RESIDENT & FELLOW RESEARCH

2022–23

University of Pittsburgh

School of Pharmacy

School of Pharmacy Mission Statement

The School of Pharmacy develops leaders in education, discovery, and service to improve the health and well-being of the world around us.

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

- Education
- Research and Scholarship
- Patient Care and Service

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Message from the Dean

Amy L. Seybert, PharmD

Dear Members of the Resident Class of 2023,

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 here in Pittsburgh has provided the best that the academic and practice worlds have to offer through the 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, and Western Psychiatric Hospital, UPMC Health Plan, UPMC Chartwell and CarepathRx, RxPartners, plus Allegheny County Health Department, Pennsylvania Pharmacist Care Network, Pitt Vaccination & Health Connection Hub, Rite Aid Corporation, Giant Eagle, Inc., and CVS Caremark.

You have been committed to learning and demonstrating clinical research and scholarship skills, which will serve you well during your career as you will be the leaders to solve clinically important questions. These skills created a foundation on which to build answers—and to become tomorrow's leaders and innovators. Additionally, you have each just become an alumnus of our Pitt Pharmacy Residency and Fellowship Program and will forever be a part of our collaborative alumni network. It is my sincere hope that you carry with you fondly the rich experiences of the past year and network of colleagues and friends as you launch the next phase of your career.

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

Amy L. Seybert, PharmD
Dean, School of Pharmacy

Valuing Our Partners

The University Pittsburgh School of Pharmacy values our partnerships with UPMC, UPMC Health Plan, RxPartners, Chartwell Pennsylvania, CarepathRx, RxPartners, Allegheny County Health Department, Pennsylvania Pharmacist Care Network, Pitt Vaccination & Health Connection Hub, Rite Aid Corporation, Giant Eagle, Inc., and CVS Caremark. It is through these partnerships that the Residency and Fellowship Program has grown in national reputation.

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. UPMC Presbyterian, UPMC Shadyside, UPMC Magee-Womens Hospital, UPMC McKeesport, UPMC Mercy, UPMC St. Margaret, UPMC Children's Hospital of Pittsburgh, and UPMC Western Psychiatric Hospital participate in our residency programs. Additionally, Chartwell Pennsylvania, LP and RxPartners, Inc are our partners in residency programs.

UPMC Health Plan, the largest medical insurer in western Pennsylvania, is owned by UPMC, an integrated global health enterprise. The integrated partner companies of the UPMC Insurance Services Division offer a full range of group health insurance, Medicare, Special Needs, CHIP, Medical Assistance, behavioral health, employee assistance, and workers' compensation products and services more than 3.9 million members.

CVS Health is the nation's premier integrated pharmacy services provider, combining one of the nation's leading pharmaceutical services companies with the country's largest pharmacy chain. CVS Health drives value for pharmacy services customers by effectively managing pharmaceutical costs and improving health care outcomes through its retail stores, pharmacy benefit management division, and mail service and specialty pharmacy division.

Our pharmacy fellowship partners include UPMC Presbyterian with our Clinical Pharmacogenomics, Implementation Science/PharmacoAnalytics, Infectious Diseases, PharmacoAnalytics and Outcomes, and Pharmacy Administration and Leadership fellowship programs. Additionally, we partner with Pfizer and Sandoz on PharmacoAnalytics fellowships in addition to our Pitt Pharmacy fellowships in Natural Product-Drug Interactions, Medication Safety and Nephrotoxin Stewardship, Community Pharmacy, and Public Health Pharmacy.

Pharmacy Residency Research Program

Carlo J. Iasella, PharmD, MPH, BCTXP, BCPS, Co-Director,
Resident Research Series
Sandra L. Kane-Gill, PharmD, MSc, FCCM, FCCP, Co-Director,
Resident Research Series

The Residency Research Program at the University of Pittsburgh School of Pharmacy incorporates a structured educational series with longitudinal research working groups. This approach provides a foundation for performing research, gives appropriate mentorship, fosters interactive discussions, allows peer critiques, and individual accountability for each resident project. Within the framework of the Residency Research Program, residents are responsible for the completion of all aspects of their project, from conceptualization to final manuscript preparation. Many of the projects completed this year focused on optimizing medication use in ambulatory care, infectious diseases, behavioral health, diabetes, solid organ transplant, anticoagulation, and critical care. Projects also included application of pharmacogenomics; strategies to improve medication safety and utilization; and opportunities for cost saving strategies. In addition, there were several assessments of opportunities in pharmacy practice in special populations such as pediatrics and older adults.

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

Our program is highly successful with publication rates for our residents exceeding the national average by at least three-fold. The success of this program is a result of the efforts of the working group facilitators and other major contributors: Lucas Berenbrok, Allison Dittmer, Tanya Fabian, Amy Grimes, Sophia Herbert, Pam McCormick, Cody Moore, Ryan Rivosecchi, Melissa Saul, and Jennifer Shank.

The efforts of the program directors and research mentors are greatly appreciated. Amy Seybert, Dean of the School of Pharmacy and Alfred L'Altrelli, Senior Director of Pharmacy, UPMC Presbyterian Shadyside Hospital, must also be recognized for their dedication to the program. We would be remiss not to mention the support of the Research Day planning work group Kim Coley, James Coons, Pam McCormick, Christine Ruby-Scelsi, and Rebecca Tokarski as well as the administrative contributions of Evan Bynoe and Stephanie Mavrodin for their efforts in making today possible.

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

Impact of Home Gabapentinoid On Use of Opioid Analgesics During Acute Hospital Admission

Madison Abbs, PharmD; Megan Baumgartner, PharmD, BCPS; Alison Dittmer, PharmD, BCCCP; Frank D'Amico, PhD; Stella Winters, MD; Cynthia Pathmathasan, MD

PURPOSE/BACKGROUND: Research has suggested gabapentinoid used in the acute surgical setting may decrease use of opioid analgesics. One study concluded that gabapentin administered before and during the first 24 hours post-hysterectomy reduced morphine consumption by 32%, without a significant impact on patient-reported pain scores[3]. However, there is limited research showing the impact that chronic gabapentinoid use may have on the selection of acute non-surgical pain regimens. In addition, home gabapentinoid regimens may be adjusted or held during an admission for multiple reasons such as acute kidney injury or alterations in mental status, which may influence opioid utilization. Strategies to minimize the use of opioids during an inpatient admission may help mitigate the growing opioid epidemic. The objective of this study was to determine how the continuation of home gabapentinoids during hospitalization affects the dosing of opioid analgesics during inpatient non-surgical admission at a community teaching hospital.

METHODS: This was a single-center, retrospective cohort study conducted from January 1, 2022, to June 30, 2022, at UPMC St. Margaret Hospital in Pittsburgh, Pennsylvania. Non-surgical patients ≥18 years of age, on a home gabapentinoid regimen, and admitted to a non-ICU floor were included. The primary outcome was mean daily oral morphine milligram equivalents (MME) required during admission up to 72 hours or at discharge, whichever was sooner, in patients who were continued on home gabapentinoids compared to patients in which home gabapentinoids were held or dose adjusted. The secondary outcome was the use of additional non-opioid analgesics. Differences in gabapentinoid regimens between admission and discharge were also analyzed.

RESULTS: There was no difference in baseline demographics. There was no difference in overall average daily MME required in patients that gabapentinoid was continued with no dose adjustment compared to patients that gabapentinoid was held or dose-adjusted (p=0.06). Specifically, in patients with a non-pain-related diagnosis, patients where gabapentinoid was held or dose-adjusted required more average daily MME than patients where gabapentinoid was continued (p=0.03).

CONCLUSIONS: Continuation of a home gabapentinoid regimen did not reduce average daily opioid consumption overall during the first 72 hours of admission. Further research is needed to determine the impact gabapentinoids may have on reduction of opioid consumption in a non-surgical, hospitalized population.

Madison Abbs, PharmD

Madison Abbs, PharmD is a current PGY1 Resident and Faculty Development Fellow at UPMC St. Margaret Hospital. Madison received her Doctor of Pharmacy degree in 2022 from Northeast Ohio Medical University in Rootstown, OH. Madison is currently on track to complete a PGY2 residency in ambulatory care at UPMC St. Margaret. Clinical interests include diabetes management, academia, and global health. Outside of work, Madison enjoys hiking with her two dogs and traveling to new places (especially national parks).

Mentor(s): Megan Baumgartner, PharmD, BCPS; Alison Dittmer, PharmD, BCCCP

Influence of the COVID-era on Sedation Practices in Mechanically Ventilated non-COVID Patients

Burdick AE, Groetzinger L, Rivosecchi RM

PURPOSE: Recent studies have exhibited that patients diagnosed with COVID require higher levels of sedation when compared to non-COVID patients. Although current guidelines express the risk of deep sedation in critically ill patients, deep sedation practices became common in COVID patients requiring mechanical ventilation. This "sedation creep" during the COVID-era may have resulted in increased sedative usage in the non-COVID population, resulting in unnecessary sedation for these patients. There is currently limited data exploring the effect of the COVID pandemic on sedation practices in critically ill patients without COVID. The aim of our study was to evaluate the impact of COVID on sedation practices in non-COVID mechanically ventilated patients.

METHODS: This was a single system, multi-center, retrospective observational study that included non-COVID, mechanically ventilated adult patients admitted to a medical or mixed medical surgical ICU between June 2019 and December 2022. Patients were excluded if they met any of the following criteria: age of 17 or younger, COVID-positive, received cisatracurium infusion, or received more than 6 bolus doses of rocuronium or vecuronium. The primary endpoint of this study was the number of sedative charges per day of mechanical ventilation. Propofol, fentanyl, ketamine, midazolam, and dexmedetomidine were included in the analysis. Secondary outcomes include length of ICU stay and rate of delirium. Statistical analyses were performed using SPSS. Endpoints were analyzed by comparing high vs. low COVID-era time periods which were defined by greater than 15% COVID rate in the ICU and less than 10% COVID rate in the ICU, respectively.

RESULTS: Research in progress, results are yet to be determined.

CONCLUSIONS: Pending

Allison Burdick, PharmD

Allison is from Brook Park, OH, and received her PharmD in 2022 from the University of Findlay College of Pharmacy located in Findlay, Ohio. She is currently a PGY1 pharmacy resident at UPMC Presbyterian. Upon completion of PGY1, she will complete a PGY2 in emergency medicine at Jackson Hospital located in Montgomery, Alabama.

Mentor(s): Lara Groetzinger, PharmD, BCCCP; Ryan Rivosecchi, PharmD, BCCCP

Effect of Vasopressin Restriction on Cost of Admission, Utilization, and Outcomes in Septic Shock Patients

Collier VM, Rivosecchi RM

PURPOSE: In response to vasopressin's rising cost, UPMC implemented a formulary restriction to reserve vasopressin for septic patients requiring norepinephrine doses ≥0.7 mcg/kg/min for whom epinephrine is not appropriate. Large randomized controlled trials comparing norepinephrine and vasopressin for septic shock have shown no mortality difference; however, some have shown potential benefits of vasopressin including reduced risk of renal replacement therapy (RRT) and atrial fibrillation. It is possible that despite increased medication spend with vasopressin compared to high dose norepinephrine or addition of epinephrine, the overall cost of admission may decrease due to less complications. Initially, UPMC's vasopressin restriction was strictly monitored and enforced at a system level. Although the restriction remains in place, monitoring and enforcement have since ceased. The objective of this study was to assess the effect of vasopressin restriction with active oversight and enforcement vs without on overall cost of admission, vasopressin utilization rates, and patient outcomes.

METHODS: This was a retrospective cohort analysis of adult patients diagnosed with septic shock within a single health system consisting of 15 hospitals, who received at least one vasopressor continuous infusion and were admitted to an ICU between 7/2019-10/2022. Patients admitted between 7/1/2019 and 12/31/2020 were grouped into the "active oversight" cohort where there was strict enforcement of the vasopressin restriction. Patients admitted between 1/1/2021 and 10/31/2022 were placed into the "no active oversight" group where the restriction was no longer being monitored and enforced at the system level. The primary outcome was cost of hospitalization when vasopressin was formulary restricted with active oversight compared to no active oversight. Secondary outcomes include comparison of vasopressin utilization and patient outcomes between the two time periods, including rates of RRT and antiarrhythmic use, number of days on a vasopressor, number of different vasopressors used, ICU and hospital length of stay, and in-hospital mortality.

RESULTS: 11,666 patients across the UPMC health system were included in the analysis. Final results are pending.

CONCLUSION: Final conclusions are pending.

Victoria Collier, PharmD

Vicki received her PharmD from Creighton University School of Pharmacy & Health Professions in 2022. She is completing her PGY-1 Acute Care Pharmacy Residency at UPMC Presbyterian. Her interests include critical care and emergency medicine. Upon residency completion, she plans to practice in a hospital pharmacy setting.

Mentor(s): Ryan Rivosecchi, PharmD, BCCCP

Difference in ED Length of Stay with Oral vs Intravenous Antibiotics for Acute Cystitis

D'Ettorre, SB, McCormick, PJ, Zimmerman, DE

PURPOSE: Urinary tract infections (UTI) are one of the most acquired bacterial infections in both the community and hospital settings. The average length of stay (LOS) in the Emergency Department (ED) is ~4 hours, with prolonged LOS associated with higher mortality rates and worsened clinical outcomes. Current IDSA guidelines for the Treatment of Acute Uncomplicated Cystitis, recommend treatment with an oral agent, in most cases. There is debate over the necessity, and advantage, of administering a one-time dose of an IV antibiotic for the treatment of acute UTIs prior to discharge, with an oral antibiotic script to complete therapy. The main objective of this study was to determine if there was a difference in the estimated LOS for patients who received oral versus IV antibiotics in the ED, without changes in their clinical outcomes, i.e., return visits to the ED within 48-hours or changes to therapy based on resulting culture data.

METHODS: This was a retrospective chart review including patients who received IV or PO antibiotics to treat acute UTIs at UPMC Mercy Hospital's ED from 1/1/2022 - 12/31/2022. Patients were identified for inclusion based on medication charges and service date. Data collected included antibiotic administered in the ED and corresponding formulation, antibiotic prescribed at discharge, presence of UTI symptoms, collection of a urine culture and resulting culture data, and pertinent medical history. The primary outcome was to assess if there was a difference in the estimated LOS for patients who received PO versus IV antibiotics in the ED, without changes in their clinical outcomes, i.e., return visits to the ED within 48-hours or therapy changes therapy based on resulting culture data. Secondary outcomes included evaluating demographic data favoring prescription of IV antibiotics, asymptomatic bacteriuria treatment appropriateness, and time of day impact on ED LOS.

RESULTS: A total of 120 patient charts were identified for review. From admission to discharge time, patients who received a one-time dose of IV antibiotics prior to discharge experienced a longer ED LOS compared to those who received PO antibiotics ($p=0.0007$). However, evaluating from time of first medical contact to discharge, there was no difference in ED LOS between antibiotic formulation received ($p= 0.1329$). Regardless of the treatment formulation received, no patients returned to the ED within 48-hours for their UTI. The most cultured organism was E.coli (n=35) and most prescribed antibiotic at discharge was Cefuroxime (n=76).

CONCLUSIONS: ED LOS was longer in those who received IV antibiotics versus PO from admission to discharge. ED LOS was no different, however, when evaluated from time of first medical contact to discharge. There was no difference in clinical outcomes experienced with IV versus PO antibiotics for the treatment of acute cystitis in the ED, suggesting a one-time dose of IV therapy in this patient population may be unnecessary. This can assist with decreasing LOS, while potentially lessening the overall workload for both physicians and nurses.

Sierra D'Ettorre, PharmD

Sierra is a PGY-1 Pharmacy Resident at UPMC Mercy. She is from Buffalo, NY and received both her B.S. in Pharmacology and Toxicology and PharmD degrees from the University at Buffalo School of Pharmacy and Pharmaceutical Sciences. Upon completion of her PGY-1, Sierra hopes to pursue a career as an MSL with a focus in either Oncology or Immunology.

Mentor(s): Pamela McCormick, PharmD, BCPS, David E. Zimmerman, PharmD, BCCCP, FASHP

Evaluation of Antimicrobial Selection and Duration in Patients with Esophageal Perforation

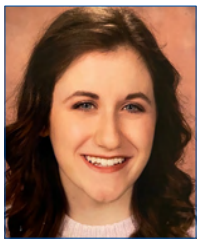
DiGiorgio D, Hansen M, Wein M

PURPOSE: Esophageal perforations (EP) can lead to significant morbidity and mortality when not appropriately treated. Broad spectrum antimicrobials are recommended to help reduce the risk of serious infections such as mediastinitis. While it is widely agreed upon that initial antimicrobial coverage should be broad then narrowed based on culture and sensitivity data, literature is limited regarding what antimicrobial coverage is warranted and how long EP should be treated. Within our institution, most patients are empirically initiated on anti-pseudomonal, anti-MRSA, and anti-fungal coverage following a perforation. The aim of this study is to determine if MRSA antimicrobial coverage impacts progression to sepsis, hospital length of stay, and prevalence of *C.difficile* infection compared to a group who did not receive MRSA coverage. The results of this evaluation will assist with the creation of additional antimicrobial stewardship structure and guidance within our institution.

METHODS: This is a retrospective chart review including patients who have had physician diagnosed EP over a five-year period at UPMC Mercy. Patients who received IV fluconazole were identified based on medication charges during the specified date range. The identified patients were split into two groups based on whether they received MRSA coverage or not post-perforation. The no-MRSA group either were not prescribed an anti-MRSA agent or these antibiotics were discontinued within 72 hours after initiation. The primary outcome was MRSA positive cultures following EP. The secondary endpoints were progression to sepsis, hospital length of stay, prevalence of *C. difficile,* and incidence of acute kidney injury (AKI). Descriptive statistics were used to evaluate the difference in the primary and secondary outcomes between groups.

RESULTS: A total of 21 patients were identified for this review. While 44% (n=7) of patients in the MRSA and 80% (n=4) of patients in the no-MRSA group had culture positive infections, there were no cultures growing MRSA in either group. The median duration of antimicrobials in the MRSA and no-MRSA groups was 14 and 22 days, respectively. The incidence of AKI was higher in the MRSA group (81%, n=13) compared to the no-MRSA group (40%, n=2)). Infectious disease (ID) was consulted less in the MRSA group (25%, n=4) compared to the no-MRSA group (80%, n=4).

CONCLUSIONS: Based on this review, we did not identify any patients who had a culture positive infection due to MRSA. Therefore, in patients who progressed to sepsis, MRSA was an unlikely causative pathogen. Antimicrobial duration varied greatly between groups as well as between each individual patient. Interestingly, ID was consulted more frequently in the no-MRSA group compared to the MRSA group. Our findings call into question the utility of using anti-MRSA agents as well as the need to further evaluate an appropriate duration for empiric treatment in patients with EPs. Moreover, large-scale studies are required to further validate our findings.



Danielle DiGiorgio, PharmD

Danielle is from Indiana, PA., and received her PharmD from the University of Pittsburgh School of Pharmacy. She is currently a PGY1 at UPMC Mercy Hospital. Her professional interests include infectious disease and emergency medicine. Upon completion of her PGY1, she will be staying on at UPMC Mercy to work as a 50/50 OR/inpatient pharmacist at the new Mercy Pavilion. In her free time, Danielle enjoys baking cookies, trying new restaurants around Pittsburgh, and spending time with her goldendoodle pup, Ellie.

Mentor(s): Meaghan Hansen, PharmD; Megan Wein, PharmD; Pamela McCormick, PharmD; Mohamed Yassin, MD

Clindamycin plus Vancomycin versus Linezolid for Treatment of Necrotizing Soft Tissue Infection

Dorazio J, Chiappelli A, Shields RK, Tsai YV, Skinker P, Nabozny MJ, Bauza G, Forsythe R, Rosengart M, Gunn S, Marini R, Clarke L, Falcione B, Ludwig J, McCreary EK

PURPOSE: Necrotizing soft tissue infections (NSTIs) are life-threatening infections. The aim of this study is to evaluate the safety of clindamycin plus vancomycin versus linezolid as empiric treatment of NSTI.

METHODS: Retrospective, single-center, cohort study of patients admitted from June 1, 2018 to June 30, 2019 (pre-intervention) and May 1, 2020 to October 15, 2021 (post-intervention). Patients who received surgical management within 24 hours of NSTI diagnosis and at least one dose of linezolid or clindamycin were included. The primary endpoint was death at 30 days. The secondary outcomes included rates of acute kidney injury (AKI) and Clostridioides difficile infection (CDI).

RESULTS: 274 patients were identified by admission diagnosis code for NSTI or Fournier's Gangrene; 164 patients met the inclusion criteria. Sixty-two matched pairs were evaluated. There was no difference in rates of 30-day mortality (8.06% vs. 6.45%, p = 0.65). There was no difference in CDI (6.45% vs. 1.61%, p = 0.07) but more AKI in the pre-intervention group (9.68% vs. 1.61%, p = 0.05).

CONCLUSION: In this small, retrospective, single-center, cohort study, there was no difference in 30-day mortality in patients receiving treatment with clindamycin plus vancomycin versus linezolid in combination with standard gram-negative and anaerobic therapy and surgical debridement for the treatment of NSTI. A prospective, randomized clinical trial is needed to determine if linezolid is non-inferior to clindamycin plus vancomycin for treatment of NSTI.

Joshua Dorazio, PharmD

Josh is a PGY1 Pharmacy Resident at UPMC Presbyterian, completing a non-traditional residency program over a 2-year period. Josh has interests in areas such as critical care medicine and infectious disease. Following graduation from his PGY1 program, Josh will stay on at UPMC Presbyterian to complete a PGY2 specializing in critical care medicine.

Mentor(s): Abby Chiappelli, PharmD, BCCCP and Erin McCreary, PharmD, BCIDP

Evaluation of Intentional Overdose Trends among Youth in Pennsylvania Before and During the COVID-19 Pandemic

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

PURPOSE: The number of deaths attributed to overdoses has been increasing since 2000, including in the child and adolescent population. Both the mental and physical health of this age group were largely impacted by the COVID-19 pandemic due to changes in routine, caregiver absences, financial instability, illness, and more. The purpose of this study was to evaluate rates of intentional overdose and related morbidity and mortality before and during the COVID-19 pandemic. Additional aims were to identify overdose trends based on age, gender, and substance.

METHODS: Data were obtained from cases reported in the National Poison Data System. Cases included intentional exposures to any substance for individuals between the ages of 6 and 19 years old reported to both regional poison centers in Pennsylvania between October 2017 and September 2022. Quarterly overdose trends were analyzed with the onset of the COVID-19 pandemic defined as March 2020. Data elements collected included age, sex, substance, and outcome.

RESULTS: There were 12,973 cases during the study period. Case incidence increased during the COVID-19 pandemic at a steeper rate than before. There were 877 overdose cases in Quarter 1 of 2022, which was the highest quarter reported. During the study period, 66% of cases occurred within 15–19-year-olds, 31% within 10-14-year-olds, and 3% within 6-9-year-olds. Almost three-quarters of cases involved females. There were 630 unique substances identified with one third of cases involving more than one substance. The top three substances were antidepressants, NSAIDs, and acetaminophen. Death or major effects occurred in 2.8% of cases.

CONCLUSIONS: In this dataset, the COVID-19 pandemic, female gender, and age 15-19-years-old appear to be three key factors in the rising rates of intentional overdose in the Pennsylvanian youth population. Next steps for this study are to analyze the socioeconomic impact on overdose trends and to identify risk factors and substances associated with death or major effects.

Paige Dorvè-Lewis, PharmD

Paige is a PGY-1 pharmacy resident at UPMC Western Psychiatric Hospital. She is from Inverness, FL, and earned her PharmD from the University of Florida College of Pharmacy. Her areas of professional interest include psychiatry and pediatrics. In her spare time, Paige enjoys gardening, watching professional soccer, and playing with her dog Wednesday. Upon completion of her PGY-1, Paige will continue her training in a PGY-2 residency program in psychiatric pharmacy at UPMC Western Psychiatric Hospital in Pittsburgh, PA.

Mentor(s): Andreea Temelie, PharmD, BCPP, Tanya Fabian, PharmD, PhD, BCPP, Kelsey Bero, LPC, NCC, Victoria Winkeller, MD, FAAP, Anthony Jaworski, PharmD, BCCCP, CSPI, Amanda Korenoski, PharmD, MHA, BCCCP

Evaluation of Deprescribing Interventions for Potentially Inappropriate Medications in Patients Aged 65 Years and Older

Dyne S, McCormick P, Steele A, Berletic J, Gionfriddo M

PURPOSE: Certain medications are considered potentially inappropriate in patients aged 65 years and older. These medications are commonly prescribed but rarely discontinued and can have significant side effect profiles, especially in geriatric patients. This retrospective review aimed to demonstrate the benefit of pharmacist intervention on potentially inappropriate medications in this patient population. The target medication classes included benzodiazepine receptor agonists, muscle relaxants, and select medications with strong anticholinergic properties. There are several randomized clinical trials evaluating deprescribing methods in a community pharmacy setting; however, data is lacking on inpatient pharmacist intervention on the deprescribing of similar medications. By conducting this retrospective review, we aim to better assess the effectiveness of deprescribing initiatives in an inpatient setting.

METHODS: This was a retrospective review of patients aged 65 years or older on one target hospital unit at UPMC Mercy in 2021. Patients were included if they were 65 years of age or older, had an active prescription for a potentially inappropriate medication, and had an external prescription fill history. Patients were excluded if they were made comfort measures only while inpatient, discharged to inpatient hospice, admitted for >2 weeks, or had an intervention for an over-the-counter medication. The primary outcome was maintenance of deprescribing within 3 months post-discharge, defined as discontinuation or dose reduction of the potentially inappropriate medication. Secondary outcomes included appearance of deprescribing interventions in the discharge summary and readmission to hospital within 30 days and 3 months post-discharge. Intervention patients were matched based on drug category, sex, and age within 5 years to patients on a similar medicine unit of the hospital with no pharmacist intervention.

RESULTS: A total of 57 pharmacist interventions were made on patients on the target unit. There were 40 interventions for strong anticholinergic medications, 12 for benzodiazepine receptor agonists, and 5 for muscle relaxants. Of the pharmacist interventions, 30 were dose reductions and 27 were complete discontinuations. The potentially inappropriate medication was re-prescribed within 3 months of discharge 17 times in the intervention group compared to 26 times in the control group ($p = 0.08$). The deprescribing intervention appeared in the discharge summary 45 times in the intervention group compared to 13 times in the control group ($p = < 0.001$).

CONCLUSIONS: Inpatient pharmacist intervention helped to decrease outpatient utilization of three categories of potentially inappropriate medications. Pharmacist intervention significantly increased the appearance of a medication prescribing change in the patient's discharge summary from the hospital.

Sydney Dyne, PharmD

Sydney Dyne, PharmD is a PGY-1 Pharmacy Resident at UPMC Mercy. She is from Kane, Pennsylvania and received her PharmD degree from the University of Pittsburgh in 2022. After completion of residency, she plans to stay at UPMC Mercy as an inpatient pharmacist.

Mentor(s): Abigail Steele, PharmD, BCPS, BCGP; Josef Berletic, PharmD, BCPS; Pamela McCormick, PharmD, BCPS

Pharmacists Enhancing Oncology Care in the Outpatient Setting

Eross M, Gingo L, Nero J

PURPOSE: Shifts in insurance reimbursement structure are leading to a rise in outpatient administration of parenteral chemotherapy. Due to the immense workload of oncologists and oncology clinicians, there is a growing demand for oncology-trained pharmacists to provide medication education and monitoring for patients receiving chemotherapy. Previous retrospective reviews have shown the advantages of pharmacists in the outpatient oncology setting, including increased patient satisfaction and cost-savings. The purpose of this study was to evaluate the impact of a pharmacist on outpatient oncology care by quantifying patient satisfaction, nursing satisfaction, and pharmacist-driven clinical interventions.

METHODS: This study was a prospective, descriptive analysis conducted at a single infusion center within a women's hospital specializing in breast and gynecologic cancers. From January 9th, 2023, to February 10th, 2023, a pharmacist was integrated into the outpatient chemotherapy infusion center and partnered with the oncology staff to provide patient education. Counseling sessions were offered to patients who were newly diagnosed with cancer beginning chemotherapy for the first time. The impact of a pharmacist was evaluated by patient surveys, nursing surveys, and documented pharmacist clinical interventions.

RESULTS: A total of 35 patients were included in this study, which accounted for 87.5% of eligible patients who began chemotherapy during the intervention period. Six oncology nurses were surveyed at the end of the study. The results of patient and nursing surveys were overwhelmingly positive with 100% of patients strongly recommending a pharmacist-led educational session to other patients starting chemotherapy, and 100% of nurses advocating for increased pharmacy involvement in the outpatient chemotherapy infusion center. The pharmacist documented 13 clinical interventions in the areas of supportive care, drug interactions, medication recommendations, drug information questions, and transitions of care.

CONCLUSION: The addition of a pharmacist in the outpatient chemotherapy infusion center demonstrated a positive impact on overall patient care and staff satisfaction. Due to the small sample size and short duration of the intervention period, additional assessments are warranted to evaluate the potential benefit within the study's institution.

Mikaila Eross, PharmD

Mikaila is from Pittsburgh, PA, and received her PharmD at Lake Erie College of Osteopathic Medicine. She is currently a PGY-1 Acute Care Pharmacy Resident at UPMC Magee-Womens Hospital. Following completion of her PGY-1 residency training, Mikaila will complete a PGY-2 Oncology Residency at Allegheny General Hospital.

Mentor(s): Leslie Gingo, PharmD, BCPS; Jessica Nero, PharmD, BCPS

Factors Affecting Treatment Retention for Long-Acting Injectable Antipsychotics

Ferro H, PharmD, Cullen M, PharmD, BCPP, Yabs M, PharmD, BCPP, MS, Fabian T, PharmD, BCPP, PhD

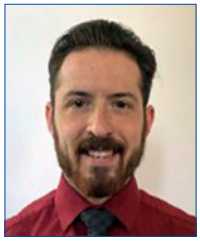
BACKGROUND: Long-acting injectable antipsychotics (LAIAs) are indicated for the treatment of schizophrenia, schizoaffective disorder, or bipolar disorder. LAIAs may improve treatment retention and reduce psychiatric hospitalizations compared to oral antipsychotics. There is limited evidence on what factors influence treatment retention for LAIAs. This project aims to identify the factors that may influence LAIA treatment retention of LAIA at 1, 3, 6, and 12 months.

METHODS: A retrospective review was conducted of patients initiated on a LAIA while admitted to an acute psychiatric hospital and following up post discharge between the same healthcare system post discharge between January 1 and December 31, 2021. Chart review was conducted to obtain demographic and clinic information. Data elements included diagnosis, current and past antipsychotic regimens, documented efficacy and tolerability, psychiatric legal commitments, psychiatric readmissions, and psychiatric emergency department visits. Statistical analysis was performed using chi-square analysis and unpaired T-tests to determine if factors of interest were correlated with treatment retention.

RESULTS: A total of 52 patients were included in the analysis. LAIA retention rates at 1, 3, 6, and 12 months were 61.5%, 50%, 34.6%, and 25% respectively. Dose adjustments correlated with LAIA treatment retention at all time points. Presence of a substance use disorder or active substance use were correlated with reduced treatment retention at 1 month. Prior LAIA exposure correlated with reduced retention at 1 month.

CONCLUSION: Antipsychotic non-adherence is a major challenge in the treatment of patients with serious mental illness. While LAIAs are a valid therapeutic option for patients who are non-adherent to oral antipsychotics, it is critical to identify factors that impact LAIA treatment retention. Larger-scale, prospective studies are needed to identify predictive factors that positively or negatively impact LAIA treatment retention to optimize patient and health system outcomes.

Presented at American Association of Psychiatric Pharmacists (AAPP) Annual Meeting April 2023.



Harrison Ferro, PharmD

Harrison received his PharmD from Wilkes University in 2021. Harrison completed his PGY1 pharmacy practice residency at UPMC Western Psychiatric Hospital. He is currently completing a PGY2 in psychiatry at UPMC Western Psychiatric Hospital. Upon completion of residency, Harrison will be starting a position as a clinical pharmacy practitioner in psychiatry at the Veterans Affairs Health System. Harrison's areas of interest include addiction medicine, schizophrenia, transitions of care, and academia.

Mentor(s): Marissa Cullen, PharmD, BCPP, Melanie Yabs, PharmD, BCPP, MS,
Tanya Fabian, PharmD, PhD, BCPP

An Analysis of Adherence to a Clinical Support System for Diltiazem in Reduced Ejection Fraction

Foster EM, Ibrahim R, Ibrahim J, Schmidt M, Puccio E, Keen S, Hickey G, Horn E, Coons J, Rivosecchi R

PURPOSE: Diltiazem (dilt) is a rate control option for atrial fibrillation with rapid ventricular response. Guidelines discourage the use of dilt in patients with reduced ejection fraction (EF) due to risk of heart failure exacerbation and cardiogenic shock. Our institution implemented a clinical decision support system (CDSS) tool recommending against the use of dilt in patients with an EF≤35%. The objective of this study is to compare outcomes of patients for whom providers adhered to the CDSS alert compared to patients for whom providers were non-adherent.

METHODS: This retrospective study evaluated patients for whom the CDSS alert triggered between March and December 2022. Patients who received at least one dose of IV dilt after the alert triggered were considered non-adherent. The primary endpoint was clinical deterioration, defined as inotrope requirement, pressor requirement, transfer to an intensive care unit (ICU), acute kidney injury (AKI), or renal replacement therapy (RRT) requirement.

RESULTS: A total of 111 patients were included, of which 71 patients (64%) received dilt after the alert triggered. Clinical deterioration was twice as likely in patients who received dilt compared to those who did not (32% vs 15%, p=0.045). Rates of ICU transfer were increased in patients who received dilt (24% vs 10%, p =0.07). Rates of AKI were increased in patients who received dilt (21% vs 10%, p=0.14). Patients who received dilt were more likely to require inotropes (6% vs 0%, p=0.13) and pressors (7% vs 3%, p=0.31). Rates of RRT were similar (2% vs 0%, p=0.45).

CONCLUSIONS: In adults with EF ≤35%, non-adherence to a CDSS alert recommending against dilt resulted in a doubling of clinical deterioration. This study emphasizes the risk of dilt use in patients with reduced EF. Future directions include alert redesign and provider education to increase alert adherence and patient safety.

Elizabeth Foster, PharmD

Elizabeth Foster is a PGY2 Cardiology Pharmacy Resident at UPMC Presbyterian/Shadyside. She is from Cincinnati, OH and received her PharmD from UNC Chapel Hill Eshelman School of Pharmacy. Next year, she will be moving to Ann Arbor to join the cardiology pharmacy team at Michigan Medicine.

Evaluation of Rates of and Reasons for Vaccine Acceptance or Refusal Among Patients at a Free Clinic Utilizing the Health Belief Model

Garcia A, Hutar M, Karlson K, McKenna C, Jonkman L, Connor S

PURPOSE: The purpose of this study is to identify the rates of vaccine acceptance and hesitancy at the Birmingham Free Clinic and to compare them with those reported in the literature for the general population. We hope these study findings will be useful internally - to learn more about our patient population's attitudes regarding vaccination and identify ways to improve patient health maintenance - as well as externally – to examine if free clinic vaccine processes may be associated with higher rates of vaccine acceptance compared to traditional insurance-driven clinics. We also hope to use this data to assess the potential benefit of the addition of COVID-19 vaccinations to our clinic formulary.

METHODS: Birmingham Free Clinic patients who are determined to be eligible, per Center for Disease Control recommendations for at least one of the hepatitis B, herpes zoster, influenza, 20-valent pneumococcal, or and tetanus, diphtheria, acellular pertussis vaccine series during their clinic visit will be included. Primary data will be collected via a questionnaire given to the patient verbally. The questionnaire will include information regarding which vaccinations the patient accepts or declines, as well as the patient's expressed reasons for accepting or declining each vaccination. Patients will also be asked about the status of their COVID-19 vaccination series. Patients who are found to be not up to date on their COVID-19 vaccination series will be asked for more information about perceived barriers and beliefs regarding COVID-19 vaccination. Reasons for vaccine acceptance or refusal will be categorized using the Health Belief Model and reported as an aggregate.

RESULTS: Data collection is currently completed, and data analysis is underway. Results are pending full data analysis of questionnaire responses.

CONCLUSIONS: We hope findings from this study will be useful in improving vaccine uptake at Birmingham Free Clinic and assist in developing targeted messaging to overcome common reasons for vaccine hesitancy. Data from this study may be useful to determine the potential impact of the addition of COVID-19 vaccines to our free clinic formulary and to compare rates of vaccine uptake at a free clinic to those reported in the literature at traditional outpatient clinics.

Andrew Garcia, PharmD

Andrew graduated from the University of Florida College of Pharmacy. His professional interests include underserved care, global and public health, and ambulatory care. Outside of residency, Andrew enjoys weightlifting, cooking, baking, hiking, and watching movies. He is also the proud dad of several houseplants.

Mentor(s): Sharon Connor, PharmD, Lauren Jonkman, PharmD, MPH, BCACP

Evaluation of Single vs Double-Dose Basiliximab Induction Therapy in Live-Donor Liver Transplant

Herrmann BN, Shimko KA

PURPOSE: Basiliximab is a high-cost medication with well-established data for its use as induction immunosuppression in liver transplant recipients. Most data currently support its use as a two-dose regimen, in which renal-protective benefit is shown as it can delay time to calcineurin inhibitor initiation. In January of 2019, UPMC Presbyterian's basiliximab protocol was changed so live-donor liver transplant recipients with a serum creatinine (SCr) <1.5 mg/dL would be eligible to receive a single dose for induction immunosuppression. Prior to the change, all living-donor recipients received two basiliximab doses regardless of renal function. A recent quality-improvement project at UPMC Presbyterian evaluated the effect of single-dose basiliximab vs the two-dose series, finding no difference in renal outcomes and cost-savings benefit with the single-dose regimen. The purpose of this study was to evaluate renal outcomes associated with single versus double-dose basiliximab administration in patients with stable renal function at time of transplant.

METHODS: This retrospective chart review included patients who received a live-donor liver transplant between June 1, 2017 – June 30, 2021, with a SCr <1.5 mg/dL on post-operative day (POD) 5. Patients were excluded if they had any prior history of transplant, received multi-organ transplants, were enrolled in other studies that precluded them from receiving basiliximab, or their basiliximab regimen was not given per protocol. The primary endpoint was mean change in SCr from POD0 to POD30 between the two cohorts. Secondary endpoints included mean change in eGFR from POD0 to POD30, incidence of infection (bacterial, viral, fungal) within 3 and 6-months, incidence of rejection within 3 and 6-months, time to calcineurin inhibitor (CNI) initiation, time to therapeutic CNI level, and time to change of immunosuppressive agent.

RESULTS: A total of 232 patients are included in the final analysis. Final results are pending.

CONCLUSIONS: Final conclusions are pending. Results from this research will provide more evidence for use of single-dose basiliximab as induction immunosuppression in liver recipients with stable renal function at time of transplant, as well as highlight the cost-savings benefit of the single-dose regimen.

Benjamin N. Herrmann, PharmD

Ben is a current PGY-1 pharmacy resident at UPMC Presbyterian. He received his PharmD from the University of Pittsburgh School of Pharmacy in 2022 and is completing his PGY-1 pharmacy residency at UPMC Presbyterian Hospital. His professional interests include solid organ transplant. Ben will be staying at UPMC Presbyterian for his PGY-2 pharmacy residency specializing in solid organ transplant.

Mentor(s): Kristen Shimko, PharmD, BCTXP; Cody Moore, PharmD, MPH, BCTXP, BCPS

Standardization of Ambulatory Care Pharmacists' Encounter Reporting to Characterize and Quantify Pharmacist Services

Janosik JE, Fischer G, Hall DL, Miller TA, Gabriel CT

PURPOSE: Historically, there has not been a standardized practice of labeling and reporting encounters in Epic, the electronic health record, for ambulatory care pharmacists practicing at UPMC Presbyterian/Shadyside (UPMCPS). Recently, a pharmacist work group request to Epic was made to add additional pharmacy-related "actionable steps." With the addition of new pharmacy-related actionable steps to describe the actions conducted during an encounter, comes differences in interpretation and use, which prevents consistency in the pooling of pharmacist activities across multiple practices. The process for reviewing data across practice sites, not just a single site, would need to be determined as the reporting process is not currently available within EPIC.

METHODS: A procedure was created by a primary care pharmacist working group practicing at UPMCPS clinic sites to define actionable steps and standardize encounter labeling to ensure that pharmacists document similarly across different primary care clinics. The procedure was presented to primary care pharmacists at a department-wide meeting in August of 2022 and the pharmacists were instructed to begin using the procedure to label their encounters starting September 1, 2022. Reports were run on December 1, 2022 by individual pharmacists from an existing EPIC report titled "Encounters – Past 90 Days". Data within the report will identify patient and encounter-related data including "Reason for Visit/Call." Adherence to the procedure will be assessed and is defined as labeling one disease state and at least one actionable step per encounter.

RESULTS: Over a 90-day period between September 1, 2022 and December 1, 2022, primary care pharmacists across four clinics UPMCPS created a total of 2208 encounters. Anticoagulation-related encounters accounted for 54% of the total encounters. Of the ten most common "disease states" that encounters were opened for each month, Hospital Follow-up (33%), Diabetes (16%), and Treatment Adherence (13%) were the most prevalent. Of the ten most common "actionable steps" that pharmacists completed during encounters, Medication Reconciliation (36%), Medication Monitoring (16%), and Medication Evaluation (13%) were the most prevalent. Adherence to the procedure increased from 78% in September, to 92% in November.

CONCLUSIONS: Pharmacist services in primary care settings at UPMCPS can now be quantified and characterized as a result of this procedure and report. In addition, outcomes from this project will inform the development of a department-wide report which will allow for quicker, more streamlined assessments of pharmacist encounters by managers of the ambulatory care pharmacists.

Jack Janosik, PharmD

Jack was born and raised in Cleveland, Ohio, and received his PharmD from the University of Toledo College of Pharmacy and Pharmaceutical Sciences. Last year he completed a PGY1 pharmacy residency at Cleveland Clinic Avon Hospital in Avon, Ohio. He is now one of the PGY2 Ambulatory Care residents at UPMC Presbyterian/Shadyside. His areas of professional interest include primary care, diabetes, and hypertension. In his spare time, Jack likes to spend time with his girlfriend, root for Cleveland sports teams, explore Pittsburgh, and watch TV.

Mentor(s): Deanne Hall, PharmD, CDE, BCACP, Trisha Miller, PharmD, MPH, BCACP, Carly Gabriel, PharmD, BCACP

Impact of Implementing a PowerPlan on Appropriate Sedation Titrations in the Critical Care Setting

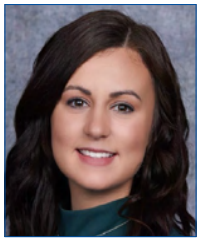
Johnson S, Lau S, Imhoff A, Burke C, Bauer R

PURPOSE: Critically ill and mechanically ventilated patients may often require multiple sedative agents, which can potentially cause adverse drug events, oversedation, or other risks. Because of medication safety concerns, this prompted the UPMC Health System to create a PowerPlan titled "Adult ICU Pain and Sedation for Mechanically Ventilated Patients." A prescriber may add or modify orders for various sedation agents including propofol, ketamine, dexmedetomidine, and midazolam. The sedation agents each contain a prepopulated bolus and infusion order with pre-built titration parameters to a RIKER Sedation-Agitation Scale (SAS). However, the PowerPlan provides the prescriber with the opportunity to order sedative agents with duplicate titration scales. This allows nurses to titrate more than one agent at a time leading to the potential to practice outside their scope. The purpose of this study is to evaluate the effect of a PowerPlan on prescriber's compliance with PADIS guidelines and the Joint Commission (TJC) standards.

METHODS: A retrospective, cohort study was conducted for critically ill patients requiring pharmacologic sedation admitted to a tertiary hospital during a 13-month period. All administered orders for the sedation PowerPlan by a prescriber were included in this study between 06/01/2021 and 07/31/2022. Patients aged 18 years or older admitted to the ICU requiring mechanical ventilation and multiple continuous infusion sedation agents were included. Compliance to TJC standards with the utilization of a sedation PowerPlan was evaluated as a primary endpoint, with mechanical ventilation days, ICU length of stay, use of antipsychotics, and overall mortality evaluated as secondary endpoints. This project was approved by the UPMC Quality Improvement Review Committee.

RESULTS: A total of 194 critically ill adult patients were reviewed, with 41 patients ordered more than one sedation agent. Amongst the 41 patients, 5% of patients contained orders that complied with TJC standards on therapeutic duplication and clear titration goals. Only 2% of the remaining 95% of patients had orders modified to fall into compliance. A total of 90% of patients contained multiple titratable continuous agents and 88% contained multiple as needed bolus options. All orders contained the medication name, route, rate of infusion, incremental units and frequency to increase/decrease the rate, and maximum rate of infusion.

CONCLUSION: This study provides evidence for the further need for direction and education on steps to ensure appropriate sedation orders. Pharmacists must review orders to ensure proper instruction that would avoid therapeutic duplication, as well as provide clear titration goals. PowerPlan orders should not place nursing in the position of making dosing/administration decisions that conflict with their scope of practice. Modfifications to PowerPlan orders need to be made accurately to avoid an increased risk of adverse drug events, oversedation, mechanical ventilation days, ICU length of stay, other medication safety risks.



Stephanie Johnson, PharmD

Stephanie received her PharmD from Duquesne University School of Pharmacy in 2022. She is completing her PGY-1 Pharmacy Residency at UPMC Magee-Womens Hospital. Her professional interests include emergency medicine and critical care. Upon residency completion, she plans to practice in a hospital pharmacy setting.

Mentor(s): Scarlet Lau, PharmD, MPH; Allison Imhoff, PharmD; Clayton Burke, BS, PharmD; Robert Bauer, MSN, CRNP, AG-ACNP-BC

Deprescribing Aspirin for Primary Prevention of Cardiovascular Disease in Geriatric Patients

Kim GE, Mohan E, Sakely H, Grimes A

PURPOSE: Previously, the US Preventative Services Task Force (USPSTF) recommended shared-decision making on the use of low-dose aspirin for patients between 60-69 years old. The newly updated 2022 guideline recommends against the use of aspirin for primary prevention of cardiovascular disease (CVD) in older adults ≥ 60 years old given previous trials showed increased risk of mortality, bleeding and nonsignificant reduction in atherosclerotic cardiovascular disease associated with use in older adults. In lieu of the recent guidelines update, the aim of this project is to identify and assess aspirin use and implement the USPSTF updates to two geriatric outpatient clinics.

METHODS: This is a multi-site, retrospective chart review to identify and assess the use of aspirin for primary prevention of CVD in older adults presenting to two geriatric outpatient clinics. All patients seen via office or telehealth visit between August 2021 to July 2022 will be screened for aspirin use. Patients taking aspirin will be assessed for deprescribing eligibility based on bleeding risk (history of hospitalization due to bleed, age, chronic kidney disease, and concurrent use of medications that increase risk of bleeding.) Providers will be notified of potential deprescribing opportunities, and their responses will be collected for review. The primary outcome of this project is to determine the percentage of patients eligible for deprescribing aspirin for primary prevention. The secondary outcome is to determine percentage of provider acceptance of pharmacy-led recommendations on deprescribing. Descriptive statistics were utilized to evaluate the data.

RESULTS: Out of 771 patients, 601 patients were excluded, and 170 patients were identified as taking aspirin. Of those patients, 29 patients (22.7%) were on aspirin for primary prevention. Of those 29 patients, 5 patients (17.2%) were taking for diabetes, 3 patients (10.3%) due to patient preference, and 3 patients (10.3%) due to intolerance or refusal of statins. There was a lack of documentation of indication for 18 patients (62.0%). Results pending of provider response to deprescribing recommendations.

CONCLUSIONS: Preliminary results indicate that 17.2% of clinic patients were deemed potentially eligible for deprescribing aspirin for primary prevention of CVD. Provider responses to deprescribing recommendations are pending.

Grace Kim, PharmD

Grace is currently at PGY-2 Geriatric Pharmacy Resident at UPMC St. Margaret. She received her Doctor of Pharmacy from the University of Maryland School of Pharmacy and completed her PGY-1 training at UPMC Presbyterian. Upon completion of her training, she plans to practice as a clinical pharmacist in the ambulatory care setting.

Mentor(s): Amy Grimes, PharmD, BCPS, BCGP; Elizabeth Mohan, MD; Heather Sakely, BCPS, BCGP

Piloting a Pharmacist EConsult Service in a Large Urban Family Health Center

Koverman MK, Ballard SL

PURPOSE: EConsults are a formalized consultation response system intended to expand provider access to expertise without patient interaction. At UPMC Shadyside Family Health Center (SFHC), primary care providers (PCPs) use an existing billable eConsult model for in-house psychiatrist consultation to inform primary care management of behavioral health needs. In response to limited availability and increasing patient wait times for pharmacist appointments, Family Health Center (FHC) pharmacists piloted an eConsult format focusing on type 2 diabetes medication optimization.

METHODS: The Pharmacist eConsult Service (PeCS) used an existing systemwide eConsult workflow for in-house requests and established a target of 85% completion within 10 business days. Physician utilization of the PeCS service was encouraged via email and announcements at a didactic session and clinic huddles. Workflow processes, documentation, and service implementation results were reviewed periodically for improvements in subsequent Plan-Do-Study-Act cycles. The primary outcomes were number of PeCS requests, percentage of requests completed within 10 business days, and time in minutes spent on each eConsult. Secondary outcomes were number and type of pharmacist recommendations, proportion of PeCS requests with recommendations implemented within 3 months and shared savings reporting for Medicare Star Measures relating to diabetes control. Statistical Process Control analysis was used to identify signals of change/improvement. Demographics were collected for referred patients. Data will be analyzed with descriptive statistics, t-test, chi-square, and multiple regression for exploration of relationships.

RESULTS: Cycle I process pilot (1/16-1/31/23) targeted patients aged 65+ with A1c >9%. Two PeCS requests were received; both were completed within 10 days and took 30 and 40 minutes. One patient's A1c decreased from 9.5% to 6.5% with the implementation of pharmacist recommendations. The documentation template was refined and inclusion was broadened. Cycle II (2/1-3/31/23) targeted adults with A1c >8%. All 8 eligible PeCS were completed on-time and average time spent was 40 minutes. Phase III began 4/1/2023 and will include billing estimates. Additional results will be reported after 3-month post-intervention data collection.

CONCLUSIONS: An eConsult service provided structured access to pharmacist expertise and potential for team-based billing outside of typical pharmacist medication management activities. Continued advocacy for pharmacists to be listed as qualified health providers at the state level is needed to ensure pharmacists are able to bill directly for interprofessional consultation.

Presented at: Research in Progress Presented at: ASHP 2022 Midyear Clinical Meeting

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Michelle Koverman, PharmD

Dr. Koverman is the current PGY2 Ambulatory Care (Family Medicine) Pharmacy Resident at UPMC Shadyside. Her career interests include primary care and caring for vulnerable patient populations while working on an interprofessional team. Most recently she completed a PGY1 Community-based Pharmacy Resident with the University of Pittsburgh School of Pharmacy and Rite Aid. Upon completion of residency, she plans to pursue a career focused in expanding pharmacist role in outpatient care, interprofessional program and development, and care for vulnerable patient population. Michelle is also from St. Louis, Missouri and earned her PharmD from the University of Missouri – Kansas City.

Mentor(s): Stephanie Ballard, PharmD, BCPS, BCACP

Area Deprivation Index Impact on Type-2 Diabetes Management in a Regional Health Plan Population

Laffey TN, Marr D, Modany A, McGraw M

PURPOSE: Rates of attainment of high-quality diabetes care have been shown to be lower for patients living in more disadvantaged and rural areas. Management of diabetes relies on access to care and is complicated by the crossover of physical, social, and economic factors. One way to evaluate these factors is through utilization of area deprivation index (ADI). ADI is a validated composite measure of social determinants of health that can be used to quantify geographic disparities. This study aimed to determine the clinical and economic impact of ADI on patients with diabetes. Clinical objectives included the percentage of members that achieved A1c goal level ≤7%, the percentage of members that received comorbidity-focused therapies, medication adherence, and the frequency and type of healthcare services utilized. Economic outcomes included per member per month (PMPM) differences in total cost of care, pharmacy cost, medical cost, and diabetes-associated cost.

METHODS: This retrospective review of pharmacy and medical claims included 8,814 adult members with newly diagnosed type 2 diabetes enrolled in an integrated health plan during calendar year (CY) 2021. To be included, members were required to be adults, reside in Pennsylvania, and have continuous enrollment for two years prior to type 2 diabetes diagnosis. State-level ADI data was derived for each member and applied to the Census block group on file in the administrative claims data. Members were excluded if they were pregnant, relocated with a resulting change in ADI decile during the study period, received a cumulative 90-day supply of prandial insulin, or had at least one claim for continuous glucose monitoring equipment in CY 2020 or 2021. Multivariable regression models were used to evaluate the association between ADI and outcomes while controlling for confounding variables. Statistical significance was defined at an alpha value of 0.05.

RESULTS: There were no statistically significant differences between any ADI quintile for achievement of A1c goal. Significant differences were identified between ADI quintiles 1 (least deprived) and 5 (most deprived) for obtainment of at least one A1c test during CY 2021 (72% vs. 56%, $P < 0.01$) and adherence to non-insulin diabetes medications (70% vs. 62%, $P < 0.01$). Statistically significant differences were also identified for all-cause inpatient, outpatient, and unplanned healthcare service utilization. The difference in PMPM all-cause total cost of care was on average $363.50 less for those living in ADI quintile 1 versus quintile 5 ($P < 0.01$).

CONCLUSIONS: Statistically significant differences were identified between ADI quintiles 1 and 5 for medication adherence, frequency of A1c test claims, all-cause healthcare service utilization, and total cost of care. There were no statistically significant differences between ADI quintiles for achievement of A1c goal or receipt of comorbidity-focused therapies. These findings warrant future research to investigate other disease states that may contribute to the all-cause differences identified in this study.

Presented at AMCP Annual 2023 in San Antonio, Texas

Taylor Laffey, PharmD

Taylor received her PharmD degree from the University of Pittsburgh School of Pharmacy in 2022. She is the current PGY1 managed care resident at UPMC Health Plan. Her current professional interests include formulary and utilization management, quality and provider relations, and specialty pharmacy management. Upon completion of her residency, Taylor will be staying with UPMC Health Plan as a Clinical Pharmacy Specialist on the formulary team.

Mentor(s): David Marr, PharmD, Ashley Modany, PharmD, and Molly McGraw, PharmD, BCPS

Quality Improvement Evaluation of Midazolam Use After Implementation of a Pain and Sedation Protocol for Mechanically Ventilated ICU Patients

Madara H, Heisel R, Zeigler H, Trisler M

PURPOSE: The 2018 Clinical Practice Guidelines for the Prevention and Management of Pain, Agitation/Sedation, Delirium, Immobility, and Sleep Disruption in Adult Patients in the Intensive Care Unit (ICU) suggest that nonbenzodiazepine sedatives are preferred in critically ill, mechanically ventilated adults. To reflect these guidelines, the "Adult ICU Pain and Sedation for Mechanically Ventilated ICU Patients Protocol" was implemented at UPMC Shadyside Hospital in June 2021. According to this protocol, propofol is the preferred sedation agent and fentanyl is the preferred pain medication. Benzodiazepines, such as midazolam, are highly discouraged and are only recommended when contraindications exist to the preferred agents. The purpose of this study is to analyze the impact that this protocol had on midazolam use in critically ill, mechanically ventilated patients.

METHODS: This single-center retrospective observational study was approved by the institution's quality improvement committee. Patients were included if they were mechanically ventilated and received midazolam in the medical intensive care unit (MICU) at UPMC Shadyside Hospital from October 2020 through March 2022. Patient data collected included demographics, length of hospitalization, length of ICU stay, length of mechanical ventilation, cumulative midazolam dose (IV bolus and IV infusion), duration of midazolam infusion, Intensive Care Delirium Screening Checklist (ICDSC) score, Riker Sedation-Agitation Scale, and documentation of sedation interruption. Patients were excluded if they did not receive midazolam, received dialysis/renal replacement therapy, received a paralytic agent, had comfort measures only designation, or if midazolam was indicated for any of the following: benzodiazepine withdrawal, alcohol withdrawal, or active seizure. Data was assessed using descriptive statistics. Statistical significance was assessed using a chi-square test or Mann-Whitney U Test.

RESULTS: A total of 132 patients met the inclusion criteria (73 patients pre-protocol and 59 patients post-protocol). There was no significant difference in demographics between the two groups. Additional data assessment is still in process.

Conclusions: Pending

Hannah Madara, PharmD

Hannah Madara is a PGY-1 Pharmacy Resident at UPMC Shadyside Hospital. She is originally from Duncansville, PA. She received her PharmD from the University of Pittsburgh School of Pharmacy. Hannah has accepted an offer to stay on as an inpatient unit-based pharmacist at UPMC Shadyside Hospital after completion of her residency.

Mentor(s): Ronald Heisel, PharmD, BCCCP; Holly Zeigler, PharmD, BCPS, BCCCP; Michael Trisler, PharmD, MPH, BCIDP

Real-World Experience of Fidaxomicin vs Oral Vancomycin for Treatment of *C. difficile* Infection

Elisabeth Marker, PharmD; Aaron Pickering, PharmD, BCPS; and Frank D'Amico, PhD

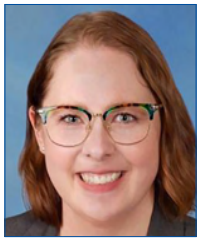
PURPOSE/BACKGROUND: *Clostridioides (Clostridium) difficile* infection (CDI) is recognized as a leading cause of hospital-acquired diarrhea encountered by general medicine inpatient teams. Treatment guidelines were updated in June 2021 to suggest fidaxomicin over vancomycin for initial and recurrent episodes of CDI. However, newer drugs such as fidaxomicin are often difficult for patients to obtain. Its high price limits third party payors' willingness to cover the cost, prevents outpatient pharmacies from stocking it, and steers skilled nursing facilities towards preferring vancomycin. These barriers can delay discharge or interrupt care. To date, no study has been published evaluating differences in length-of-stay, how economic pressures may influence antibiotic choice, or how patients' clinical course might be affected by mid-treatment therapy changes. This retrospective study aims to evaluate real-world patient experience with fidaxomicin and vancomycin in a community teaching hospital.

METHODS: This retrospective chart review evaluated adult inpatients with CDI at UPMC St. Margaret between 06/01/2018 and 9/30/2022. All patients who received at least one dose of either fidaxomicin or oral vancomycin were included. Patients were excluded if they received IV metronidazole, if no positive result was detected on a *C. difficile* toxin test, or if outpatient treatment information was missing.

The primary outcome was the length of hospital stay in days since the first dose of CDI treatment. Groups were divided by treatment course into patients who received only vancomycin, only fidaxomicin, or both medications at any time over their treatment course. Secondary outcomes include the frequency of changing agents and reason for change; patients were grouped according to first CDI drug received. The total duration of therapy (both inpatient and outpatient doses) for those who changed medications was also compared to those who completed therapy with a single antibiotic.

RESULTS: Over the study period, 146 patients received vancomycin, 28 patients received fidaxomicin, and 26 patients received both medications. The average length of stay was 8.4 ± 8.3 days for patients on vancomycin, 6.7 ±24.9 for fidaxomicin, and 7.1 ± 12.6 for patients who received both ($p = 0.46$). More patients who were started on fidaxomicin (8/36 [22%]) vs. vancomycin (18/164 [11%]) required a change in therapy by discharge, with out-of-pocket costs the most common reason. However more of the patients started on vancomycin who changed agents did so due to treatment failure (9/18 [50%]) compared to fidaxomicin (1/8 [12.5%]).

CONCLUSIONS: There was no statistically significant difference in length of stay between groups receiving vancomycin, fidaxomicin, or both agents for treatment of CDI. However, the leading cause of medication change for patients who received fidaxomicin was out-of-pocket costs. The results in this small sample size of patients suggest that cost remains a barrier to patients receiving guideline-directed therapy for CDI.



Elisabeth Marker, PharmD

Elisabeth Marker is a PGY-1 Pharmacy Resident at UPMC St. Margaret Hospital. She is originally from Minneapolis, Minnesota and received her Pharm.D. from Virginia Commonwealth University in Richmond, Virginia. She has a passion for working with older adults, especially in the primary care setting. Her professional interests include deprescribing, fall prevention, and palliative care. Upon completing her PGY-1, she is excited to stay at St. Margaret as a PGY-2 Geriatric Pharmacy Resident, practicing in their Geriatric Care Center and associated skilled nursing facilities.

Mentor(s): Aaron Pickering, PharmD, BCPS; and Frank D'Amico, PhD

Retrospective Analysis of a Pharmacist 48-hour Stop Protocol on IV Hydromorphone use in Hospitalized Patients

Mast MA, Then JE

PURPOSE: Opioids are a cornerstone in the management of severe acute pain, and IV opioid therapy is easy to prescribe, titrate to effect, and administer. If IV therapy is continued up until a patient is medically cleared for discharge, the patient's departure from the hospital may be delayed to allow for transition to an appropriate home regimen. In an effort to minimize unnecessary days of IV opioid therapy, UPMC Presbyterian-Shadyside implemented policies permitting a pharmacist 48-hour automatic stop on select IV opioid products. This is intended to encourage active reassessment of pain management plans and rapid transition to regimens that can be utilized at home. We sought to analyze the impact of pharmacist interventions on inpatient intravenous (IV) opioid prescribing and transitions to multimodal pain management regimens. This project analyzes IV hydromorphone prescribing trends through a pre-post, historical, cohort study of general medicine and surgical patients cared for from May of 2020 through 2022.

METHODS: This evaluation included individuals treated with IV hydromorphone for pain management on select general medicine or surgical floors during the month of May in 2020, 2021, or 2022 at UPMC Presbyterian. Patients were excluded if they were documented as receiving post anesthesia care unit (PACU) orders for IV hydromorphone, designated as comfort measures only (CMO), receiving IV patient-controlled analgesia (PCA) hydromorphone products, or prescribed IV hydromorphone products with a concentration greater than 2 milligrams per milliliter. Primary outcomes included total days of IV opioid therapy and hospital length of stay. Secondary objectives included oral opioid use at discharge, and subgroup outcomes for patients managed for acute sickle-cell crisis. Data were collected through charge reports and chart review and were assessed utilizing descriptive statistics.

RESULTS: A total of 4237, 5060, and 4833 potential hydromorphone charges were generated for May of 2020, 2021, and 2022, respectively. Further results and analysis to follow, pending patient order matching and subsequent chart review.

CONCLUSIONS: Pending completion and final analysis.

Presented at the 2022 Vizient Pharmacy Network Meeting in Las Vegas, Nevada

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Michael Mast, PharmD

Michael is from Glenshaw, Pennsylvania and received his PharmD from The University of Pittsburgh School of Pharmacy in 2022. He is currently completing his PGY1 Pharmacy Residency at UPMC Presbyterian. His professional interests include clinical management, pharmacy automation, and drug development. After this year, he will complete his PGY2 at UPMC Presbyterian as a part of the Health System Pharmacy Administration and Leadership Residency Program.

Mentor(s): Janine Then, PharmD, BCPS

Evaluation of the Perception of Burnout and Utilization of Resources Among Pharmacy Residency Preceptors at UPMC

Maurer J, O'Brien C, Trisler, M

PURPOSE: The purpose of this project is to evaluate the degree of perceived burnout among pharmacy residency preceptors at UPMC, describe specific factors that may influence preceptors' perception of professional burnout, and assess the current utilization of available resources to mitigate burnout.

METHODS: A multi-center, cross-sectional study was conducted for current pharmacy residency preceptors at any UPMC site. Inclusion criteria were licensed pharmacists serving as pharmacy residency preceptors at a UPMC site at the time the survey was delivered on February 16th, 2023. Access to an anonymous 28-question survey was delivered by email to eligible preceptors via their respective residency program directors. Preceptors were given a 4-week period to complete the survey. Responses were collected via Microsoft Forms and data analyzed using Microsoft Excel. Primary endpoints include the degree of perceived professional burnout among pharmacy residency preceptors at UPMC, and scope of resource utilization to mitigate burnout. Questions used to measure the degree of burnout were adapted from portions of the Copenhagen Burnout Inventory.

RESULTS: Out of an estimated 172 current preceptors, 57 completed the survey (response rate = 33%). The most common reported contributing factors to feelings of burnout were a high administrative workload, high direct patient care load, and lack of support from leadership. The top 3 resources utilized to mitigate burnout were reported as exercise, music, and support from family/friends. Overall, the average "burnout score" was 47.9 out of 100 based on answers to select questions from the Copenhagen Burnout Inventory.

CONCLUSIONS: Pharmacy residency preceptors at UPMC are experiencing an intermediate to high severity of burnout. The contributing factors of these feelings of burnout vary between individuals but do appear to be associated with work-related factors. It is important to continue to evaluate the perception of burnout for preceptors at UPMC and take actions to decrease the degree of burnout among this population.

Julena Maurer, PharmD

Julena is currently a PGY-1 pharmacy resident at UPMC Shadyside Hospital. She earned her Doctor of Pharmacy degree from the University of Buffalo School of Pharmacy and Pharmaceutical Sciences. Her professional interests include ambulatory care, global health, and emergency medicine. Upon completion of her PGY-1, Julena will continue her training under the UPMC PGY-2 Ambulatory Care Global Health Track pharmacy residency program.

Mentor(s): Casey O'Brien, PharmD, BCPS, Michael Trisler, PharmD, MPH, BCIDP

Evaluation of Actual Discharge Antibiotic Prescription Length Congruence with Intended Length of Therapy

Meaney DM, Pickering A, D'Amico F, Grimes A

PURPOSE: Over 35 million hospital discharges occur in the United States every year, and the discharge process is complex and rife with challenges. While discharge antibiotic dose and duration are carefully decided for each patient, factors including delayed discharge and multiple discharging prescribers can result in shorter or longer antibiotic courses than intended. Shorter than intended discharge antibiotic course may lead to higher risk of reinfection and readmission, whereas longer than intended course may lead to an increased risk of adverse effects and antimicrobial resistance. The frequency at which this discordance in antibiotic prescriptions occurs is unknown and has not been previously evaluated in literature. Our study aims to address this question as well as identify potential types of error.

METHODS: A single-site, retrospective chart review was conducted involving patients discharged from the hospital on an antibiotic from January 2021 to August 2022. Patients were excluded if investigators were unable to determine intended antibiotic duration. The primary outcome was the difference between intended and actual length of discharge antibiotic therapy. Secondary outcomes included related readmission rate, as well as error rate and type by medical service (geriatrics, hospitalist, etc.), prescriber type (attending, resident, etc.), route (IV/PO), and infectious diseases involvement.

RESULTS: A total of 236 prescriptions were evaluated, of which 43 (18.2%) had an error. Of the 43 erroneous prescriptions, 37 (15.7%) had an error resulting in different actual length than intended (0.08 average days of difference [95% CI -0.07-0.23]). Patients with an error on discharge antibiotic prescription had significantly higher readmission rates compared to those without errors (16.2% vs. 5.9%, p = 0.04). When infectious diseases was involved in discharge antibiotic selection, there was a non-significant increase in prescription error rate compared to when infectious disease was not involved (21.3% vs. 14.7%, p = 0.19).

CONCLUSIONS: Approximately 1 in 5 patients were discharged on an erroneous antibiotic prescription. Patients with a discharge antibiotic prescription error were 64% more likely to have a related readmission within 30 days of discharge. 63% of errors were due to miscalculation, misunderstandings with multiple prescribers, or lack of duration adjustment when hospitalization was extended.

Presented at the Society of Teachers of Family Medicine Annual Spring Conference, Tampa, FL, April 29th-May 3rd, 2023.

Drake Meaney, PharmD

Drake is from Buffalo, NY, and received his PharmD in 2022 from the University at Buffalo. He is a PGY1 Pharmacy Residency at UPMC St. Margaret and will be staying at St. Margaret next year to complete a PGY2 residency in ambulatory care with a focus in family medicine.

Mentor(s): Aaron Pickering, PharmD, BCPS; Amy Grimes, PharmD, BCPS, BCGP

Safety and Efficacy Outcomes for Pharmacist-Directed Vancomycin Dosing in a Home Infusion Setting

Meredith CN, Zielke MK, Frey L, Schott S

PURPOSE: Pharmacokinetic vancomycin dosing protocols are widely utilized in inpatient healthcare settings and have resulted in improved clinical outcomes, maintenance of therapeutic troughs, and reduction of acute kidney injury (AKI). Currently, there is not robust data guiding vancomycin protocols in the home infusion setting. Furthermore, a review of this institution's pharmacokinetic dosing practices identified inconsistencies in internal management of patients requiring vancomycin therapy, likely secondary to lacking an institutional protocol. The purpose of this quality improvement study was to identify opportunities for pharmacists to improve efficacy and safety outcomes for patients receiving vancomycin therapy in a home infusion setting. Efficacy was assessed by evaluating resolution of infection, duration of therapy, and therapeutic trough levels following pharmacist-directed dosing. Safety was assessed by evaluating the incidence of AKI, non-AKI adverse drug reactions (ADRs), and premature discontinuation of therapy. Results from this study will facilitate the development of an institutional, pharmacist-directed vancomycin dosing protocol.

METHODS: This single-center retrospective observational review was approved by the organization's Quality Review Board. It included patients aged 18 years or older transitioning from an inpatient setting to home who received vancomycin with a target trough of 15-20 mg/L between January 1, 2021, and December 31, 2021. Collected baseline characteristics included age, sex, race, dosing weight, renal function at initiation of therapy, predetermined comorbidities, infection-specific information, and concomitant nephrotoxic therapies. The following data was collected to evaluate the primary and secondary objectives of efficacy and safety, respectively: days of therapy, vancomycin troughs, patient-specific doses, dose adjustments, resolution of infection along with change in renal function, adverse drug reactions (ADRs) and reasons for premature discontinuation. Data was obtained through electronic health records which were de-identified, maintained in a confidential manner, and analyzed using descriptive statistics.

RESULTS: Thirty-one patients met inclusion criteria, of which 80.7% had the following comorbidities associated with AKI; hypertension and diabetes. Osteomyelitis was the most common indication for vancomycin therapy (45.2%), while MRSA was the most identified organism (51.61%). Six (20.7%) patients with detectable first outpatient troughs had therapeutic troughs before pharmacist-directed dosing, while 14 patients (50%) had therapeutic second troughs after initiating pharmacist-directed dosing. Subsequent troughs showed similar therapeutic trends. Thirty-two supratherapeutic troughs were collected from 21 patients, with a mean total daily dose of 31.29 mg/kg. Four (12.9%) patients discontinued vancomycin secondary to safety concerns, two of which developed AKI.

CONCLUSIONS: An increased rate of therapeutic troughs and low occurrences of adverse safety outcomes were observed after the initiation of pharmacist-directed dosing. Limitations of this study include a small sample size, restricted access to electronic health records, and a reduced population of prescribers that utilize pharmacist-directed dosing. The results suggest sustained improvement in therapeutic troughs and minimal ADRs following pharmacist-directed dosing. Furthermore, results support expanding pharmacy-directed vancomycin dosing in a home infusion setting with the implementation of a standardized protocol.

Presented at the NHIA 2023 Annual Conference, National Harbor, MD, March 2023.

Claire Meredith, PharmD

Claire received her PharmD from Duquesne University and is completing her PGY1 residency at CarepathRx, focusing on home infusion and specialty pharmacy. Her professional interests include ambulatory care, home infusion, specialty, and transplant pharmacy. Upon completion of her PGY1, Claire will continue with CarepathRx as a specialty pharmacist.

Mentor(s): Megan K. Zielke, PharmD, BCCCP; Leita Frey, PharmD, BCPS; Shelby Schott, PharmD

Evaluation of Two Bivalirudin Titration Strategies in Patients with Mechanical Circulatory Support

Mitchell MI, Sullinger DP, Rivosecchi RM

PURPOSE: The purpose of this study was to characterize the use of bivalirudin before and after the implementation of an orderset with standardized titration nomograms based on type of MCS in patients with MCS in a quaternary care hospital.

METHODS: A retrospective review of patients who received bivalirudin for MCS before and after the institution of the standardized bivalirudin titration nomograms was conducted. The primary outcome was to compare the proportion of therapeutic aPTTs. Additional outcomes included number of sub- and supratherapeutic aPTTs, incidence of bleeding and clotting events, bivalirudin titrations per day, and percentage of patients who achieved therapeutic aPTT level during therapy.

RESULTS: A total of 100 patients were included (pre-cohort=67; post-cohort=33). The proportion of therapeutic aPTTs was significantly higher in the post-cohort compared with the pre-cohort (62% vs 48%; p<0.001). The post-cohort also had 0% of patients fail to achieve therapeutic aPTT levels compared to 17% in pre-cohort (p=0.014). Additionally, the number of titrations per day was significantly lower in the post-cohort with 1.20 titrations per day compared to 1.93 in the pre-cohort (p<0.001). Bleeding and clotting events were infrequent and similar between groups.

CONCLUSIONS: Implementation of the bivalirudin titration nomograms within the EHR significantly increased the number of therapeutic aPTTs, reduced the number of patients who never achieved at least one therapeutic aPTT on bivalirudin, and reduced the number of titrations required per day.

Madeline Mitchell, PharmD

Madeline received her PharmD from University of Pittsburgh School of Pharmacy in Pittsburgh, Pennsylvania. She completed her PGY1 pharmacy residency at Moses H. Cone Memorial Hospital. Her professional interests include neurocritical care, sedation management, and precepting. This year she is continuing her training at UPMC Presbyterian as a PGY2 critical care pharmacy resident.

Mentor(s): Danine Sullinger, PharmD, BCCCP and Ryan Rivosecchi, PharmD, BCCCP

Outpatient Antibiotic Appropriateness after Emergency Department Visits

Rahman H, Castelli G, Pickering A, D'Amico F

PURPOSE: Appropriate antibiotic prescribing is key in preventing antibiotic resistance. The majority of prescriptions for antibiotics are written in the outpatient setting, including primary care offices and emergency departments (ED). It is approximated that half of these may be inappropriate with regard to dose, selection, indication, or duration. Patients seen within the ED are often prescribed antibiotics under the conditions of rapid medical decision making, limited diagnostic data, and variable follow-up post discharge. These conditions allow for outpatient stewardship to be a high yield area for intervention on antibiotic appropriateness. The aim of this project is to compare antibiotic failure rate between those with and without most recent evidence based antibiotic courses for common outpatient infections.

METHODS: This is a retrospective chart review evaluating adult patients belonging to 1 family health center discharged from the ED with an antibiotic for urinary tract infection, cellulitis, chronic obstructive pulmonary disease exacerbation, or community acquired pneumonia. Patients excluded are those with multiple infections, <18 years of age, pregnant patients, immunocompromised, those on antibiotics prior to ED admission, and those with a recurrent infection in the last 30 days. Evidence based antibiotic courses were those appropriate in terms of dose, duration, frequency, and antibiotic selection. The primary outcome is the rate of 30-day failure defined as a need for additional antibiotic therapy after the index course for the same infection. The secondary outcome was composite 30-day ED visits or inpatient admission. Chi-squared test will be used to analyze categorical variables.

RESULTS: A total of 71 patients were included with a median age of 37 (IQR 25-49). There was no significant difference in the primary outcome for those on appropriate (n=13) vs inappropriate (n=58) regimens (15% vs 12%; 95% CI -0.15 to 0.24) and for the secondary composite outcome (23% vs 45%; 95% CI -0.07 to 0.44). Most patients with inappropriate regimens had durations that were longer than required (55/58) and longer durations did not seem to confer additional benefit. There were many more patients in the inappropriate regimen group, confounding results. Patients received 155 avoidable days of antibiotics.

CONCLUSIONS: There was no difference in measured outcomes, but findings highlight a major problem with antibiotic prescribing in the ED.

Accepted for presentation at the 2023 Annual STFM (Society of Teachers of Family Medicine) Conference.

Habibur Rahman, PharmD, BCPS

Dr. Rahman is a PGY-2 ambulatory care pharmacy resident and faculty development fellow at UPMC St. Margaret. He received his Doctor of Pharmacy degree from University at Buffalo School of Pharmacy and Pharmaceutical Sciences. His professional interests are in academia, global health, underserved care, infectious diseases, and preventative medicine. Dr. Rahman will be continuing his career in ambulatory care in the Buffalo area.

Mentor(s): Gregory Castelli, PharmD, BCPS, BC-ADM, CDCES, FCCP

Comparison of Opioid Monitoring Tools for Analgosedation in the Intensive Care Unit

Reigh AV, Dittmer A, Ordons B, Lohr B, D'Amico F, Falkowski B, Brehm J

PURPOSE: Analgosedation in mechanically ventilated (MV) intensive care unit (ICU) patients has been associated with reduced use of sedatives, shorter duration of MV, and reduced incidence of delirium compared to alternative sedative approaches. Two validated tools to assess analgosedation in MV patients include the Critical Care Pain Observation Tool (CPOT) and the Riker Sedation-Agitation Scale (Riker-SAS), which assess pain and sedation, respectively. There is no current consensus on which tool best meets patients' ventilation and comfort goals while limiting sedative and opioid requirements. Our health system recently transitioned from monitoring analgosedation via Riker-SAS to CPOT. The objective of this study is to evaluate the impact of analgosedation adjusted via CPOT versus Riker-SAS on daily opioid use and clinical outcomes in MV ICU patients.

METHODS: A multicenter, retrospective cohort study was conducted at UPMC St. Margaret and UPMC Passavant. Eligible patients were adults who received a fentanyl infusion for analgosedation between July 1, 2020 and August 1, 2022, excluding a period from July 2 to 31, 2021 in which our institution transitioned from monitoring via Riker-SAS to CPOT. Key exclusion criteria included use of a non-titratable infusion or one for deep sedation (Riker-SAS <3), seizures/status epilepticus during intubation, therapeutic hypothermia, or primary diagnosis of alcohol withdrawal. The primary outcome was cumulative opioid usage in the first 2 days of intubation, measured in intravenous morphine milligram equivalents (MME) in the CPOT cohort versus Riker-SAS cohort. Secondary outcomes included daily MME usage for days 1 and 2, administration of additional opioid or analgesic agents, incidence of delirium evaluated by the Intensive Care Delirium Screening Checklist (ICDSC), and indicators of inadequate analgosedation.

RESULTS: Pending

CONCLUSIONS: Pending

Abigail Reigh, PharmD

Abigail is a PGY-1 Pharmacy Resident at UPMC St. Margaret. She is from Hollidaysburg, PA, and received her PharmD in 2022 from the University of Pittsburgh School of Pharmacy. Next year, she will be staying with St. Margaret to complete a PGY-2 Pharmacy Residency in Geriatrics. Her professional interests include geriatrics, palliative care, and transitional care management.

Mentor(s): Alison Dittmer, PharmD, BCCCP, Brianna Ordons, PharmD, BCPS, BCCCP

Optimization of Glucagon-like Peptide-1 Agonist through a Population Health Curricular Session at a Residency Program

Rizkalla J, Koenig M, Winters S, D'Amico F

PURPOSE/BACKGROUND: Recent changes to the Accreditation Council for Graduate Medical Education include incorporating population health into the family medicine (FM) program curriculum. Using principles of population health, this project investigated the use of glucagon-like peptide-1 agonists (GLP-1a) for weight loss and glycemic control in patients with type 2 diabetes (T2DM). Optimization of diabetes care can lead to a reduction in diabetes-associated complications such as atherosclerotic cardiovascular disease (ASCVD), diabetic neuropathy, and amputations. GLP-1a are recommended first-line therapy options in patients with insufficient glycemic control on maximally tolerated metformin. GLP-1a also reduce the risk of ASCVD and aid in weight loss, which can further aid in glycemic control. The aim of this project is to determine if an interprofessional population health team activity focusing on optimizing GLP-1a use in overweight patients with T2DM can lead to increased prescribing of GLP-1a.

METHODS: This quality improvement project was conducted at a single community teaching hospital and three affiliated family health centers (FHC). Starting in July 2022, FM resident physicians were educated by a pharmacist on the benefits of GLP-1a therapy during weekly population health educational sessions. Resident physicians randomly selected up to five T2DM patients with an A1c >7% and a BMI >25 who were scheduled for an office visit within the next seven days. The physician was contacted through the electronic health record about initiating or increasing a GLP-1a, metformin, or sodium glucose cotransporter-1 inhibitor, and closing care gaps. Five months after the activity commenced, a pharmacist reviewed the charts of identified patients. Patients who received an interventional message were compared to those who did not. The primary aim was to determine if there was a change in prescribing patterns of GLP-1a therapy in overweight patients with T2DM.

RESULTS: A total of 128 unique patients were reviewed. Only patients who met inclusion criteria and showed up to their appointment (n=63) were included in data analysis, 65 patients served as a control group. Patients in the intervention group had a higher initial BMI, weight, and A1c. After the review period, five GLP-1a were started in the intervention group and two in the control group. Four patients in the control group were titrated to a higher dose of GLP-1a compared to zero in the intervention group. Seven patients were started on a SGLT2i compared to three patients in the control group.

CONCLUSIONS: The population health curriculum did not lead to a statistically significant change in GLP-1a prescribed by the residents. This quality improvement shows the importance of a more targeted approach to initiate and titrate GLP-1a to maximally tolerated doses. These results will be shared with UPMC St. Margaret New Kensington Family Health Center to implement more direct action regarding GLP-1a management.

Joseph Rizkalla, PharmD, BCPS

Joe grew up in Johnstown, PA where he obtained a B.S. in Biology and a minor in Chemistry at the University of Pittsburgh at Johnstown. He then completed a PharmD at the University of Pittsburgh. His professional interests include ambulatory care and cardiology. Outside of pharmacy, he enjoys spending time with friends/family, running, tennis, and listening to music.

Mentor(s): Marianne Koenig, PharmD, BCPS

Personalized Immunosuppression: Role of Pharmacogenetics in Tacrolimus Dosing in Heart Transplant

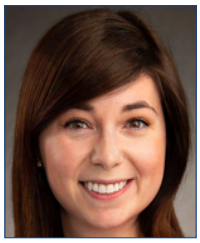
Robinson KM, Horn E, Empey PE

PURPOSE: Tacrolimus is widely used for the prevention of rejection after heart transplantation. Cytochrome P450 3A5 (CYP3A5) is mainly responsible for the metabolism of tacrolimus; however, many patients of European ancestry do not express CYP3A5. Thus, standard dosing of tacrolimus does not result in therapeutic trough levels in patients who express CYP3A5. The Clinical Pharmacogenetics Implementation Consortium (CPIC) has guidelines for the prescribing of tacrolimus if the CYP3A5 phenotype is known; they recommend increasing the initial dose by 50-100%. While the relationship between CYP3A5 phenotype and tacrolimus dose requirements are known, the impact of polymorphisms in CYP3A5on hospital resource utilization, intra-patient variability, and clinical outcomes in heart transplant is not well understood. We hypothesize that CYP3A5 phenotype is associated with a longer time to reach the therapeutic range, lower time in therapeutic range during the initial hospital stay, and a longer length of stay.

METHODS: This is a single-center retrospective study of patients who received a heart transplant at UPMC from January 2017 through February 2021 and survived past hospital discharge. Biobanked blood samples were genotyped on the Pharmacoscan™ array, and standard quality control measures were implemented using Axiom™ Analysis Suite. CYP3A5 phenotypes were called using Axiom™ Analysis Suite using translations from CPIC. CYP3A5 normal and intermediate metabolizers, or patients who had at least one functional CYP3A5 allele, were considered CYP3A5 expressors. Clinical data was obtained from an electronic health record (EHR) data pull. Time-to-therapeutic was calculated as the number of days from the transplant date to the first time tacrolimus was within the therapeutic range (8-12 ng/ml) for two consecutive days. Time in therapeutic range was calculated using the Rosendaal method. Differences in continuous variables between CYP3A5 expressors and non-expressors were assessed using Kruskal-Wallis tests.

RESULTS: Of the 123 heart transplant patients, 90 (73%) were CYP3A5 poor metabolizers, 29 (24%) were CYP3A5 intermediate metabolizers, and 4 (3%) were CYP3A5 normal metabolizers. CYP3A5 expressors (n=33) had a significantly longer median time to therapeutic range than non-expressors (n=90) (13 days (IQR 9-18days) vs. 9 days (IQR 6-13 days), $p<0.001$). This translated to a lower median time in therapeutic range during the hospital stay (35% (SD 36% (IQR 15-50%) vs. 47% (IQR 31%-63%), respectively, $p= 0.01$). Median length of stay did not differ in CYP3A5 expressors (15.5 days (IQR 11.75-22 days) vs. 13 days (IQR 11-23 days), $p=0.43$).

CONCLUSIONS: Non-genotype-guided dosing of tacrolimus resulted in a longer time to achieve therapeutic levels and a lower percent of time in the therapeutic range during the hospital stay in heart transplant patients who are CYP3A5 expressors. Implementation of CYP3A5-guided dosing of tacrolimus may improve tacrolimus disposition in heart transplant patients. Next steps include determining the association of CYP3A5 phenotype on clinical outcomes, such as acute rejection, formation of donor-specific antibodies, and tacrolimus-induced adverse events, and the role of other genetic variants in tacrolimus disposition in heart transplantation.



Katherine Robinson, PharmD, BCPS

Katherine is currently a Clinical Pharmacogenomics Fellow and masters student at the University of Pittsburgh School of Pharmacy. She received her Pharm.D. from the University of Tennessee Health Science Center. She previously completed a PGY1 residency at UK HealthCare and a PGY2 specialty residency in Clinical Pharmacogenomics at St. Jude Children's Research Hospital. She became a board-certified pharmacotherapy specialist in 2021. Katherine's professional areas of interest include using implementation science for the integration of pharmacogenomics into routine care and identifying drivers of variability in medication outcomes to advance precision medicine.

Mentor(s): Philip E. Empey, Pharm.D., Ph.D., FCCP and Edward Horn, Pharm.D., BCCCP

Sustainability of Clinical Pharmacogenomics Services within a Primary Care Practice

Rowe K, Empey PE, Berenbrok LA.

PURPOSE: Pharmacogenomics (PGx) is the study of how an individual's genes impact their response to medications. PGx implementation into clinical practice promises to improve medication outcomes towards cost-effective care. While pharmacists do not have provider status in Pennsylvania, several health-systems, including UPMC, have utilized mechanisms to bill for pharmacist time for providing pharmacogenomic services in outpatient settings. One strategy is to bill incident to physician services. Currently there is no published data surrounding successful reimbursement mechanisms when billing for pharmacogenomic services incident to physician services.

METHODS: The study design is a single-center descriptive, retrospective chart review conducted at UPMC Primary Care Precision Medicine Clinic. The primary endpoint is successful payer reimbursement for pharmacogenomic services when pharmacist bills incident to physician services. Secondary endpoints include indications for pharmacogenomic services, quantity of clinically actionable recommendations, and medication changes subsequent to PGx testing. Multivariable analyses will determine associations of endpoints with demographics, clinical, and administrative factors. Charts from patients who have participated in at least one pharmacogenomics service visit with the pharmacist (initial pharmacogenomics consultation and/or return of results consultation) will be included.

RESULTS: Sustainability of the UPMC Primary Care Precision Medicine Clinic will be evaluated via the above methods. Complete results and analysis are in progress.

CONCLUSIONS: Pending

Kayla Rowe, PharmD

Kayla Rowe is a Clinical Pharmacogenomics Fellow at the University of Pittsburgh School of Pharmacy. She is from Richmond, Virginia and received her PharmD from the Virginia Commonwealth University School of Pharmacy. Her interest is in the implementation of pharmacogenomic services in outpatient settings.

Mentor(s): Philip Empey PharmD, PhD, FCCP, Lucas Berenbrok PharmD, MS, BCACP

Safety Analysis of IV Methadone versus Hydromorphone PCA in Post-operative and Post-traumatic Adults

Serniak A, Pursglove M, McCormick P

PURPOSE: Hydromorphone is an opioid receptor agonist that exerts strong analgesic effects, making it a favorable agent in the post-operative and post-traumatic setting. Methadone, a long-acting opioid, has recently gained popularity in the intraoperative setting due to studies showing lower post-operative opioid requirements and decreased reported pain at 48 hours versus other opioids. Despite these benefits, methadone carries risks including respiratory depression and QTc prolongation. Because of the variable and prolonged half-life of methadone, doses may accumulate which can increase the risk of these adverse events. To date, methadone has not been formally studied in the post-operative setting. The purpose of this study is to assess IV methadone and IV hydromorphone use in post-operative neurosurgery, orthopedic trauma, and burn patients to compare safety profiles related to respiratory and cardiovascular events.

METHODS: Patients were included in this retrospective chart review if they were surgery patients ≥18 years of age, were admitted to the neurosurgery, orthopedic trauma, or burn services, and were administered intermittent IV methadone or hydromorphone patient-controlled analgesia (PCA). Patients were excluded if they received only intraoperative methadone or hydromorphone doses, received only one dose post-operatively, or were identified as comfort measures only within 24 hours of surgery. The primary outcome was incidence of a respiratory event, defined as O_2Sat < 90%, respiratory rate < 8 bpm, increase in supplemental oxygen to maintain O_2Sat >96%, or use of naloxone within 24 hours of IV methadone or hydromorphone PCA administration. Secondary outcomes included the incidence of QTc prolongation, defined as >500 or 20% increase from baseline, within 24 hours of IV methadone or hydromorphone PCA administration. Other secondary outcomes included the number of additional rescue opioid doses administered and use of concomitant opioids, benzodiazepines, or ketamine.

RESULTS: A total of 100 patients – 50 in each group – were evaluated. In the methadone group, the median patient age was 38 years, median BMI was 26.5 kg/m^2, and 78% of the patients were male. In the hydromorphone group, the median patient age was 54.5 years, median BMI was 29.3 kg/m^2, and 68% of the patients were male. The following number of patients were admitted under burn, orthopedic trauma, and neurosurgery, respectfully: 14 in the methadone group vs 3 in the hydromorphone group, 21 in the methadone group vs 26 in the hydromorphone group, and 15 in the methadone group vs 21 in the hydromorphone group. Preliminary results suggest that patients in the IV methadone group experienced more primary and secondary outcomes, however the majority of these events did not require an escalation of care. Only one patient, who was receiving IV methadone, required naloxone.

CONCLUSIONS: Pending. We anticipate that the results of this study will add to the growing body of literature and safety profile of intermittent IV methadone.

Arienne Serniak, PharmD

Arienne Serniak is a 2022 graduate of Duquesne University School of Pharmacy, located in Pittsburgh, PA. She is a current PGY1 pharmacy resident at UPMC Mercy. Upon completion of her residency, she will continue her employment with UPMC Mercy as a staff pharmacist.

Mentor(s): Marci Pursglove, PharmD; Pamela McCormick, PharmD

Evaluating the Rate of Metabolic Adverse Effects and Monitoring in Patients Being Treated with Antipsychotics

Shanholtzer, C; Smith, A

PURPOSE: Antipsychotic medications are utilized for the treatment of several psychiatric disorders and the side effect profiles of these medications are well established and can include weight gain, hyperglycemia, dyslipidemia, and Type 2 Diabetes Mellitus. This project took place at UPMC McKeesport Hospital's Transitional Recovery Unit (TRU), an extended stay behavioral health unit where patients are treated for complex psychiatric disorders. Current hospital practice recommends that patients have their body weight and waist circumference measured at least once weekly, with A1C, fasting blood glucose, and lipid panel being measured every three months. The purpose of this project is to measure the percentage of patients who experienced an adverse metabolic side effect while being treated with antipsychotics. The second aim is to measure the frequency of patients who had metabolic parameters measured in accordance with current practice on TRU and clinical practice guidelines.

METHODS: This project reviewed patients residing on TRU between July 1st, 2022 and December 31st, 2022. Patients had to be at least 18 years of age and treated with an oral or long-acting injectable antipsychotic during their hospitalization. Data was collected through a retrospective chart review and included: body weight, waist circumference, height, A1C, fasting blood glucose, and lipid panel on admission and throughout the duration of hospitalization. Body mass index (BMI) was obtained through calculation due to not consistently being reported in Cerner. A comparison analysis of the frequency of metabolic parameter monitoring will be performed and compared to hospital practice (weight and waist circumference weekly; all other labs every three months) and clinical practice guidelines (weight, height, and BMI at baseline and every six months; lipids and A1C or fasting blood glucose after four months and then annually thereafter) to ensure that best practice is being followed.

RESULTS: Complete results and analysis pending.

CONCLUSIONS: Pending.

Claire Shanholtzer, PharmD

Claire is currently the PGY-1 pharmacy resident at UPMC McKeesport Hospital. She completed her Bachelor of Science in Chemistry from West Virginia State University in 2019 and Doctor of Pharmacy from Marshall University in 2022. Next year, she will be continuing to a PGY-2 in psychiatric pharmacy at the Martinsburg VA Medical Center in Martinsburg, West Virginia. Her professional areas of interest include addiction medicine, pain management, community mental health, and underserved care.

Mentor(s): Ashley Smith, PharmD

Evaluating the Impact of a Pharmacist-Driven Diabetes Population Health Initiative in a Geriatric Primary Care Setting

Lauren Sittard, PharmD, BCPS; Elizabeth Mohan, MD; Heather Sakely, PharmD, BCPS, BCGP

PURPOSE: This project aimed to identify patients with gaps in diabetes care and provide recommendations to their primary care providers on how to help them achieve their disease state goals. The primary outcome of this study were number of care gaps identified. Secondary outcomes included acceptance rates of these outcomes by the primary care provider and/or the patient.

METHODS: Patients with diabetes who have a primary care provider at one of two outpatient geriatric offices were included in the study. A pharmacist screened a report generated by the electronic health system to identify opportunities to improve the following diabetes medication-focused measures: updated A1c in the last 6 months, A1c < 8%, most recent office blood pressure < 140/90 mmHg, on statin therapy, updated urine albumin creatine within the last 12 months, and if microalbuminuria (uACr ≥ 30), were patients on an ACE inhibitor or ARB. Recommendations following the most up to date American Diabetes Association Standard of Care Guidelines, at the time of the intervention, were communicated to patient's primary care providers for consideration.

RESULTS: This study identified 68 patients with at least one gap in diabetes care. In total 114 gaps were identified. Approximately 35% of these gaps were a result of being overdue for a uACr, 25% being overdue for an A1c, 11% due to not being on a statin, 10% due to elevated A1c, and 10% due to elevated blood pressure. The results related to number of interventions accepted by providers and patients are pending at this time.

CONCLUSIONS: Pharmacists are successful in identifying and providing recommendations for patients not meeting their disease state goals. Population health initiatives such as this, supplement routine care to identify at-risk patients. A two-pronged approach of using dashboard reports and chart review are necessary to identify which gaps are appropriate to intervene on based on patient specific factors.

Presented At: The American Geriatric Society Annual Meeting

Lauren Sittard, PharmD, BCPS

Dr. Sittard is currently a PGY-2 Geriatric Pharmacy Resident at UPMC St. Margaret. She completed her pharmacy training at the University of Rhode Island in 2021 and PGY-1 Pharmacy resident at UPMC St. Margaret in 2022. Her professional interests include geriatrics, ambulatory care, rheumatology, and academia.

Mentor(s): Heather Sakely, PharmD, BCPS, BCGP

Risk Factors Associated with Clinical Failure of *S. Maltophilia* Bacteremia

Slaven BN, Shah S

PURPOSE: Currently, common treatment options for *stenotrophomonas maltophilia (S. maltophilia)* include sulfamethoxazole/trimethoprim, levofloxacin, and ceftazidime. However, as of March 2022 the IDSA guidelines have discouraged the use of ceftazidime as a treatment option due to the theory that the intrinsic resistance of *S. maltophilia* may render ceftazidime ineffective. Nevertheless, there is limited clinical data to support avoiding the beta-lactam antibiotic. In an attempt to identify the optimal management, the aim of this study was to identify risk factors associated with clinical failure in *S. maltophilia* bacteremia.

METHODS: This was a multi-center within a single-system, retrospective cohort study conducted by chart review looking at patients with *S. maltophilia* bacteremia. Data was pulled from UPMC Presbyterian and Shadyside from January 2012 to January 2022. Inclusion criteria consisted of patients $\geq$ 18 years and at least one positive blood culture of *S. maltophilia.* Exclusion criteria consisted of patients who experienced mortality before treatment was initiated or within 48 hours of treatment initiation or were diagnosed with line colonization that was either considered a contaminant or did not receive treatment for the line colonization. The primary outcome was identifiable risk factors for clinical failure in patients with *S. maltophilia* bacteremia. Secondary outcomes included risk factors such as ceftazidime failure, time to treatment, time to clinical resolution, repeat bacteremia with positive *S. maltophilia* within 180 days, resistance within 180 days, and post infection length of stay.

RESULTS: Results are pending

CONCLUSION: Results of this study will identify risk factors associated with clinical treatment failure for *S. maltophilia* bacteremia

Presented at ASHP Midyear Conference – Resident Poster Session, Las Vegas, NV 2022

Brianne Slaven, PharmD

Brianne is from Aurora, CO and received her B.A. in Neuroscience at the University of Colorado, Boulder followed by her PharmD from the Medical University of South Carolina College of Pharmacy located in Charleston, SC. She is currently a PGY1 pharmacy resident at UPMC Presbyterian. Upon completion of her PGY1 residency program she will begin her PGY2 as the Global Health pharmacy resident at UPMC Presbyterian-Shadyside.

Mentor(s): Sunish Shah, PharmD, BCIDP

Comparison of Fixed versus Weight-Based Prothrombin Complex Concentrate Dosing Strategies for Factor Xa Inhibitor Reversal

Snyder BR, McCormick PJ, Miller TJ

PURPOSE: Factor Xa Inhibitors (FXaI) are among the most commonly used Direct Oral Anticoagulants, supported by an increase in prescription volume from 14.1% to 57.3% of anticoagulant prescriptions from 2013 to 2018.[1] Although FXaIs demonstrate advantages with respect to major bleeding, in the event that they must be urgently reversed, four-factor prothrombin complex concentrate (PCC) can be an effective and widely available reversal agent. In April 2022, UPMC Mercy introduced fixed-dose PCC with the intent to streamline the order verification process while maintaining similar efficacy outcomes. Previous studies using fixed-dose PCC for vitamin K antagonist reversal showed comparable efficacy. The objective of this research project is to compare fixed versus weight-based PCC dosing strategies for FXaI reversal.

METHODS: A single-site, retrospective chart review was conducted at a tertiary care academic medical center. Patients 18 years and older, who presented to UPMC Mercy between April-December 2022 and received at least one dose of PCC to reverse anticoagulation from apixaban or rivaroxaban were eligible. These subjects were compared to those who received PCC between April and December 2021. The primary outcome observed within this study was the time between order entry and drug administration. Secondary outcomes included: average dose of PCC, repeat PCC doses needed, post-administration procedures, achieved hemostasis, 30-day mortality, thromboembolic events, hospital length of stay, discharge disposition, adverse drug events and overall drug costs. Statistical analyses included t-tests to assess the primary outcome and chi-square tests for most secondary outcomes which were comprised of ordinal data.

RESULTS: A total of 239 patients received PCC during the specified time ranges; 174 met inclusion criteria for review. Subjects were stratified into fixed (n= 72) and weight-based dose (n=102) groups. No statistically significant differences in baseline demographics were observed. The most common hemorrhage type in both groups was intracranial. The time between order entry and drug administration was on average 5.5 minutes shorter in favor of the fixed-dose ($P > 0.05$). Numerically, more patients in the fixed-dose arm achieved hemostasis (80.5% vs 71.6%). Patients who received weight-based PCC required more subsequent surgeries, repeat doses, and experienced a higher mortality rate (60.5% vs 30.8%)

CONCLUSIONS: This evaluation did not confirm a reduction in time to drug administration using the fixed-dose strategy but did suggest higher rates of hemostasis with a numerically lower mortality rate. Both dosing strategies were supported as safe by the absence of adverse drug events. Considering PCC's rapid onset of less than 30 minutes, the potential for time savings by utilizing the fixed-dose method has high clinical utility.[2] Future studies can further elucidate which fixed-dosing regimen is therapeutically optimal.

Brett R. Snyder, PharmD

Brett is from Grove City, Pennsylvania. He received his PharmD from Duquesne University in Pittsburgh. He worked as a staff pharmacist, learning from many role models at UPMC Altoona. Brett is a PGY1 resident at UPMC Mercy and will complete a PGY2 in Emergency Medicine at UPMC Mercy. His favorite part of PGY1 was learning from preceptors and co-residents, who he considers to be lifelong friends. In his free time, Brett enjoys fly fishing and spending time with loved ones in Grove City, Buffalo and Uniontown.

Mentor(s): Pamela J. McCormick, PharmD, BCPS, Taylor J. Miller, PharmD

Optimizing Evidence-Based Medicine for Asthmatic Patients in a Primary Care Setting through Pharmacist-Led Interventions

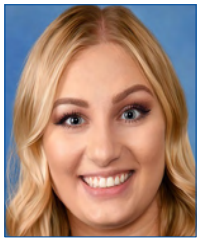
Sprando AC, Farrah RM

PURPOSE: While multiple studies show that short acting beta agonist (SABA) only treatment increases the risk of severe asthma exacerbations compared to patients treated with inhaled corticosteroid and long-acting beta agonist, providers' practice lags behind these guideline changes. The adoption of new guideline recommendations is even more important in the training environment as resident training impacts how they practice thereafter. The goal of this QI project was to determine if a pharmacist-led intervention in a Family Medicine Residency Program Clinic can increase guideline implementation to optimize health outcomes for patients. The primary outcome was the percentage of change in mild asthmatic patients on SABA-only therapy before and after pharmacist-led interventions.

METHODS: This quality improvement project was a prospective, single-centered study designed to identify asthmatic patients at a family health center (FHC), assess current regimen for appropriate evidence-based treatment, and if appropriate, provide recommendations to optimize therapy. Patients were identified using a report generated through the Epic electronic health record which identified all patients at the Lawrenceville FHC with a diagnosis of asthma from October 2022-October 2023. Patients were reviewed for inclusion/exclusion criteria. Prospective reports were run weekly to identify asthmatic patients coming to Lawrenceville for a visit. Any asthmatic patient scheduled in the coming week that met inclusion criteria was flagged for intervention. Pharmacist-led interventions included weekly messages to PCPs and in person educational sessions provided during clinic time. The primary outcome was the percent of patients on SABA only therapy before and after pharmacist-led interventions over 6 months (November 2022-April 2023). Descriptive statistics were used to represent the data.

RESULTS: Research in progress; results are yet to be determined.

CONCLUSIONS: We anticipate that this quality improvement project will increase prescribing of evidence-based medicine among our prescribers. We hope this will also highlight the impact that embedded pharmacists can have on implementation of evidence-based medications.



Arianna Sprando, PharmD

Arianna is from Grove City, PA, and received her PharmD in 2021 from the University of Pittsburgh. She is currently a PGY2 Family Medicine/Ambulatory Care Pharmacy Resident and Faculty Development Fellow at UPMC St. Margaret. Her professional interests include chronic disease state management, supporting underserved populations, and demonstrating the impact of pharmacist driven value-based care. Arianna hopes to pursue a career as an embedded clinical pharmacist in a primary care office. In her spare time, she enjoys spending time with family and hosting game nights with friends.

Mentor(s): Roberta Farrah, PharmD, BCPS, BCACP

Assessment of Long-Acting Injectable Antipsychotic Use in Child and Adolescent Patients with Psychiatric Disorders

Sun C, Goulding H, Temelie A, Clark C, Yabs M, Fabian T

PURPOSE: Long-acting injectable antipsychotics (LAIAs) are widely known as an effective treatment option for adult patients with schizophrenia, schizoaffective disorder, and bipolar 1 disorder. Despite this, literature regarding LAIA use in pediatric and adolescent patients is sparse. Currently no LAIAs are FDA-approved for use in patients less than 18 years of age; however, there have been case reports and studies documenting off-label use in this patient population that suggest clinical benefit. The purpose of this study is to describe the use of LAIAs in pediatric and adolescent patients with psychiatric disorders.

METHODS: This retrospective study was approved by the UPMC Quality Improvement Review Committee. Patients under 18 years of age discharged from an acute psychiatric hospital with an inpatient or day-of-discharge order for a LAIA between October 1, 2015 and October 31, 2022 were included. LAIAs of interest included aripiprazole monohydrate, aripiprazole lauroxil, olanzapine pamoate, paliperidone palmitate, risperidone microsphere, risperidone subcutaneous, haloperidol decanoate, and fluphenazine decanoate.

Patient information, including age at admission, date of birth, sex, and race, was collected. Hospital encounter information, including medical record number, admission and discharge dates, diagnoses, attending physician, and hospital unit at discharge was collected. Manual chart review was performed on all patients to capture concomitant psychotropic medications, dose and duration of oral antipsychotic overlap, loading dose regimen for LAIA, duration of LAIA therapy (up to 6-months post-discharge), and side effects.

RESULTS: Of the 6402 unique pediatric and adolescent patients discharged from an acute psychiatric hospital within the specified time frame, 45 patients (0.70%) were newly initiated on a LAIA. Monthly paliperidone palmitate was the most commonly prescribed LAIA (n=21), followed by aripiprazole monohydrate (n=15), aripiprazole lauroxil (n=7), haloperidol decanoate (n=1), and risperidone microsphere (n=1). The most common diagnoses for LAIA therapy included bipolar disorder (n=14), unspecified psychotic disorder (n=7), schizophrenia (n=5), schizoaffective disorder (n=5), and autistic disorder (n=5). Most patients (71%) received a loading dose or oral overlap regimen consistent with adult package-insert dosing.

CONCLUSIONS: Prescribing rates of LAIAs in pediatric and adolescent patients with psychiatric disorders remain low. The most prescribed LAIA in this patient population was paliperidone palmitate. Bipolar disorder was the most common indication for LAIA therapy. Further research is needed to determine LAIA efficacy, tolerability, and impact on clinical outcomes in this special patient population.

Christina Sun, PharmD

Christina is from Wexford, PA and received her PharmD from the University of Pittsburgh School of Pharmacy in 2022. She is one of the PGY1 pharmacy residents at UPMC Western Psychiatric Hospital. Her professional interests include psychiatry and pharmacogenomics. Christina will continue at UPMC Western Psychiatric Hospital next year to complete a PGY2 in psychiatric pharmacy.

Mentor(s): Hannah Goulding, PharmD, BCPP, Andreea Temelie, PharmD, BCPP, Christine Clark, PharmD, BCPP, Melanie Yabs, PharmD, MS, BCPP, Tanya Fabian, PharmD, PhD, BCPP

Novel Approach to Safe Medication Usage in Hospitalized Pediatric Patients with Renal Dysfunction

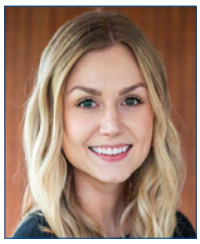
Crowley KL, Kibler A, Ordons KJ, Shenk J, Ditaranto HE, Fuhrman DY

PURPOSE: Prompt recognition of renal dysfunction in hospitalized pediatric patients can be challenging. Medication selection and dosing adjustments are necessary to maintain effective and appropriate drug exposure while minimizing toxicity and adverse effects. In August 2022, UPMC Children's Hospital of Pittsburgh (CHP) implemented a novel electronic medical record (EMR) renal function alert signaling providers and pharmacists when a patient's estimated glomerular filtration rate (eGFR) falls below 50 ml/min/1.73 m^2 at any point during the previous 96 hours. A CHP customized renal dosing guideline was created in conjunction with the EMR alert to provide immediate access to dosing recommendations, which was embedded into the EMR alert in March 2023. The purpose of this study is to assess the impact of implementing the renal function alert with dosing guideline tandem trigger tool.

METHODS: This single-center EMR review was approved by the UPMC QI Review Committee and included patients aged 1 – 17 years old who triggered the renal function alert at least once during hospital admission between August 2022 and April 2023. Data collected included patient demographics, diagnosis, renal laboratory values, medication profile and dosing as well as mode of renal replacement if utilized. Data analysis is descriptive. Outcome data includes whether renally-dosed medications were appropriate during the period of renal dysfunction based on the renal dosing guideline and documented pharmacist interventions.

RESULTS: In the testing phase, 108 patients had an eGFR < 50 ml/min/1.73 m^2 and 60 met inclusion criteria. Of those included, 25% had pre-existing renal comorbidities, 5% required hemodialysis, and 8.3% required continuous renal replacement therapy. Five patients had prior kidney transplants, and five received donor kidney transplants during admission. There were 96% of nephrotoxic medications and 80% of renally adjusted medications dosed correctly for renal function. Famotidine and cefepime were the most common dosing errors during renal dysfunction. Post implementation data to be presented.

CONCLUSION: In progress.



Erin Tamulonis, PharmD

Erin is from Youngstown, Ohio. She earned a bachelor's degree in chemistry from the University of Mount Union prior to earning her PharmD from Northeast Ohio Medical University in 2022. She is currently the PGY1 pharmacy resident at UPMC Children's Hospital of Pittsburgh. Her professional interests include medication safety, nephrology, and solid organ transplant. Following residency, Erin hopes to continue practicing in a pediatric clinical setting.

Mentor(s): Kelli Crowley, PharmD, BCPS, BCPPS; Alexandra Kibler, PharmD, BCPS, BCPPS; Kevin Ordons, PharmD, BCPS, BCCCP; Jennifer Shenk, PharmD, BCPPS; Dana Fuhrman, DO, MS; Ryan Rivosecchi, PharmD, BCCCP

Evaluation of Screening and Referral for Substance Use in a Psychiatric Emergency Setting

Thacker EP, Fabian TJ

PURPOSE: Emergency departments (EDs) are viewed as vital access points to the health care system, yet only recently has the ED been recognized as an opportunity to screen and refer patients to care for substance use disorders (SUDs). The purpose of this study is to evaluate the current level of screening and referral for SUD treatment that occurs in a psychiatric emergency setting within UPMC. In addition, we aim to determine patient characteristics such as age, gender, race, and comorbid conditions that impact screening and referral rates and identify potential barriers that need to be addressed to improve access to treatment for patients with SUDs.

METHODS: This retrospective chart review included patients aged 13+ who were seen and evaluated in a psychiatric emergency room during the calendar year 2022. Information collected included screening for SUD as evidenced by completion of relevant items in their ED assessment noting current or past drug/alcohol use. Additional data elements included patient demographics, chief complaint, discharge disposition, and dispensing of naloxone.

RESULTS: A total of 11,990 patients were evaluated during the study period. Of those, 29.8% of patients did not have their current or lifetime drug use documented during their ED encounter. Of the 70.2% of patients that did have their drug use history documented, 3,527 reported any history of drug use with 405 indicating current opioid use. The majority (82.5%, n=334) of current opioid users were admitted to the hospital or referred to outpatient treatment. A total of 79 patients received clonidine for ambulatory detoxification and 82 received a naloxone kit.

CONCLUSIONS: This study will help to inform policies and procedures regarding assessment of drug and alcohol use during psychiatric emergency department visits. The trends and barriers identified will serve as a guide for developing targeted interventions for ED staff which can facilitate increased screening and help connect those with SUD to appropriate treatment and resources.

Emily Thacker, PharmD

Emily Thacker, PharmD, is a PGY-2 Psychiatric Pharmacy Resident at UPMC Western Psychiatric Hospital in Pittsburgh, PA. She completed her PGY1 residency at the same site after graduating from West Virginia University School of Pharmacy in 2021. Emily's professional interests include substance use disorders, serious mental illness, and rural psychiatry. Following residency, Emily has accepted a clinical pharmacist position at UPMC Western Psychiatric Hospital where she will be working to expand addiction medicine services.

Mentor(s): Tanya Fabian, Pharm D, PhD, BCPP

Evaluation of Enoxaparin for Venous Thromboembolism Prophylaxis in Patients with Low Body Weight

Thompson T, Ordons B, Taylor A, D'Amico F

PURPOSE: Venous thromboembolism (VTE), including deep vein thrombosis (DVT) and pulmonary embolism (PE), is a potential complication in acutely ill hospitalized patients. It is estimated that VTE occurs in around 900,000 patients per year in the United States and has a mortality rate of up to 12%. There is little guidance on the appropriate dose of enoxaparin for VTE prophylaxis in acutely ill hospitalized patients with low body weight, as the existing literature in this population is minimal and inconclusive. There is concern for increased exposure to enoxaparin in low weight individuals when using non-weight adjusted prophylactic dosages of enoxaparin. This study aims to evaluate the safety and efficacy of reduced dose enoxaparin (30 mg subcutaneous [SC] daily) versus standard dose enoxaparin (40 mg SC daily) for VTE prophylaxis in hospitalized patients with low body weight.

METHODS: This is a multi-site, retrospective cohort study evaluating low weight patients (defined as ≤ 50 kg) 18 years or older that were hospitalized at one of two hospitals (a community hospital or a tertiary care level I trauma hospital) within a health system from January 1, 2020, to December 31, 2022. Patients had to receive enoxaparin for VTE prophylaxis and be admitted to a medicine or hospitalist service to be considered for inclusion. Patients were excluded if any of the following criteria were met: any surgical intervention; diagnosis of COVID-19; disruption in enoxaparin therapy for ≥ 24 hours; pregnancy; creatinine clearance (CrCl) < 30 mL/min; body mass index (BMI) of 40 or greater; interruption in enoxaparin therapy by switching to a different anticoagulant medication. The primary outcome is the incidence of major bleeding. The secondary outcome is the incidence of diagnosed VTE (PE and DVT).

RESULTS: Four hundred and forty-three patients were included in the study. Out of the 443 patients, 339 (77%) received enoxaparin 40 mg SC daily, while 104 (23%) received enoxaparin 30 mg SC daily. Five major bleeding events occurred, with 4 events in the 40 mg group (1.18%), and 1 event in the 30 mg group (0.96%). The rate of major bleeding was not significantly different (OR [95% CI] 1.23 [0.14-11.1]). No patients in either study group experienced a VTE.

CONCLUSIONS: Reduced dose enoxaparin (30 mg SC daily) compared to standard dose enoxaparin (40 mg SC daily) for VTE prophylaxis showed no statistically significant difference in major bleeding or VTE events. There was a minimal reduction in rate of major bleeding with enoxaparin 30 mg compared to enoxaparin 40 mg. Larger, prospective studies are required to further evaluate improved safety of the reduced dose of enoxaparin. Enoxaparin 30 mg SC daily is a safe and effective dose for VTE prophylaxis in acutely ill hospitalized patients weighing ≤ 50 kg.

Presented at the Society of Teachers of Family Medicine (STFM) 2023 Annual Spring Conference, Tampa, FL.

Taylor C. Thompson, PharmD, MBA

Taylor is a PGY-1 Pharmacy Resident at UPMC St. Margaret. She attended West Virginia University to complete a dual degree program, including a PharmD and MBA. She will continue her post-graduate training at St. Margaret as a PGY-2 in Ambulatory Care. Her career aspirations include clinical pharmacy and academia, with her main interests being family medicine, cardiology, and anticoagulation. Taylor hopes to attain a dual faculty position that involves both patient care and teaching at a school of pharmacy. Outside of medicine, Taylor enjoys exercising, traveling, trying coffee shops, and spending time with family and her dog, Ruby.

Mentor(s): Heather Sakely, PharmD, BCPS, BCGP

Opioid Prescribing Patterns in Opioid-Naïve Patients from Critical Illness through Transitions of Care at an Academic Medical Center

Tober RE, Groetzinger L, Roberts K, Lamberty P

PURPOSE: The Society of Critical Care Medicine (SCCM) guidelines recommend analgesia-first sedation strategies for critically ill patients in the intensive care unit (ICU). Opioids are a mainstay of therapy, yet there are unknown long-term effects of their use in this population. Opioids are known for their addictive potential and significant morbidity/mortality related to their inappropriate use. Opioids are a high-risk medication because of the potential for adverse events to occur when errors are made. Medication errors lead to unnecessary, increased healthcare utilization and harm to patients. Transitions of care are associated with medication errors, especially in patients with complex regimens; this can lead to inadvertent continuation/discontinuation or duplication of therapy. Improving the planning and coordination of transitions of care is key to reducing the burden of errors associated with these transitions. Characterizing prescribing practices of opioids in the ICU and at discharge is important for evaluating potential future interventions.

METHODS: Our study is a single-center, retrospective, observational evaluation of opioid-naïve adult patients admitted to an ICU between January and December 2021. Patients undergoing a surgical procedure other than tracheostomy or feeding tube placement will be excluded. Opioid-naivety is defined as patients who have not received opioids in the 30-days prior to hospital admission. The primary endpoint is the rate of opioid continuation at transitions of care from ICU to step-down, and step-down to discharge. Secondary endpoints include appropriateness of discharge opioid prescriptions and variables associated with opioid continuation. Appropriate continuation of opioid therapy is defined as documented opioid use within 24-hours prior to hospital discharge, indicating an ongoing need for pain management.

RESULTS AND CONCLUSIONS: Comprehensive results and conclusions will follow when analysis of the data is complete.

Ryan Tober, PharmD, MPH

Ryan is a first-year health-system pharmacy administrative resident at UPMC Presbyterian. He is from Malone, NY and graduated with his PharmD and MPH from the University at Buffalo in 2022. He currently has interests in clinical management, automation, and population-based health.

Mentor(s): Lara Groetzinger, PharmD, BCCCP and Katherine Roberts, PharmD, BCCCP

Impact of Rabbit Antithymocyte Globulin (rATG) on Chronic Lung Allograft Dysfunction (CLAD)

Uwechia UI, Moore C, Iasella C, Sacha L

PURPOSE: Chronic lung allograft dysfunction (CLAD) is the major limiting factor for allograft longevity after lung transplantation. By 5 years post-transplant, roughly 50% of lung transplant recipients develop chronic lung allograft dysfunction (CLAD) leading to graft failure and/or death. Current treatment options are limited, and the majority are based on low quality evidence. One of those treatment options is rabbit antithymocyte globulin (rATG), a T-lymphocyte depleting agent. At University of Pittsburgh Medical Center (UPMC) Presbyterian Hospital, rATG is sometimes employed in the treatment of progressive CLAD. The goal of this retrospective study is to determine if rATG provides lung function stabilization or improvement for those diagnosed with CLAD after lung transplantation.

METHODS: A retrospective review of adult lung transplant patients treated with rATG for diagnosed CLAD at UPMC Presbyterian Hospital between January 1st, 2010, and November 30th, 2021. The primary endpoint was change in forced expiratory volume in one second (FEV1) at 3 months, 6 months, and 12 months after treatment. Secondary endpoints include bacterial, fungal, or viral culture or PCR positivity between 7 and 180 days after treatment, as well as death by 1 year after treatment.

RESULTS: A total of 45 patients were evaluated. Of that, the population was 23/45 (51%) male, 38/45 (84%) white, and the median age of 54 years old. 8/45 (17.7%) patients received up to 4 doses of rATG, 37/45 (82.3%) received at least 5 doses. 27/45 (60%) of patients had a positive culture or PCR within 6 months after treatment. 13/45 (28.8%) of patients died at or before 1 year after treatment. The primary outcome is still in progress.

CONCLUSION: In progress

Uzoamaka Uwechia, PharmD

Uzoamaka is from Long Island, New York, but received her PharmD from Howard University College of Pharmacy in Washington, D.C. After receiving her degree, she returned to New York to complete her PGY-1 residency at Montefiore Medical Center in the Bronx. She is currently pursuing a specialty in transplant pharmacy as the PGY-2 Solid Organ Transplant Resident at UPMC Presbyterian. Her areas of interest include transplant infectious diseases and chronic allograft rejection.

Mentor(s): Cody Moore, PharmD, MPH, BCTXP, BCPS; Carlo Iasella, PharmD, MPH, BCTXP, BCPS; Lauren Sacha, PharmD, BCTXP, BCPS

Impact of a Clinical Pharmacist Driven Admission Drug Regimen Review in the Skilled Nursing Facility

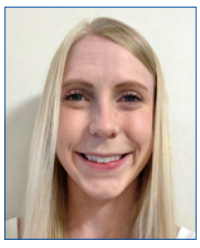
Vecera C., Bruno M., Aspinall M., Ruby, CM.

PURPOSE: Patients who are discharged from the hospital to the Skilled Nursing Facility (SNF) often have complex medication regimens. During transition of care (TOC), medication discrepancies can occur. These discrepancies can range from medication errors to inappropriate dosing and may result in harm to the SNF resident. Admission drug regimen reviews (ADRR) are thorough medication evaluations completed upon admission to the SNF. ADRRs are required by the Center for Medicare and Medicaid Services (CMS), but currently, CMS does not define a specific healthcare professional that must complete them. Historically, RxPartners Pharmacy's clinical pharmacists have provided this service to the UPMC Senior Communities' SNFs. The primary objective of this study was to demonstrate the impact clinical pharmacists have performing the admission drug regimen review. Recommendations on high-risk medications were also described.

METHODS: This study included residents admitted to six UPMC Senior Communities' SNFs in Pittsburgh between June 1st, 2022- August 31st, 2022. A retrospective review classified the ADRR recommendations into further categories including significant or non-significant recommendations, medication-related problems, medication interventions, type of medications involved, and number of recommendations involving clinical knowledge. The primary endpoint was the total number of clinically significant recommendations. We defined clinically significant recommendations as those involving high risk medications (e.g., anticoagulants, antiplatelets, antipsychotics, antimicrobials, insulins, and opioids) and/or required immediate attention due to risk of harm to the resident. Secondary endpoints included the total number of recommendations accepted by the provider and the 30-day hospital readmission rate. This project was approved by the UPMC QI Committee.

RESULTS: Pharmacists made 939 recommendations on 588 admissions, averaging 1.6 recommendation per admission. Of those recommendations, 258 (27%) were determined to be clinically significant and 229 (24%) of the total recommendations involved a high-risk medication. The most frequent types of clinically significant recommendations were omitted medications (58%), stop dates (19%) and improper medication selections (14%). The most common high-risk medication recommendations involved 71 (7%) anticoagulants, 48 (5%) antipsychotics, and 43 (4%) antimicrobials. Seventy-four percent of the recommendations involving high-risk medications were accepted by the provider. There was a total of 192 residents who had a 30-day hospital readmission.

CONCLUSIONS: Clinical pharmacists play an important role during transitions of care in the SNF setting. Pharmacists utilize their extensive knowledge of medications and medication regimens to bring added value to transitions of care beyond comparing medication lists. This added value includes identifying high-risk medications, reducing potential adverse events, and reducing harm to the resident. This was exemplified by the data gathered in this study which showed a quarter of recommendations involved high-risk medications and were categorized as significant. This ultimately could prevent the readmission of patients to the hospital and eliminate unnecessary medication costs.



Camryn Vecera, PharmD

Camryn Vecera is originally from Plano, Texas and attended Duquesne University School of Pharmacy where she received her PharmD. She completed a community-based PGY-1 pharmacy residency with UH Meds in Cleveland, OH and is now the PGY-2 geriatric pharmacy resident with UPMC Presbyterian/Shadyside. After residency, Camryn plans to stay on as a geriatric pharmacist with Rx Partners Pharmacy.

Mentor(s): Matthew Bruno, PharmD, Monica Aspinall, PharmD, BCGP, and Christine Ruby-Scelsi, PharmD, BCPS, BCGP, FASCP.

Evaluation of Medication Reconciliation Practices of Healthcare Providers in Primary Care Clinics

Jason Walker, Deanne Hall, Trisha Miller, Kim Coley, Madeline Allen, Akshaya Sudhakar

PURPOSE: Standardization of medication reconciliation practices have been identified as a key aspect of patient safety and have been encouraged by multiple national organization including the National Institute for Health and Care Excellence. Though these recommendations exist, UPMC primary care clinic have not established standardized medication reconciliation practices. Additionally, the use of two separate electronic medical record keeping systems between UPMC's inpatient and outpatient settings presents additional barriers to accurate patient medication lists.

METHODS: This qualitative research study was performed in western Pennsylvania at three primary care focused ambulatory care clinics within a single large healthcare system. Virtual interviews were conducted with a variety of healthcare workers involved in medication reconciliation using a semi-structured interview approach. Interview questions were developed to identify processes for medication reconciliation services including how information is collected, verified, and documented. The interview questionnaire was framed from the Institute of Healthcare Improvement guide for medication reconciliation based on 3 main steps in appropriate reconciliation: verification, clarification, and reconciliation. A codebook was developed and two investigators coded each transcript independently. Coding discrepancies were resolved through discussion. A thematic analysis conducted by the investigative team is ongoing with a solution-based approach to all proposed barriers

RESULTS: A total of 11 interviews were conducted with eligible participants consisting of providers (n=4), pharmacists (n=4), nurses (n=2), and a medical assistant (n=1). Interviews lasted approximately 15-25 minutes and were audio-recorded and transcribed. Seven identified preliminary barriers to effective medication reconciliation include time, pharmacy staff availability, difference between inpatient and outpatient electronic medical record use, poor job execution, poor patient recall, and poor communication between patient providers

CONCLUSIONS: Pending

Jason Walker, PharmD

Jason is from Northern Utah and earned his PharmD from Roseman University. He completed his PGY1 Clinical Pharmacy Residency with the Cleveland Clinic prior to coming to UPMC to pursue a PGY2 in Ambulatory Care. His areas of professional interest include internal medicine, cardiology, and LGBTQ+ care. Following residency, Jason hopes to have a career in academia and primary care in the ambulatory setting.

Mentor(s): Deanne Hall, PharmD, CDCES, BCACP; Trisha Miller, PharmD, MPH, BCACP; Kim Coley, PharmD, FCCP

Analysis of Neurotoxicity Associated with Lorlatinib Use in Non-Small Cell Lung Cancer Patients

Werner TS, Brenner TL, Burns TF, Huang Z, Bastacky ML

PURPOSE: Lorlatinib is a third-generation tyrosine kinase inhibitor (TKI) with activity in *ALK* and *ROS1* positive non-small cell lung cancer (NSCLC) in the treatment naïve and TKI-resistant settings. Lorlatinib carries a risk of neurologic and psychiatric adverse events (AEs) ranging from peripheral neuropathy to cognitive dysfunction or mood effects. In clinical trials, neurologic and psychiatric AEs occurred in 15-35% of patients. Events were primarily noted to be mild to moderate in severity and typically resolved with dose reductions and/or supportive care. The frequency and severity of these neurologic AEs outside of clinical trials has not been reported. Anecdotal experience at our institution suggests that these neurologic and psychiatric AEs make it challenging for patients to tolerate lorlatinib. We sought to evaluate the characteristics of lorlatinib-associated neurologic and psychiatric AEs in patients with *ALK* or *ROS1* positive NSCLC and to identify predisposing factors for the development of these events.

METHODS: 33 patients were identified using prescription records generated by electronic medical records. 28 patients with advanced *ALK* or *ROS1* positive NSCLC who received >1 dose of lorlatinib monotherapy between August 1, 2016 and October 1, 2022 were included. The primary objective was to characterize the neurologic and psychiatric AEs associated with lorlatinib use at UPMC Hillman Cancer Centers. Secondary objectives were to identify patient-specific and disease-specific factors that predispose patients to lorlatinib neurologic and psychiatric AEs and to evaluate the impact of neurologic and psychiatric AEs on time to progression of disease. Data collection included patient demographics, cancer treatments, comorbidities, concomitant medications, timing, and grading of AEs. Timing of lorlatinib dose adjustments, holds, and discontinuation were also collected. AEs were characterized and graded according to Common Terminology Criteria for Adverse Events (CTCAE) Version 5.0. Descriptive statistics were used to analyze the study population. Comparisons were made with non-parametric statistical tests.

RESULTS: Of the 28 patients included, 18 patients (64.3%) experienced at least one neurologic or psychiatric AE and 8 patients (28.6%) required a dose adjustment. The median time to dose adjustment was 46.5 days. All neurologic and psychiatric AEs were mild to moderate in severity (grade 1-2) and commonly occurred within the first month of treatment with lorlatinib. A preexisting psychiatric comorbidity was associated with an increased risk of neurologic or psychiatric AEs. Patients who experienced neurologic or psychiatric AEs appeared to have progression of disease later than those who did not experience AEs, although this difference was not statistically significant.

CONCLUSIONS: This is the first real-world characterization of neurologic and psychiatric AEs with lorlatinib. Compared to lorlatinib clinical trials, the incidence of neurologic and psychiatric AEs was much higher in this single center, retrospective, real-world analysis (15-35% vs 64.3%). Given the early occurrence of neurologic and psychiatric AEs observed in our study, patients on lorlatinib may derive benefit from closer monitoring within the first month of treatment. Additional studies with larger sample size are necessary to further identify patient-specific and disease-specific factors that predispose patients to neurologic and psychiatric AEs.

Presented At: Hematology/Oncology Pharmacy Association 19th Annual Conference, Phoenix, AZ, March 29-April 1, 2023

Taylor Werner, PharmD

Taylor Werner is the PGY2 oncology pharmacy resident at UPMC Shadyside Hospital. She received her Doctor of Pharmacy from University of North Carolina Chapel Hill and completed her PGY1 pharmacy residency at UPMC Presbyterian. After finishing residency, Taylor will join Atrium Health Levine Cancer Institute in North Carolina as a clinical oncology pharmacist.

Mentor(s): Melissa L. Bastacky, PharmD, BCOP; Timothy L Brenner, PharmD, BCOP; Timothy F Burns, MD, PhD

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

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Pharmacy at UPMC St. Margaret
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Pharmacy Residency Program

PGY1/PGY2 Health-System Pharmacy Administration and Leadership

UPMC Presbyterian Shadyside
Director: Alfred A. L'Altrelli, PharmD

Post Graduate Year 2 (PGY2)

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

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

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

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Director: Roberta M. Farrah PharmD, BCPS, BCACP

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Geriatrics at UPMC St. Margaret
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Oncology at UPMC Cancer Centers
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