. He received his PharmD from the Eshelman School of Pharmacy at the University of North Carolina in Chapel Hill, NC. Kyle completed his PGY1 pharmacy residency at Carilion Roanoke Memorial Hospital in Roanoke, VA. He is particularly interested in toxicology, trauma, and cardiovascular emergencies within the emergency department. After completing his PGY2 in Emergency Medicine, Kyle will continue his work at UPMC Mercy as the overnight ED pharmacist.

Mentors: Pamela McCormick, PharmD, BCPS, BCEMP, Emily Ankney, PharmD, BCCCP, BCEMP, Heather Prunty, MD, Kevin Leonard, MD

Assessing the potential for pharmacist-driven tacrolimus and cyclosporine dosing and management at UPMC Hamot

Jellison SM, Crandall AC, Bullan BN

BACKGROUND: Calcineurin inhibitors (CNIs) such as tacrolimus and cyclosporine are vital for immunosuppression following solid organ transplantation. Despite their efficacy, CNIs are narrow therapeutic index medications associated with significant adverse effects when inappropriately dosed. UPMC Presbyterian currently has a protocol that enables pharmacist-driven dosing of CNIs to optimize therapeutic levels and reduce toxicity and rejection risks. The aim of this study is to identify and assess current gaps in clinical monitoring that may result in increased length of stay and adverse drug events (ADEs), thus indicating a need for pharmacist-driven CNI dosing and monitoring program at UPMC Hamot.

METHODS: This retrospective study will analyze data from hospitalized patients at UPMC Hamot between January 2023 and December 2024 who received oral tacrolimus or cyclosporine for maintenance of a solid organ transplant. Patients must be ≥18 years old and have documented CNI monitoring ranges to be included. Data on organ transplanted, drug interactions, timing of trough level collections, adverse events, and dosing adjustments was collected. The primary outcome is CNI level impact on length of hospitalization. The secondary outcome includes CNI adverse effects, including renal and hepatic dysfunction. Statistical analysis was performed using a two-tailed t-test, chi-squared, and descriptive methods.

RESULTS: After excluding repeat admissions, a total of 133 patients taking tacrolimus and 22 patients taking cyclosporine were assessed for inclusion. 71 and 9 patients were included for analysis, respectively, with the remaining being excluded for not having a documented monitoring range in the electronic health record or not having CNI levels ordered during hospitalization. Approximately 62% of patients taking tacrolimus and 89% of patients taking cyclosporine had levels appropriately ordered. There was a significant reduction in length of stay for patients taking tacrolimus who had appropriate levels collected compared to those who did not (5.51 days vs. 8.68 days, $p<0.05$). In the tacrolimus group, there was a statistically significant presence of adverse drug events in patients who had a high trough level compared to a low or normal level ($p=0.0498$) with nephrotoxicity being the most prevalent (24%). No statistically significant data was found in the cyclosporine group.

CONCLUSIONS: This study found that there was a significant reduction in length of stay for patients taking tacrolimus who had trough levels appropriately collected, demonstrating the need for further intervention for these patients. Implementation of pharmacist-driven CNI dosing and monitoring may benefit transplant patients at UPMC Hamot by reducing length of hospitalization and adverse drug events.

Shayla Jellison, PharmD, MSMEd Candidate

Shayla received a Bachelor of Science in Biology from Seton Hill University in Greensburg, PA and Doctor of Pharmacy from Lake Erie College of Osteopathic Medicine (LECOM) in Erie, PA. They are currently completing a PGY-1 pharmacy residency at UPMC Hamot in Erie, PA. Sayla's professional interests include internal medicine, diabetes, and transplant. Shayla will be staying at UPMC Hamot as a staff pharmacist with hopes to take a clinical pharmacist role on an internal medicine unit.

Mentors: Ashley Crandall, PharmD, MSMEd, Bethany Bullan, PharmD, MSMEd, Christine Zdaniewski, PharmD, BCPS, Rajesh Govindasamy, MD

Evaluating the need for pharmacist optimization of DOAC utilization in patients with atrial fibrillation

Kim G, Hall DL, Miller TA, Gabriel C

BACKGROUND: Atrial fibrillation (AF) is one of the most commonly treated cardiac arrhythmias and is a leading cause of stroke in older adults. According to the American Heart Association/American Stroke Association (AHA/ASA) and the American College of Chest Physicians (ACCP), oral anticoagulation has been shown to decrease the risk of stroke by 64% and the risk of death by 26% in individuals with AF. Although direct oral anticoagulants (DOACs) are recommended over warfarin for managing nonvalvular atrial fibrillation, gaps remain in ensuring their appropriate use and consistent delivery. Studies have demonstrated that pharmacist-led interventions resulted in a significant reduction in inappropriate prescribing, successfully improved the use of oral anticoagulants, and effectively managed the transition from warfarin to DOAC therapy in accordance with guidelines. The study objective is to assess the need for pharmacist-led interventions for DOAC use in patients with atrial fibrillation within the identified practice sites.

METHODS: The study population is adults aged ≥18 years diagnosed with atrial fibrillation who are included in the Epic Cardiac (AFib) Registry, and had an appointment completed at General Internal Medicine Oakland or Shea Medical Center within the past 12 months from 10/1/2023 to 10/1/2024. Patients with no body weight listed will be excluded. The Cardiac (AFib) Patient Registry report will be generated from Epic to identify potential patients. Data that is collected will include patient demographics (age in years, gender, actual body weight), serum creatinine, name of the DOAC agent, and dose of the DOAC agent. The report that will be run within EPIC will include this information. The pharmacist resident will review the report to evaluate the appropriateness of DOAC use in patients with atrial fibrillation. The goal will be to identify the percentage of patients requiring adjustment in DOAC use.

RESULTS: Results are pending.

CONCLUSIONS: Conclusions are pending. Data will be reviewed to determine the percent of patients with atrial fibrillation who are not on the appropriate dose of DOAC. Results will be shared with clinic leadership to identify the next steps, with incorporation of pharmacist intervention to meet DOAC use guidelines and increase rates of anticoagulation in atrial fibrillation. This change in percentage will then be evaluated.

Grace Kim, PharmD

Grace is from NJ/NYC and received her PharmD from the University of North Carolina (UNC) Eshelman School of Pharmacy in Chapel Hill, NC. She completed her PGY-1 pharmacy residency at The Mount Sinai Hospital in NYC. She is completing her PGY-2 Ambulatory Care pharmacy residency at UPMC Presbyterian/Shadyside in Pittsburgh, PA. Her clinical interests include cardiology and endocrinology, and she is interested in working as a Clinical Ambulatory Care pharmacist.

Mentors: Deanne L. Hall, PharmD, BCACP; Trisha A. Miller, PharmD, MPH, BCACP; Carly Gabriel, PharmD, BCACP

Misinformation on naloxone in populations experiencing homelessness

Kruse CL, Connor S, Crowder A, Lee H, Leon-Jhong A, Abbott J, Tsvetkova M, Douaihy A

BACKGROUND: People who are unhoused experience overdose-related death at a rate 10 times higher than the general population. Naloxone nasal spray is a medication that can reverse overdose by working as an antagonist at the opioid receptor. There is a paucity of literature evaluating what patients perceive to be most important in naloxone education. Programs are often developed without the input of the community most impacted. This study plans to obtain the perspectives of PEH in tandem with the perspectives of practitioners who work with this patient population to develop a comprehensive training program for naloxone intranasal spray.

METHODS: Persons experiencing homelessness (PEH) were the first target population. Subjects were eligible if they were 18 years of age or greater, spoke English and met the definition of homelessness set in the McKinney-Vento Act. Subjects were recruited from a medical clinic located inside a low-barrier shelter in an urban setting. Individual interviews were conducted using a semi-structured interview guide. The interviews were anonymous, audio-recorded, and transcribed verbatim. Participants were gifted a $20 gift card to a local supermarket in exchange for their participation. A virtual focus group was conducted with practitioners who work with PEH. Discussion prompts relating to PEH gaps in knowledge, designing an educational program for naloxone, and barriers to educational programs were used. This focus group was also audio recorded and transcribed verbatim. Qualitative analysis was conducted to identify themes.

RESULTS: Thirty PEH participated in semi-structured interviews. Preliminary thematic analysis has identified that many subjects have perceptions of excessive naloxone use by healthcare professionals and shelter staff. Subjects also endorsed concern over the safety of naloxone, including worry over organ damage and interactions with other drugs. Five practitioners participated in a virtual focus group. Preliminary themes identified included building trust with PEH and compassionate naloxone dosing. Subjects also discussed the changing drug supply and the need for educational programs that address the current issues PEH face.

CONCLUSIONS: Research is in progress with conclusions pending. Conclusions from this research will be useful for guiding the development of naloxone educational programs tailored to the needs of populations experiencing homelessness.

Presented at the American Pharmacists Association Substance Use Disorders Institute in Salt Lake City, Utah May 28-31, 2025.

Cassandra Kruse, PharmD

Cassandra received her PharmD from the University of Findlay in Findlay, Ohio. She went on to complete her PGY-1 training at Cleveland Clinic Marymount in Garfield Heights, Ohio. She is currently a PGY-2 Ambulatory Care resident in the Global Health program at UPMC Presbyterian. Cassandra is interested in substance use disorders and global health.

Mentor: Sharon Connor, PharmD

Assessing Baseline Community Hospital Intravenous Opioid Utilization

Lee SL, Ordons BM, Gallagher LM

BACKGROUND: Opioid stewardship is an evolving field of increasing interest, and regulatory bodies have emphasized improving pain management and optimizing opioid use. Multidisciplinary efforts have been shown to reduce opioid prescriptions and oral morphine equivalents (OME), and some pharmacist-led efforts include provider education and intravenous (IV) to oral (PO) interchange. Efforts aimed at reducing IV opioid use have led to decreased product use with comparable analgesia outcomes. At this community hospital, the goal is to assess current opioid use and develop opioid stewardship efforts by assessing clinical appropriateness of IV opioids.

METHODS: This quality improvement project was a single-center retrospective cohort study of patients who received intravenous opioids at a community hospital. Data was collected for patients hospitalized from April 1, 2024, through June 30, 2024. Patients were included if they were 18 years or older and received intravenous opioids in the hospital over a period greater than 48 hours. Patients were excluded if admission began before or ended after the study period, if they received fewer than two doses of opioids, received opioids for analgosedation, received them exclusively intraoperatively/postoperatively, changed status to comfort measures only within 48 hours, if they received intravenous opioids for less than 48 hours, or due to charting error. Patients were identified via charge reports of administered intravenous opioids. One pharmacist completed retrospective chart review to assess whether patients received opioids optimally based on the following: receiving multimodal pain management (e.g., topical agents, acetaminophen, NSAIDS), and ordered IV opioids only for breakthrough or if patients were not taking other medications by mouth. The pharmacist also collected information on patient age, sex, pain severity based on chart review (classified as "mild 1-3", moderate "4-6", "severe 7-10", or breakthrough), how many OME patient's received, how many days during which they were admitted, how many doses they received, which parenteral agents (morphine, fentanyl, or hydromorphone) were received, and if patients received naloxone during their admission. Analysis consisted of descriptive statistics.

RESULTS: Of the 560 patients evaluated, 85 met inclusion criteria. Demographics were collected and descriptive statistics performed. Of these patients 29% received opioids optimally as specified. Most patients (94%) had orders for multimodal therapy, but only 57 patients (67%) were consistently receiving it. Of these patients, 80 (94%) were taking other medications by mouth. Notably, only 30 (35%) had opioids only ordered for breakthrough. Most patients were receiving hydromorphone, and most patients had opioids ordered for severe pain (7-10) as opposed to moderate or breakthrough pain. Patients received an average of 256.5 OME (range = 20-1482) from IV opioids, and an average of 530.9 total OME (range = 42 - 4062). One patient received naloxone during this study period.

CONCLUSIONS: This study aimed to assess baseline intravenous opioid utilization. This project was inspired by a previous hospital initiative where pharmacists placed 48-60 hour stop dates on IV opioids. Limiting utilization to breakthrough pain and shortening the stop date to within 48 hours may represent possible areas of improvement.

Sydney Lee, PharmD

Sydney received her degree from the University of Pittsburgh School of Pharmacy and is currently a PGY1 Pharmacy Resident at UPMC St. Margaret on the Geriatrics Track. She is interested in deprescribing and palliative care and intends to pursue geriatric or palliative care clinical positions after residency.

Mentors: Brianna Ordons, PharmD, BCPS, BCCCP, Lia Gallagher, MSN, FNP-BC

Outcomes associated with ribavirin for the treatment of community acquired viral infections (CARVs)

Lindamood CK, Moore CA, Sacha LM, Iasella CJ

BACKGROUND: Community Acquired Respiratory Viruses (CARVs) are viruses that range from mild upper respiratory infections to severe lower respiratory infections, notably in immunocompromised individuals. In lung transplant recipients (LTRs), CARV infections are associated with an increased risk of complications including chronic lung allograft dysfunction (CLAD), which is the primary limitation to long-term survival after lung transplant. In addition, adequate treatment for CARV infections in LTRs remains a challenge. One antiviral agent, ribavirin, has been studied and is a potential option for CARV treatment. Ribavirin is a guanosine analog with broad coverage against most RNA viruses, including respiratory syncytial virus (RSV), metapneumovirus (MPV), or parainfluenza virus (IV). The goal of this study is to evaluate ribavirin's impact on supplemental oxygen use after treatment in LTRs infected with RSV, MPV, or PIV.

METHODS: This was a single centered retrospective study conducted at UPMC Presbyterian Hospital evaluating the efficacy and safety of ribavirin in adult LTRs with CARV infections. The study included adult LTRs who were infected with RSV, MPV, or PIV from January 1, 2012 – June 30, 2024, following up to one-year post-infection and receiving either oral, inhaled, or IV ribavirin. Data collection included baseline demographics, ribavirin regimen, and outcomes after ribavirin treatment. These include oxygenation status, supplemental oxygen use, and FEV1. Infected patients were identified based on microbiological data such as respiratory viral panel (RVP) collected from bronchoalveolar lavage (BAL) or bronchial wash. The primary outcome was the patient's need for supplemental oxygen status at 6 months and 12 months. Other outcomes included CLAD incidence at 6 months and 12 months along with safety outcomes of ribavirin, particularly incidence of hemolytic anemia and acute kidney injury (AKI) during treatment.

RESULTS: A total of 95 patients were included in the study. In the total cohort, median age was 59 years (IQR 51-68) and 54 (57%) were male. The most common indication for lung transplant was COPD in 37 (39%) patients. The breakdown of CARV type was 41 (43%) with PIV, 28 (30%) with RSV (30%), and 23 (24%) with MPV. The most common ribavirin dosage formulation used was oral, which was found in 77 (83%) patients, then followed inhaled 13 (14%) patients. The median duration of therapy was 7 days (IQR 5-10). Most patients (67%) did not have oxygen requirements prior to receiving ribavirin. Final analysis and results are pending.

CONCLUSIONS: Final conclusions are pending.

Christopher Lindamood, PharmD

Christopher is a PGY1 Pharmacy Resident at UPMC Presbyterian. He is originally from Strongsville, OH and received his Doctor of Pharmacy from Ohio Northern University, Raabe College of Pharmacy in 2024. He is aiming for a career specialty in solid organ transplant. Upon completion of his training in Pittsburgh, he plans to pursue a hospital pharmacist position within the UPMC network.

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

Automating acute kidney intervention and pharmacotherapy (AKIP) list updates: Identifying renally eliminated and nephrotoxic medications

Lukan CJ, Eldien H, Lukan CA, Barreto EF, Kane-Gill SL

BACKGROUND: The Acute Kidney Intervention and Pharmacotherapy (AKIP) list is an evidence-based standardized list designed to aggregate all renally-dosed and/or potentially nephrotoxic medications. The AKIP list sourced data from primary literature, FDA package inserts, tertiary references, and clinical decision support system rules. The list as developed is static, but there is great potential to leverage technology to facilitate automated updates as new drugs or data become available. The aggregation of evidence from systematic reviews is a time-intensive process that poses a significant barrier to timely updates, underscoring the need for more efficient, technology-driven approaches. The goal of this project was to automate the discovery of new renally dosed drugs or nephrotoxins suitable for addition to the AKIP list.

METHODS: A systematic PubMed search was created by a research librarian for 2022 to 2024, corresponding to a one-year overlap with the terminal date of the existing AKIP search and two additional years. Each returned article was reviewed by at least two pharmacists and labeled according to whether it identified a potentially renally dosed or nephrotoxic drug. After labeling, we used a tokenizer trained on a medical corpus to tokenize all of the labeled articles. Tokenization is a process by which words are turned into numerical representation that computers can recognize. We used the tokenized text to fine-tune a bidirectional encoder representation from transformers (BERT) classification model. To ensure robust model performance, we fine tuned the BERT model with nested cross-validation, which is a process that divides a dataset into multiple subsets where the model is trained on one portion of the data and tested on the remaining portion. The model achieving the highest recall across the outer loop folds was selected as the final model for analysis. Once predictions were generated, we excluded articles containing medications already on the list.

RESULTS: There were 1,543 articles identified in the sampling timeframe, of which 702 were labeled as related to potentially renally dosed or nephrotoxic drugs that could be added to the AKIP list. After exclusion of articles containing medications already existing on the list from the predictions, there were 202 articles left for review. The recall and accuracy of the best performing model for correctly classifying relevant articles was 97.14% and 87.66% respectively.

CONCLUSIONS: We found good performance of a technology driven approach for article screening that identifies new candidate drugs for addition to the AKIP list. Next steps include removal of articles that do not mention a drug eligible for addition to the list. The model will be integrated into a web application to support biannual surveillance of the literature and new drug releases, enabling iterative updates to the AKIP list.

Caiden J. Lukan, PharmD

Caiden earned his Doctor of Pharmacy degree with a minor in Data Science from Butler University in Indianapolis, IN. He is currently serving as a Nephrotoxin Steward Fellow at the University of Pittsburgh School of Pharmacy. His professional interests lie at the intersection of data science and pharmacy, with a focus on pharmacoepidemiology, health outcomes and economics, and real-world evidence generation. Caiden is passionate about leveraging data-driven insights to improve patient care. Following his fellowship, he aspires to become a leader in the field of health outcomes and economics through impactful work in the pharmaceutical industry or healthcare consulting.

Mentors: Sandra Kane-Gill, PharmD, MSc, Kangho Suh, PharmD, PhD

Use of a standing order to increase appropriate emergency contraceptive prescribing at academic family health practices

Messenger CA, Ballard SL

BACKGROUND: Emergency contraception (EC) therapies, such as Plan B (levonorgestrel) and Ella (ulipristal acetate), are effective in preventing pregnancy after unprotected sex. For individuals with a BMI ≥ 30 kg/m^2, ulipristal acetate is the preferred oral agent due to its higher efficacy (96.9%) compared to levonorgestrel (92.6%). In 2022, a project aimed at improving access to EC found that 83% of levonorgestrel orders for patients with elevated BMI were made outside of office visits, primarily in telephone calls and refill encounters. This project aims to improve the appropriate prescribing of EC in telephone-based encounters.

METHODS: A pharmacy resident-led continuous quality improvement team developed a standing order and workflow allowing phone triage nurses to order EC during telephone encounters, which was offered to 10 academic family medicine practice sites in Western Pennsylvania. Prescribing rates will be monitored through monthly reports that detail the number of patients prescribed EC, associated encounter type and provider, BMI, and other patient demographics.

RESULTS: Pending

CONCLUSIONS: Pending

Presented at UPMC Family Medicine Scholarship Day in Altoona, PA on 25 April 2025.

Carly Messenger, PharmD

Carly received her PharmD from St. John Fisher University in Rochester, NY. She then completed her community-based PGY1 at Middleport Family Health Center/University at Buffalo in Buffalo, NY. She is currently completing an ambulatory care PGY2 at UPMC Shadyside Family Health Center in Pittsburgh, PA. Her professional interests include diabetes management and medication adherence. After residency, Carly hopes to continue working in a primary care setting.

Mentor: Stephanie Ballard, PharmD, BCACP

Safety and efficacy of rapid intravenous administration of valproic acid

Metheney HM, Phinney TA, Lipski M, Zdaniewski CL

BACKGROUND: Valproic acid (VPA) is a widely used antiepileptic and migraine treatment with both Federal Drug Administration approved and off-label indications. Traditionally, intravenous (IV) VPA is administered as a diluted infusion at a rate not exceeding 20 mg/min potentially leading to delays in treatment. Recent studies suggest undiluted IV push (IVP) VPA administered over 3–5 minutes may achieve therapeutic levels faster without compromising safety. In 2024, University of Pittsburgh Medical Center (UPMC) Hamot implemented IVP VPA for all patients receiving IV VPA. This study aims to evaluate the safety, efficacy, and cost differences between IV infusion and IVP VPA administration.

METHODS: This retrospective study will include adult patients (≥18 years) at UPMC Hamot who received IV VPA between January 1, 2023, and December 31, 2024. Patients must have received VPA for seizures, headaches, or as continuation of maintenance therapy. Those with hepatic impairment, lamotrigine doses ≥200 mg/day, or concomitant carbapenem use were excluded. Patients will be grouped based on VPA administration route (IV infusion vs. IVP). Data collected will include demographics, indication, VPA dosing, vital signs, co-administered medications, and pain scores. The primary outcome is a composite of heart rate, mean arterial pressure, oxygen saturation, and respiration rate measured at baseline and post-administration times of 30 minutes, 60 minutes, and 4 hours. Secondary outcomes include time to seizure resolution, need for additional rescue therapy, headache relief (based on pain scores), time from order to administration, incidence of extravasation, and cost.

RESULTS: A total of 80 subjects were included (Infusion: n=40; IVP: n=40). The average ages were 58±18.8 years (Infusion) and 53.1±18.4 years (IVP). Indications for VPA use included seizures (Infusion: 17.5%; IVP: 17.5%), headache (Infusion: 17.5%; IVP: 10%), and maintenance regimen (Infusion: 65%; IVP: 72.5%) Primary outcomes showed no significant differences in changes in mean arterial pressure, oxygen saturation, or respiratory rate at 30 minutes, 60 minutes, or 4 hours post-administration. The outcome of change in heart rate did have a statistically significant difference at 60 minutes (infusion -5.5 beats per minute (bpm) [IQR –18 - -0.5] vs IVP –0.5 bpm [IQR –6.3 - 1.8], p=0.05), but not at 30 or 4 hours post administration. Median time to administration was significantly shorter for IVP (48.5 vs. 72.5 mins, p=0.02). Time to seizure resolution, need for additional rescue medications, and changes in pain scores for headache had minimal data documented in data review and did not undergo statistical analysis. No extravasation occurred requiring hyaluronidase administration in either group. Cost analysis is still ongoing.

CONCLUSIONS: Administration of valproic acid demonstrated comparable safety with traditional infusion vs IVP, with no significant differences in most hemodynamic outcomes. Additionally, IVP significantly reduced time to administration, suggesting a more efficient delivery method without compromising patient safety.

Hannah Metheney, PharmD

Hannah earned her Bachelor of Science in Biology at Seton Hill University in Greensburg, PA and her Doctor of Pharmacy degree at Lake Erie College of Osteopathic Medicine School of Pharmacy in Erie, PA. She is currently a PGY-1 Pharmacy Resident at UPMC Hamot and will be completing a PGY-2 Critical Care pharmacy residency at UPMC Presbyterian in Pittsburgh, PA. Hannah's professional interests include advanced cardiac life support, critical care, and emergency medicine. Upon completion of her PGY-2 Pharmacy Residency, she plans to pursue critical care board-certification (BCCCP).

Mentors: Michelle Lipski, PharmD, BCCCP; Trevor Phinney, MD; Christine Zdaniewski, PharmD, BCPS

Pharmacist-driven strategies to enhance naloxone prescribing for opioid overdose prevention at hospital discharge

Molnar CS, Alfera RA, Hedayati DO, Hoffmaster RB, Nakaishi LA, Taylor AM

BACKGROUND: Opioid overdose is a leading cause of accidental death in the United States. Patients at high risk for opioid overdose should be prescribed naloxone to have available to reverse an overdose. The Center for Disease Control defines high risk for opioid overdose as concomitant use of an opioid and a benzodiazepine, prior opioid overdose, history of opioid use disorder, or daily morphine milligram equivalents ≥50 per day. A previous quality improvement project showed that an interdisciplinary effort was successful at increasing naloxone prescriptions at discharge. Based on this, we implemented a pharmacist-driven intervention to increase naloxone prescribing rates at discharge for patients at high-risk for opioid overdose.

METHODS: A quality improvement study was performed at UPMC St. Margaret hospital. All patients admitted to the hospital's two interdisciplinary inpatient teaching services (family health center and geriatric) were included. Patients were excluded from the study if they were transferred to another inpatient service, died during admission, or discharged to a skilled nursing facility (SNF), hospice, or an inpatient rehabilitation facility. A three-month retrospective review to gather baseline naloxone prescribing rates for those who met at least one of the four high risk opioid overdose criteria was performed. Then a three-month pharmacist-driven intervention was performed. Clinical pharmacists reviewed patient charts upon hospital admission to assess the initial need for naloxone and once more prior to discharge to reassess for any changes made to their home medication list during the inpatient stay. If the patient met at least one of the four criteria for high risk of opioid overdose, the pharmacist counseled the patient on the use of naloxone. The pharmacist then wrote a consult note in the patient's chart to document the prescribing and counseling of naloxone. The pharmacist then recommended the provider prescribe naloxone for the patient upon discharge. The primary outcome was naloxone prescribing rates for individuals at high risk for opioid overdose. The secondary outcomes included the time of the completion of patient counseling prior to discharge and the average time of the intervention.

RESULTS: A total of 52 patients met criteria for high risk of opioid overdose at baseline. Of those 52 patients, 44.2% (23) were prescribed naloxone at discharge. Of the 49 patients considered high risk during the implementation of the intervention, 63.3% (31) were prescribed naloxone at discharge. Naloxone prescribing rates increased by 19.1% with a pharmacist-driven intervention.

CONCLUSIONS: The initiation of a pharmacist-driven intervention increased naloxone prescribing rates at hospital discharge for patients identified as high risk for opioid overdose. The pharmacist's role in the interdisciplinary team is crucial to providing adequate medication education to patients.

Presented at the Society for Teachers of Family Medicine, Salt Lake City, UT, May 5, 2025.

Camryn Molnar, PharmD

Camryn is a PGY1 pharmacy resident and first-year Faculty Development Fellow at UPMC St. Margaret. She received her Bachelor of Science degree from the University of Mary Washington in Fredericksburg, VA and her Doctor of Pharmacy degree from Virginia Commonwealth University School of Pharmacy in Richmond, VA. Her professional interests include diabetes management, ambulatory care, and community outreach. This upcoming year, Camryn plans to continue her training as a PGY2 Ambulatory Care Pharmacy Resident at UPMC St. Margaret.

Mentor: Alexandria Taylor, PharmD, BCPS

Evaluating inpatient warfarin management by pharmacists compared to providers

Naumovski I, Lauver AR, Trisler M, Zeigler HR

BACKGROUND: Warfarin is an anticoagulant used to prevent thrombosis and embolism, but its narrow therapeutic index requires precise dosing and INR monitoring. Management is complicated by interactions with medications, foods, and supplements. Pharmacists play a crucial role by adjusting doses, monitoring interactions, and educating patients. Pharmacists may provide more consistent management due to their ability to monitor patients more frequently than providers. This quality improvement project aims to assess whether a pharmacist-led warfarin management results in improved outcomes, including faster time to therapeutic INR and fewer side effects compared to provider-led management.

METHODS: We conducted a pre-/post-implementation evaluation of an inpatient pharmacist-managed warfarin consult service at UPMC Shadyside hospital. Adult patients were included if prescribed warfarin between either January 2022 to May 2022 (provider group) or November 2023 to November 2024 (consult group), and were excluded if presenting with bleeding on admission, those whose warfarin was held anytime during hospitalization for surgery, or those who never received a dose. The primary objective of this study was to evaluate safety and efficacy outcomes between the two groups.

RESULTS: We screened 502 patients, and 250 eligible patients were included: 115 patients in the consult group and 135 patients in the provider group. Among the 252 patients excluded, the most common reason was "warfarin held for surgery while inpatient" (n=103). The consult group experienced less bleeding events, 1.7 vs 11.1% and no difference in clotting events 0.9% (1 patient) to 0%. Amongst patients readmitted with a bleed or clot within 30 days of discharge (n=16), there were 0 patients from the consult group and 11.9% from the provider group. Consult group patients achieved a therapeutic INR more quickly, 1.38 vs 1.69 days and were therapeutic for a longer duration of time before discharge, 2.52 to 2.2 days. In addition, a greater number of patients in the consult group were discharged with a therapeutic INR (57.4% vs 49.0%).

CONCLUSIONS: Pharmacist-led warfarin management was associated with improved outcomes compared to provider-led management. Patients under pharmacist care experienced fewer bleeding events, reached therapeutic INR levels more quickly, maintained those levels longer prior to discharge, and were more often discharged within the therapeutic range. No readmissions due to bleeding or clotting occurred in the pharmacist-managed group. These findings highlight the clinical value of pharmacist involvement in anticoagulation therapy and support continued integration of pharmacists into warfarin management protocols.

Igor Naumovski, PharmD

Igor is currently completing his PGY-1 residency at UPMC Shadyside Hospital and soon starting his PGY-2 residency at the UPMC Shadyside Family Health Center, specializing in ambulatory care. He earned his Doctor of Pharmacy degree from Duquesne University School of Pharmacy in Pittsburgh, Pennsylvania. His professional interests include chronic disease state management, with a focus on diabetes, dyslipidemia, heart failure, and hypertension. Upon completing his PGY-2 residency, he plans to pursue a clinical ambulatory care pharmacist position in a primary care setting, ideally in the Pittsburgh area.

Mentors: Holly R. Zeigler, PharmD, BCPS, BCCCP, Allison R. Lauver, PharmD, BCPS, BCCCP, Michael Trisler, PharmD, MPH, BCIDP

Retrospective analysis of oral de-escalation versus continued intravenous therapy for *Streptococcal* bacteremia

Nealis LA, Hitchcock AM, Andrick LM

BACKGROUND: *Streptococcal* bacteremia is commonly associated with community acquired pneumonia and skin and soft tissue infections with risk for deep-seated complications such as endocarditis, bone & joint infections, and prosthetic involvement. Current management of *Streptococcal* bacteremia involves at least 2 weeks of intravenous therapy from the first set of negative blood cultures. Oral stepdown has been evaluated for Gram-negative bacteremia and deep-seated infections such as endocarditis; however current data supporting oral antimicrobial therapy for *Streptococcal* bacteremia is lacking. Continued intravenous therapy carries concern of increased healthcare burden (cost, hospital length of stay, transitions of care) and adverse effects (infusion reactions, line infections). The objectives of this study are to compare the hospital length of stay and clinical outcomes of patients with *Streptococcal* bacteremia receiving either oral stepdown therapy or continued intravenous therapy.

METHODS: This Institutional Review Board exempted study is a retrospective analysis of adult patients aged ≥ 18 years with *Streptococcal* species identified in > 1 blood culture at seven facilities in the UPMC Central PA region from August 1, 2021, to July 31, 2024. Patients were excluded from this study in the setting of polymicrobial bloodstream infections, bacteremia due to *Streptococcus* spp. in the preceding 30 days, suspected central nervous system infection, enrollment in hospice prior to completing antibiotics, and > 48 hours between positive culture and effective therapy. Data collection included demographic information, *Streptococcus* spp. bacteremia characteristics, empiric and targeted antibiotic regimes, hospital length of stay, and clinical outcomes. Descriptive statistics were utilized to characterize the patient sample. The primary outcome of hospital length of stay was calculated via T-test using socscistatistics.com. 30-day secondary outcomes of all-cause mortality, recurrence of *Streptococcal* spp. bacteremia, and readmission were calculated via Chi-square or Fisher exact test.

RESULTS: Of 181 patients, 117 met inclusion criteria for analysis. A majority of patients (61.5%) received oral de-escalation while 38.5% (45/117) continued intravenous therapy for the duration of treatment. Summative characteristics for both groups include male sex 71/117 (60.7%) and mean age 65.8 years (range 24-96). The IV arm had a statistically higher rate of ICU admission (48.9% vs.22.2%; p = .003) and necessitation of vasopressors (26.7% vs. 6.9%; p = .003). Hospital length of stay was significantly shorter in the oral group (median 4.2 days; IQR 3.2-5.9), compared to intravenous group (median 8.2 days; IQR 5.8-14.3), p < .00001. 30-day all-cause mortality was significantly less likely in the oral group (0/72; 0%), compared to the intravenous group (4/45; 8.9%), p = .02. There was no significant difference between groups in both readmission and recurrence rates.

CONCLUSIONS: Hospital length of stay was significantly shorter in patients who received oral stepdown therapy for *Streptococcal* bacteremia; however, confounding factors may include a higher severity of illness in the intravenous therapy group, as evidenced by ICU admission status and vasopressor requirements. Oral stepdown therapy was not associated with worse 30-day clinical outcomes.

Leah Nealis, PharmD

Leah is from Austin, TX and received her PharmD from The University of Texas at Austin College of Pharmacy. She is currently a PGY-1 Pharmacy Resident at UPMC Harrisburg in Harrisburg, PA. Her clinical interests include infectious disease, critical care, and solid organ transplantation. Upon completion of residency, Leah intends to work as a pharmacist in the acute care setting.

Mentors: Allison Hitchcock, PharmD, AAHIVP; Laura Andrick, PharmD, BCCCP

Nebulized magnesium sulfate for status asthmaticus

Nero SZ, Stramara LN

BACKGROUND: Magnesium sulfate works as a calcium antagonist, causing smooth muscle relaxation and bronchodilation to treat asthma exacerbations. According to the 2022 GINA Guidelines, nebulized magnesium sulfate may be used as an adjunct in the first hour of treatment for patients ≥2 years old with a severe asthma exacerbation. Several systemic reviews looked at randomized controlled trials with nebulized magnesium sulfate compared to intravenous magnesium sulfate or standard therapy that revealed it was associated with better lung function outcomes and was more tolerable. However, little is known about the effectiveness of using the inhaled formulation alone. The objective of this study was to evaluate the efficacy of nebulized magnesium sulfate compared to combination therapy with intravenous magnesium sulfate for the treatment of status asthmaticus.

METHODS: This is a single center, retrospective, observational, cohort study conducted in an 11-bed pediatric intensive care unit. Participants included pediatric patients who received nebulized magnesium sulfate only and nebulized magnesium sulfate with intravenous magnesium sulfate in the first 24 hours of admission, between August 1, 2021, to December 31, 2024. Patients were excluded if they received nebulized magnesium sulfate after 24 hours of admission and if they were intubated prior to receiving the first dose. Data collection included age, weight, respiratory support, asthma diagnosis, asthma distress score, blood pressure, serum magnesium levels, and confounding concomitant medications. Chi-square analysis and t-tests will be utilized to detect demographic differences between the two intervention groups. The primary outcome will be analyzed using relative risk calculations and secondary outcomes will be analyzed using descriptive statistics. The primary outcome of this study is escalation of respiratory support after receiving nebulized magnesium sulfate in the first 24 hours of admission. Secondary outcomes include endotracheal intubation within 24 hours of admission, improvement in asthma distress score, hypotension within 1 hour after receiving nebulized magnesium sulfate, and hypermagnesemia.

RESULTS: Data analysis is in progress and results are pending.

CONCLUSIONS: Conclusions will follow after data analysis is complete.

Safiya Nero, PharmD

Safiya is currently a PGY-1 pharmacy resident at UPMC Harrisburg in Harrisburg, PA. She received her Doctor of Pharmacy degree from the University of Maryland School of Pharmacy and will complete her PGY-2 pediatric pharmacy residency at the University of Maryland in Baltimore, Maryland. She plans to practice as a pediatric clinical pharmacy specialist after the completion of her training.

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

Efficacy of high-dose tamsulosin compared to standard dosing in spinal cord injury patients

Orji DC, Bornstein AM, McCormick PJ

BACKGROUND: Tamsulosin, a selective alpha-1 receptor antagonist, is currently FDA-approved for the treatment of benign prostatic hyperplasia in males. It is also used off-label for the management of voiding dysfunction. Therapeutic doses of 0.4 mg and 0.8 mg have demonstrated symptom relief (improved bladder storage, emptying, reduced symptoms of autonomic dysreflexia) in cases of urinary retention in males. Patients with spinal cord injuries commonly experience symptoms of neurogenic lower urinary tract dysfunction. Tamsulosin is prescribed at doses up to 1.6mg/day in patients with spinal cord injuries for neurogenic bladder. Previous research has focused on lower doses of tamsulosin and its use with catheterization, limited studies have investigated the impact of higher doses in this unique population. This study aims to investigate the efficacy and safety of high-dose tamsulosin compared to standard dosing in patients with spinal cord injuries at UPMC Mercy.

METHODS: This is a retrospective, single-center chart review of patients treated with high-dose tamsulosin (1.2-1.6mg/day) between January 1, 2019 and January 1, 2024 while admitted to the spinal cord injury (SCI) rehabilitation unit at UPMC Mercy. Patients included in this study were 18 years or older, with a diagnosed spinal cord injury, who received a total of 1.2-1.6mg/day of tamsulosin. Patients were excluded if they were on a high-dose tamsulosin regimen prior to admission, had a urologic procedure in the past two years, and received fewer than four doses while on either tamsulosin regimen of high-dose (1.2-1.6mg/day) or standard maximum dose of (0.8mg/day). The primary efficacy endpoint is the change in mean post-void residual volume from baseline (0.8mg/day) to high-dose (tamsulosin 1.2 mg/day or tamsulosin 1.6mg/day). Secondary efficacy endpoints include the number of straight catheterizations required and episodes of urinary incontinence. Safety outcomes include incidences of hypotension, dose-limiting dizziness, acute kidney injury, and autonomic dysreflexia.

RESULTS: Data collection has been completed, and data analysis is pending. Of the 73 patients screened, 40 patients were excluded. The main reason for exclusion was a result of patients receiving less than four doses while on either high-dose regimen of tamsulosin.

CONCLUSIONS: Conclusions and findings of this study will be completed after data analysis. Pending our results, potential guidance may be provided on how to effectively utilize tamsulosin within this unique patient population at our institution.

Diamond Orji, PharmD

Diamond received her PharmD from the University at Buffalo School of Pharmacy and Pharmaceutical Sciences, Buffalo, NY. 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 ambulatory care at UPMC St. Margaret. Her clinical interests include chronic disease management and cardiology.

Mentors: Abigail Bornstein, PharmD, BCPS; Pamela McCormick, PharmD, BCPS, BCEMP

Evaluating the effects of the COVID-19 pandemic on ICU mortality and sedation charges

Paley C, Rivosecchi R, Suh K

BACKGROUND: The COVID-19 pandemic fundamentally challenged healthcare infrastructure and delivery, particularly during its peak periods. However, the extent to which these disruptions affected the clinical care and outcomes of non-COVID-19 patients in intensive care units (ICUs) remains unclear. Mechanically ventilated (MV) patients are highly vulnerable, and changes in ICU resource allocation could indirectly impact their outcomes. Understanding these effects is crucial for future crisis planning and response. This study aimed to compare sedative drug charges and mortality among MV ICU patients without COVID-19 during periods of varying COVID-19 ICU burden.

METHODS: This retrospective cohort study included MV ICU patients without COVID-19 admitted to the University of Pittsburgh Medical Center (UPMC) system from March 2020 through December 2022. High COVID-19 periods were defined as months when patients with COVID-19 accounted for 50% or more of MV ICU admissions. Sedation charges were calculated using the 2023 UPMC chargemaster for individual agents (dexmedetomidine, ketamine, fentanyl, propofol, midazolam). A mixed-effects logistic regression model assessed the association between COVID-19 periods and ICU mortality, with random intercepts for hospital and patient to account for clustering. A two-part model evaluated sedation drug charges. Models were adjusted for demographic, clinical, and ICU-level characteristics.

RESULTS: Periods of high COVID-19 burden were associated with a 13.7% increase in the odds of ICU mortality among MV patients without COVID-19. Significant covariates associated with increased mortality included higher age and elevated Global Open Source Severity of Illness Score. There were no significant differences in sedation drug charges between high and low COVID-19 periods.

CONCLUSIONS: High COVID-19 periods were associated with increased ICU mortality among non-COVID-19 MV patients, highlighting the indirect effects of pandemic-related strain on patient outcomes. The stability in sedation charges suggests that medication resource allocation remained consistent across pandemic periods. These findings underscore the need for targeted strategies to maintain care quality for all ICU patients during future healthcare crises.

Caroline Paley, PharmD

Caroline earned their Doctor of Pharmacy degree from the University of Wisconsin–Madison School of Pharmacy. They are currently completing a two-year Health Economics and Outcomes Research (HEOR) and Medical Affairs Fellowship through the University of Pittsburgh and Indivior. Caroline's professional interests include addiction and psychiatric medicine. Following their fellowship, Caroline plans to pursue a career as an HEOR consultant or real-world evidence (RWE) scientist.

Mentors: Robert Rivosecchi, PharmD, MS, Kangho Suh, PharmD, PhD

Combination therapy versus standard of care for the treatment of persistent *Staphylococcus aureus* bacteremia

Phar LG, McCormick PJ, Wein ME

BACKGROUND: Persistent *Staphylococcus aureus* bacteremia is associated with poor clinical outcomes and an increased risk of mortality. Previous literature has evaluated the use of combination antimicrobial therapies in patients with both methicillin-sensitive and methicillin-resistant *Staphylococcus aureus* bacteremia. While this data demonstrates promising results in time to blood culture sterilization compared to the standard of care, these results are not reflected in clinical practice guidelines, and more data is needed to determine the optimal treatment regimen for local practice. This study aims to assess the efficacy of the addition of a carbapenem to the standard of care for the treatment of persistent methicillin-sensitive *Staphylococcus aureus* (MSSA) bacteremia, as well as the transition to daptomycin in combination with ceftaroline for the treatment of persistent methicillin-resistant *Staphylococcus aureus* (MRSA) bacteremia.

METHODS: This is a single-site retrospective chart review of patients 18 years or older who have at least two positive blood cultures drawn greater than or equal to 48 hours apart identifying *Staphylococcus aureus* at UPMC Mercy from January 2019-December 2023. Patients are excluded if they were incarcerated at the time of admission, polymicrobial infection, received a carbapenem following blood culture sterilization of MSSA or received ceftaroline following blood culture sterilization of MRSA, or had unavailable data. The primary outcome is time to blood culture sterilization from first in-vitro active agent. Secondary outcomes include in-hospital mortality, bacteremia recurrence within 90 days, length of stay, length of stay from time of blood culture sterilization, intensive-care unit length of stay, time from blood culture sterilization to switch back to standard of care, and time on combination therapy.

RESULTS: A total of 590 patients were identified with *Staphylococcus aureus* bacteremia, of which 175 were deemed persistent and 76 were included. Patients were classified into MSSA bacteremia (n=47) and MRSA bacteremia (n=29). Data collection is complete, and data analysis is ongoing.

CONCLUSIONS: The results of this study will provide further insight into the optimal treatment for *Staphylococcus aureus* bacteremia.

Lauren Phar, PharmD

Lauren is a current PGY-1 pharmacy resident at UPMC Mercy. She is from Latrobe, PA and received her B.S in pharmaceutical sciences and PharmD from the University of Pittsburgh School of Pharmacy. Lauren has professional interests in critical care areas as well as infectious diseases.

Mentors: Megan E. Wein, PharmD, Pamela J. McCormick, PharmD, BCPS, BCEMP

Evaluation of ketamine tolerance after living-liver transplant donation

Pikounis EM, Lukan CJ, Iasella CJ, Johnson, HJ

BACKGROUND: For living-liver donors undergoing an elective hepatectomy, optimal pain control is a necessary component of post-operative care. Opioids have been the mainstay for analgesia post-operatively, but the utilization of multimodal agents can help alleviate pain while also providing an opioid-sparing effect. Of the multimodal analgesics available, ketamine has been shown to provide effective pain management without being associated with the typical adverse effects that opioids are associated with. Given ketamine is a hepatically-metabolized drug, there is a possibility that the dosing strategies utilized in patients with fully intact livers may not be as well tolerated in patients with newly partially resected livers. As dose-rate reductions and early discontinuations of ketamine post-hepatectomy have been commonly witnessed in practice, this study aims to examine if there are patient-specific factors that would allow for better predictions of ketamine intolerance post living-liver transplant donation.

METHODS: We conducted a retrospective chart review involving adult (>18 years old) liver donors admitted to UPMC Presbyterian between 6/1/2020 and 9/15/2024. All adult patients who underwent liver resection for the purpose of donation and were ordered a 72-hour ketamine infusion post-operatively were included in this study. Patients with a history of opioid tolerance, who donated an additional organ with or prior to the liver resection, returned to the operating room during the first 72 hours post-operatively, had sepsis, had missing data, or never started ketamine were excluded from the study. Demographic information, total liver remnant (TLR) parameters, hepatic laboratory markers, and presence of concomitant psychiatric medications were collected and utilized for the analysis. Multinomial and binomial logistic regressions were used to assess the significance of the patient characteristics of interest on the effect of patients completing ketamine therapy versus dose-reducing and/or discontinuing early.

RESULTS: A total of 230 patients were included in the study, with the majority having donated the right lobe of their liver (88.3%). The mean calculated TLR varied between lobe types, with 79.3% (75.4%-82.4%) and 46.7% (42.2%-51.3%) representing the left and right lobes, respectively. When comparing patients who completed the ketamine infusion to those who discontinued early, donor weight (OR 1.05, 95% CI 1.022-1.091; OR 1.06, 95% CI 1.026-1.097) and TLR (OR 1.04, 95% CI 1.015-1.07; OR 1.04, 95% CI 1.013-1.07) were considered statistically significant predictors in both the binomial and multinomial regressions.

CONCLUSIONS: Based on what is known regarding ketamine's metabolism, our results align with what is to be expected with the physiological changes that occur with a hepatectomy. Having a larger body weight or larger proportion of liver remaining compared to the patient's original total liver volume were more associated with completing ketamine therapy compared to those with a lower body weight or larger proportion of liver removed. These findings suggest that patients who are of lesser weight or have a smaller TLR may benefit from a decreased ketamine dose post-liver resection to have better tolerability and decrease the utilization of opioids.

Eleni Maria Pikounis, PharmD

Eleni is a PGY1 Acute Care Pharmacy Resident at UPMC Presbyterian. She is originally from Baltimore, Maryland and received her Doctor of Pharmacy from the University of Maryland School of Pharmacy. Her professional interests include transplant and infectious diseases. Upon completing her PGY1, Eleni will remain at UPMC Presbyterian to pursue a PGY2 in Solid Organ Transplant.

Mentor: Heather Johnson, PharmD, BCPS, FCCP

Design of the personalized medication review visit for the MyPGx (Implementing risk-based preemptive pharmacogenomic testing in employee health) clinical trial

Polkowski KA, Capozzolo NY, Ericson RG, Kim RE, Prebehalla L, Coons JC, Massart MB, Berenbrok LA, Empey PE

BACKGROUND: Pharmacogenomics (PGx) can guide selection and dosing of medications to improve outcomes while also minimizing adverse health events. Best practice guidance for delivery of PGx services has not yet been established, especially for preemptive PGx testing. For the MyPGx clinical trial, we developed a personalized medication review (PMR) to standardize interventions following PGx testing in efforts to maximize clinical value of PGx and mitigate risks.

METHODS: We conducted a literature review and integrated institutional practices to develop a virtual workflow from scheduling to post-visit interventions based on a comprehensive medication management model. Information gathering and documentation templates were created to standardize processes for research documentation and provider communication in the Epic, RedCap, and an app-based decentralized clinical trial platform. Focus was placed on scalable processes, tailored communication based on current PGx clinical actionability of interventions, and mitigation of risk associated with return of results from preemptive testing outside of typical patient care workflows. Procedures were deployed in the MyPGx randomized controlled trial.

RESULTS: The final workflow included pre-visit medication reconciliation with confirmation during the virtual pharmacists visit. Active and historical medication-related problems were identified during the PMR visit and categorized using the Medication Therapy Problem (MTP) Categories Framework (Pharmacy Quality Alliance, 2017). Documentation in the EHR-employed Epic dot phrases for standardization. A rubric for gene-drug pairs current actionability and severity/priority directed EHR routing vs direct communication to the primary health care team. Results return to patients was through the PMR visit and EHR portal. Standardized education and risk mitigation directed sharing results with downstream providers, lifelong value of results, reinterpretation, and not making self-directed medication changes.

CONCLUSIONS: Structured workflows for delivering PGx interventions following preemptive testing were successfully developed for the MyPGx clinical trial and could be extrapolated broadly for other preemptive testing outside of typical clinical care workflows.

Kathleen Polkowski, PharmD, MBA

Kathleen graduated from the Medical University of South Carolina in Charleston, South Carolina. She is currently a Clinical Pharmacogenomics Fellow at the University of Pittsburgh. Professional interests focus on the implementation and integration of pharmacogenomics results into the electronic health record. Her immediate plans are to continue working on the clinical trial while completing a second year of the Pharmacogenomics Fellowship at the University of Pittsburgh.

Mentor: Philip E Empey, PharmD, PhD

Assessing return on investment of SGLT2 inhibitors and GLP-1 agonists: A descriptive analysis on utilization

Rapp HE, Marr D, Modany A, Bryk A, Christian N, Good CB

BACKGROUND: Real world adherence and persistence to sodium-glucose cotransport 2 inhibitors (SGLT2i) and glucagon-like peptide-1 receptor agonists (GLP-1a) has been shown to be low. When these classes are compared, SGLT2i demonstrate a higher cost efficacy than GLP-1a; however, research surrounding combined use of the two is limited. Research regarding return on investment (ROI), a measure that forecasts financial returns through cost benefit comparison, is also limited for these classes. Thus, the primary objective of this study was to assess return on investment of SGLT2i and GLP-1a as it relates to adherence, persistence, utilization, and cost.

METHODS: This descriptive analysis included treatment naïve adults initiated on either a SGLT2i, GLP-1a, or combination of the two from calendar year 2021 to calendar year 2022. Pennsylvania members with continuous enrollment from all lines of business were included, and pregnant members were excluded. In order to calculate ROI, perceived benefits such as medication adherence, persistence, and healthcare utilization were monetized and compared to expenditure to the health plan, adjusted for inflation. Adherence was defined as a proportion of days covered $\geq$ 80%, and persistence was defined as no gaps in therapy exceeding 60 days. Acute care utilization and total cost of care were analyzed in a pre/post analysis, which reported the changes in these outcomes 6 months before and 6, 12, and 18 months after medication initiation for each member. Demographics, including Charlson Comorbidity Index and Area Deprivation index, were also reported for the study population.

RESULTS: A total of 29,391 members were included in the analysis: 11,242 in the SGLT2i group, 16,571 in the GLP-1a group, and 1,578 in the combination group. Majority of participants were white, female, and were in the commercial line of business. ROI was negative across all three groups, driven by pharmacy cost. Adherence and persistence decreased over time; and less than half of members remained persistent to medication therapy at the end of the study period. Acute care utilization increased overall and was noted to be higher for those non-adherent to medication in the SGLT2i and GLP-1a groups. Lastly, between 6-12 and 12-18 months, total cost of care was higher in those adherent to medication therapy, also driven by pharmacy cost.

CONCLUSIONS: High pharmacy costs played a large role in driving the negative ROI and high total cost of care, thus an extension study with a longer time frame may be beneficial to perceive some of the long-term health benefits with these agents through reduced acute care utilization. Adherence and persistence results are consistent with previously published studies on these agents, which highlights an area of opportunity for clinical program development. Overall, these results provide novel information on outcomes with SGLT2i and GLP-1a combination use, which could be further evaluated through a future matched study to compare results across groups.

Presented at the Academy of Managed Care Pharmacy Annual Clinical Meeting in Houston, Texas on April 2, 2025.

Hannah Rapp, PharmD

Hannah is the current PGY-1 Managed Care Pharmacy resident at UPMC Health Plan. She earned her B.S. in biochemistry from University of Maryland and PharmD from University of Maryland School of Pharmacy. Hannah's professional interests include formulary management and specialty medications. Upon completion of her managed care program, she will pursue a clinical pharmacist role in a managed care organization.

Mentors: Ashley Modany, PharmD; David Marr, PharmD

Comparison of intensive care unit delirium outcomes in patients admitted for trauma who receive fentanyl boluses or continuous infusion

Richetti SD, McCormick PJ, Miller TJ, Ganchuk S

BACKGROUND: Fentanyl is an opioid analgesic that is commonly utilized for analgosedation in critically ill patients. Fentanyl is advantageous, in that, it exemplifies rapid onset and short duration of action properties as well as demonstrated tolerability in the setting of hemodynamic instability. To continue, there is currently very limited data to draw conclusions as to which mode of administration of fentanyl, IV bolus or continuous infusion, leads to a lesser incidence of Intensive Care Unit (ICU) delirium. The aim of this study is to assess the incidence of ICU delirium outcomes with IV bolus versus continuous infusion fentanyl in patients admitted for trauma related events.

METHODS: This is a retrospective study of patients admitted to UPMC Mercy and UPMC Presbyterian from July 2021 to August 2024 for trauma related events who received either fentanyl bolus or continuous infusion for analgosedation. Individuals 18 years of age or older admitted to trauma or critical care services who were on mechanical ventilation for greater than 48 hours will be included. Prisoners and burn patients were excluded from this study. The primary outcome of this study is mean days of ICU delirium defined by an ICDSC score of 4 or greater. Secondary outcomes consist of mortality during admission, ICU length of stay, hospital length of stay, total cumulative dose of fentanyl, percentage of time at Riker Sedation-Agitation Scale (SAS) goal, and mean days on mechanical ventilation. Patient demographics, comorbidities, Sequential Organ Failure Assessment (SOFA) scores, and doses of benzodiazepines were also recorded. Statistical analysis was performed using SPSS software.

RESULTS: Pending.

CONCLUSIONS: Pending.

Salvatore Richetti, PharmD

Sal received his PharmD from the University of Pittsburgh School of Pharmacy. He is currently completing his PGY-1 residency at UPMC Mercy in Pittsburgh, PA. After completion of his PGY-1, he is pursuing opportunities within PGY-2 pediatric residency training. His clinical interests include critical care, pediatrics, and cardiology.

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

Effect of clinical pharmacist presence on postintubation sedation timing in the emergency department

Riedy B, Lipski M, Michlinski A.

BACKGROUND: In the emergency department (ED), rapid sequence intubation (RSI) is the preferred method for securing the airway in patients unable to effectively ventilate. It typically involves administration of a sedative agent followed by a neuromuscular blockade agent (NMBA) to facilitate intubation. Because NMBAs lack analgesic and sedative properties, it is necessary to consider the pharmacokinetic and pharmacodynamic properties of induction agents used to avoid awake paralysis. Studies have shown that administration of post-intubation analgesia and/or sedation is often delayed. The presence of a pharmacist during RSI has been associated with significantly reduced time to post-intubation sedation, which may improve patient outcomes. This study aims to evaluate whether the presence of a bedside pharmacist decreases the time to appropriate analgesia and/or sedation following intubation in the ED.

METHODS: This retrospective study reviewed adult patients that underwent RSI and received rocuronium in the ED at UPMC Hamot between January 1, 2024, and April 2, 2025. Patients were analyzed in two groups—pharmacist presence or absence at the time of RSI. A primary outcome of timely administration of post-intubation analgesia and/or sedation was assessed. "Timely administration" was defined as the following – within 10 minutes of administration of etomidate or ketamine for RSI, within 15 minutes of fentanyl administration for RSI, and within 60 minutes of midazolam administration for RSI. Secondary outcomes evaluated were time to administration of post-intubation analgesia and/or sedation, dosing of agents used to facilitate RSI, and need for vasopressor initiation peri-RSI.

RESULTS: A total of 173 patients were included; 86 patients in the pharmacist present (PP) group and 87 patients in the pharmacist absent (PA) group. There were 56 (65%) patients in the PP group and 44 (50%) patients in the PA group who received timely administration of analgesia and/or sedation post-RSI (p=0.04). Median time to sedation was not statistically different between the two groups (9 vs 11 min, p=0.13). There were no statistically significant differences between groups for dosing of RSI agents. The need for vasopressor initiation was similar between groups (30% vs 21%, p=0.15).

CONCLUSIONS: This single center, retrospective cohort demonstrates that the presence of a pharmacist in the ED, during RSI, is associated with a higher rate of timely administration of post-RSI analgesia and/or sedation. These findings support the inclusion of pharmacists are a vital component to the interdisciplinary team in the ED.

Brittany R. Riedy, PharmD

Brittany received her Doctor of Pharmacy degree from D'Youville University School of Pharmacy in Buffalo, NY. She is currently completing her PGY-1 Pharmacy Residency at UPMC Hamot in Erie, PA. Her clinical interests include critical care and emergency medicine. Following the completion of her residency, she will continue her career at UPMC Hamot as a pharmacist.

Mentors: Michelle Lipski, PharmD, BCCCP, Ariel Michlinski, PharmD, Justin Puller, MD, FACEP

Neonatal outcomes in the setting of diabetes during pregnancy: A retrospective chart review

Robb AA, Christer J, Nero J, Pasqualicchio M

BACKGROUND: From 2016 to 2021 the percentage of mothers giving birth who received a diagnosis of diabetes increased from 6.0% to 8.3%. Increases in the incidence of gestational diabetes mellitus (GDM) were seen with increasing age. As diabetes becomes more prevalent in this population it is important to understand how to treat and prevent complications for mothers and their newborns. Some complications seen in newborns to mothers with diabetes are hypoglycemia, macrosomia, respiratory distress syndrome, and premature delivery. This study was conducted at UPMC Magee-Womens Hospital (MWH) which has a large labor and delivery suite delivering over 10,000 babies per year, as well as an 83-bed level III NICU. These patient populations make MWH an ideal setting to analyze occurrence of both maternal and neonatal outcomes. This study aims to assess prevalence of hypoglycemia in neonates born to mothers with different types of diabetes.

METHODS: This study was a retrospective chart review at MWH with IRB exemption. Patients were included in this study if they had type 1 diabetes, type 2 diabetes or gestational diabetes and delivered at MWH from July 1, 2024 through October 31, 2024. Patients admitted during the specified time frame without delivery as well as those with prediabetes or an unclear diagnosis of diabetes were excluded. The primary outcome was incidence of neonatal hypoglycemia relative to the type of maternal diabetes during pregnancy. Neonatal hypoglycemia is defined as blood glucoses less than 40mg/dL. Secondary outcomes include delivery method, other hospital admissions during pregnancy, and neonatal poor outcomes (macrosomia, NICU admission, prematurity, respiratory distress syndrome). A patient list was created based on patients with a diagnosis code for diabetes as well as patients admitted to labor and delivery floors with orders for insulin or metformin.

RESULTS: Research in progress with results pending.

CONCLUSIONS: Research in progress with conclusions pending.

Abigail Robb, PharmD

Abby is a PGY1 Pharmacy Resident at UPMC Magee-Womens Hospital. She is from Indianapolis, IN and received her PharmD from Duquesne University in Pittsburgh, Pennsylvania. Her professional interests include emergency medicine and pediatrics/neonatal ICU. Upon completion of her PGY1 she hopes to pursue a hospital pharmacy career with opportunities to precept students and residents.

Mentors: Jenna Christner McCullough, PharmD, BCPS; Mary Beth Pasqualicchio, Pharm D

Development of an Emergency Response Tool for Medication-Related Preparedness

Schneider SN, Barik K, Jonkman L, Truong HA, Connor S, Carroll JC

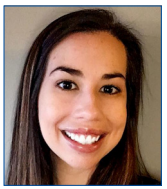
BACKGROUND: The COVID-19 pandemic and recent disasters highlighted the need for a tool to support community pharmacists with emergency planning and response. Three pharmacists with experience in international medical response developed a 36-item Emergency Response Readiness Checklist for short-term humanitarian efforts, published in Disasters and Emergencies: A Planning and Response Guide for Pharmacy Professionals. There's a need to expand the use of this checklist and adapt its content to support all community pharmacies in emergency preparedness planning, response and recovery. The objective of this research was to adapt the previously developed checklist for community-based pharmacists.

METHODS: We aimed to adapt a previously developed Emergency Response Readiness Checklist by systematically gathering expert pharmacist feedback and reaching consensus. To achieve this, we used a modified Nominal Group Technique (NGT), a qualitative consensus-building method that includes four steps: idea generation, recording, discussion, and ranking. An expert panel of pharmacists with emergency preparedness experience reviewed and provided input on the original 36-item checklist. Our modified NGT process included two rounds. Each round consisted of: (1) electronic questionnaire for individual item review; (2) expert panel discussion and feedback; and (3) checklist revisions. Experts were selected using purposeful, maximum variation sampling to ensure a broad range of experience. The research team recruited pharmacists with relevant work or research experience across diverse geographic settings. This ensured that the adapted tool reflected practical, globally informed perspectives on pharmacists' roles in emergency planning and response.

RESULTS: Fifteen pharmacists were invited to participate; nine agreed and contributed their expertise, having collectively responded to over 50 emergencies across 20 countries and five continents. Their experience included bioterrorism planning, mass vaccinations, medication donations, and response to natural disasters and disease outbreaks. Round 1, panelists indicated a checklist format was insufficient, as emergency preparedness is a continuous process. They recommended a more comprehensive tool with a user guide and glossary. Key feedback included: (1) narrowing the tool's focus to pharmacists' medication-related roles; (2) making it broadly applicable to community pharmacists globally; and (3) including a glossary and a user guide. Round 2 focused on refining checklist items for clarity and improving usability. Panelists suggested adding examples and resources to support implementation. Based on their input, the final tool includes: (1) a revised medication-related planning guide; (2) a glossary of terms; and (3) supporting resources for planning, response, and recovery.

CONCLUSIONS: This tool offers an expert-informed systematic process for pharmacists to follow when preparing, responding, or recovering from disasters and emergencies. Medication related emergency preparation is a multiple-step process that is critical for communities and experts agreed pharmacists are in an ideal position to assist.

Presented at the Pennsylvania Pharmacists Association Annual Conference in Harrisburg PA on February 16, 2025, and the American Pharmacist Association Annual Meeting in Nashville TN on March 22, 2025.



Sarah Schneider, PharmD, MPH

Sarah is a Public Health Pharmacy Fellow at the University of Pittsburgh School of Pharmacy within the Community Leadership and Innovation in Practice Center. She is also a pharmacist with the Allegheny County Health Department. Sarah has expertise and interest in community pharmacist roles in emergency preparedness and care for underserved communities. She has experience providing pharmacy care in outpatient clinics both domestically and internationally. Her public health efforts have been focused on pharmacist-initiated HIV PrEP services, harm reduction services, maternal health services and pharmacist screening for intimate partner violence in community pharmacies

Mentors: Joni Carroll, PharmD, BCACP; Sharon Connor, PharmD

Time to vancomycin de-escalation in pneumonia patients screened for MRSA using culture versus PCR testing

Simanski KN, Wein ME, McCormick PJ, Ott BM

BACKGROUND: Consensus guidelines have recommended MRSA screening by nares swab to guide treatment for patients with pneumonia, and de-escalation can be delayed due to pending MRSA microbiology results. Until October 2024, UPMC Mercy utilized nasal cultures for testing, while UPMC Presbyterian employed PCR. No studies have compared vancomycin treatment duration or de-escalation between these two testing methods. The study aims to compare the total days of vancomycin therapy between the two MRSA testing types.

METHODS: This was a multi-site, retrospective chart review of adult patients started on empiric vancomycin treatment for pneumonia from September 2023-2024. Patients were excluded if they were incarcerated at the time of admission, had an empyema or necrotizing infection, or had *staphylococcus* bacteremia. The primary outcome was the duration of vancomycin days. Secondary outcomes included length of hospitalization, number of vancomycin doses saved, incidence of acute kidney injury, and time from collection of culture to vancomycin discontinuation.

RESULTS: A total of 120 patients met the inclusion criteria, with 57 patients evaluated with culture and 63 patients evaluated with PCR. The duration of vancomycin treatment was 1.80 days for cultures and 0.77 days for PCR (p=<0.001). The time from collection of the MRSA test to vancomycin discontinuation was 1.38 days for cultures and 0.29 days for PCR (p=<0.001). There was no statistically significant difference in length of hospitalization or acute kidney injury occurrence.

CONCLUSIONS: PCR testing for MRSA resulted in a significantly shorter duration of vancomycin therapy for patients with pneumonia. The use of PCR led to 1.47 fewer doses of vancomycin, resulting in cost savings for the hospital.

Kayla Simanski, PharmD

Kayla is originally from Cresson, PA and received her PharmD from Duquesne University. She is a current PGY-1 pharmacy resident at UPMC Mercy in Pittsburgh, PA. After completing her PGY-1, Kayla has accepted a position as an acute care clinical pharmacist at Geisinger in Danville, PA. Her clinical interests include internal medicine, cardiology, and infectious disease.

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

DOAC Monitoring in Older Adults

Stachler EA, Grimes A, Proddutur B

BACKGROUND: The updated 2023 American College of Cardiology and American Heart Association atrial fibrillation practice guidelines increased the frequency of direct oral anticoagulant (DOAC) monitoring from yearly up to every 1-3 months based on expert opinion. A meta-analysis showed that low DOAC doses are associated with higher stroke or systemic embolism risks, but no significant differences in bleeding risks were observed. Another meta-analysis found that high DOAC doses were associated with higher risks of ischemic stroke/systemic embolism or major bleeding. However, there are no current studies evaluating the utility of frequently monitoring complete blood count (CBC) and liver function tests (LFTs). This quality improvement project aims to update the current monitoring process at two outpatient geriatric clinics based on the updated guidelines.

METHODS: This retrospective single-center chart review and quality improvement study was conducted over a six-month period from September 2024 through March 2025. The study population included patients from two outpatient geriatric clinics. The inclusion criteria were age 65 years and older, diagnosis of atrial fibrillation, and active DOAC therapy. Patients were excluded if they had a history of a venous thromboembolism, resided in a skilled nursing facility, were monitored by a cardiologist, or had not been seen by their primary care provider within the past year. The primary outcome was a comparison of the number of pharmacist interventions between the prior and updated monitoring processes. Secondary outcomes included appropriateness of DOAC dosing and incidence of adverse events with prior monitoring practices. Adverse events were defined as minor bleeding, major bleeding events, and stroke.

RESULTS: During the review period, 57 patient charts were reviewed and 37 patients met inclusion criteria. With the previous monitoring processes, 56.8% did not have DOAC follow-up within 1 year and 16.2% had no prior pharmacist monitoring. Following the monitoring process updates, two patients were found to have an inappropriate DOAC dose. In addition, a pharmacist intervened on 14 patients (37.8%) to update labs for monitoring. Of these patients, 27%, 16.2% and 40.5% needed an updated CBC, LFTs, and serum creatinine, respectively. Adverse events related to DOAC therapy included minor bleeding in 7 patients (18.9%), major bleeding events in three patients (8.1%) and one patient who experienced a stroke.

CONCLUSIONS: The current annual monitoring process at the UPMC GCC missed 73% of patients, however implementation of updated monitoring process improved follow-up. Frequency of lab orders was increased based on pharmacist intervention. Overall rates of adverse drug events were high at 30%, however it is unknown if increased follow up and lab monitoring will improve these outcomes. As atrial fibrillation diagnosis increases with age, there is an increased need for consideration of risks compared to benefits of more frequent monitoring based on patient goals of care.

Presented at the American Geriatric Society Annual Meeting, Chicago, IL. May 7-10, 2025.

Eva Stachler, PharmD, BCPS

Eva is a graduate from the Purdue University College of Pharmacy in West Lafayette, IN and has completed a PGY-1 Pharmacy Residency with UPMC St. Margaret Hospital in Pittsburgh, PA. She is currently a PGY-2 Geriatric Pharmacy Resident and Faculty Development Fellow at UPMC St. Margaret Hospital in Pittsburgh, PA. Her professional interests include geriatric medicine and teaching. As such, following her completion of residency, she is moving to Chicago, IL to work for the University of Illinois Chicago as clinical faculty.

Mentor: Amy Grimes, PharmD, BCPS, BCGP

Evaluation of an LDL/diabetes best practice alert for pharmacist consult in family medicine practice

Stanko M, Osborne M, Camp G, Nakaishi L, Sakely H

BACKGROUND: Cardiovascular disease remains a leading cause of morbidity and mortality in the United States, with dyslipidemia and poorly controlled diabetes as key modifiable risk factors. Best Practice Alerts (BPAs) in electronic health records (EHRs) have successfully prompted evidence-based interventions and improved patient outcomes. In 2023, an A1C BPA targeting patients with A1C ≥ 8.5% led to improved diabetes management across four clinics. Building on this success, we expanded BPA use to address both uncontrolled diabetes (A1C ≥ 8.5%) and dyslipidemia (LDL ≥ 140 mg/dL) across three family health centers. The primary outcome is the number of patients with LDL at goal post-intervention. Secondary outcomes include improvement in LDL and A1C, initiation of guideline directed medical therapies (GDMT), and lifestyle-related decision-making.

METHODS: This quality improvement project is being conducted from October 28, 2024, to April 9, 2025. A BPA was developed to alert physicians when patients met criteria for A1C ≥ 8.5% and LDL ≥ 140 mg/dL. The LDL threshold was selected because a 50% reduction achieves the guideline goal of <70 mg/dL. The BPA prompts physicians to send an e-consult to the pharmacist, who then reviews the chart, initiates follow-up, and optimizes therapy. Pharmacists may independently adjust treatment plans per existing agreements.

RESULTS: A total of 17 patients met inclusion criteria and were enrolled in the intervention. 12 patients were included in the results. At baseline, the average LDL was 162 mg/dL (range: 142–177) and the average A1C was 11.3%. Following the intervention, the average LDL decreased to 98 mg/dL (range: 28–160), representing a 64 mg/dL reduction. The average A1C decreased to 9.2% (range: 7.0–12.4), a 2.1% absolute reduction. Three patients achieved LDL at goal (<70 mg/dL) and two patients achieved A1C at goal (<8.5%). Improvements in LDL were observed in eight patients, and seven patients had improved A1C levels. On average, one lipid-lowering therapy and one additional diabetes therapy were initiated or intensified per patient. The average number of diabetes medications increased from 1 to 2 per patient. Twelve patients had documented planned decision-making around lifestyle changes, and two eligible patients had documented discussions on smoking cessation. No patients had achieved these targets during the pre-intervention period.

CONCLUSIONS: Preliminary findings suggest that implementation of an LDL and A1C BPA significantly improved initiation of GDMT, resulting in reductions in both LDL and A1C levels. The intervention also increased patient engagement in lifestyle and smoking cessation discussions. These results highlight the potential of interdisciplinary, EHR-driven strategies to improve cardiovascular risk management in primary care.

Madeline Stanko, PharmD

Madeline received her Doctor of Pharmacy from Purdue University College of Pharmacy. In 2023-24, she completed a PGY1 Pharmacy Residency at UPMC St. Margaret. Madeline is currently a PGY2 Ambulatory-Care Pharmacy Resident and Faculty Development Fellow at UPMC ST. Margaret. Her primary interests in patient care include diabetes, cardiology, and transitional care management. Post residency, Madeline will be starting as a Family Medicine Clinical Pharmacist with the University of Pittsburgh Physicians (UPP) Group in the Squirrel Hill Area of Pittsburgh.

Mentor: Heather Sakely, PharmD, BCPS, BCGP

Perioperative buprenorphine management in patients with opioid use disorder

Stiteler C, Taylor A, D'Amico F, Proddutur S, Shulman J, Baumgartner M

BACKGROUND: Medications for opioid use disorder (MOUD), such as buprenorphine, demonstrate evidence for reduction in overdose recurrence and opioid-related hospitalizations. Pain management can be a challenge when patients are on buprenorphine due to a lack of guidance of acute opioid prescribing when patients are on buprenorphine. The purpose of this study is to determine how the management of chronic buprenorphine in the perioperative setting impacts inpatient opioid requirements.

METHODS: A multi-site retrospective cohort study was performed in patients 18 years old and older who were on buprenorphine for MOUD at admission and had an inpatient surgical procedure between October 1, 2023, and December 18, 2024. Patients were excluded if they were on methadone, pregnant, or used opioids for non-MOUD indications. This study compared patients who had their buprenorphine home dose continued in the perioperative setting to patients who had their home dose of buprenorphine changed (i.e., reduced or discontinued). A general linear mixed model was utilized for outcome incidences. The primary outcome was perioperative opioid requirement differences, defined as morphine milligram equivalent (MME) 24 hours after surgery, between the two groups. The secondary outcome was assessing pain control based on the Numeric Pain Rating Scale at baseline, 24-hours, and 48-hours from surgical end time. Safety was assessed based on naloxone usage during hospitalization.

RESULTS: A total of 121 patients were included, of which 73 patients had their buprenorphine dose changed and 48 patients had their buprenorphine dose continued. The mean MME of patients whose home buprenorphine dose changed was 128.1 compared to continued was 84.0 (p=0.02). There were no differences in pain scores between the changed and continued groups at baseline, 24-hours, or 48-hours, (7.0 vs 6.8, (p=0.86), 7.6 vs 7.5 (p=0.90), 7.6 vs 6.8 (p=0.11), respectively) and no differences in naloxone usage.

CONCLUSIONS: Patients who had their home buprenorphine dose continued had a lower MME requirement in the perioperative setting.

Presented at Society of Teachers of Family Medicine Annual Conference in St Lake City, Utah.

Chaise Stiteler, PharmD

Chaise graduated in 2024 with her Doctor of Pharmacy degree from Virginia Commonwealth University in Richmond, VA. She is currently completing a PGY1 pharmacy practice residency at UPMC St. Margaret. Her professional interests include critical care, emergency medicine, and managed care. Her post residency plans are to obtain a career focused within her clinical areas of interest.

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

Comparison of buprenorphine micro-dosing strategy versus traditional methadone conversion in antepartum and postpartum patients admitted to the hospital

Tardugno A, Musco J, Nero J

BACKGROUND: Opioid use disorder (OUD) is a common issue among pregnant and postpartum women. Maintenance therapy for OUD with methadone in combination with behavioral therapy has been the standard of treatment during pregnancy for many years. In more recent years, buprenorphine maintenance dosing has become a treatment option for OUD in pregnant women. Advantages of buprenorphine compared to methadone include fewer drug interactions, ability to be treated in the outpatient setting without reporting to a daily clinic, and less dosage adjustments needed throughout pregnancy. Buprenorphine microdosing is the process of initiating low dose buprenorphine to facilitate titration to a maintenance regimen while limiting withdrawal symptoms seen with initiation of high doses of buprenorphine. The goal of this study is to examine the different strategies of managing OUD with methadone or buprenorphine in pregnancy and evaluate their effects on time to maintenance dose (days), length of stay in the hospital, and overall morphine milligram equivalents (MMEs) used.

METHODS: This was a retrospective chart review conducted at UPMC Magee-Womens Hospital. Data was collected one year pre-implementation of the Buprenorphine Microdosing PowerPlan (November 2022-October 2023) and one year post-implementation (November 2023 – March 2025). Inclusion criteria were antepartum and postpartum patients with OUD desiring transition to a maintenance therapy of either methadone or buprenorphine. Exclusion criteria included patients on a stable OUD maintenance regimen and patients admitted 20 days or longer. The following data was collected: patient age, trimester, initial clinical opiate withdrawal score (COWS), highest COWS score, average COWS score, final maintenance regimen, time to maintenance dose, length of stay, and total morphine milligram equivalents (MMEs).

RESULTS: In progress.

CONCLUSIONS: In progress.

Alexandra Tardugno, PharmD

Alex is originally from Rochester, New York and moved to Pittsburgh in 2018 where she graduated from Duquesne University with a doctorate in pharmacy and a bachelor's degree in pharmacy foundations. She currently is a PGY-1 pharmacy resident at UPMC Magee-Womens Hospital in Pittsburgh, PA. Alex's practice areas of interest include oncology, internal medicine, and pediatrics. Upon completion of her residency, she plans to pursue a career in hospital/clinical pharmacy.

Mentors: Justin Musco, PharmD, BCPS; Jessica Nero, PharmD, BCPS

Evaluating the impact of a standardized protocol for managing refractory vasoplegia after cardiopulmonary bypass

Teletnick AT, Sullinger DP, Boisen ML, Subramaniam K, Sultan I, Brown JA, Williams JR, Cabral B, Rivosecchi RM

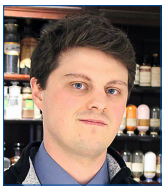
BACKGROUND: Vasoplegia is a type of distributive shock that can occur during cardiopulmonary bypass (CPB) procedures. Refractory vasoplegia, which persists despite the use of conventional vasopressors, may require the use of non-catecholamine rescue agents such as methylene blue (MB), angiotensin II (AT2), and hydroxocobalamin (B12). However, rescue agents are associated with increased cost and an optimal sequence of use has not been determined. The aim of this study is to evaluate the hemodynamic impact and cost-effectiveness of MB, AT2, and B12 when implemented in a standardized protocol for refractory vasoplegia.

METHODS: This was an observational, pre-post study of cardiothoracic surgery patients requiring CPB that received at least a single rescue agent intraoperatively at UPMC Presbyterian Hospital. Refractory vasoplegia was defined as requiring ≥ 0.25 mcg/kg/min norepinephrine equivalents (NE) to maintain a goal mean arterial pressure (MAP) of ≥ 65 mmHg. A stepwise treatment protocol was developed, escalating from a weight-based MB bolus to an AT2 infusion followed by a 5gm B12 bolus. Patients undergoing CPB prior to protocol utilization (1/1/2023 to 12/31/2023) were compared to patients after protocol implementation (1/1/2024 to 12/1/2024). The primary outcomes were percent change in NE requirements at one, two, and three hours after initial rescue agent administration and total cost of rescue therapy per patient. Secondary outcomes included percent change in MAP and systolic blood pressure (SBP) at one, two, and three hours and total vasoactive agent cost at 24 and 48 hours.

RESULTS: The primary analysis included 241 patients, with 134 and 107 patients in the pre- and post-protocol groups, respectively. Included patients had a median age of 66 years with 56% undergoing indexed CPB procedures. There was no difference in the median NE requirement (as mcg/kg/min) at time of initial rescue agent administration (0.25 vs 0.3, P=0.066) between groups. Pre-protocol patients primarily (94%) received B12, while post-protocol patients received MB in 94% of cases, with 31% and 11% progressing to AT2 and B12, respectively. AT2 was used in the post-protocol group for a median duration of 2.6 hours with median doses of 15 and 10 ng/kg/min at 1 and 2 hours, respectively, with a median utilization of one vial. No differences were identified in percent change of NE requirements at one (-30% vs -27%, P=0.343), two (-43% vs -39%, P=0.84), or three (-44% vs -48%, P=0.67) hours after initial agent administration. There was a median cost reduction of rescue therapy of $122 per patient ($974 vs $852, P<0.01) in the post-protocol group, along with median reductions in vasoactive agent cost of $82 ($1,420 vs $1,338, P<0.01) and $51 ($1,502 vs $1,451, P<0.01) per patient at 24 and 48 hours, respectively. Total cost savings amounted to $39,296, $47,186, and $46,057 in rescue and vasoactive agents at 24 and 48 hours, respectively.

CONCLUSIONS: Implementation of a stepwise protocol utilizing MB, AT2, and B12 for refractory vasoplegia resulted in similar hemodynamic efficacy while reducing cost. Future analyses will include a comprehensive cost analysis of vasoactive agents and clinical efficacy outcomes.

Presented at ACC.25 in Chicago, IL on March 30th, 2025.



Andrew Teletnick, PharmD

Andrew is a current PGY2 Cardiology Pharmacy Resident at UPMC Presbyterian Hospital. He received his PharmD from the University of Toledo in 2023 and completed his PGY1 Residency at ProMedica Toledo Hospital in Toledo, OH in 2024. His interests include critical care cardiology, heart failure, and pulmonary hypertension. Following completion of his PGY2 Residency, Andrew will be remaining at UPMC Presbyterian and round primarily with the Pavilion Cardiology service and provide float coverage for the Cardiac Intensive Care Unit.

Mentors: Ryan Rivosecchi, PharmD, BCCCP and Danine Sullinger, PharmD, BCCCP

Analyzing nephrotoxic burden and acute kidney injury in adult patients admitted to non-intensive care units at two hospital systems

Tran TL, Lukan CJ, Adiyeke E, Ozrazgat-Baslanti T, Bihorac A, Kane-Gill SL, the MEnD-AKI Study Group

BACKGROUND: Acute Kidney Injury (AKI) is associated with poor short and long-term patient outcomes; thus, risk assessment, prevention, and treatment are essential. Medications are a common cause of AKI contributing to kidney damage and deterioration in renal function. Co-administration of nephrotoxic drugs cause burden on the kidney increasing the likelihood of developing AKI. Current evaluations of nephrotoxic burden are limited to critically ill or pediatric patients. The objective of this study was to assess the number of nephrotoxic drugs administered to adult patients admitted to non-intensive care units and investigate the progression of kidney injury from no AKI or stage 1 AKI to AKI stage ≥ 2 in two geographically distinct health centers.

METHODS: A retrospective cross-sectional study was conducted in adult patients admitted to non-intensive care units at the University of Florida Health (UFH) between 2012 and 2019 and at the University of Pittsburgh Medical Center (UPMC) between 2018 and 2022. Exclusion criteria were patients with end-stage kidney disease, baseline estimated glomerular filtration rate <15 mL/min/1.73m^2, a hospital length of stay of less than 48 hours, AKI stage ≥ 2 upon admission and those with no serum creatinine within the first two days of admission. Number of drugs administered with known mechanisms of causing kidney injury and dysfunction during the patient's hospitalization were assessed. Nephrotoxic drugs evaluated were selected from a published list that used a Delphi method for inclusion. Exposure to 3 or more nephrotoxic drugs was considered nephrotoxic burden. AKI was defined and staged according to the Kidney Disease Improving Global Outcome serum creatinine criteria. A descriptive assessment of nephrotoxin exposure and progression from no AKI or AKI stage 1 to AKI stage ≥ 2 was conducted.

RESULTS: There were 122,324 hospital admission included at the UFH and 39,756 admissions at UPMC with 1.5% and 4.7% progressing from no AKI or AKI stage 1 to AKI stage ≥ 2, respectively, without consideration of nephrotoxin exposure. At UPMC, 14,337 patients experienced nephrotoxic burden, and of those 807 (5.6%) progressed from no AKI or stage 1 AKI to AKI stage ≥ 2 compared to the 18,546 patients that did not receive any nephrotoxins (i.e. no burden) among whom 672 (3.6%) progressed to AKI stage ≥ 2. At UFH, 63,858 patients received 3 or more unique nephrotoxic drugs and of those 1,388 (2.2%) progressed from no AKI or stage 1 AKI to AKI stage ≥ 2 compared to the 34,258 patients that did not receive any nephrotoxins, among whom 179 (0.5%) progressed to AKI stage ≥ 2.

CONCLUSIONS: At both institutions, occurrence of AKI progression was higher for patients with nephrotoxin burden compared to those patients who did not receive any nephrotoxins. Nephrotoxin burden surveillance should be a component of nephrotoxin stewardship in pharmacy practice to prevent AKI occurrence, and progression.

To be presented at International Pharmaceutical Federation (FIP) World Congress 2025, Copenhagen, Denmark, 31 August to 3 September 2025

Tiffany L. Tran, PharmD

Tiffany is currently a second-year Clinical Research Fellow for Medication Safety and Nephrotoxin Stewardship at the University of Pittsburgh School of Pharmacy. She received her PharmD and BS in Chemistry at the Virginia Commonwealth University. Tiffany's professional area of interest is in the field of patient safety.

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

Expanding Access to Narcan and Promoting Harm Reduction Education

Tsvetkova M, Rebitch C

BACKGROUND: Opioid use is a wide-spread problem in the United States, and Pennsylvania is one of the leading states in terms of annual deaths attributed to overdose. UPMC Matilda Theiss Health Center receives free naloxone and fentanyl and xylazine test strips from the Allegheny County Health Department to be distributed to patients. As of now, there is no standard protocol for making sure these resources are available to all the patients who may benefit from them. The aim of this project is to increase the number of harm reduction resources provided to patients through establishing a pharmacist-led medication reconciliation process.

METHODS: Project sample included patients seen at UPMC Matilda Theiss Health Center from 7/1/24-5/1/25 who have opioids, naloxone, or opioid use disorder therapies documented on their medication lists. Patients not currently on the abovementioned therapies confirmed in a pharmacist-performed medication reconciliation were excluded from the project sample. Patients who were included were offered naloxone and harm reduction resources, including fentanyl and xylazine test strips. Patients received pharmacist-provided education on naloxone and test strips use. The primary outcome of this project is increasing naloxone distribution and education among UPMC Matilda Theiss Health Center patients. The number of naloxone kits distributed pre and post intervention will be used to determine if intervention was effective. Reasons naloxone was not dispensed will be used to start developing a protocol for continuity of this project.

RESULTS: Pending

CONCLUSIONS: Pending

Maya Tsvetkova, PharmD

Maya is from Saint Petersburg, Russia and received her PharmD from the University of Pittsburgh. She is a PGY-2 resident with UPMC Ambulatory Care Global Health program, and her interests include emergency medicine, toxicology, and global health. Outside of pharmacy she enjoys knitting, gardening, hiking, and camping.

Mentor: Catherine Rebitch, PharmD, BCACP

Incidence of hypoglycemia with high dose vs. low dose intravenous regular insulin for hyperkalemia treatment

Vulcano DG, Gray VC, Gradisek PA, McCormick PJ

BACKGROUND: Hyperkalemia is an electrolyte disturbance that may result in fatal cardiac arrhythmia. Intravenous (IV) regular insulin is one of several medications used to lower serum potassium in patients with acute hyperkalemia but may cause hypoglycemia. Previous studies have demonstrated a decreased incidence of hypoglycemia with regular insulin doses less than 10 units compared to the conventional 10 units. There is limited data comparing the incidence of hypoglycemia between 5 units and 10 units of IV regular insulin for the treatment of hyperkalemia in the general inpatient population. This study aims to evaluate if 5 units of IV regular insulin is associated with a lower rate of hypoglycemia than 10 units for the treatment of hyperkalemia.

METHODS: This was a retrospective chart review of patients with hyperkalemia admitted to UPMC Mercy from January 1, 2023 to August 31, 2024. Patients were included if they were 18 years or older, had a pre-insulin serum potassium $\geq$ 5 mEq/L, and received 5 units or 10 units of IV regular insulin ordered through the "Hyperkalemia Management PowerPlan." The primary outcome was incidence of hypoglycemia (blood glucose < 70 mg/dL). Secondary outcomes included incidence of severe hypoglycemia (blood glucose < 50 mg/dL), change in serum potassium, number of additional potassium lowering agents administered, incidence of arrythmia, incidence of myocardial infarction, hospital length of stay, and in-hospital mortality.

RESULTS: A total of 381 patients were reviewed, and 172 met the inclusion criteria. Hypoglycemia occurred in 6 of 86 patients receiving 5 units of insulin and in 19 of 86 patients receiving 10 units of insulin (7.0% vs. 22.1%; p=0.008). There was no significant difference in incidence of severe hypoglycemia (p=1.000), change in serum potassium (p=0.995), or in-hospital mortality (p=0.839). Patients receiving 5 units of insulin had a significantly shorter hospital length of stay (7.7 days vs. 12.0 days; p=0.001).

CONCLUSIONS: Five units of IV regular insulin resulted in fewer hypoglycemic events compared to 10 units with no significant difference in change in serum potassium. These findings suggest that providers should use 5 units of regular insulin for hyperkalemia management to reduce the risk of hypoglycemia while preserving the desired potassium lowering effect.

Danielle Vulcano, PharmD

Danielle received both her Bachelor of Science in Pharmaceutical Sciences and Doctor of Pharmacy from The Ohio State University in Columbus, Ohio. She is from Pittsburgh, Pennsylvania and is currently a PGY1 pharmacy resident at UPMC Mercy. Her areas of interest include internal medicine, infectious diseases, and medication safety.

Mentors: Victoria Gray, PharmD, BCPS; Pamela Gradisek, PharmD, BCPS; Pamela McCormick, PharmD, BCPS, BCEMP

Pharmacist education to family medicine teaching service and incident ratio of nicotine replacement therapy at discharge

Wardoclip A, Farrah R, D'Amico F

BACKGROUND: Smoking remains the leading cause of preventable disease, disability, and death in the United States. Hospitals offer a unique opportunity to encourage smoking cessation due to the controlled environment, free of common environmental cues that often trigger smoking. Hospitalization, especially for smoking-related illnesses, presents an ideal moment to intervene in smoking behavior change. Nicotine replacement therapy (NRT) is a commonly used and effective intervention to ease withdrawal symptoms and cravings. NRT has been shown to increase quitting success rates by 50-60%. There are many factors impacting the continuation of NRT at discharge from the hospital including patient's willingness to continue smoking cessation efforts. The hypothesis of this study is that a pharmacist-led educational intervention will increase the rate of NRT prescribed at discharge, thus improving smoking cessation efforts.

METHODS: This study utilized a pre-post interventional design to evaluate the impact of pharmacist-led education on inpatient family health service physicians' prescribing patterns for nicotine replacement therapy (NRT). Data was collected over two phases: a baseline period prior to the intervention and a post-intervention period. The study was conducted within the inpatient family health center service at UPMC St Margaret Hospital. Participants included all attending physicians, resident physicians, and medical students involved in the care of inpatients within the unit. Patients were included in the analysis if ≥ 18 years of age, smoking on admission, admitted to the family medicine teaching service, and not on any form of nicotine replacement therapy or other smoking cessation medications upon admission. The intervention consisted of a comprehensive pharmacist-led educational session focused on the use of NRT for smoking cessation during hospital stay and at discharge. The focus of the session was proper prescribing patterns for NRT based on current smoking habits and the importance of continuing this at discharge if a patient had been receiving NRT during their admission. The intervention also discussed evidence-based recommendations for smoking cessation with NRT, practical considerations for initiating and managing NRT, as well as common barriers to prescribing NRT and strategies to overcome these barriers. The education was delivered through an in-person presentation supplemented with handouts. A question-and-answer portion of the education was included to address any questions regarding the educational component.

RESULTS: A total of 78 patients met inclusion criteria (n = 44 during the pre-intervention period, n = 34 during the post-intervention period). Post-pharmacist education resulted in a 5% increase in nicotine replacement therapy prescriptions sent at discharge (p = 0.60; 95% CI -0.13 to 0.22).

CONCLUSIONS: Many barriers exist to continuing nicotine replacement therapy at discharge from the hospital which may be the reason for the low rate of change in prescriptions sent at discharge. Future directions include investigating these barriers and surveying patients and providers during the time of discharge.

Alexa Wardoclip, PharmD, BCPS

Alexa Wardoclip is a PGY2 Ambulatory Care Pharmacy Resident at UPMC St Margaret at the Lawrenceville Family Health Center. She also completed her PGY1 pharmacy residency at UPMC St Margaret. Alexa received her Doctor of Pharmacy degree from the University of Pittsburgh School of Pharmacy. Her professional interests include ambulatory care, family medicine, cardiology, and transplant. Her post-residency plans are pending at this time.

Mentors: Roberta Farrah, PharmD, BCPS, BCACP and Frank D'Amico PhD

Evaluation of a neuromuscular blockade PowerPlan on drug consumption in critically ill patients with acute respiratory distress syndrome

Yaeger K, Rivosecchi R, Lamberty P, Groetzinger L

BACKGROUND: Acute respiratory distress syndrome (ARDS) has limited pharmacologic options that have been shown to improve patient outcomes. Neuromuscular blockade (NMB) is a guideline recommended therapy in ARDS management to increase ventilator synchrony to improve oxygenation. The 2016 Society of Critical Care Medicine Guidelines for Sustained Neuromuscular Blockade in Critically Ill Adults suggests utilizing train-of-four (TOF) monitoring to determine depth and efficacy of paralysis in combination with clinical assessment. However, TOF may not be the best marker of efficacy for ARDS patients. In 2021, this institution developed a NMB order set for ARDS which uses patient-ventilator synchrony rather than TOF-based titrations of NMB. The purpose of this study is to assess the NMB order set implementation and describe the effects of utilizing ventilator synchrony compared to TOF guided titrations on drug consumption, sedation requirements with paralytic interruptions, duration of use, and dyssynchrony events.

METHODS: This study is a retrospective, pre-post analysis of the implementation of a NMB order set for ARDS which occurred on July 14, 2021. The pre-implementation group utilized TOF-monitoring for NMB infusion titration and was assessed from January 2013 to December 2018. The post-implementation group utilized ventilator synchrony guided titrations and was assessed from order set implementation in July 2021 to December 2024.This study was approved by the University of Pittsburgh Institutional Review Board. Individuals were mechanically ventilated and identified through order set, either continuous infusion subphase or bolus subphase, charge data. Adult patients age 18 or older located in the intensive care unit were screened and excluded if they met one of the following criteria: did not have a diagnosis of ARDS mentioned within clinical notes; received continuous infusion NMB for less than 36 hours; did not receive two bolus doses within a 24-hour period; had active or recent COVID-19 infection; required extracorporeal membrane oxygenation; had continuous infusion paused for greater than 3 hours; or had NMB initiated at an outside hospital not within the study site's health system. The primary outcome was drug consumption defined as total amount of drug normalized to patients' actual body weight until continuous infusion discontinuation or 48 hours, whichever came first.

RESULTS: The historical pre-implementation group included a total of 99 patients. 553 patients were screened for the post-implementation group and 80 patients were included. Within this group, 66 patients utilized continuous infusion NMB which were used for the post-analysis. The remainder received bolus NMB therapy (N=14). The most common reason for exclusion within the post-analysis group was a lack of formal diagnosis of ARDS within clinical notes (N=270, 48.8%) followed by receiving NMB for less than 36-hours (N=133, 24.1%).

CONCLUSIONS: Conclusions and findings of this study are to be reported after data analysis is completed.

Kayleigh Yaeger, PharmD

Kayleigh is a PGY2 Critical Care pharmacy resident at UPMC Presbyterian. She is from Munster, IN and received her PharmD from Purdue University College of Pharmacy in West Lafayette, IN in 2023. Her professional interests include neurotrauma critical care and emergency medicine. Kayleigh is actively pursuing careers within the ICU and emergency department as the next step in her professional career.

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

The impact of pharmacist led AIMS monitoring service

Zecopoulos A, Ryan C, Temelie A, Goulding H, Clark C, Cullen M, Thacker E, Fabian TJ

BACKGROUND: Tardive dyskinesia (TD) is an involuntary movement disorder commonly caused by prolonged use of antipsychotic medications. Despite the American Psychiatric Association's (APA) recommendations for regular assessments using the Abnormal Involuntary Movement Scale (AIMS), assessments are not consistently documented at recommended intervals. APA recommends screening at baseline and every 6 or 12 months for high-risk and other patients, respectively. Recent studies suggest that pharmacist-driven TD screening services can significantly improve AIMS screening frequency and early detection of TD. This project uses an AIMS screening tool to identify high-risk patients for TD and prompt assessment based on inclusion criteria. The primary objective is to evaluate whether the introduction of a pharmacist-led AIMS monitoring service increases the screening, documentation and diagnosis of TD among psychiatric inpatients on antipsychotic medications.

METHODS: This is a prospective quality improvement study of patients admitted to an inpatient psychiatric facility between 11/01/2024 and 05/31/2025. Patients were eligible if prescribed an antipsychotic and met at least three predefined risk factors (e.g., age >50, female sex, African American race, EPS history, antipsychotic polypharmacy, or no prior AIMS). Patients under 18 years old were automatically included due to antipsychotic prior authorization requirements. Baseline demographic information (age, sex, race) and hospital encounter information (length of stay) were collected. Prospective AIMS assessments were documented in the electronic health record and data was extracted via chart review. Comparator data were collected retrospectively from a six-month period prior to the intervention (04/01/2024–10/31/2024). Data collection included retrospective chart review using existing data from Cerner to determine the number of patients with completed AIMS assessments in the pre-intervention period.

RESULTS: In the retrospective group (N = 1,114), no patients had a documented AIMS assessment. The average age was 38 years, with a near-even distribution of female (50.6%) and male (49.4%) patients. The majority identified as White (64.5%) or Black (27.2%). The most frequently prescribed antipsychotics were aripiprazole (n = 374, 23.9%), risperidone (n = 330, 21.1%), olanzapine (n = 324, 20.7%), and quetiapine (n = 203, 13.0%). The most common primary diagnoses included substance-related and addictive disorders (25.8%), depressive disorders (21.2%), schizophrenia spectrum and other psychotic disorders (18.6%), and bipolar and related disorders (18.4%). The average length of stay for this group was 19 days. Full results, including demographic information and AIMS data for patients, to follow.

CONCLUSIONS: Full conclusions to follow. Results from this quality improvement project will provide insight into the impact of a pharmacist-led AIMS consultation service on screening rates and identification of tardive dyskinesia in psychiatric inpatients initiated on antipsychotics.

Angeleki Zecopoulos, PharmD

Angeleki obtained her PharmD from the Medical University of South Carolina College of Pharmacy in 2024. She is currently the PGY1 pharmacy resident at UPMC Western Psychiatric Hospital and will be the PGY2 psychiatric pharmacy resident in 2025. Her professional interests include severe mental illness, geriatric psychiatry, and forensic psychiatry. Outside of work, Angeleki enjoys hanging out with her pet cat, going to Pilates, and watching reality TV. Angeleki hopes to continue working in an inpatient psychiatric hospital at an academic medical center specializing in one of her areas of interest.

Mentors: Andreea Temelie, PharmD, BCPP; Christine Clark, PharmD, BCPP; Emily Thanker, PharmD, BCPP; Hannah Goulding, PharmD, BCPP; Marissa Cullen, PharmD BCPP; Tanya J. Fabian, PharmD, BCPP, PhD

PHARMACY RESIDENCY & FELLOWSHIP PROGRAMS

Pharmacy Residency Programs

Post Graduate Year 1 (PGY1)

Managed Care at CVS Caremark
Director: Angela Pieprzak, PharmD, CSP

Managed Care at UPMC Health Plan
Director: Ashley Modany, PharmD

Pharmacy at UPMC CarepathRx
Director: Leita Frey, PharmD, BCPS

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
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

PGY1/PGY2 Health-System Pharmacy Administration and Leadership

UPMC Presbyterian Shadyside
Director: Amanda S. Korenoski, PharmD, MHA, BCCCP

Post Graduate Year 2 (PGY2)

Ambulatory Care at UPMC Presbyterian Shadyside
Director: Deanne Hall, PharmD, CDCES, BCACP

Ambulatory Care Global Health at UPMC Presbyterian
Director: Martha Ndung'u, PharmD

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

Ambulatory Care at UPMC St. Margaret
Director: Roberta M. Farrah PharmD, BCPS, BCACP

Cardiology at UPMC Presbyterian
Director: James C. Coons, PharmD, FCCP, FACC, BCCP

Critical Care at UPMC Presbyterian
Director: Lara Groetzinger, PharmD, BCCCP

Emergency Medicine at UPMC Mercy
Director: Pamela J. McCormick, PharmD, BCPS

Geriatrics at UPMC Shadyside/RxPartners
Director: Christine Ruby-Scelsi PharmD, BCPS, BCGP, FASCP

Geriatrics at UPMC St. Margaret
Director: Heather Sakely, PharmD, BCPS, BCGP

Oncology at UPMC Shadyside
Director: Timothy L. Brenner, PharmD, BCOP

Psychiatric Pharmacy at UPMC Western Psychiatric Hospital
Director: Tanya J. Fabian, PharmD, PhD, BCPP

Solid Organ Transplantation at UPMC Presbyterian
Director: Cody Moore, PharmD, MPH, BCTXP, BCPS

Fellowship Programs

Antiretroviral Clinical Pharmacology at the University of Pittsburgh
Director: Aaron Devanathan, PharmD, PhD, AAHIVP

Clinical Pharmacogenomics Fellowship at the University of Pittsburgh
Director: Philip Empey, PharmD, PhD, FCCP

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

Health System Pharmacy Administration and Leadership at UPMC
Director: Amanda Korenoski, PharmD, MHA, BCCCP

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

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: Sandra L. Kane-Gill, PharmD, MS, FCCM, FCCP

Public Health Pharmacy at the University of Pittsburgh
Director: Joni C. Carroll, PharmD, BCACP, TTS