

Resident Research 2021-22



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School of Pharmacy

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in education of pharmacists and pharmaceutical scientists,
in research and scholarship,
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We foster a dynamic, diverse, and inclusive learning and work environment
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to assure that PittPharmacy is a destination for those who seek to be
leaders and innovators.

VALUES

Integrity guides our daily work. We foster:
Passion, commitment, and diligence;
Creativity and personal growth;
Collaboration and teamwork;
A culture of respect for the individual.

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MESSAGE FROM THE DEAN



Patricia D. Kroboth, PhD

Dear members of the residency Class of 2022,

Congratulations! Each and every one of you has distinguished yourself among pharmacy practitioners by completing one of the country's finest and largest residency programs. What an intensive year you have had—gaining practice expertise and mastering elements of both teaching and research.

As residents, you have enjoyed the best that the academic and practice worlds have to offer through the collaborations between the University of Pittsburgh School of Pharmacy and each of its partners—UPMC Children's Hospital of Pittsburgh; UPMC Magee-Womens Hospital; UPMC McKeesport; UPMC Mercy; UPMC Presbyterian; UPMC Shadyside; UPMC St. Margaret; UPMC Western Psychiatric Hospital; UPMC Health Plan; Chartwell Pennsylvania, LP; Rx Partners, Inc.; Rite Aid Corp.; Giant Eagle, Inc.; and CVS Caremark.

You also have three other distinctions. First, you committed to learning and demonstrating clinical research skills, which will serve you well during your career as you are faced again and again with clinically important questions. These skills created a foundation on which to build answers and to become tomorrow's leaders. Second, you have shown that you are pioneers in what we hope is a once-in-a-century pandemic as student pharmacists and residents. And, finally, you have all just become alumni of our residency program and will forever be part of our community. It is my sincere hope that you carry with you fond memories of the rich experiences of the past year and a network of colleagues and friends as you launch the next phase of your career. There has never been a better time for pharmacy.

Congratulations, good luck, and keep in touch! Let the Pitt residents roar!

Patricia D. Kroboth, PhD
Dean and Dr. Gordon J. Vanscoy Distinguished Service Professor
University of Pittsburgh School of Pharmacy

VALUING OUR PARTNERS

The University Pittsburgh School of Pharmacy values our partnerships with UPMC, UPMC Health Plan, Rx Partners, Chartwell Pennsylvania, Rite Aid, Giant Eagle, Asti's 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.

Rite Aid Corporation is one of the nation's leading drugstore chains with nearly 2,500 stores in 17 states with a strong presence on both the East Coast and West Coast, and 51,000 associates.

Giant Eagle Pharmacy is a leading regional pharmacy with more than 400 Giant Eagle locations across five states with more than 32,000 team members. Giant Eagle Pharmacy offers comprehensive services including, worksite and in-store immunizations, Specialty Pharmacy offerings, Rx delivery, blood pressure tracking, contact lenses, long-term care pharmacy, pet medications, and more.

Asti's South Hills Pharmacy, located in Pittsburgh, PA, is an innovative community pharmacy providing excellent patient care in a family atmosphere. Services include comprehensive medication and chronic care management, extensive immunization services, compounding, HIV specialty care, disease state education programs, medication synchronization and specialty packaging as well as traditional dispensing services.

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, and Pharmacy Administration 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, immunology, and anticoagulation. Projects also included application of pharmacogenomics; strategies to reduce adverse events; improving medication utilization; and opportunities for cost saving strategies. In addition, there were several assessments of opportunities in pharmacy practice for enhancing services.

The Residency Research 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, Joni Carroll, Allison Dittmer, Breana Goscicki, Amy Grimes, Tanya Fabian, Pam McCormick, Cody Moore, Ryan Rivosecchi, Melissa Saul, Jennifer Shenk and Anne Taylor.

The efforts of the program directors and research mentors are greatly appreciated. Amy Seybert, chair of the Department of Pharmacy and Therapeutics and Alfred L'Altrelle, Senior Director of Pharmacy Operations, UPMC Presbyterian Shadyside Hospital, must also be recognized for their dedication to the program. We greatly appreciate the continued support of Dean Patricia D. Kroboth. We would be remiss not to mention the administrative support of Metanthi Tzanakos, Matthew Freidhoff and Sherri Peterson. Most importantly, this program is successful because of the commitment of our outstanding residents.

RESIDENT BOOKLET ABSTRACT

Evaluation of Antipsychotics Use for Agitation Management in Geriatric Patients

Ali-Syed LS, Miller TJ, McCormick P

Purpose: Management of agitation in geriatric patients varies among providers. However, inappropriate management of agitation can lead to poor outcomes and adverse effects in the geriatric population. The Emergency Department (ED) at UPMC Mercy has a protocol to guide practitioners on effective ways to manage agitation in patients 65 years of age and older. The ED protocol outlines the escalation of oral to parenteral use of antipsychotics to treat agitation, utilizing benzodiazepines as a last line measure. The purpose of this evaluation is to describe the prescribing patterns of antipsychotics in agitation within the geriatric population in the inpatient setting, and to assess how similar these patterns are to the established ED protocol.

Methods: This was a retrospective chart review of patients age 65 years or older admitted to UPCM Mercy. Patients were included if they received oral olanzapine or risperidone, or if they received intramuscular or intravenous olanzapine, haloperidol, lorazepam, or midazolam. Only medication administrations on the general medical floors were assessed. Patients were excluded if the medication was reconciled from the patient's home medications or was part of the comfort measures only order set. The primary outcome was percentage of prescribing that is consistent with ED policy. Descriptive statistics were used to evaluate the prescribing patterns in 130 patients.

Results: The mean age of the patients assessed was 81.6 years of age and 41.5% of patients were female. The appropriate escalation of oral to parenteral medication occurred in 27% of the population. Parenteral medication was used as first line treatment in 69.1% of patients with 21.5% of patients receiving a benzodiazepine as first line treatment. A fall during the inpatient stay was noted in 5.3% of the population and benzodiazepine use was observed in 2 of these instances.

Conclusion: Based on this review, parenteral medications are given first line for the management of agitation in geriatric patients. Management of agitation on the general medicine floors are not consistent with the ED protocol for agitation management. There is a large use of benzodiazepines as first line agitation management which does not align with the ED protocol. Further education of management of agitation in the geriatric population could help to standardize a practice among the providers on the general medicine floors.



Lalah Ali-Syed, PharmD

Lalah is a PGY-1 Pharmacy Resident at UPMC Mercy Hospital. She is from Pittsburgh, Pennsylvania, and received her PharmD from Duquesne University in 2020. Her professional areas of interest include medication safety and population health.

Mentors: Taylor J. Miller, PharmD and Pamela McCormick, PharmD, BCPS

Evaluation of Barriers and Thoughts Regarding Vaccinations in a Free Clinic

Balakrishna Sharma V, Likar N, Sugiura Y

Purpose: Vaccination rates in marginalized populations remain low due to a variety of reasons such as misinformation, racial and ethnic disparities, and barriers to healthcare access. The population in McKeesport, PA has limited access to other free clinics in the Pittsburgh, primarily due to distance. The 9th Street Clinic, a free clinic for uninsured adults, utilizes a multidisciplinary team of volunteers to provide medical and pharmacy services. Providers at the clinic attempt to treat chronic conditions and capture health maintenance even during acute visits given the transient population. The objectives of this project are to (1) gain perspective on vaccine hesitancy and (2) to evaluate barriers that patients face in obtaining vaccinations.

Methods: This single-site, descriptive, quality improvement project utilizing survey research was implemented at the 9th Street Clinic for a total of 8 weeks (1/20/22 - 3/20/22) in adult patients. Surveys were self-administered in paper form. Survey questions assessed vaccine hesitancy, misconceptions about vaccines, barriers to receiving immunizations, and trust in health care professionals. Patients were also asked if they would like to receive education about vaccines and if they stated 'yes,' the pharmacist would provide information and resources to them. This project was approved by the UPMC Quality Improvement Review Committee.

Results: A total of 118 patients were seen at the clinic during the study period. Of those seen, 90 patients participated in the study and a total of 48 surveys were returned (53.3%). Findings of the returned surveys include: 76% indicated awareness that vaccination is important; 25.5% expressed concern that vaccines were not safe; 42.6% stated that possible side effects made them uneasy; 55.6% of patients conveyed that they would be very likely to get a vaccine if available at that moment; 8.9% opted to receive further information and resources about vaccines.

Conclusions: Based on current results, most patients are aware of the benefits of vaccination and would be amenable to receiving immunizations. Next steps of our project are to encourage providers at the 9th Street Clinic to intervene on patients who are overdue for immunizations and to continue researching cost-effective resources to ensure our patients are fully vaccinated.



Vidya Balakrishna Sharma, PharmD

Vidya is from Hershey, Pennsylvania, and received her PharmD from the University of Pittsburgh. She is currently completing a PGY-1 residency at UPMC McKeesport. Upon completion, Vidya intends to pursue a career as an inpatient clinical pharmacist.

Mentors: Nicole Likar, PharmD, BCPS; Yui Sugiura, DO, MPH

Accepted for presentation at the 2022 Annual STFM (Society of Teachers of Family Medicine) Conference

Characterization of Sodium Glucose Cotransporter-2 (SGLT2) Inhibitor use in an Outpatient Geriatric Primary Care Practice

Beathard W, Sakely H

Purpose: Type 2 diabetes mellitus (DM) is a significant risk factor for both heart failure (HF) and chronic kidney disease. In recent years, utility of sodium-glucose cotransporter 2 inhibitors (SGLT2i) has expanded far past the singular indication for DM. Emergence of cardiorenal benefit suggested in clinical trials assessing the benefit of these agents in DM led to study for additional indications. Subsequent trials have demonstrated benefit in both HF and chronic kidney disease (CKD) for select SGLT2i. While indications exclusive of DM have been established, prescribing practice often does not reflect this. This project will describe how geriatric clinical pharmacists impact physician confidence in prescribing SGLT2is for novel indications through education and quantify this change with patient level interventions.

Methods: This was a multiple site, retrospective chart review performed on Geriatric Care Center outpatients older than 60 years of age who had diagnoses of heart failure with reduced (HFrEF) or preserved (HFpEF) ejection fraction, or CKD between August 2018 and August 2021. Patients were included based on inclusion criteria abstracted from the primary literature. Patient level data was obtained by electronic health record data (EHR) request and was incorporated into a pharmacist-led educational intervention supplemented with a pre/post-educational survey. The primary outcome of this study will characterize use and measure pharmacist impact on practice-level prescribing of SGLT2i for HF and CKD through individualized patient care interventions. The secondary outcome of this study was to identify changes in geriatric care center physician confidence, perception of increased medical knowledge, and prescribing habits related to SGLT2i as evidenced by thematic analysis.

Results: A total of 180 patients were evaluated for SGLT2i eligibility; the indication of CKD predominated (69%), followed by HFpEF (36%) and HFrEF (24%). Of patients not already prescribed an SGLT2i, 23% are candidates for use with 50% of eligible patients meeting criteria for HFpEF. A subset of patients with both CKD and heart failure with any ejection fraction tended to favor eligibility. Five providers completed the pre- and post- education survey. Medical knowledge, confidence, and prescribing comfort increased from slightly confident to moderately confident, an increase of 2 on the Likert Scale. Common barriers for use included cost and adverse effects.

Conclusions: SGLT2i are currently underutilized in the outpatient geriatric setting most commonly in patients with HFpEF likely due to the novelty of the supporting literature. CKD predominated the compelling indications however patients often did not meet criteria for use per trial design. Patients with both CKD and HFpEF were more likely to meet criteria. Other limitations to SGLT2i candidacy include patients who would likely not clinically benefit including those of more advanced age or with preclusive goals of care. Pharmacist education shifted provider confidence with SGLT2i. Future directions include providing clinically applicable recommendations for SGLT2i initiation based on results.



William A Beathard, PharmD, BCPS

William is a PGY2 geriatric pharmacy resident and faculty development fellow at UPMC St. Margaret. He received his Doctor of Pharmacy degree from Texas Tech University in 2020, and he completed his PGY1 residency training at UPMC St. Margaret, as well. After completion of his PGY2 residency, he plans to work as a primary care clinical pharmacist.

Mentor: Heather Sakely, PharmD, BCPS, BCGP

Presented at the American Geriatrics Society 2022 Annual Scientific Meeting, Orlando, Florida, May 12-14, 2022

Efficacy and Safety of Tenecteplase Compared with Alteplase for the Treatment of Acute Ischemic Stroke

Bornstein A, Ankney E, McCormick P, Gionfriddo M

Purpose: Currently, alteplase is the only FDA-approved thrombolytic for the treatment of ischemic stroke, whereas tenecteplase is considered off-label. The use of tenecteplase has several advantages over alteplase such as lower cost, faster administration time, and ease of dosing. For the treatment of stroke, tenecteplase has been evaluated at doses of 0.25 mg/kg or 0.4 mg/kg bolus (maximum of 25 mg or 40 mg, respectively), whereas alteplase is dosed as a 0.09 mg/kg bolus (maximum of 9 mg) with a continuous infusion of 0.81 mg/kg (maximum of 81 mg) over 60 minutes. UPMC recently transitioned from alteplase to tenecteplase as the thrombolytic of choice for ischemic stroke treatment. Emerging data supports the use of tenecteplase for this indication but data comparing it to alteplase is limited. This study aims to compare the safety and efficacy of tenecteplase 0.25 mg/kg versus standard dose alteplase for the treatment of ischemic stroke within UPMC.

Methods: A retrospective chart review was conducted between 9/24/2020 and 9/24/2021 for patients with an acute ischemic stroke treated with tenecteplase or alteplase in the emergency department (ED) of UPMC Mercy and UPMC Hamot. Patients included in this study were 18 years or older, with a National Institutes of Health Stroke Scale (NIHSS) score of at least 1, and presented within 4.5 hours of symptom onset. Patients without a final ischemic stroke diagnosis were excluded. Data collection included patient demographics, time of ED arrival, last known well, time to drug administration, NIHSS at baseline, 90, 180, 270, and 360 minutes, and 24 hours post-thrombolytic, and adverse events during the hospitalization. The primary efficacy outcome was median improvement in NIHSS score from baseline to 24 hours post-administration of tenecteplase or alteplase. Primary safety outcomes included mortality, intracerebral hemorrhage (ICH), symptomatic ICH, parenchymal hematoma, extracranial hemorrhage, and angioedema.

Results: Of 141 patients screened, 93 were included for retrospective chart review (52 tenecteplase, 41 alteplase). There were no significant differences in baseline characteristics between groups. Median improvement in NIHSS score from baseline to 24 hours post-thrombolytic was 3 for tenecteplase and 1 for alteplase ($P=0.10$). Median time from ED presentation to administration of tenecteplase or alteplase was 28 versus 39 minutes, respectively ($P=0.0008$). There were 7 deaths (1 tenecteplase; 6 alteplase), 9 ICH (2 tenecteplase, 7 alteplase), 3 parenchymal hematomas (alteplase), 2 extracranial hemorrhages (tenecteplase), 2 in each group with symptomatic ICH, and 1 in each group with angioedema.

Conclusions: There was no difference in median change in NIHSS score from baseline to 24 hours post-thrombolytic between the alteplase group and the tenecteplase group. Median time from ED arrival to thrombolysis was significantly shorter for tenecteplase and there was no difference in significant adverse effects, when compared to alteplase. Results from this study aid in support for the use of tenecteplase for acute ischemic stroke treatment within UPMC, despite its current off-label use.



Abigail Bornstein, PharmD

Abigail is from Syracuse, New York, and received her BS from the University of Pittsburgh prior to completing her PharmD from St. John Fisher College Wegmans School of Pharmacy in 2021. She is currently completing her PGY-1 pharmacy residency at UPMC Mercy. Her professional interests include critical care, cardiology, and emergency medicine. Upon completion of her residency, Abigail plans to pursue a clinical pharmacist role within the hospital setting.

Mentors: Emily Ankney, BCCCP, PharmD; Pamela McCormick, BCPS, PharmD; Taylor Miller, PharmD; Michael Gionfriddo, PhD, PharmD

Utility of Olive Oil-based Lipid Emulsion as an Alternative Fatty Acid Source in Home Parenteral Nutrition Patients

Burkhalter J, Bezjak J, Tokarski R, Szabo K, Benedict D

Purpose: Lipids are a critical source of calories and key in preventing essential fatty acid deficiency in patients unable to attain caloric needs via the enteral route. The high omega-6 content of soybean oil, the most common type of lipid emulsion for parenteral nutrition, makes this lipid source pro-inflammatory in nature. Patients receiving soybean-only products are subject to complications related to liver dysfunction and elevated triglycerides and potentially immune dysfunction. This study aimed to determine the impact of inflammatory-neutral olive oil lipid emulsion combination product on stability of hepatic and immune system function, with the intent to guide future use of olive oil-based products in patients receiving parenteral nutrition in the home infusion setting.

Methods: This prospective, multisite, observational study was submitted to the company compliance officer for approval. Included patients were adult patients receiving combination olive-oil and soybean oil lipid emulsion (OO-ILE) for at least 90 days, beginning therapy between August and November 2022. Patients were subdivided into two groups: the first included those transitioned from soybean-oil lipid emulsion (SO-ILE) to OO-ILE, while the latter consisted of patients starting on OO-ILE without known prior SO-ILE use. For patients previously administered SO-ILE, AST, ALT, alkaline phosphatase, bilirubin, triglycerides, and white blood cell counts were collected from most recent available laboratory data. The same values were recorded 90-120 days following OO-ILE initiation and compared via the Wilcoxon Signed Rank Sum Test. Any instances of hospital admission were also documented.

Results: No significant differences were observed in AST, ALT, alkaline phosphatase, total bilirubin, triglycerides or WBCs ($p > 0.05$ in all values evaluated) in the patients compared. The six lipid-naïve patients had similar lab profiles to those seen in patients previously on SO-ILE. Thirty three percent of patients were hospitalized, with a total of 21 hospitalization events. Causes of hospitalization included infection, gastrointestinal complications, hematologic abnormalities, renal dysfunction, or unknown or multifactorial causes.

Conclusions: Given that no significant differences were seen among endpoints evaluated and hospitalization rates were similar, OO-ILE and SO-ILE may have comparable safety profiles. In instances of drug shortages, these products may be interchanged to ensure consistent patient care.



Jake Burkhalter, PharmD

Jake received his PharmD from University of Houston. He is currently the PGY-1 resident at Chartwell Pennsylvania, LP. His professional interests include infectious diseases, nutrition support, oncology, and precepting. On completion of his PGY-1, he plans to pursue a position as a home-infusion pharmacist.

Mentor: Johanna Bezjak, PharmD, BCNSP

Presented at the American Society of Health-System Pharmacists Midyear Clinical Meeting 2021 and the National Home Infusion Association Annual Conference 2022

Utilization of Bayesian Population Pharmacokinetics/Pharmacodynamics and Electroencephalography to Predict Cefepime Neurotoxicity

Campagna ML, Rivosecchi RM, Palka S, Durkin J, McGinnis C, Pientka A, Thorngren C, Shutter L, Shields RK, Smith BJ

Purpose: Cefepime (FEP) is a pillar in the antimicrobial armamentarium which has demonstrated a favorable safety profile. However, similar to other B-lactams, FEP exhibits a dose-dependent risk of neurotoxicity (NT), which has been attributed to its ability to cross the blood-brain-barrier and exhibit concentration-dependent γ -aminobutyric acid (GABA) antagonism. Neurotoxic symptoms can present as depressed consciousness, encephalopathy, myoclonus, seizures, nonconvulsive status epilepticus or coma. Prior studies have found that serum trough concentrations (C_{min}) > 20 mg/L correlate with increased risk of neurotoxicity. In 2019, our institution transitioned from standard 30-minute infusion times to prolonged infusions over 3 hours to optimize FEP pharmacokinetics. B-lactam therapeutic drug monitoring (TDM) is not routinely employed in the United States. Our study aims to correlate the electroencephalography (EEG) diagnosis of NT with FEP exposures based on a previously published Bayesian population pharmacokinetic/pharmacodynamic (PK/PD) model.

Methods: We performed retrospective, single center, post-hoc TDM modeling for patients receiving FEP and either continuous or spot EEGs. Patients were grouped into either 'Pre' (bolus infusion over 30 minutes) or 'Post' (prolonged 3 hour infusion) groups based on the timeframe of their cefepime administration. EEG recordings were independently reviewed by our neurologist team to classify FEP NT on a continuum: definite, probable, possible, or unlikely. Patient demographics, serum creatinine values, and FEP dosing information was used to generate our expected Bayesian PK/PD exposures (Delattre et al. Clin Biochem 2012). The model was used to predict FEP peak (C_{max}), trough (C_{min}) and exposure (AUC₂₄) at the time of EEG. Multiple EEG readings were assessed separately, and continuous EEGs were assessed in 24-hour increments. Exposures were compared between the 'Pre' and 'Post' groups with and without neurotoxicity, respectively.

Results: 147 patients (57 pre, 90 post) were reviewed by our neurology team for EEG evidence of NT. We anticipate complete PK/PD modeling of those patients receiving ≥ 2 doses of cefepime and not undergoing renal replacement therapy. We further anticipate comparing the exposures between the four groups: Pre-No NT, Pre-Yes NT, Post-No NT, Post-Yes NT. Additionally, we will compare the rates of NT in those with and without renal impairment ($CrCl < 60$ mL/min).

Conclusions: Upon completion of our final analysis, we aim to evaluate the role of Bayesian population PK/PD modeling to identify patients at high risk of developing FEP NT as measured objectively by EEG.



Marissa L. Campagna, PharmD

Marissa is the PGY-2 critical care pharmacy resident at UPMC Presbyterian. She earned her Doctor of Pharmacy degree from the University of Pittsburgh School of Pharmacy and completed her PGY-1 pharmacy residency at UPMC Mercy. Her professional interests currently include emergency medicine, trauma, and clinical research. After completion of her PGY-2 residency training, she will be joining the critical care pharmacy team at Northwestern Memorial Hospital in Chicago, Illinois, and pursuing board certification.

Mentors: Ryan M. Rivosecchi, PharmD, BCCCP, Brandon J. Smith, MD, PharmD

Presented at the 24th Annual Making a Difference in Infectious Diseases (MAD-ID) Meeting, Orlando, Florida, May 18-21, 2022

Utilization Trends of Top Drug Classes Throughout the COVID-19 Pandemic

Cole E, Jose A, Hospodar A, Hobaugh C, Bartley J

Purpose: To identify utilization trends of top drug classes throughout the COVID-19 pandemic.

Methods: A retrospective, claims-based, observational analysis was completed on utilization trends of select drug classes throughout the COVID-19 pandemic. The drug classes evaluated were identified as the top five drug classes utilized based on days supply per member per month (PMPM) from the first quarter of 2019. These drug classes include antidepressants, antihypertensives, antihyperlipidemics, antidiabetics, and contraceptives. Pharmacy claims data was analyzed from January 1st to December 31st, year-over-year (YoY) and quarter-over-quarter (QoQ) for years 2019, 2020, and 2021. The primary outcome of the study assessed the percent change in utilization trend for each of the five drug classes YoY. Secondary outcomes assessed the percent change in utilization trend for each of the five drug classes QoQ based on days supply PMPM and adherence measured by average proportion of days covered (PDC) YoY for four of the top five drug classes (antidepressants, antihypertensives, antihyperlipidemics, and antidiabetics) for the same time period.

Results: Days supply PMPM increased for antidepressants (+14.2%), antihyperlipidemics (+8.0%), and antidiabetics (+9.6%) from 2019 to 2021. Contraceptive utilization declined (-6.1%). All drug classes analyzed had a negative percent change in utilization from Q1 to Q2 2020 and Q4 2020 to Q1 2021. All drug classes had a positive percent change between Q2 and Q3 2020. From 2019 to 2020, average PDC increased for the four drug classes analyzed. From 2020 to 2021, average PDC remained static for the four drug classes analyzed. All average PDC results were $\geq 80\%$, suggesting appropriate adherence for these four drug classes.

Conclusions: The utilization of antidepressants, antihypertensives, antihyperlipidemics, and antidiabetic agents has increased over the COVID-19 pandemic while the utilization of contraceptives has decreased. All drug classes showed decreased utilization around the time the COVID-19 pandemic was announced in the U.S. It is possible stay-at-home policies and state closure disruptions could have affected utilization of these medications. Early refills in preparation for state closures could have affected trends at this time. All drug classes had decreased utilization when COVID-19 hospitalizations peaked in the U.S. From 2019 to 2020, adherence measured by average PDC increased, suggesting adequate adherence to these medication classes.



Erin Cole, PharmD, RPh

Erin Cole received her Doctor of Pharmacy degree from Duquesne University School of Pharmacy in May of 2021. Additionally, she will graduate with her Master of Business Administration degree from Duquesne University Palumbo-Donahue School of Business in August of 2022. Upon completion of her managed care residency training at CVS Health, she plans to continue developing clinical programs and utilization management criteria within a managed care organization to decrease costs and ensure positive patient outcomes.

Mentors: Abraham Jose, PharmD; Alexa Hospodar, PharmD; Carlo J. Iasella, PharmD, MPH, BCTXP, BCPS

Presented at the AMCP Annual Meeting 2022, Chicago, Illinois

A Pharmacist Team Improves Medication Reconciliation Post-discharge Completion

Crossey CD, Ballard SL, Hebda MF

Purpose: Thirty-day Medication Reconciliation Post-discharge (MRP) is a CMS Star Measure, with a target completion $\geq 75\%$. UPMC Shadyside Family Health Center (SFHC) has historically completed MRP at first post-discharge visits, which frequently do not take place within the 30-day window. The purpose was to implement and evaluate a pharmacist-run 30-day MRP service.

Methods: SFHC patient discharges from UPMC hospitals were identified via daily discharge report and embedded SFHC pharmacists called patients to complete telephonic MRP. Patients discharged to home were included in the analysis. Data collection was completed retrospectively via chart review. The primary outcome was percentage and mode of 30-day MRP completion. Secondary outcomes included average time to MRP completion, readmission rate, successful phone contacts, completed in-office follow-up visits, and additional pharmacist activities beyond medication reconciliation. Descriptive statistics were used for data analysis.

Results: From August to December 2021, 303 patient discharges (235 patients) were eligible for inclusion. The average age was 55 years, 70.2% were Black, 55.7% were labeled female in the EHR, with an average of 11 medications. Thirty-day MRP completion was 93.1% (n=282). Average time to MRP completion was 16.0 days. Only half (50.2%) of patients (n=152) were seen for in-office follow-up visits, and 17.8% were readmitted (n=54 from 37 patients). Pharmacists reached 48.5% (n=147) via telephone and counseled 23.5% (n=54). Fourteen patients were referred to pharmacotherapy clinic for identified medication issues. A total of 184 medication recommendations (42.4% accepted) resulted in 38 medications started, 24 stopped, and 16 dose-adjusted. A total of 58 patients needed medication refills; SFHC pharmacists were able to send refills per office protocol for 25.9% of them (n=15). Overall, 42.9% of MRP would not have been completed without pharmacist involvement.

Conclusions: A pharmacist-run MRP service exceed targets for 30-day MRP completion due to telemedicine format and chart updates in the absence of patient contact. Pharmacist-run MRP resulted in pharmacotherapeutic interventions and recommendations beyond traditional medication reconciliation.



Caroline Crossey, PharmD

Caroline was born and raised in Pittsburgh, Pennsylvania. She received her PharmD from Duquesne University School of Pharmacy and completed her PGY1 pharmacy residency at St. Louis College of Pharmacy and Mercy Hospital St. Louis in Missouri. Her professional interests include family medicine, ambulatory care, and academia. In her spare time, Caroline enjoys spending time with family and friends, traveling, going to the theater, and practicing yoga. Upon completion of her residency, she hopes to obtain a position as a family medicine pharmacist and faculty member in the Washington, D.C. area.

Mentors: Stephanie Ballard, PharmD, BCPS; Michele Hebda, PharmD, BCPS

Presented in poster format at the 2021 ASHP Midyear, 2022 UPMC Fourth Annual Quality and Improvement Symposium (Poster Winner), and 2022 STFM Annual Spring Conference

Inappropriate Dosing of Drugs at Hospital Discharge for Patients with Impaired Kidney Function

Day G, Kane-Gill SL

Purpose: Around 20-47% of drugs that require dose adjustment are mismanaged at the time of hospital discharge likely due to fluctuating kidney function throughout a patient's hospitalization and a need for repeated evaluation. The purpose of this study is to assess appropriateness of drug dosing based on recommendations for patients with kidney impairment at the time of discharge in our institution.

Methods: Retrospective cohort study of 13,000 patients discharged from a medical-surgical care ward at UPMC Presbyterian Hospital. Theradoc, a clinical surveillance system, was used to identify patients from January 1, 2019 to January 1, 2020 who were receiving a medication from a selected list within 48 hours of hospital discharge. The medication list included agents requiring dose adjustment based on kidney function and was curated from UPMC's own renal dosing protocol, 2020 Beers list, Hanlon et al publication, and Taji et al publication. Additionally, the identified patients were evaluated if their clearance < 50 ml/min using Cockcroft Gault formula. Appropriate dose was determined by the recommendations in the aforementioned references and if not specified the package insert was used.

Results: A total of 946 patients taking a total of 1496 medications that required renal dosage adjustment were identified. In total, 239 (18.1%) medications were over dosed based on the most recent CrCl at the time of discharge. Additionally, 35 (2.7%) medications were underdosed and 94 (7.1%) should have been avoided based on current renal function. Overall, 27.9% of medication doses were not optimized at the time of patient discharge. Secondary assessments of other nephrotoxic medications at discharge and post discharge dose adjustment are still ongoing.

Conclusions: There is an opportunity to improve drug dosing at hospital discharge to be consistent with recommendations, but this requires an understanding of the barriers to providing appropriate prescribing and a modification to the current process.



Garrett Day, PharmD, BCPS

Garrett received his PharmD degree from the University of Pittsburgh School of Pharmacy in 2020. He is currently a PGY1 Health-System Pharmacy Administration and leadership resident (HSPA) at UPMC Presbyterian. His current professional interests include pharmacy automation, sterile products preparation, leadership, and investigational drug research. Upon completion of his residency, he will pursue a hospital pharmacist leadership position within a health system.

Mentors: Sandra L. Kane-Gill, PharmD, MSc, FCCM, FCCP

Establishing the Feasibility of Enhanced Myocarditis Monitoring During Clozapine Initiation

DeLorme DL, Cullen M, Shuster J, Fabian TJ

Purpose: Clozapine is a second-generation antipsychotic reserved for treatment resistant schizophrenia. Despite being effective in the treatment of patients who have failed antipsychotic therapy, clozapine is often underutilized due to safety concerns. Clozapine has five black-box safety warnings, and one of those is myocarditis. This titration-dependent side effect typically occurs within the first 40 days of clozapine initiation. Over the past 30 years, more than 1500 cases have been reported to the FDA with 85% reported within the last 5 years. In our institution, five cases have been reported over the last two years. Clinical monitoring for myocarditis consists of observing for signs of flu-like symptoms and chest pain, as well as monitoring for tachycardia and fever. Elevated troponin and C-reactive protein (CRP) have also been linked to clozapine-induced myocarditis. This pilot project aims to determine the feasibility of enhanced monitoring for myocarditis in an urban inpatient psychiatric hospital.

Methods: This is a prospective, single-center study focusing on patients aged 18 years and older admitted to an inpatient psychiatric hospital beginning August 2021. Patients who were newly initiated or reinitiated on clozapine therapy will be included in the analysis. In addition to REMS requirements regarding absolute neutrophil count (ANC) monitoring, troponin and CRP monitoring will occur at baseline and days 7, 14, 21, and 28. Daily vital signs will be monitored in accordance with hospital policy. For those patients who develop signs or symptoms of unidentified illness, HR > 120 BPM or increased by >30 BPM, CRP 5-10mg/dL, or mild elevation in troponin (≤ 2 ULN): clozapine therapy will continue, and troponin and CRP will be monitored daily. If the patient develops troponin >90 ng/L or 5 times the upper limit of normal or CRP > 10mg/dL: an EKG will be obtained, and cardiology will be consulted.

Results: Complete results and analysis are pending.

Conclusions: Pending



Dante Delorme, PharmD

Dante Delorme is currently a PGY2 Psychiatric Pharmacy Resident at UPMC Western Psychiatric Hospital. He completed his PGY1 pharmacy residency at UPMC Western Psychiatric Hospital after obtaining a PharmD at Duquesne University. His professional areas of interest include serious mental illness (SMI), transitions of care, underserved care, and interprofessional collaboration. After residency, Dante will continue to work as a psychiatric pharmacist.

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

Increasing Vaccine Access Among Uninsured Patients at a Free Clinic

Delk JA, Hutar MM, Tsvetkova M, Hisashima JT, Jonkman L, Connor S

Purpose: Vaccination, a key aspect of primary health care, is an important human right. Unfortunately, rates for routine adult vaccinations are known to be lower among uninsured, low-income individuals, predominantly due to cost. For individuals seeking care at free clinics, many are unprotected, particularly for pneumococcal disease, human papillomavirus, hepatitis B, and herpes zoster. Importantly, some routine adult vaccinations are available through patient assistance programs (PMAPs), whereby pharmaceutical companies provide free or low-cost medications to patients based on income and insurance status. The Birmingham Free Clinic (BFC) provides primary health care services for uninsured individuals in the Pittsburgh area at no charge. The clinic already has a robust PMAP protocol for non-vaccine products increasing access to essential medicines at no charge. This quality improvement project aims to 1) evaluate the baseline gap in routine adult vaccinations among BFC patients and 2) develop a process to increase access to vaccines via PMAPs.

Methods: To evaluate the gap in vaccinations among patients at the BFC, a retrospective chart review was conducted. The specific vaccines examined include the following: 13-valent pneumococcal conjugate vaccine (PCV13), 23-valent pneumococcal polysaccharide vaccine (PPSV23), human papillomavirus vaccine (HPV), hepatitis B vaccine (HBV), and recombinant zoster vaccine (RZV). All patients with a visit in the prior six months were assessed for these five routine adult vaccinations before QI implementation. Vaccine eligibility was determined by the recommendations from the Advisory Committee on Immunization Practices (ACIP) of the Centers for Disease Control. After identification of individuals who are unvaccinated but eligible, a structured system will be implemented utilizing PMAPs to improve vaccine affordability and vaccination rates.

Results: In total, 477 patient records were reviewed for vaccine eligibility. This represents all patients with a visit to the BFC between July 1, 2021 and December 31, 2021. The average age of the patients was 46.5 years (SD: ± 17). Regarding pneumococcal immunizations, 44% (16/36) and 58% (120/207) of eligible patients were vaccinated for PCV13 and PPSV23, respectively. There was a 23% (15/66) vaccination rate for HPV for individuals currently eligible for the vaccination. Of the patients considered to be at high risk of HBV, 21% (27/129) were vaccinated. Finally, 30% (61/206) of the patients eligible for RZV were immunized. A protocol was developed with clinic staff to facilitate patient enrollment in PMAP, and subsequent administration of vaccine dose(s) once approved. Vaccine administrations will be recorded in a log and the patients' electronic health records. Implementation of the vaccine administration program is ongoing.

Conclusions: These preliminary results confirm the expected gaps in vaccination rates among the patient cohort. While the project's methodology is not designed to identify cost as the only barrier, implementation of the vaccination administration program aims to close gaps in routine vaccinations in this patient population.



Jasmine A. Delk, PharmD (PGY-2 Ambulatory Care Resident – Global Health)

Jasmine Delk grew up in Pocono Summit, Pennsylvania, and received her PharmD in 2020 from the Philadelphia College of Pharmacy in Philadelphia, Pennsylvania. She completed her PGY1 Pharmacy Residency in 2021 at Xavier University of Louisiana College of Pharmacy in New Orleans, Louisiana. Her professional interests include diabetes, hypertension, heart failure, infectious disease, psychiatry, substance use disorder, and how these disease states are affected by social determinants of health. This year she travelled to both Honduras and Namibia to learn and gain new perspectives from local health providers. Post-residency, Jasmine hopes to continue to provide care to patients in resource-limited settings, both locally and internationally. Outside of pharmacy, Jasmine enjoys taking care of her houseplants, trying new restaurants, painting, and listening to podcasts.

Mentors: Lauren Jonkman, PharmD; Sharon Connor, PharmD

Impact of Deprescribing Acetylcholinesterase Inhibitors for Patients with Alzheimer's Disease

Della Grotta Lc, Grimes A, Sakely H, Leman K

Purpose: Acetylcholinesterase Inhibitors (Acheis) Are The Primary Pharmacological Options For Symptomatic Management Of Alzheimer's Disease (Ad). Deprescribing Acheis May Be Warranted For Some Patients Given Potential Severe Adverse Events Such As Syncope, Bradycardia, And Diarrhea As Well As A Lack Of Evidence For Long-Term Effectiveness. However, Limited Data Exists On The Effects Of Achei Deprescribing. One Barrier To Deprescribing Is The Possibility Of Worsening Behavioral And Psychological Symptoms And Subsequent Prescribing Of High-Risk Antipsychotics. The Objective Of The Study Was To Evaluate The Rate Of Achei Deprescribing In Outpatients Of Two Geriatric Clinics. Secondary Outcomes Included Rates Of Tapering Versus Abruptly Stopping Achei's, Cognitive And Behavioral Decline, And Incident Antipsychotic Prescribing.

Methods: A Retrospective Analysis Was Conducted In Patients With Ad Taking An Achei And Had An Office Visit Between 2016 And 2021 At Two Geriatric Primary Care Practices. The Study Included Patients With A Diagnosis Of Ad Prescribed Either Donepezil, Rivastigmine, Or Galantamine Identified Through An Epic Data Request. Patients Residing In A Skilled Nursing Facility Or On Hospice Within 3 Months Of Achei Deprescribing Were Excluded. Descriptive Statistics Were Used To Compare Baseline Characteristics And Outcomes. The Primary Outcome Of The Study Was To Evaluate The Rate Of Achei Deprescribing As Reported By Physicians In The Electronic Health Record (Ehr). Secondary Outcomes Included A Comparison In Rates Of Tapering Versus Abruptly Stopping Acheis. Additional Outcomes Included Characterizing Potential Withdrawal Reactions In The 3 Months Following Deprescribing As Reported In The Ehr As Well As The Rate Of Subsequent Antipsychotic Prescribing Or Resumption Of Achei Therapy.

Results: Over The 6-Year Study Period, 24 Of The 55 Patients (43.6%) Had An Achei Deprescribed, Equating A Rate Of Approximately 7.3% Per Year. The Most Common Reason For Achei Discontinuation Was For Side Effects (37.5%) Followed By Side Effects And Lack Of Effectiveness (29.2%), Lack Of Effectiveness Alone (20.8%), And Polypharmacy (12.5%). Most Patients Had Their Achei Tapered (66.7%) Compared With No Taper (33.3%). The Most Common Withdrawal Reactions Were Worsening Cognition (37.5%), Labile Mood (20.8%), Falls (33.3%), And Hallucinations (12.5%). Only 2 Patients (8.3%) Were Prescribed An Antipsychotic And 1 Patient (4.2%) Had The Achei Restarted In The 3-Months Following Discontinuation.

Conclusions: Rate Of Achei Discontinuation (7.3% Per Year) And Incident Antipsychotic Prescribing (1.4% Per Year) Were Lower Than Previously Reported Literature. Tapering Acheis Did Not Result In A Lower Rate Of Withdrawal Reactions Compared With Abrupt Discontinuation. However, Disease Progression May Have Influenced These Reactions. Additionally, Patients Who Were Tapered May Have Had Closer Follow-Up With The Healthcare Team Leading To Increased Documentation Of Adverse Effects. Ultimately, The Study May Aid Providers When Counseling Patients And Caregivers On Potential Withdrawal Reactions After Discontinuing An Achei. However, Future Trials Are Needed To Associate Withdrawal Reactions To Deprescribing And Evaluate If Tapering Is Necessary.



Lauren Della Grotta, Pharmd, Bcps

Lauren Was Born And Raised In Rhode Island And Received Her Pharmd From The University Of Rhode Island. Currently, She Is A Pgy2 Geriatric Pharmacy Resident And Faculty Development Fellow At Upmc St. Margaret. Her Professional Interests Include Geriatrics And Chronic Disease State Management. In Her Free Time, Lauren Enjoys Golfing, Traveling, And Spending Time With Friends And Family.

Mentors: Amy Grimes, Pharmd, Bcps, Bcgp; Heather Sakely, Pharmd, Bcps, Bcgp; Krista Leman, Do
Presented at the Society Of Teachers Of Family Medicine (Stfm) Annual Spring Conference (May 2022, Indianapolis, Indiana), American Geriatric Society (Ags) Annual Scientific Meeting (May 2022, Orlando, Florida)

Evaluation of the Implementation of a Heparin Induced Thrombocytopenia Powerplan on Medication Use And Outcomes

DiBridge JN, Szymkowiak A, Rivosecchi RM, Iasella C, Coons J

Purpose: Variability exists in the management of heparin-induced thrombocytopenia (HIT), regarding the choice of alternative anticoagulation. Historically, intravenous direct thrombin inhibitors (DTI) have been the cornerstone of acute management; however, transitioning from DTI therapy to warfarin can be laborious and time-consuming. Direct acting oral anticoagulants (DOAC) offer a potentially more advantageous therapy that allows for easier transition to oral management of HIT. The 2018 American Society of Hematology guidelines conditionally support the use of DOACs in stable HIT patients at average risk of bleeding. However, DOAC use in HIT has not yet been widely adopted in clinical practice. A new HIT treatment pathway and comprehensive orderset (“PowerPlan”) in Cerner (North Kansas City, MO) was implemented at our health system in March 2021. The goal of this project was to facilitate the implementation of these guidelines into practice, and evaluate the impact on DTI therapy, DOAC use, and length of hospital stay.

Methods: This was a retrospective review of inpatients across 9 hospitals within the UPMC Health System from August 1, 2020 to September 30, 2021 approved by the IRB. Included patients were ≥ 18 years old with a positive heparin-platelet factor 4 antibody test at any time during their index visit and who had a medication charge for argatroban, bivalirudin, fondaparinux, rivaroxaban, apixaban, or warfarin. Patients with mechanical circulatory support (MCS) were excluded. The primary aim was to evaluate difference in days on DTI therapy, DOAC use, and length of hospital stay, pre- and post- implementation of the UPMC HIT PowerPlan. The secondary aims were to determine rates of thrombosis and bleeding pre- and post-PowerPlan implementation.

Results: A total of 521 patients were identified for analysis and 89 patients met criteria for inclusion. After exclusion of patients who received MCS, 69 patients were identified for study inclusion; 33 in the pre-implementation cohort and 36 in the post-implementation cohort. The median duration of IV DTI therapy was 9 [4-14.5] and 7 [4-9.8] days respectively, $p=0.25$. The use of DOAC as initial treatment strategy increased in the post-implementation cohort, 15% (5) and 25% (9). The duration of hospitalization was reduced in the post-implementation cohort, 23.5 [20-28] and 25 [21-39], $p=0.536$. Additional results pending.

Conclusions: The results of this study will add to the existing literature regarding use of a HIT decision support tool to incorporate treatment guidelines into clinical practice.



Julie DiBridge, PharmD, BCPS

Julie completed her undergraduate and pharmacy school training at the University of Pittsburgh. She completed her PGY-1 Acute Care residency at UPMC Presbyterian and stayed on to complete her PGY-2 Cardiology Pharmacy Residency. Her areas of interests include advanced heart failure, mechanical circulatory support, critical care cardiology, and anticoagulation. Julie has accepted a position post-residency as a Cardiology Clinical Specialist at WVU Medicine.

Mentors: James C. Coons, PharmD, FCCP, FACC, BCCP; Adrienne Szymkowiak, PharmD; Ryan Rivosecchi, PharmD, BCCCP; Carlo J. Iasella, PharmD, MPH, BCPS, BCTXP

Pharmacy Prospective Antibiotic Order Review and Preparation to Improve Patient Safety in a Pediatric Emergency Department

Esadah E, Ferguson E, Ordons K

Purpose: Pharmacy order review has been demonstrated to reduce medication errors rates by up to 37% in the emergency department (ED)¹. The ED at UPMC Children's Hospital of Pittsburgh serves about 70,000 pediatric patients each year. The current pharmacy order review process at our institution has room for safety optimization since automated dispensing cabinet overrides allow for the administration of intravenous (IV) antibiotics prior to pharmacist review. The primary objectives of this study were to improve the overall safety of antibiotics in the ED by requiring pharmacist order review prior to administration and automatic pharmacy preparation and delivery for all IV antibiotics

Methods: This was a UPMC QI Committee-approved, retrospective evaluation of all IV antimicrobials ordered in the ED over a 7-month period. The data was evaluated in 2 phases: a pre-implementation phase (September—November 2021), followed by education and implementation of a pharmacy process change (January 18th, 2022), and a post-implementation phase (January—March 2022). The process change focused on timely pharmacist order review, pharmacy preparation, and delivery of all antibiotics to the ED within 30 minutes of order placement. All IV antibiotic orders prescribed during an ED encounter were included. The primary outcomes of the project were to improve pharmacist verification rates for ED antibiotic orders, increase the number of IV antibiotics prepared in the pharmacy, and increase the number of antibiotics delivered to the ED within 30 minutes of order placement. Overall time from order to the administration of the first antibiotic was used to ensure timely administration after the process change.

Results: During the pre-implementation phase, there were a total of 1039 IV antibiotics ordered with 44% prepared by the pharmacy. Thirty-seven percent of orders were administered prior to pharmacist review. The average time to order verification and delivery was 34 and 111 minutes, respectively. The average time to first antibiotic administration was 64 minutes. Full data analysis for post-implementation data is pending. Preliminary results demonstrate a significant reduction in time to order verification and delivery with an increase in the percentage of pharmacist orders reviewed prior to administration.

Conclusions: Based on two months of post-intervention data, the pharmacy process change led to an increase in the overall percent of antibiotics verified prior to administration and the percent of antibiotics dispensed by the pharmacy. There was no delay in antibiotic administration with pharmacy preparation. Our results suggest that prospective pharmacy order review and antibiotic preparation is safe in the pediatric emergency department.

1Weant KA, Bailey A, Baker S. Strategies for reducing medication errors in the emergency department. Open Access Emergency Medicine. 2014;45. doi:10.2147/oaem.s64174



Esther Esadah, PharmD, MS

Esther received her PharmD and Master of Pharmaceutical Sciences degrees from the University at Buffalo School of Pharmacy and Pharmaceutical Sciences. She is currently a PGY-1 pediatric resident at UPMC Children's Hospital and will be continuing her training as a PGY-2 infectious disease resident at Lucile Packard Children's Hospital Stanford. Her professional interests include pediatrics, critical care, and infectious diseases

Mentors: Elizabeth Ferguson, PharmD, BCPPS; Kevin Ordons, PharmD, BCPS, BCCCP

Presented at the Pediatric Pharmacy Association PediatRx Annual Meeting, Norfolk, Virginia, May 2-6, 2022

Evaluation of a Community Health Worker within an Interprofessional Family Medicine Teaching Practice

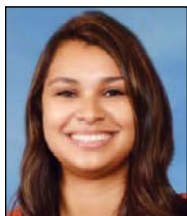
Faggioli A, Farrah R

Purpose: There is a growing body of evidence that supports community health worker (CHW) integration into primary care. As members of the healthcare team, CHW are able to bridge the gap between the community and health care services. At the St. Margaret Lawrenceville Family Health Center (LVFHC) we identified a need for our Somali Bantu patients. Pittsburgh is home to a vast immigrant population with approximately 500 Somali Bantu living in primarily three underserved neighborhoods. In 2020, LVFHC, centrally located between these three city neighborhoods, incorporated Somali CHW within the practice. This project aims to describe the work and impact of CHW within the primary care setting.

Methods: This is a single-center, retrospective chart review quality improvement project of Somali Bantu patients presenting to an urban Family Health Center. This practice is an interprofessional academic primary care clinic comprised of medical residents, nurses, social workers, pharmacists and a community health worker. Somali Bantu patients were included if they had a CHW referral and were seen in clinic between February 2021 to February 2022. Baseline demographic information and the clinical data was obtained via outpatient health record. The primary outcome was to describe community health care worker's interventions on the socioeconomic (social security, transportation), cultural (interpretation), and healthcare barriers (adherence to medication, appointment schedule). The secondary outcome was to assess and quantify the impact on diabetes patient health, including statin use, foot and eye exam, and covid vaccinations.

Results: 102 patients were identified that required CHW intervention between February 2021 and February 2022. CHW initially identified barriers for care for 44% of the patients. In total, there were 784 interventions with 65.7% of the interventions addressing healthcare barriers. 13.5% of interventions addressed socioeconomic barriers and 11.4% of interventions addressing cultural barriers. Covid vaccine hesitancy was mitigated through CHW intervention and a total of 72 covid vaccines were administered.

Conclusions: Community Health Worker has addressed many social, cultural, and healthcare barriers for Somali patients over the trial period. Future studies may help quantify impact on disease related outcomes.



Alicia Faggioli, PharmD, BCPS

Alicia is a PGY2 ambulatory care pharmacy resident at UPMC St. Margaret Lawrenceville Family Health Center. She completed a PGY1 residency at UPMC St. Margaret. She received both her bachelor's degree in chemistry and her PharmD from the University of Tennessee. She will be continuing her career post residency at Cleveland Clinic as a Pharmacy Clinical Specialist in Primary Care. Her favorite activities outside of work include painting, trying out local coffee shops, and running. You can also catch her supporting the UT Volunteers on Saturday and Pittsburgh Steelers on Sunday!

Mentors: Roberta Farrah, PharmD, BCPS, BCACP

Presented at the STFM National Spring Conference, Indianapolis, Indiana, April 30-May 4, 2022

Pharmacist Impact on Treatment Retention for Medications for Alcohol Use Disorder and Opioid Use Disorder

Ferro HP, Reid T, Fabian TJ

Purpose: Treatment retention rates for opioid use disorder (OUD) and alcohol use disorder (AUD) remain low. Two major areas of engagement are that of treatment initiation and retention. Telehealth pharmacy services can improve retention rates for medications for AUD (MAUD) and OUD (MOUD). Exposure to a health provider may also assist in coordinating care after a patient leaves the hospital setting. The goal of this project is to assess if a pharmacist can improve treatment retention rates for MAUD and MOUD through a transitions of care service following discharge from a psychiatric hospital.

Methods: From October 19th, 2021, to April 1st, 2022, a pharmacist discussed initiation of MAUD or MOUD for patients diagnosed with OUD or AUD admitted to the dual diagnosis unit of Western Psychiatric Hospital. Patients could not be consistently taking MOUD or MAUD to be selected for treatment. Patients that accepted medications were then contacted via telephone once weekly for 3 weeks following discharge. During these calls, the pharmacist would discuss medication efficacy, side effects, barriers to care, and address any questions. If a patient did not answer after 3 calls, no further contact attempts were made. The primary outcome assessed 30-day fill dates for MOUD and MAUD with a secondary outcome of 30-day hospital readmission. The control group is a cohort of patients from one year prior in which a pharmacist had initiated MAUD or MOUD but did not place after-care phone calls to patients after discharge.

Results: Fifty-seven total patients were seen by a pharmacist regarding MAUD or MOUD initiation. Of those 57 patients, 40 accepted medications. Of those 40 patients, 37 were prescribed MAUD or MOUD at discharge. The 30-day treatment retention and hospital readmission rate will be evaluated after May 1st, 2022, as the final patient was seen on April 1st, 2022. The comparison to the control group will also be assessed after May 1st, 2022.

Conclusions: The conclusion of this research project is pending.



Harrison Ferro, PharmD

Harrison received his PharmD from Wilkes University in 2021. Harrison is currently completing his PGY1 pharmacy residency at UPMC Western Psychiatric Hospital. He will be completing a PGY2 in psychiatry at UPMC Western Psychiatric Hospital upon completion of his PGY1. Harrison's areas of interest include addiction medicine, schizophrenia, transitions of care, and academia. Outside of pharmacy, Harrison enjoys hiking, listening to music, and visiting local coffee shops.

Mentors: Tiffany Reid, PharmD, Tanya Fabian, PharmD, PhD, BCPP

Use of a Delphi Approach to Identify Skills and Qualities Essential for International Pharmacy Practice Experiences

Garcia A, Mercer J, Januszka J, Jonkman L

Purpose: As opportunities for and interest in global health opportunities increase among student pharmacists, so too does the need for rigorous support and selection systems. Supporting student pharmacists on international experiences starts during the selection process. Faculty and others who select and prepare students for these transformational experiences need tools to measure non-academic skills, including maturity, adaptability, leadership, communication skills, cultural sensitivity, and ability to work as part of a team. These skills are thought not only to contribute to student success, but also to prevent harms to the student, local community and relationship between the local community and the student's home institution. The purpose of this study is to identify and prioritize the social and behavioral skills and constructs which are markers of student pharmacist success on international pharmacy experiences via expert consensus.

Methods: This mixed methods study will take a two-phase approach. In the first phase, focus groups with pharmacy faculty experts will generate constructs. In the second phase, a larger group of experts will be engaged to participate in a Delphi process incorporating the focus group constructs and constructs from a literature review to generate consensus around the most important non-academic factors influencing student success on international rotations. The focus groups will be analyzed using a content analysis to identify and define important constructs the experts described. The primary outcome of the Delphi process will be non-academic behaviors and skills identified as meeting 80% expert consensus by the final iteration of the questionnaire.

Results: Phase 1 (focus groups) is currently underway. During the initial focus group, non-academic qualities and skills identified included: flexibility, adaptability, resiliency, problem-solving, motivation, passion for patient care, humility, culturally sensitivity, strong communication, self-reflective, outgoing, imperturbable, considerate, conscientiousness, maturity, openminded, empathy, respect for others, curiosity, pragmatism, and having global-political awareness, An additional focus group is planned and then phase 2 will begin.

Conclusions: We hope findings from this study will be useful in guiding pharmacy faculty looking to screen pharmacy students applying for international outreach experiences and anticipate the results may be applied to creation of a Situational Judgement Test (SJT) for such screening and orientation processes.



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, yoga, cooking, reading, and watching movies. He is also the proud dad of several houseplants. He will be continuing his journey next year by completing a PGY2 in ambulatory care with an emphasis in global health and underserved care at UPMC.

Mentors: Lauren Jonkman, PharmD, MPH; Michael Trisler, PharmD, MPH, BCIDP

Evaluation of Timing of Venous Thromboembolism (VTE) Pharmacologic Prophylaxis Initiation in Trauma Patients

Holder TA, McGinnis CB, Chiappelli AL

Purpose: Major trauma is a strong risk factor for venous thromboembolism (VTE). The observed rates of VTE are reported to be as high as 58% for major trauma patients without prophylactic intervention leading to fatal complications including pulmonary embolism. Due to this risk, pharmacologic VTE prophylaxis is standard of care for trauma patients. National guidelines recommend early initiation of pharmacologic VTE prophylaxis, between 24 to 72 hours after injury or admission, based on injury type and need for operative intervention. Although early initiation of VTE prophylaxis is recommended, therapy may be delayed due to several factors. The aim of this study was to assess compliance of different trauma injury types in correlation with guideline recommendations and determine the impact of compliance on VTE and bleeding events.

Methods: This quality improvement project was a single center retrospective cohort study analyzing trauma and neurotrauma patients admitted to UPMC Presbyterian and initiated on VTE prophylaxis between January 1, 2020 to December 1, 2021. Patients were included if they were 18 years or older, admitted to intensive care or non-intensive care trauma or neurotrauma units, and had an admitting diagnosis consistent with trauma injury types. Patients were identified by VTE prophylaxis medication charges and ICD-10 trauma diagnosis codes. Those without traumatic injury, receiving therapeutic anticoagulation prior to admission, or presenting with an indication for therapeutic anticoagulation were excluded from this study. The primary endpoint was compliance of initiation of pharmacologic VTE prophylaxis with guideline recommendations and institutional protocol. Secondary endpoints included rate of symptomatic VTE, rate of bleeding, and time to pharmacologic VTE prophylaxis. Demographics were analyzed with descriptive statistics while outcomes were assessed with various statistical tests as appropriate.

Results: Research in progress with results pending.

Conclusions: Pending.



Taylor Holder, PharmD

Taylor is from Chicago, Illinois and received her PharmD from the University of Illinois at Chicago College of Pharmacy. She is completing her PGY1 Pharmacy Residency at UPMC Presbyterian. Her professional interests include solid organ transplantation and cardiology. Upon completion of her PGY1 residency, she will continue her career as a clinical pharmacist at the University of Chicago.

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

Assessment of Potential Drug Interactions Associated with Natural Products In Published Case Reports

Jackson MJ, Kane-Gill SL, Boyce R.

Purpose: Natural products have long been used to treat medical conditions dating back to the earliest of human culture. These products have often been used for a multitude of different ailments throughout history, and often have multiple uses. While these products have been around for years, they lack regulation and rigorous evaluations, and a significant gap in the safety information available. Further natural products are used along with prescription medications providing safety concerns for potential unknown drug interactions. This is alarming as complementary and alternative medicines have become more prevalent and accepted by the public, while the public generally regards these as harmless products. The aim of this study is to identify potential interactions.

Methods: A retrospective analysis was conducted from published case reports to assess for potential drug interactions associated with multiple natural products. Published case reports were identified utilizing PubMed searches for various natural including aloe vera, apple cider vinegar, chlorella, cinnamon, cranberry, fenugreek, feverfew, garcinia, garlic, ginger, ginkgo biloba, ginseng, goji berry, guaran, horsetail, kava, milk thistle, niu bang zi, red yeast, rhodiola, senna seed, and soy. Case reports were analyzed by two independent pharmacist reviewers to assess for potential drug interactions utilizing the Drug Interaction Probability Scale (DIPS). Each case report was entered into the Natural Product-Drug Interaction (NaPDI) database independently by each reviewer. Prior evidence as well as timing and pharmacokinetic profiles of each product and interactive medication were collected for assessment. These were then further stratified by each natural product and interacting medication.

Results: Data collection ongoing for 54 case reports. 37 case report reviews of various natural products were completed.

Conclusions: Understanding that the lack of safety data available about natural products and concomitant administration with prescription drugs, we were left to assess case reports for potential drug interactions. These data are the basis for signal detection in the Food and Drug Administration Adverse Drug Event Reporting database to determine identify support for the data provided in the case reports.



Matthew Jackson, PharmD

Matthew is from North Huntingdon, Pennsylvania, and received his PharmD from Duquesne University in 2021. He is currently completing his PGY1 Pharmacy Residency at UPMC Presbyterian. His professional interests include pharmacy operations and automation. After this year, he will complete his PGY2 at UPMC Presbyterian as part of the Health System Pharmacy Administration and Leadership Residency Program.

Primary Mentor: Sandra L. Kane-Gill, PharmD, MSc, FCCM, FCCP

Patient Specific Factors Associated with Low Dose Induction of Buprenorphine

Karavolis Z, Roy P

Purpose: Opioid use disorder (OUD) affects over 16 million people worldwide, including over 2.1 million people in the United States. Medications for opioid use disorder (MOUD), including buprenorphine, are the gold standard treatments for patients with OUD. Traditional buprenorphine induction requires patients to experience mild to moderate withdrawal before initiating therapy. A novel low dose buprenorphine induction has been proposed to initiate buprenorphine in patients who are taking full opioid agonists without the risk of precipitated withdrawal. The objective of this study is to determine patient specific factors associated with successful low dose induction of buprenorphine.

Methods: Patients seen by the Addiction Medicine Consult Service (AMCS) in a large academic medical center and started on buprenorphine using a low dose induction between April 20, 2021 and July 20, 2021 were included in this study. Low dose buprenorphine induction was conducted using a transdermal buprenorphine patch followed by subsequent sublingual buprenorphine/naloxone. The primary outcome was successful induction of buprenorphine determined by greater than or equal to 24 hours on maintenance buprenorphine dose. Secondary outcomes included morphine milliequivalents (MME) in 24 hours prior to start of induction, MME during each day of induction, time for induction, final daily maintenance dose of buprenorphine, and taper of full opioid agonists during induction period.

Results: A total of 21 patients with OUD were included in the analysis. Of the 21 patients, 19 (90.5%) successfully completed low dose buprenorphine induction and were started a buprenorphine maintenance dose. Average MME utilization in the 24 hours prior to induction was 136.88 MME in the successful group and 83.3 MME in the unsuccessful group. The average time between admission and patch application in the successful group was 8.16 days while the average in the unsuccessful group was 12.5 days. Of the patients that successfully transitioned, the average time for induction was 4.58 days.

Conclusions: Transdermal buprenorphine patch followed by sublingual buprenorphine/naloxone resulted in a high success rate for low dose buprenorphine induction. There does not appear to be an association with baseline MME requirement and days of induction.



Zoe Karavolis, PharmD

Zoe received her PharmD degree from Northeastern University School of Pharmacy and completed her PGY1 Residency at UPMC Presbyterian. She is currently a PGY2 Psychiatry Pharmacy Resident at UPMC Wester Psychiatric Hospital. Her professional interests include substance use disorders and schizophrenia spectrum disorders. Upon completion of her residency, Zoe will continue her career as a psychiatric clinical pharmacist in the inpatient setting.

Mentors: Payel Jhoom Roy, MD, MSc, Tanya Fabian, PharmD, PhD, BCPP

Presented at the 2022 College of Psychiatric and Neurologic Pharmacists Annual Conference in San Antonio, Texas

Oral Anticoagulation After Alteplase for Massive Pulmonary Embolism: A Comparison of Direct Oral Anticoagulants versus Warfarin

Kim GE, Rivosecchi RM, Groetzinger LM

Purpose: Massive pulmonary embolism (PE) is associated with a high 90-day mortality and often requires systemic thrombolysis. Per the American College of Chest Physicians, direct oral anticoagulants (DOAC) are recommended over warfarin to prevent recurrent thromboembolism following a PE. DOACs are increasingly favored due to its fast onset of action, lack of “bridging period”, and no routine laboratory monitoring parameters. Randomized clinical trials have demonstrated low bleeding rate with similar efficacy in reducing recurrent venous thromboembolisms in apixaban and rivaroxaban compared to warfarin. However, these trials excluded patients who received any type of thrombolysis. A study in patients with submassive PE after catheter-directed thrombolysis found a decreased median hospital length of stay (LOS) in the DOAC group compared to warfarin group. Due to the lack of data in the massive PE patient population, the purpose of this study was to evaluate the effect of DOACs compared to warfarin after alteplase administration for massive PE on hospital LOS, major bleeding rates, and recurrent thrombotic events.

Methods: This was a retrospective, multi-center review of patients 18 years of age or older, with a diagnosis code for massive PE and a medication charge for alteplase between November 2011 to July 2021. Exclusion criteria included patients who did not received alteplase for massive PE, diagnosed with heparin induced thrombocytopenia, and death within 24-hours of alteplase administration. Primary outcome included hospital LOS defined as days from alteplase administration to discharge from institution. The secondary outcomes included number of major bleeding and thromboembolic events from hospitalization and up to 90-days post discharge and intensive care unit LOS. For analysis, the warfarin group will be compared with the DOAC group which included apixaban and rivaroxaban per the health-system formulary.

Results: Data collection and analysis are currently in progress.

Conclusions: The results of this study will provide insight regarding LOS, rates of bleeding and thromboembolic events associated with apixaban and rivaroxaban versus warfarin use in massive PE post alteplase administration.



Grace Kim, PharmD

Grace is from Rockville Maryland and received her Doctor of Pharmacy from the University of Maryland School of Pharmacy. She is currently a PGY1 pharmacy resident at UPMC Presbyterian. Upon completion of her PGY1 training, Grace will stay in Pittsburgh to complete a PGY2 in Geriatrics at UPMC St. Margaret.

Mentors: Lara Groetzinger, PharmD, BCCCP and Ryan Rivosecchi, PharmD, BCCCP

Advancing Interprofessional Connections through a University-based Vaccination and Wellness Center

Koverman MS, Herbert SMC, Carroll JC, Coley KC, Klatt PA, Ossman KL, McGivney MS

Purpose: Interprofessional education and training is an accreditation standard requirement for various professional health discipline schools. Universities are often challenged to find mechanisms to connect health science learners while they complete discipline-specific coursework. The COVID-19 pandemic created a unique opportunity to bring students and health professionals from different health sciences together to provide vaccinations. The University of Pittsburgh developed an interprofessional space, the Pitt CoVax Vaccination Center, to operate and provide vaccinations to the public. This Center is managed by a team of pharmacists with volunteer support from six health sciences schools. At the Center, students are cross-trained to provide care in each of the areas of the vaccination process (e.g. screening, education, vaccination, and medical observation). The objective of this project is to gather health science student perceptions on their professional growth from working within an interprofessional team while providing community-based vaccinations.

Methods: Health science students who participated in the University's COVID-19 vaccination efforts were eligible. A mixed-methods approach including a survey and semi-structured interviews was utilized. A survey with demographic questions and two open-ended questions was deployed to gather information on students' interprofessional experiences with community-based vaccinations. Descriptive statistics were used to characterize quantitative data. A content analysis of open-ended questions will be conducted. A purposeful, maximum variation sampling strategy was used to recruit interview subjects at the Pitt CoVax Vaccination Center. The interview questions were informed by the Interprofessional Education Collaborative Expert Panel's Core Competencies for Interprofessional Collaborative Practice. Interviews were audio-recorded and transcribed verbatim. A codebook was developed by the research team and transcripts were independently coded by two investigators using NVivo qualitative analysis software. Coding discrepancies will be reconciled through discussion. A mixed deductive-inductive thematic analysis will be performed. This research was approved by the University's IRB.

Results: A total of 91 health science students responded to the survey with the majority being pharmacy, medicine, and nursing students (47%, 23%, 18% respectively). A majority of health science students want to work directly in patient care (n = 63), work in an interprofessional capacity (n = 23), and academia (n = 23). Seventeen health science students were interviewed: dental (n = 1), medical (n = 2), nursing (n = 7), pharmacy (n = 5), physician assistant (n = 1), and public health (n = 1). Analysis is currently in progress.

Conclusions: Vaccinations can be a connection point for many health disciplines to provide students with interprofessional patient care experiences. Preliminary findings are indicating that health science students valued the interprofessional experience while providing COVID-19 vaccinations. The outcomes of this project will provide insight into the value of the students' interprofessional educational experience and strategies to strengthen their experiences moving forward at the University of Pittsburgh. The results of this study may be used by other Universities to inform development of interprofessional sites on their own campuses with health science schools.



Michelle Koverman, PharmD

Michelle is currently the PGY1 Community-based Pharmacy Resident with the University of Pittsburgh School of Pharmacy and Rite Aid. Her career interests include chronic disease state management with a focus on diabetes. Her passions also include caring for geriatric and underserved population in ambulatory and community settings while working on an interprofessional team. Upon completion of residency, she plans to pursue additional training with a PGY2 in Ambulatory Care (Family Medicine) at UPMC Shadyside Hospital. Michelle is from St. Louis, Missouri, and earned her PharmD from the University of Missouri – Kansas City.

Mentors: Sophia M.C. Herbert, PharmD; Kim C. Coley, PharmD, FCCP; Joni C. Carroll, PharmD, BCACP, TTS; Kristine L. Ossman, PharmD; Melissa A. Somma McGivney, PharmD, FCCP, FAPhA

The Effect of PCSK9 Inhibitor initiation on Statin Adherence and Clinical Outcomes

LaFratte CM, Huang Y, Peasah SK, Hall D, Good CB

Purpose: Statin discontinuation rates are reported up to 70% within two years of initiation. In high-risk patients for whom poor tolerance or response to statins limits therapeutic benefit, proprotein convertase subtilisin/kexin type 9 inhibitors (PCSK9i) may be initiated. PCSK9i are well tolerated, potentially lower cholesterol, and decrease cardiovascular events when added to statin therapy. However, the effects of statin discontinuation after PCSK9i initiation on clinical and economic outcomes remain unclear. The purpose of this study was to determine the effects of PCSK9i initiation on statin adherence and subsequent effects on cardiovascular events and hospitalizations within two years.

Methods: In this retrospective pre-post difference-in-difference analysis at a large regional health plan, prescription claims between September 2017 and November 2019 were used to identify and propensity match new PCSK9i users to statin-alone users in a 1:4 ratio. The primary outcome was statin adherence (proportion of days covered [PDC] and discontinuation, defined as the absence of statin coverage for at least 60 days) 12 months following PCSK9i initiation. Secondary outcomes were low-density lipoprotein cholesterol (LDL-C) and prevalence of ASCVD events and hospitalizations after a year.

Results: A total of 220,538 statin users and 700 PCSK9i users were identified, from which 184 met inclusion for the PCSK9i group and were propensity matched to 736 patients in the statin-alone group. At 12 months, mean statin PDC decreased from 66% to 48% in the PCSK9i group ($p < .0001$) and increased from 66% to 85% in the statin-alone group ($p < .0001$). Statin discontinuation rates increased from 10% to 38% ($p < .0001$) in the PCSK9i group and from 10% to 13% in the statin-alone group ($p = .0429$). Proportion of patients achieving LDL-C < 70 mg/dL, myocardial infarction, and re-vascular events significantly favored the PCSK9i group.

Conclusions: In this retrospective pre-post difference-in-difference analysis, there was a significant increase in statin nonadherence and discontinuation within 12 months of PCSK9i initiation. Despite greater statin nonadherence, PCSK9i users had significantly lower LDL-C, cardiovascular events, and hospitalizations at 12-months follow-up compared to statin-alone users. Further study on long-term impact is warranted.



Christopher LaFratte, PharmD

Originally from Scranton, Pennsylvania, Chris earned his PharmD with an academic area of concentration in Global Health from the University of Pittsburgh School of Pharmacy in 2020. Upon graduation, Chris relocated to Philadelphia, where he completed a PGY1 Pharmacy Residency at the Hospital of the University of Pennsylvania. His interests in chronic disease state management and population health management brought him back to Pittsburgh, where he is currently a PGY2 Ambulatory Care Pharmacy Resident with UPMC Presbyterian.

Mentors: Sam Peasah, PhD, MBA, RPh, Yan Huang, MS, Deanne Hall, PharmD, CDE, BCACP, Chester B Good, MD, MPH

Short-course Therapy for Treatment of Community-acquired Pneumonia

Liu L, Marini R, Shield R

Purpose: Using the “shortest effective duration” of therapy has increasingly become an identified area of practice improvement for many antimicrobial stewardship programs. Historically, the most effective and safe duration of therapy for community-acquired pneumonia (CAP) is not well defined. The 2019 IDSA/ATS guideline endorses a minimum of 5-day treatment duration based on limited evidence. Recent epidemiology studies have shown clear harm with each additional day of antibiotics which predispose patients to increased risk for *Clostridioides difficile* infection and antibiotic-related adverse drug events. Emerging evidence has demonstrated the non-inferiority of a 3-day-course of antibiotic therapy for moderately severe CAP in hospitalized patient. The objective of this quality improvement project was to evaluate the current practice to treat CAP at UPMC Presbyterian for short-course therapy (defined as 3 days of therapy).

Methods: A retrospective review of 100 unique patients who were admitted to UPMC Presbyterian (PUH) during the year of 2021 was completed. Patients were included in the analysis if they received combination therapy of azithromycin plus either ampicillin-sulbactam or ceftriaxone. To capture CAP therapy, patients were excluded if the antimicrobial regimen was started beyond 48 hours of hospital admission. Comorbid conditions (CC) and hospital length of stay (LOS) were assessed based on chart review. Other exclusion criteria include history of lung transplant, cystic fibrosis, sickle cell disease and active SARS-CoV-2 infection. Duration of therapy (DOT) was assessed based on inpatient and discharge data. Baseline demographics, in-patient antibiotic therapy duration, discharge antibiotic prescriptions, as well as patient outcomes were collected via Power Chart and EPIC chart review. Cohort patients (CP) from UPMC PUH were compared to study by Dinh et al, which served as control population. Data were described using descriptive statistics.

Results: CP had more CC compared to the Dinh et al study with 80 (80%) and 39 (26%) individuals, respectively. Additionally, more individuals experienced ICU admission, 26 (26%) versus 0 (0%). The hospital LOS was similar between groups with a median of 6 days and 5 days. 85% CP received a discharge summary diagnosis of possible CAP. Moreover, 28 patients were initiated on MRSA/pseudomonas coverage without indication. CP received an average DOT of 5.7 days for inpatient beta-lactam therapy, and 3.5 days for azithromycin. The average total DOT was 7.5 days. Over half CP were continued on oral antibiotics upon discharge.

Conclusions: CAP treatment duration is variable at UPMC PUH and durations are longer than guideline recommendations. Additionally, there may be a sub-population eligible for short-course CAP therapy at our institution. Further research is warranted to assess the outcomes of short course CAP therapy at UPMC PUH through prospective intervention and monitoring. Stewardship efforts are also warranted in the transition-of-care process putting the correct end date on the discharge prescription if further antibiotics are indicated.



Leanna Liu, PharmD, BCIDP, BCPS

Leanna received her PharmD from the University of Texas at Austin in 2010 and finished the PGY-1 pharmacotherapy residency at Methodist Hospital in San Antonio, Texas. Before she joined the 2-year infectious disease/antimicrobial stewardship fellowship program at UPMC Presbyterian, Leanna had a variety of inpatient clinical pharmacy practices and management experience. She enjoyed working as an antimicrobial stewardship pharmacist for 5 years and as a clinical pharmacy manager for 2.5 years before relocating to Pittsburgh with her family. Leanna plans to stay in the Pittsburgh area after graduating her fellowship and hopes to continue her clinical practice focusing on ID/stewardship.

Mentors: Rachel Marini, PharmD, BCIDP; Ryan Shield, PharmD, MS

Evaluation of Levetiracetam Monitoring and Subsequent Dose Adjustments at an Academic Medical Center

Lomax, S. Brock

Purpose: Levetiracetam levels are commonly ordered for patients admitted to UPMC Mercy despite controversy regarding the clinical necessity. Due to lack of standardization in timing of level ordering, they may be inappropriately drawn in relation to administration of the previous dose. Levetiracetam levels, whether appropriate or not, may then be used to guide dose adjustments for these patients. The goal of this research is to determine the amount of inappropriately drawn levels and evaluate if inappropriate levels are used to change doses.

Methods: This was a UPMC Quality Improvement approved retrospective cohort study of all patients who had a levetiracetam level ordered at UPMC Mercy between November 2020 and October 2021. Patients were excluded if their levetiracetam order was cancelled, a laboratory error occurred, or the patient was discharged before the level resulted. If a patient had multiple levetiracetam levels results, only the first level result was included. Patients with levetiracetam level collected before inpatient administration of levetiracetam were assumed to be clinically relevant to assess antiepileptic drug compliance and deemed appropriate. The primary outcome was the frequency of inappropriate levetiracetam levels, with further analysis and comparison between those who received appropriate or inappropriate monitoring. An appropriate levetiracetam trough level is defined as a level collected within one hour prior the next scheduled dose. Secondary outcomes included subpopulation analysis to identify potential trends in ordering. Baseline demographics were analyzed using descriptive statistics.

Results: A total of 211 levetiracetam levels met inclusion criteria. Of these levels, 175 (83%) were inappropriate due to timing of level collection. Levetiracetam doses were changed in 36 (17%) in response to the obtained level, with 32 (89%) made after an inappropriately drawn level. Acuity of care, renal function, age, sex, concomitant antiepileptic drugs, and the presence of a neurology consult did not reveal any consistent patterns of monitoring.

Conclusions: In its current form, therapeutic drug monitoring of levetiracetam at UPMC Mercy is inconsistently utilized. The majority of levels obtained did not result in change in therapy. Most dose adjustments that did occur were in response to inappropriately timed level. These data will be presented to the Quality Improvement Committee and Neurology to determine future initiatives. Our findings may be used to support provider education for proper levetiracetam therapeutic drug monitoring or adoption of pharmacy-led levetiracetam drug monitoring protocol.



S. Brock Lomax, PharmD, MBA

Brock is from Frederick, MD and earned his PharmD and MBA at West Virginia University. He is currently a PGY1 pharmacy resident at UPMC Mercy. Brock's clinical interests include emergency medicine and critical care medicine. He looks forward to moving back to Maryland and pursuing a career in emergency department pharmacy. Outside of pharmacy, Brock enjoys going to concerts, traveling with his friends, and trying new restaurants.

Mentors: Taylor Miller, PharmD; Pam McCormick, PharmD, BCPS

Real-world Evaluation of Drug Interactions with Sotorasib in Non-Small Cell Lung Cancer (NSCLC) Patients at a Large Academic Medical Center

Mansour D, Bastacky M, Brenner T, Burns T

Purpose: KRAS G12C mutations are common oncogenic drivers in non-small cell lung cancer (NSCLC), occurring in 13% of all NSCLC patients. Sotorasib was recently approved for the treatment of KRAS G12C-mutated locally advanced or metastatic NSCLC. As a major CYP3A4 substrate, moderate CYP3A4 inducer, and P-glycoprotein inhibitor, sotorasib is subject to several drug-drug interactions (DDIs). The primary objective was to describe the frequency of sotorasib associated DDIs at a large academic medical center. The secondary objectives were to define the severity of DDIs with sotorasib, identify the most common classes of interacting medications, and compare the number of DDIs identified by a clinical pharmacist versus drug-drug interaction databases.

Methods: This retrospective study was a UPMC approved quality improvement initiative evaluating KRAS G12C-mutated locally advanced or metastatic NSCLC patients receiving sotorasib at UPMC Cancer Centers. Patients administered sotorasib as standard of care (SOC) and as part of a clinical trial (CT) (NCT03600883, NCT04185883, and NCT04625647) from January 2018 through January 2022 were included. The cohort was identified via lists obtained from research coordinators and prescribing reports generated from the electronic medical record. The total number and severity of drug interactions identified by pharmacist review, UpToDate, and Micromedex were recorded. Adverse events were graded according to Common Terminology Criteria for Adverse Events (CTCAE) Version 5.0. Baseline demographics were analyzed using descriptive statistics. Chi square was used to analyze categorical variables, and t-tests were used to analyze interval variables.

Results: Twenty-eight of 37 patients with locally advanced or metastatic KRAS G12C-mutated NSCLC patients prescribed sotorasib met inclusion criteria, including 14 SOC and 14 CT patients. Patients were prescribed a median of 12 concomitant medications (range 7-28). Twenty-seven of 28 patients (96%) were subject to at least one potential DDI. The median number of DDIs per patient was 2.5 for the CT group versus 3 for the SOC group ($p=0.94$). However, the average number of severe DDIs per patient was 0.71 for the CT group versus 1.43 for the SOC group ($p=0.02$).

Conclusions: DDIs were prevalent among patients receiving sotorasib as part of a CT and as SOC. Severe DDIs were more common among SOC patients whereas moderate DDIs were more common among CT patients. Pharmacist review of DDIs is important for efficacy and safety of sotorasib and concomitant medications. Further evaluation of the impact of these DDIs on clinical efficacy outcomes and guidance on the management of DDIs with sotorasib are needed.



Diana Mansour, PharmD

Diana is from Greensburg, Pennsylvania, and earned her PharmD from the University of Pittsburgh School of Pharmacy. Last year she completed a PGY1 pharmacy residency at UPMC Mercy, and she is now the PGY2 Oncology Pharmacy Resident at UPMC Shadyside and Hillman Cancer Center. Her professional interests include hematology/oncology, palliative care, and academia.

Mentors: Melissa Bastacky, PharmD, BCOP, Timothy L. Brenner, PharmD, BCOP, Timothy Burns, MD, PhD

Presented at the Hematology/Oncology Pharmacy Association Annual Conference, Boston, MA, March 30-April 2, 2022

Barriers to SGLT-2 Inhibitor Initiation in HFrEF or CKD Non-diabetic Patients Within Primary Care Clinics

McConnell M, Miller T, Hall D

Purpose: According to the recently updated ACC/AHA/HFSA and KDIGO guidelines, the use of SGLT-2 inhibitors is now recommended in heart failure with reduced ejection fraction (HFrEF) and chronic kidney disease (CKD) irrespective of diabetes status. This is the result of the original antidiabetic medication class demonstrating a risk reduction of all-cause and cardiovascular death, heart failure hospitalizations, in addition to preservation of estimated glomerular filtration rate (eGFR) in patients with HFrEF and CKD. It is important to understand primary care physician's prescribing habits of such medications in these patient populations to ensure optimal disease state management. In addition to prescribing habits, understanding barriers to initiating SGLT-2 inhibitors will be useful for maximizing patient care and targeted improvement initiatives. As a result, a physician survey and patient data collection were completed to understand the prescribing practices and possible barriers to utilization of SGLT-2 inhibitors within three primary care settings.

Methods:: A survey was developed for physicians with an active practice within the noted primary care clinics (Shea Medical Center, General Internal Medicine-Oakland, Shadyside Family Health Center). Questions assessed baseline knowledge of indications, prescribing comfort and frequency for HFrEF/CKD indications, perceived barriers to prescribing, and potential ways to overcome said barriers. Demographic information was also collected (practice type, professional position, and training years). Data was evaluated on an overall aggregate response. Patients with HFrEF or CKD with/without diagnosis of diabetes who were evaluated within the primary care practices were pulled using existing EPIC dashboard data between the dates of July 1st, 2021 – December 31st, 2021. In the HFrEF cohort, patients were stratified based on ejection fraction (EF) of < 40%. Additionally, both cohorts were stratified based on diagnosis of diabetes. The data was evaluated with descriptive statistics.

Results: A total of 62/133 (46.6%) physicians completed the survey. 71% (n=44) and 33.9% (n=21) have prescribed an SGLT-2 inhibitor for HFrEF or CKD, respectively. The most prevalent barriers to prescribing SGLT-2 inhibitors were insurance/cost (72.6%), patient willingness to initiate (46.8%), and risk of polypharmacy (41.9%). A total of 762 and 871 patients were identified for HF and CKD, respectively. There were 98 patients in the HFrEF cohort without a diabetes diagnosis, but only 7.1% (n=7) prescribed an SGLT-2 inhibitor. Alternatively, 411 patients in the CKD cohort included patients without a diabetes diagnosis, but only 1.5% (n=6) prescribed an SGLT-2 inhibitor.

Conclusions: When surveyed, numerous barriers to SGLT-2 inhibitor utilization were highlighted by physicians. Additionally, many physicians then provided suggestions for overcoming said barriers. This presents the opportunity to implement pharmacists in developing strategies to increase SGLT-2 inhibitor utilization within primary care clinics. A small percentage of patients with HFrEF or CKD without diabetes were found to be actively prescribed an SGLT-2 inhibitor within the given timeframe of the quality improvement study, proving a need for additional clinic education and review of guideline updates.



Madison McConnell, PharmD

Madison is a PGY-2 ambulatory care pharmacy resident at UPMC Presbyterian. She is from Pittsburgh, Pennsylvania, and received her PharmD from the University of Pittsburgh School of Pharmacy. Her professional interests include ambulatory care and academia. In her spare time, she enjoys baking, skiing, and hiking. Upon completion of her PGY-2, Madison will be moving to Phoenix, Arizona to continue her professional career as an ambulatory care pharmacist.

Mentors: Trisha Miller, PharmD, BCACP and Deanne Hall, PharmD, CDE, BCACP

Clinical Impact of Implementing Vancomycin AUC-guided Therapeutic Drug Monitoring

Meehl SP, Oleksiuk LM, Trisler MJ

Purpose: In March of 2020, UPMC Presbyterian Shadyside expanded the pharmacokinetic (PK) consult service, revised trough-targets, and implemented area under the concentration time curve (AUC)-guided dosing based on the 2020 consensus guidelines for monitoring of vancomycin therapy. This shift was made to optimize efficacy while minimizing vancomycin-induced nephrotoxicity. The primary objective analyzed was incidence of acute kidney injury (AKI), with secondary objectives including total vancomycin exposure, ability of a Cmax level to be predictive of a suprathreshold AUC-24, and incidence of the trough-based dosing strategy being used when AUC-based dosing was indicated.

Methods: Retrospective, pre- and post-quality improvement analysis was completed between the time periods of July 2019-August 2021; the pre-implementation period was July 2019-August 2019, and the post-implementation periods were July 2020-August 2020 and July 2021-August 2021. The incidence of AKI and mean daily vancomycin exposure were compared for the pre- and post-implementation periods. The objectives focusing on ability of a Cmax to be predictive of a suprathreshold AUC-24 and incidence of the trough-based dosing strategy being used when AUC-based dosing was indicated were assessed in the post-implementation period solely. Patients receiving vancomycin therapy for > 72 hours were included. Patients requiring renal replacement therapy or who had an AKI at the time of vancomycin initiation were excluded.

Results: A total of 268 patients were included, with 86 and 182 patients in the pre- and post-implementation periods, respectively. AKI occurred in 15/86 (17%) pre-implementation and 15/182 (8%) post-implementation (RR 0.47, 95% CI 0.24-0.92, p=0.03). Total vancomycin exposure per day (mean, SD) was 32 (14) mg/kg/d re-implementation and 28 (9) mg/kg/d post-implementation. A Cmax threshold of 35 mcg/mL was determined to capture 83% of patients with an AUC-24 greater than 600 mcg*h/mL. Finally, use of trough-based dosing when AUC-based was indicated occurred in 23/182 (13%), with 7/23 (30%) being due to IV access issues.

Conclusions: Transition to an AUC-based dosing strategy was associated with a reduction in the incidence of AKI and a reduction in vancomycin exposure. Results of secondary objectives will aid in informing subsequent protocol adjustments for vancomycin monitoring.



Shawn Meehl, PharmD

Shawn is from Erie, Pa. and received his PharmD from the University of Pittsburgh School of Pharmacy. He is currently completing PGY1 residency at UPMC Presbyterian Shadyside Hospital and will be completing a PGY2 residency in Pediatrics at Arnold Palmer Hospital for Children in Orlando, Florida. His professional interests within the adult and pediatric populations include oncology, infectious diseases, and critical care.

Mentors: Michael Trisler, PharmD, MPH, BCIDP, Louise-Marie Oleksiuk, PharmD, BCPS

Evaluation of Poly-(ADP-Ribose) Polymerase Inhibitor Safety in Gynecologic Malignancies

Musco JD, Gingo LL, lasella CJ

Purpose: Initial management of gynecologic malignancies includes cytoreduction followed by platinum-taxane combination therapy. Response rates to chemotherapy are high, but recurrence after chemotherapy limits treatment options. Olaparib, rucaparib, and niraparib comprise the poly-(ADP-ribose) inhibitors (PARP), a newer class of oral antineoplastic agents found to prolong progression-free survival in both the first-line maintenance as well as advanced, recurrent ovarian cancer settings. Generally, these agents are well-tolerated, but they do exhibit high rates of hematologic events including neutropenia, anemia, and thrombocytopenia warranting frequent dose adjustments. Recently, a post-hoc analysis of the niraparib phase III trial found that baseline weight and platelet count predisposed patients to these toxicities, leading to the approval of a lower initial niraparib starting dose. Hematologic toxicities are the most common treatment-emergent event reported with PARP inhibitors, suggesting a class effect. Therefore, this research aims to identify trends and clinical characteristics suggestive of hematologic toxicity across all PARP inhibitors.

Methods: A retrospective cohort analysis of 402 women with ovarian, fallopian tube, primary peritoneal cancer receiving PARP inhibitor therapy between January 2017 to September 2021 was performed. Patients were included in analysis if they were 18 years of age or older, were treatment naïve to PARP inhibitor therapy, and were curative treatment intent. Data collection included a review of outpatient provider notes, demographic information, presence of BRCA or HRD genetic mutation(s), PARP inhibitor dosing, and the incidence of adverse events with subsequent dose adjustment. The primary outcome was the incidence of hematologic adverse event requiring dose adjustment, stratified by PARP agent. Secondary outcomes evaluated were the incidence of non-hematologic adverse events, disease progression, and mortality while on PARP therapy. Baseline characteristics were evaluated using descriptive statistics and primary outcome was evaluated using a chi-square analysis.

Results: Of the 402 patients reviewed during the specified period, 303 patients met inclusion criteria for analysis. The mean age of the population was 64.2 years with 90.8% (n = 276) of patients taking PARP therapy for high-grade serous ovarian cancer. Hematologic adverse events warranting dose adjustments occurred in 13.2% (n = 40) patients. When stratified by agent, incidence of hematologic adverse events was 26.2%, 7.5%, 15% in the niraparib, olaparib, and rucaparib groups, respectively ($\chi^2=18.15$, $p < 0.01$).

Conclusions: The results of this analysis are in progress and will add to existing literature regarding the incidence of adverse events across PARP inhibitor use in gynecologic malignancies.



Justin Musco, PharmD

Justin is from Doylestown, Pennsylvania, and earned his PharmD degree from the University of Pittsburgh School of Pharmacy. He is currently a PGY1 pharmacy resident at UPMC Magee-Women's Hospital. His professional interests include oncology, infectious diseases, and OB services. Upon completion of his PGY1, he will pursue a clinical pharmacist position focused on direct patient care.

Mentors: Leslie Gingo, PharmD, BCPS, Carlo lasella, PharmD, MPH, BCTXP

Cost Comparison of Prophylactic Emicizumab vs. Factor Replacement in Hemophilia A Patients With And Without Inhibitors

Phan A, Modany A, Marr D, Rowe D, McGraw M, Bryk A, Good C

Purpose: Hemophilia A is an X-linked recessive disorder associated with a deficiency of clotting factor VIII, causing an increased risk of spontaneous, excessive bleeding. Traditional treatment options for prophylaxis to prevent or reduce the risk of bleeding in hemophilia A include bypassing agents or recombinant factor VIII. Emicizumab (Hemlibra®) was approved by the FDA for hemophilia A prophylaxis with inhibitors in 2017 and without inhibitors in 2018 and provides several advantages over traditional prophylactic therapy options, including improved efficacy, less frequent dosing, and subcutaneous route of administration. The purpose of this study is to describe and compare per member per month (PMPM) total cost of care, PMPM pharmacy and medical costs, PMPM pharmacy and medical costs associated with hemophilia, and major bleeding events pre- and post-medication change for members who have transitioned from factor replacement products or bypassing agents to emicizumab for hemophilia A prophylaxis.

Methods: A retrospective review of pharmacy and medical claims from January 2018 to December 2021 was performed to determine direct medical costs as a result of switching from factor replacement products to emicizumab for hemophilia A prophylaxis. This analysis includes members of all ages enrolled in an integrated health plan. Eligible members had a diagnosis of hemophilia A, continuous enrollment in the health plan for at least 1 year prior to receiving emicizumab with at least one claim for factor products or bypassing agents, and continuous enrollment for at least 1 year while receiving emicizumab. Diagnosis was determined using ICD-10 codes, while medical claims were identified using HCPCS J codes. The Wilcoxon signed rank test was used to compare data from pre- and post-medication switch periods. All analyses were performed based on a significance level of 0.05.

Results: A total of 24 members met criteria and were included in the analysis. Of these members, 96% were male. At the time of the study, 46% members were under 18 years of age. There was a statistically non-significant 32% lower PMPM hemophilia-associated cost and non-significant 36% lower PMPM total cost of care for members who transitioned from factor replacement to emicizumab. Lower costs were driven by one outlier whose post-transition PMPM total cost of care decreased by 76%. There was no difference in total major bleeding events between the pre- and post- medication change periods.

Conclusions: While the sample size was insufficient to detect a significant difference, there was an overall reduction in cost observed with the transition from factor replacement products or bypassing agents to emicizumab for hemophilia A prophylaxis. The major outlier noted in the analyses illustrates the impact of inhibitor status on this patient population. Due to the limited medical record data available, we were unable to confirm inhibitor status for all members. For future studies, collaboration with local centers under data sharing arrangements to increase sample size and access individual clinical profiles may provide more accurate estimates of utilization and allow for identification of specific reasons for variability in cost.



Anh Phan, PharmD

Anh is the PGY-1 Managed Care Pharmacy Resident with UPMC Health Plan. She is from Houston, Texas, and received her PharmD degree from the University of Houston College of Pharmacy. Her professional interests include clinical outreach programs and disease state management, as well as quality and provider relations initiatives. Upon completion of her residency, Anh will pursue a clinical pharmacist role with a managed care organization.

Mentors: Ashley Modany, PharmD; David Marr, PharmD; Deanna Rowe, PharmD, MS, BCPS; Molly McGraw, PharmD, BCPS

Presented at the AMCP 2022 Annual Meeting

Vancomycin Versus Non-Vancomycin Antibiotics for Treatment of Methicillin- Resistant Staphylococcus Aureus Bacteremia

Rahman H, Farrah R, Ropchack C, Pickering AJ

Purpose: Methicillin-resistant Staphylococcus aureus (MRSA) bacteremia is associated with significant mortality which approaches 20%. For MRSA bacteremia, current practice guidelines recommend the use of vancomycin or daptomycin as first-line agents. Prior studies demonstrate the utility of daptomycin over vancomycin. In instances where first-line agents cannot be used, the Infectious Diseases Society of America (IDSA) guidelines suggest the use of alternative agents including quinupristin-dalfopristine, trimethoprim/sulfamethoxazole, linezolid, or telavancin. Ceftaroline, a newer agent, is not mentioned in these guidelines for use in bacteremia. The recommendation for alternative agents is based on low quality evidence and little efficacy data has been added to the literature since publication of guidelines.

Methods: This is a single-center, multi-site, retrospective cohort study, that evaluated patients that received vancomycin or an alternative MRSA agent between July 1st, 2018 and June 30th, 2021 for MRSA bacteremia. Alternative agents included daptomycin, ceftaroline, linezolid, or telavancin. Patients were excluded if they were less than 18 years of age, had a polymicrobial infection, previous MRSA bacteremia in the past 30 days, received greater than 1 MRSA agent for 24 hours or more, or received any MRSA agent for the 5 days leading up to index culture collection. The primary outcome was a composite of 30-day all-cause in-hospital mortality, persistent bacteremia, change in MRSA agent due to clinical failure, or 30-day relapse of infection. Secondary safety outcomes included acute kidney injury (AKI), elevations in creatinine phosphokinase (CPK), neutropenia, supratherapeutic vancomycin troughs, or new incidence of clostridium difficile infection.

Results: A total of 74 patients were included with a median age of 71 and an interquartile range of 58-79. The composite failure was similar between the alternative agents and vancomycin (7% versus 15%; P=0.11). Patients that received an alternative agent had a shorter median duration of bacteremia in days (1.9 versus 2.6; P=0.036). Alternative agents carried a lower risk of acute kidney injury compared to vancomycin (0% versus 23%; P=0.003)

Conclusions: Although results were not statistically significant, there was a numerically higher rate of composite failure in the vancomycin group. Alternative agents were associated with less kidney injury and a shorter duration of bacteremia, making them a potentially safer therapeutic option.



Habibur Rahman, PharmD

Dr. Rahman is a PGY-1 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 remain at UPMC St. Margaret to complete his PGY-2 in Family Medicine.

Mentor: Aaron Pickering, PharmD, BCPS

Accepted for presentation at the 2022 Annual STFM (Society of Teachers of Family Medicine) Conference

Analysis of UPMC Pharmacists' Readiness for Pharmacogenomic Results in the EHR

Riden KA, Berenbrok LA, Coons JC, Empey PE

Purpose: Pharmacogenomic (PGx) testing is used to identify genetic variation that may impact a patient's drug response. PGx is increasingly being utilized to advance precision medicine and provide targeted treatment for patients. UPMC is among the largest US health-systems with 40 hospitals, >800 office practices, and >5000 clinicians. Through our new PGx Center of Excellence, ≥150,000 participants will receive pre-emptive CAP/CLIA PGx testing. Results will be placed in electronic health record (EHR) systems with clinical decision support (CDS), but the needs of clinicians who are to use this data for clinical decision making are unknown. Previous literature has surveyed clinicians' knowledge, perceptions, and attitudes toward PGx and ordering testing, but has not focused on preparedness for utilizing PGx results when they are already in the EHR. This subset analysis aims to evaluate pharmacist preparedness for incoming PGx results and to specifically assess their needs regarding education and institutional support resources.

Methods: An anonymous survey was developed using Qualtrics (Seattle, WA) for deployment to clinicians across the entire health system. The Genomic Medicine Integrative Research (GMIR) Framework was utilized to conceptualize the PGx return of results (RoR) process. Additional constructs were extracted from the Consolidated Framework for Implementation Research (CFIR) for study relevancy and selected for use in survey development. The study was approved by the University of Pittsburgh IRB. Final survey contained 18 questions and was piloted in three phases. Phase 1 included our research team. Phase 2 involved health system leadership stakeholders. Phase 3 included a multidisciplinary group of clinicians. The survey was disseminated in early 2022 in a phased process through senior leadership of individual clinical groups (e.g., physicians, pharmacists, etc.) with reminder emails sent after three weeks. Descriptive statistics were used in data analysis with comparative analyses in progress. Data collection is ongoing.

Results: Thus far, 11,29 of clinicians responded to the survey, 119 (11%) pharmacists. Of pharmacists, 76% indicated no prior PGx education or training, however 35% indicated that they have encountered PGx results(s) in the EHR. Sixty six percent reported that they were either slightly confident/not confident at all with their current knowledge of PGx in relation to a patient's drug management, however 85% either strongly agreed/agreed that PGx is important at the present or will be in the future. Majority preferred educational content to be brief online training modules or continuing education courses (87%, 88%), and 81% desired prescribing/dispensing alerts.

Conclusions: Pharmacists were largely optimistic that PGx is or will be important to patient care. Even though the majority of pharmacists have not been exposed to formal training or education on PGx, many have encountered PGx results in practice, and this may be influencing perceptions and attitudes towards PGx. Preliminary findings of the survey indicate that pharmacists may not yet feel prepared for PGx results that will be available in the EHR. This survey emphasizes the need for PGx education and institutional support services. Initiatives will be directed at training pharmacists in PGx and developing clinical support resources.



Katherine A. Riden, PharmD

Clinical Pharmacogenomics Research Fellow

Katie is from Florida, where she received her Bachelor of Science and Doctor of Pharmacy degrees from the University of Florida in 2015 and 2019, respectively. Following graduation, she worked as a community pharmacist for Walgreens in Lake Buena Vista, Florida. She started a two-year Clinical Pharmacogenomics Fellowship at the University of Pittsburgh in 2020. She currently works on Pharmacogenomic research, implementation science, and provides clinical care for the Pharmacogenomics Consult Service at UPMC, PreCISE-Rx, and the UPMC Primary Care Precision Medicine clinic. She will be completing her fellowship in June and is pursuing career opportunities in pharmacogenomics.

Mentors: Philip Empey, PharmD, PhD, FCCP; James Coons, PharmD, FCCP, BCCP; Lucas Berenbrok, PharmD, MS, BCACP, TTS

Impact of a Pharmacist-built Application to Educate Resident Physicians on Combined Antiplatelet and Anticoagulant Therapy

Rizkalla J, Koenig ME

Purpose: The use of pharmacotherapy to reduce thrombotic events is well established in literature. Patients with multiple comorbidities may require combination antiplatelet and anticoagulant therapy to treat their conditions. Prior studies demonstrated that patients taking aspirin with an anticoagulant have a greater risk of major bleeding compared to anticoagulation alone. Lack of specific recommendations on duration and indications of combination therapy requires greater time and attention for appropriate prescribing. Smartphones are an integral resource for retrieving healthcare information and resident physicians have embraced this form of technology into their daily practice. Studies evaluating the value of digital education have demonstrated similar effectiveness to traditional teaching strategies. The purpose of this study was to determine if implementation of a pharmacist designed smartphone application using Microsoft Power Apps, would improve confidence and knowledge regarding indications for combination therapy among family medicine residents. Secondary aims included patient characterization and change in prescribing.

Methods: This mixed-methods study was conducted at a single community and teaching hospital located in Pittsburgh, Pennsylvania. Thirty-nine family medicine residents and five combined family medicine/psychiatric residents were recruited to participate. A pharmacist presented a brief didactic lecture on a mobile application developed for the resident physicians to use in their clinical practice. This application contained guidelines and primary literature regarding the use of combination therapy. Pre-application surveys were administered at the didactic lecture followed by post-application surveys 2 months after the didactic lecture. Surveys assessed participants' confidence and knowledge regarding combination therapy using a 5-point Likert scale and case questions respectively. In addition, participants were provided a list of patients receiving combination therapy and asked to utilize the application to assess the indication. Two months after the resident physicians received the list of patients, a pharmacist reviewed all patient charts and determined if changes were made to patients' therapies.

Results: Of the 44 family medicine and family medicine/psychiatric residents, 10 completed both the pre- and post-survey. Residents' confidence with indications for combination therapy after using the application improved (3.05 vs. 3.7). Residents' correct responses to knowledge questions increased from 47% to 56%. Residents' perceptions toward the application were positive and 90% would prefer this over traditional teaching methods. Patients who were taking combination therapy (n=41) were diagnosed with atrial fibrillation (49%), coronary artery disease (61%), and venous thromboembolic events (30%). Change in prescribing results are pending.

Conclusions: A pharmacist built application led to an increase in confidence and knowledge regarding indications for combination therapy. Further discussions should be considered regarding development of applications to assist resident physicians in pharmacotherapy selection.



Joseph Rizkalla, PharmD

Joe is a PGY1 pharmacy resident and faculty development fellow at UPMC St. Margaret. He is from Johnstown, Pennsylvania, and completed his pharmacy education at the University of Pittsburgh School of Pharmacy. His professional interests include cardiology and ambulatory care. Upon completion of his PGY1 residency, he will complete a PGY2 Ambulatory Care Residency through UPMC St. Margaret at the New Kensington Family Health Center.

Research Mentor: Marianne Koenig, PharmD, BCPS

Opportunity to Optimize CYP2C19-guided Antiplatelet Prescribing During Transitions of Care

Robinson KM, Prebehalla LR, Coons JC, Empey PE

Purpose: Most CYP2C19 genotyping implementation efforts in the cardiac catheterization setting are focused around the initial cardiac catheterization event. However, because CYP2C19 genotyping may be a reactive test, genotype results may be delayed, and genotype-guided therapy may not be optimally achieved at the time of discharge. Furthermore, medication changes often occur during transitions of care as patients receive follow-up care from downstream clinicians. The purpose of this study was to understand the impact of pharmacogenomic (PGx) testing and PGx service recommendations on antiplatelet prescribing downstream of percutaneous coronary intervention (PCI).

Methods: In an IRB-approved study, eligible patients who received a cardiac stent for PCI at UPMC Presbyterian Hospital underwent CYP2C19 genotyping as part of clinical care in the PreCISE-Rx program. Patients were included for analysis if they were prescribed a P2Y12 inhibitor at discharge, had accessible follow-up visits through at least 30 days post-PCI, and had not had the P2Y12 inhibitor discontinued by 30 days post-PCI. CYP2C19 actionable phenotypes were defined as intermediate and poor metabolizers. Escalation was defined as a switch from clopidogrel to ticagrelor or prasugrel, and de-escalation was defined as a switch from ticagrelor or prasugrel to clopidogrel. Clinical implementation efforts included clinical decision support (CDS) for clopidogrel for patients with actionable CYP2C19 phenotypes and an individualized pharmacist note in the electronic health record.

Results: Of the 2099 eligible patients, 580 (27.6%) had an actionable CYP2C19 phenotype. Of the 384 patients not on genotype-concordant therapy at discharge, 69 (18%) were escalated by 30 days, which was significantly higher than the 21 (10%) of the 196 patients on genotype-concordant therapy at discharge who were deescalated at 30 days ($p=0.02$). The odds of escalation to genotype-concordant therapy were higher for patients not receiving concomitant anticoagulation therapy, for poor metabolizers, for patients whose CYP2C19 genotype resulted after discharge, and for patients not receiving clopidogrel prior to admission ($p<0.05$).

Conclusions: PGx recommendations continued to impact antiplatelet selection following PCI through transitions of care, especially for patients whose CYP2C19 genotype results were delayed until after discharge. Clinical hand-offs, medication reconciliation processes, and education efforts should include PGx considerations and be inclusive of all downstream providers, such as cardiologists, primary care providers, and pharmacists involved in all care settings to optimize CYP2C19-guided antiplatelet prescribing post-PCI.



Katherine M. Robinson, PharmD, BCPS

Katherine is currently a Clinical Pharmacogenomics Fellow at the University of Pittsburgh School of Pharmacy. She received her PharmD 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 pharmacogenomic implementation in pediatrics and oncology populations and identifying pharmacogenomic associations to optimize care.

Mentor: Philip E. Empey, PharmD, Ph.D., FCCP

Presented at the 2022 Clinical Pharmacogenetics Implementation Consortium and Pharmacogenomics Global Research Network Meeting, Denver, CO, May 10-12, 2022

Early Conversion to Everolimus after Living Donor Liver Transplantation

Rudzik KN, Schonder KS, Humar A, Moore CA, Johnson HJ

Purpose: Maintenance immunosuppression after liver transplantation (LT) typically includes a calcineurin inhibitor (CNI) as backbone immunosuppression. CNIs are known to cause numerous toxicities including neurotoxicity and nephrotoxicity. Early conversion to everolimus (EVR) has been evaluated as alternative immunosuppression in deceased donor LT and is associated with increased rejection but improved renal function. Living donor liver transplant (LDLT) is associated with lower rates of rejection and improved outcomes compared to deceased donor LT. Because of these differences, outcomes with early EVR after LDLT may be different than deceased donor LT. However, at this time, no studies have been completed regarding early conversion to EVR after LDLT. This study aims to evaluate the impact of early CNI withdrawal and EVR introduction in LDLT. A retrospective cohort study was conducted to compare the rate of rejection and renal function in patients converted to EVR early post-LDLT to patients maintained on CNIs.

Methods: This was a single center retrospective cohort study of adult LDLT recipients between January 2012 and August 2019. Patients were excluded if they had previous solid organ transplants, received an ABO incompatible organ, did not survive to discharge, or received donor derived dendritic cell infusions as part of a clinical trial. Patients converted to EVR within the first 180 days of transplant were compared to patients maintained on CNIs. The primary endpoint was biopsy proven acute rejection (BPAR) at 24 months post-transplant. Key secondary endpoints included eGFR at 24 months, eGFR at 12 months, change in eGFR from baseline, CKD staging, adverse events, infections, and all-cause mortality. Comparative statistics (chi square, T-test) were used to analyze categorical and continuous data. A multivariable logistic regression was used to analyze risk of BPAR. Time to BPAR was analyzed using Kaplan-Meier methods and log-rank to calculate statistical significance.

Results: 58 patients were included in the EVR group and 115 in the CNI group. Patients were converted to EVR a median of 26 days post-LDLT. At 24 months, there was no difference in BPAR (22.7% EVR vs 19.1% CNI, $p = 0.63$). Baseline eGFR was similar between groups. Median eGFR at 24 months post-transplant was not significantly different (68.6 [24.8-112.4] mL/min EVR vs 75.9 [35.6-116.2] mL/min CNI, $p = 0.103$). Change in eGFR was worse in the EVR group (-13.0 [-39.9-13.9] mL/min EVR vs -5.0 [-31.2-21.2] mL/min CNI, $p = 0.047$). Adverse events were more common in the EVR group.

Conclusions: EVR was not associated with increased risk of rejection among LDLT recipients converted within the first 180 days post-transplant. Renal function was not significantly different at 24 months post-transplant. EVR may be considered an alternative after LDLT in patients intolerant of CNIs.



Katelyn Rudzik, PharmD

Katie was born and raised in Pittsburgh, PA. and received her PharmD from the University of Pittsburgh School of Pharmacy. She completed her PGY1 residency at UPMC Presbyterian and is the current PGY2 Solid Organ Transplant Pharmacy Resident. Katie has accepted a position post-residency as a Lung Transplant Clinical Pharmacy Specialist at Cleveland Clinic.

Mentors: Heather Johnson, PharmD, BCPS; Kristine Schonder, PharmD

Implementation of Continuous Glucose Monitoring Systems in Interprofessional Primary Care Clinics

Simpkins C, Castelli G

Purpose: Continuous glucose monitors (CGMs) can be a helpful tool in controlling blood glucose in select patients with diabetes. However, creating and implementing a process for CGMs in primary care clinics is a current practice challenge for busy providers and staff unfamiliar with CGMs. There are many steps in obtaining a CGM that are usually learned in practice. Currently, some clinics are utilizing CGMs with an interprofessional care team including physicians and pharmacists, but there are not always clearly defined roles and responsibilities. In order to better understand how implementing CGMs in a primary care clinic can become more efficient and effective, the aim of this project is to identify the current barriers that exist in three primary care clinics in obtaining and implementing a CGM for a patient. Subsequently, a protocol will be developed to clarify and simplify the process for interprofessional staff.

Methods: This was a quality improvement study performed at three primary care family health centers associated with a teaching community hospital. All patients who were considered for a continuous glucose monitor (CGM) and referred to a pharmacist for evaluation were included. The pharmacist at each family health center documented the process of obtaining and implementing CGM monitoring for patients, even if they did not receive a CGM. Qualitative data was also collected by asking the pharmacist to document reflections that may help create a protocol to mitigate encountered barriers throughout the process. All patient-related information was de-identified prior to retrospective analysis. The outcomes were the barriers of this process and patient characteristics that contributed to success. Descriptive statistics were utilized to evaluate the data. These outcomes were utilized to create a protocol that minimizes encountered barriers and can be easily implemented at each interprofessional family health center to identify patients that would be the most successful in using a CGM.

Results: A total of 44 patients were considered for CGMs across three primary care centers from July 1, 2021 to March 31, 2022. The most common barriers in obtaining a CGM were contacting the dispensing party (pharmacy or DME) to obtain the CGM and cost. The most common barriers in placing and monitoring the CGM were the time constraints of the initial and follow-up visit and patient expectations regarding when they need to come into the office. Out of the 28 patients who successfully received a CGM and came back for monitoring, over 70% of them had social support, were self-motivated, consistently followed with the clinic, were checking their blood glucoses at home, and were able to be easily contacted by the clinic.

Conclusions: Although CGMs can be beneficial tool in the management of diabetes, not every patient who was considered for a CGM was an ideal candidate or was able to receive the device through insurance. Within three interprofessional primary care family health centers, pharmacists aided in the implementation and management of CGM systems by predicting barriers in obtaining CGMs and addressing challenges throughout the initial process of obtaining the device. Pharmacists also assisted in identifying patients who would benefit from CGM therapy.



Courtney Simpkins, PharmD, BCPS

Courtney is from Louisville, Kentucky, and received her PharmD from the University of Kentucky. Last year she completed a PGY1 pharmacy residency at UPMC St. Margaret, and she is now the PGY2 Ambulatory Care Pharmacy Resident at the UPMC St. Margaret Bloomfield-Garfield Family Health Center. Her professional interests include chronic care management, academia, and global health. She has a passion for serving underserved patients both locally and abroad. She enjoys volunteering her time, working out at Burn Boot Camp, and finding the best donut around.

Mentor: Gregory Castelli, PharmD, BCPS, BC-ADM, CDCES

Budget Impact Analysis of a Vancomycin Stewardship Bundle

Simpson JV, Marini RV, Shields RK

Purpose: Vancomycin therapeutic drug monitoring is a common institutional practice aimed at predicting efficacy of treatment. AUC guided dosing is a novel approach that better predicts regimens to ensure safe outcomes. This study was conducted in a large academic medical center that analyzed a multi-phase implementation of a pharmacist driven vancomycin therapeutic dosing service.

Methods: Cost variables were collected from a three-month timeframe for patients both pre and post implementation of this service. The implementation contained three major parts: AUC guided dosing using a Bayesian software program, MRSA PCR tests, and GenMark Eplex tests. Cost variables included the cost of vancomycin, cost of levels drawn, and cost of any acute kidney injury incurred from vancomycin therapy. These costs were compared in both groups to see the overall financial impact of this vancomycin therapeutic drug monitoring service.

Results: In the pre-implementation group, the overall cost including all cost variables analyzed was \$1,162,232.22. In the post-implementation group, all cost variables resulted in \$801,845.29. The cost difference overall was \$360,386.93 during the three-month time frame analyzed for both groups of patients.

Conclusions: Overall, a pharmacist driven therapeutic drug monitoring service of vancomycin showed notable cost savings. These can be attributed to the decrease in AKI shown from the pre-implementation group and the post-implementation group.



Joseph Simpson, PharmD, MBA, BCPS.

Joe is originally from New Jersey and graduated from Duquesne University School of Pharmacy in 2020. Joe is currently a PGY2 Health System Pharmacy Administration and Leadership Resident at UPMC Presbyterian.

Mentors: Rachel Marini, PharmD, BCIDP, Ryan Shields, PharmD

Assessing Patient Knowledge of Proton Pump Inhibitors and Implementation of a Patient Education Deprescribing Effort

Sittard L, Dittmer A, Ordons B, McKittrick C, D'Amico, F, Grimes A

Purpose: Proton Pump Inhibitors (PPIs) are widely used by patients for a variety of gastrointestinal indications. Patients may not be aware of the indication of a prescribed PPI or may be taking it for an inappropriate reason. Long-term PPI use has been associated with serious complications. Research suggests that many patients are not aware of these risks, supporting a need for deprescribing efforts and patient education. The primary outcome of this study was patient knowledge of their PPI indication and side effects associated with long-term use. The secondary outcomes were patient prevalence of outpatient follow up, change in PPI use, and knowledge of indication after receipt of the intervention.

Methods: This study is a cross-sectional, point-prevalence, single center, survey-based study. The study was conducted at a community teaching hospital. Patients were included if they were over 18 years-old and had a PPI on their medication reconciliation done by a pharmacist. Patient knowledge of PPI indication and side effects with long term use was assessed through a survey. A pharmacist then reviewed an educational handout and recommended patients to discuss their PPI use with their outpatient healthcare provider. Patients' self-reported PPI indication was compared to the documented indication in the electronic health record. A follow-up survey was completed via phone or email 2-4 weeks after discharge from the hospital to assess if patients discussed their PPI with their provider and had any changes made to PPI use.

Results: Pending

Conclusions: Pending



Lauren Sittard, PharmD

Dr. Sittard is a PGY1 pharmacy resident and faculty development fellow at UPMC St. Margaret. She is originally from Chicopee, MA and received her pharmacy degree in 2021 from the University of Rhode Island. Her professional interests include geriatrics, chronic disease state management, and academia.

Mentor: Amy Grimes, PharmD, BCPS, BCGP

Accepted for presentation at the 2022 Annual STFM (Society of Teachers of Family Medicine) Conference

12 Months vs. Extended Therapy of Valganciclovir for CMV Prophylaxis in D+/R- Lung Transplant Recipients

Smith AN, Iasella CJ, Moore CA, Sacha LM

Purpose: Despite advances in immunosuppression and surgical techniques, overall survival following lung transplantation remains poor with 55% survival five years post-transplant. From registry data, the International Society for Heart and Lung Transplantation (ISHLT) has identified cytomegalovirus (CMV) infection as a risk factor for chronic lung rejection. Serological mismatch [CVM Donor Positive (D+)/Recipient Negative (R-)] is the greatest risk factor for development of CMV disease. It's currently recommended by the American Society of Transplantation Infectious Diseases Community of Practice Guideline to provide D+/R- patients with 12 months of valganciclovir for CMV prophylaxis. However, post-prophylaxis delayed-onset CMV disease is still observed. There is limited data to support CMV prophylaxis beyond 12 months of therapy. The objective of this retrospective study was to evaluate extended CMV prophylaxis with standard 12-month therapy in D+/R- lung transplant recipients and define its success preventing the development of CMV viremia and disease.

Methods: This retrospective cohort study included patients greater than or equal to 18 years of age and received a single or double lung transplant as identified by ICD-CM 9 and 10 procedure codes between January 2014 and December 2019 at UPMC Presbyterian. Chart review was performed to identify patients that were CMV serology status D+/R- for study inclusion. Data was only included for the first transplant for patients identified with two lung transplants within the study period. The receipt of valganciclovir during the transplantation admission was identified using medication charge data for study inclusion. The primary endpoint was the incidence and time to development of CMV viremia. Key secondary endpoints included incidence of and time to CMV disease, and time to and development of chronic lung allograft dysfunction. Descriptive statistics were used to assess the cohort at baseline, and Kaplan-Meier methods were used for time to event analysis.

Results: We initially identified 453 lung transplant recipients for screening, of which 133 met inclusion criteria. The mean age of patients was 53.2 and 57.1% were male. Of those included, 107 received a double lung transplant and 23 received a single lung transplant. Chronic obstructive pulmonary disease (COPD) was the most common diagnosis requiring transplantation followed by idiopathic pulmonary fibrosis and cystic fibrosis. Other data collected includes positive blood CMV polymerase chain reaction (PCR) results, forced expiratory volume (FEV1), presumed and confirmed presence of CMV disease, and nadir platelet, hemoglobin, and absolute neutrophil count values. Additional analysis is ongoing.

Conclusions: Pending



Autumn Smith, PharmD

Autumn grew up in the small town of Brandywine, West Virginia, and received her PharmD from West Virginia University School of Pharmacy. She is completing her PGY-1 Pharmacy Residency at UPMC Presbyterian. Her professional interests include ambulatory oncology, bone marrow transplant, and cancer survivorship care. Next year, Autumn will be traveling back to Morgantown, West Virginia to complete her PGY-2 training in Oncology at WVU Medicine.

Mentors: Cody A. Moore, PharmD, BCTXP, MPH, BCPS; Carlo J. Iasella, PharmD, MPH, BCRXP, BCPS; Lauren M. Sacha, PharmD, BCTXP, BCPS

Embedded Primary Care Pharmacists' Perceived Impact on Patient Care

Sprando, AC, Sakely, HA, Taylor, AM, Koenig, ME

Purpose: Pharmacists have become essential components to inter-professional teams and their clinical contributions have led to substantial benefits in patients' health. Despite the advancement the profession has made, pharmacists are still striving to obtain provider status which would allow full reimbursement for their services. As a result of not being able to bill for pharmacists' full services, they are not routinely embedded into primary care clinics. This qualitative research study collected pharmacist impact stories that demonstrated the value of pharmacy services on a personal level. The goal of this study was to gather evidence that continues to justify the need for pharmacist provider status.

Methods: Participants were identified as being pharmacists in the UPMC health system, embedded in a primary care setting. Inclusion criteria included pharmacists 18 years or older, employed through UPMC, and currently working as an embedded pharmacist in a primary care setting. Participants were emailed a survey that asked a series of questions to assess pharmacist impact regarding a patient encounter of their choice. The survey was open from October 2022-February 2022. Two independent coders analyzed results and code books and themes were identified through discussion among coders. Data analysis was conducted simultaneously with the ongoing survey responses to identify when thematic saturation was achieved. After thematic saturation was achieved, no further data was analyzed for the results. The research team collaboratively chose quotes for each theme to represent the outcomes of the study.

Results: Pending

Conclusions: Pending



Arianna Sprando, PharmD

Arianna is from Grove City, Pennsylvania, and received her PharmD in 2021 from the University of Pittsburgh. She is currently a PGY1 at UPMC St. Margaret. Arianna will be continuing her experience as a PGY2 at UPMC St. Margaret through their Ambulatory Care Track with a focus in family medicine. Her professional interests include chronic disease state management, family medicine, and transitional care. Arianna hopes to pursue a career as an embedded clinical pharmacist in a primary care office.

Mentors: Heather Sakely, PharmD, BCPS, BCGP; Alexandria Taylor, PharmD, BCPS; Marianne Koenig, PharmD, BCPS

Health Inequities in Vulnerable Communities: Pharmacists Supporting Medication Adherence

Tang AT, Carroll JC, Richardson RM, Gessler CA, McGivney MS, Coley KC

Purpose: Addressing health inequity is a focus of public health initiatives and involves both social and structural factors, including poverty, access to education, and transportation. Adherence to medications can also be impacted by health inequities. Factors such as food insecurity, housing instability, and social determinants of health can all impact patients' medication-taking behaviors. Community pharmacists are well-positioned to help address health equity issues because of their accessibility and geographic locations. However, they may not have the tools needed to address these inequities. The objectives of this study are to: (1) determine medication adherence disparities across locations at a regional supermarket community pharmacy chain; and (2) elicit strategies to address medication adherence-related health inequity.

Methods: This project utilized a mixed-methods design. For Objective 1, the social vulnerability index (SVI) and proportion of days covered (PDC) score for diabetes, cholesterol, and renin-angiotensin system antagonists (RASA) from 1/1/2021 to 11/30/2021 were collected for each pharmacy. SVI ranks 15 social factors, including unemployment, minority status, transportation, and disability, with higher SVI representing increasing vulnerability. Pearson correlations were used to assess the relationship between SVI and PDC scores for each pharmacy. For Objective 2, corporate leaders and clinical pharmacists were invited to participate in one of two focus groups. Pharmacists working in pharmacies located in medium-high to high SVI communities were invited to participate in semi-structured interviews. Focus groups and interviews were audio-recorded and transcribed verbatim. A mixed deductive-inductive, qualitative thematic analysis will be conducted to identify strategies to address medication adherence disparities at both the individual pharmacy and corporate levels.

Results: There were 204 pharmacies included in the medication adherence disparities analysis for Objective 1. Pearson Correlations revealed a weak, inverse correlation between SVI and cholesterol ($r = -0.149$; $p=0.03$) and RASA ($r = -0.172$; $p=0.01$) PDC scores; meaning that as vulnerability increased, medication adherence scores decreased. There was no statistically significant relationship between SVI and diabetes PDC scores. For Objective 2, a preliminary qualitative analysis revealed some initial strategies to address medication adherence-related health inequities: (1) Enhance access to medications by linking pharmacy with food access programs; and (2) Leverage technology to support patient medication education.

Conclusions: The results of this study can be used to identify existing medication adherence disparities between pharmacies within a pharmacy chain. The strategies created by stakeholders may be used by other community pharmacies nationwide to address medication adherence and health inequities within their communities.



Angela Tang, PharmD

Angela is currently the PGY-1 Community-based Residency with the University of Pittsburgh School of Pharmacy and Giant Eagle Pharmacy. Her professional interests include geriatrics, ambulatory care, and medication therapy management. Upon completion of PGY-1, Angela will complete a PGY-2 in Geriatrics at MAHEC/UNC Eshelman School of Pharmacy. She received her PharmD from the University of Florida College of Pharmacy in 2021.

Mentors: Kim C. Coley, PharmD, FCCP; Joni C. Carroll, PharmD, BCACP, TTS; Melissa A. Somma McGivney, PharmD, FCCP, FAPhA

Presented at the APhA Annual Meeting, San Antonio, Texas. March 18-21, 2022

Assessment and Result Driven Pharmacists Patient Impact Stories

Taylor AM, Sprando AC, Sakely HA, Koenig ME

Purpose: The United States Surgeon General report noted that for every \$1 spent on pharmacy services an average of \$10.07 was saved in health care spending. Despite the value the pharmacist can add to the primary care team, pharmacists are not widely embedded into primary care clinics primarily due to barriers to reimbursement of pharmacists' services provided. Our study aims to further contribute to the literature to demonstrate the value of pharmacists' interventions within the primary care setting.

Methods: This was a prospective observational study of pharmacists' reported patient encounters within primary care settings from October 2021 to March 2022. All encounters with patients 18 years or older by a UPMC pharmacist within the primary care setting were included. The primary outcome was the total number of identified medication-related problems (MRPs) as defined by the Pharmacy Quality Alliance. Secondary outcome was total cost avoidance from pharmacists' interventions calculated from cost avoided from emergency department visits (ED), hospital admissions, deprescribed medications, improved medication adherence, and A1C lowering. Cost avoidance values were estimated based on previously published literature and average costs provided by a local health plan.

Results: A total of 47 encounters were collected in which 289 MRPS were identified. Of the 289 MRPs identified, 152 (52.5%) were resolved. A total of one emergency department visit avoided, seven hospitalizations avoided, and 29 medications deprescribed. Thirty-one patients improved medication adherence and 12 patients improved A1C from a baseline of <9%. Combined outcomes resulted in an estimated cost avoidance of approximately \$113,760.

Conclusions: This study demonstrates the value of the pharmacist within the primary care team. Pharmacists play a key role in identifying and addressing MRPs. The potential cost avoidance from pharmacists' interventions can add to the justification of adding pharmacists to the care team. A focus on cost avoidance over direct reimbursement from pharmacy services should be considered when evaluating the feasibility of embedding a pharmacist into a primary care clinic.



Alexandria Taylor, PharmD, BCPS

Dr. Taylor is one of the PGY2 ambulatory care pharmacy residents at UPMC St. Margaret. Her primary practice site this past year was the UPMC New Kensington Family Health Center. She received her Doctor of Pharmacy degree from the University of Pittsburgh in addition to completing the Global Health Area of Concentration in 2020. She completed her PGY1 pharmacy residency at UPMC St. Margaret. After residency, Dr. Taylor plans to join the pharmacy residency faculty at UPMC St. Margaret and will be the inpatient family medicine clinical pharmacist.

Mentors: Marianne Koenig, PharmD, BCPS; Heather Sakely, PharmD, BCPS, BCGP

Presented at the Society of Teachers of Family Medicine 2022 Annual Spring Conference, Indianapolis, Indiana, April 30-May 4, 2022

Evaluating Phenobarbital Loading Dose on the Rate of Intubation in Patients Experiencing Alcohol Withdrawal Syndrome

Taylor VC, Ganchuk S, Miller TJ

Purpose: Alcohol withdrawal syndrome (AWS) is a common cause of morbidity and mortality in the United States. Historically, the standard of care treatment for AWS has been withdrawal assessment score (WAS) driven administration of benzodiazepines. Given the increased risk of delirium and other adverse effects associated with benzodiazepines, a need for alternative AWS treatment options has been recognized. Phenobarbital has emerged as a favorable treatment option in AWS given its favorable pharmacokinetic profile, availability in a variety of dosage forms, and mechanism of action. Multiple studies have shown the efficacy of phenobarbital when compared to WAS driven administration of benzodiazepines. However, there is a paucity of data outlining an ideal loading strategy to maximize safety and efficacy when utilizing phenobarbital in AWS. The purpose of this study is to compare the rate of intubation in two different phenobarbital loading dose groups, with the goal of optimizing future phenobarbital dosing strategies.

Methods: Patients were included in this retrospective chart review if they were admitted to UPMC Mercy between September 1, 2020 and September 30, 2021 and ordered the “Phenobarbital for the Prevention of Alcohol Withdrawal” protocol. Patients were excluded if they were ordered this protocol but never received phenobarbital or if they never received a loading dose (i.e. they only received a taper regimen). For evaluation of the primary and secondary outcomes, phenobarbital loading dose regimens were dichotomized into a low dose strategy (< 8 mg/kg/load) and high dose strategy (\geq 8 mg/kg/load). The primary outcome was rate of intubation due to either lack of control of their AWS symptoms or due to oversedation. Secondary outcomes include ICU length of stay, transfer to a higher level of care, and number of days WAS \geq 10.

Results: A total 84 patients were evaluated (47 in the low loading dose strategy and 37 in the high loading dose strategy). The median age was 58 years and approximately 81% of patients were male. The highest WAS, on average, within 24 hours of AWS diagnosis was 19. A total of 20 patients required intubation due to lack of AWS control (11 in low dose strategy and 9 in high dose strategy; $p=0.728$). No intubations in either group occurred due to oversedation. No statistically significant differences in secondary outcomes were noted between the two groups.

Conclusions: Intubations in patients receiving phenobarbital loading doses for AWS primarily occurred due to lack of control of their withdrawal symptoms rather than oversedation from their loading dose regimen. Future studies are needed to definitively determine an ideal loading dose regimen to maximize safety and efficacy in this patient population.



Veronica Taylor, PharmD

Veronica is from Virginia Beach, Virginia, and received her PharmD in 2021 from Virginia Commonwealth University. She is completing her PGY-1 residency at UPMC Mercy. Upon completion, she will remain in the Pittsburgh area and work as a pharmacist in the hospital setting.

Mentors: Steven Ganchuk, PharmD, Taylor Miller, PharmD

Incidence of Co-infections Following Treatment with Tocilizumab in Patients with COVID-19

Tempo A, Miller T, Hendrickson J, McCormick P, Gionfriddo M

Purpose: In initial trials, tocilizumab decreased progression to severe COVID-19 disease requiring mechanical ventilation. However, one study cast doubts on overall benefits of tocilizumab due to an increase in superinfections among patients treated for COVID-19. The purpose of this study is to compare the rate of co-infection among patients with COVID-19 who received tocilizumab and standard of care (SOC) versus SOC alone.

Methods: This was a retrospective cohort study of COVID-19 positive adult patients who received SOC with or without tocilizumab at UPMC Mercy between October 2020 and August 2021. The primary outcome was the incidence of co-infection within 28 days. Secondary outcomes included mortality, antibiotic usage, incidence of intubation, and length of stay. Patients who received tocilizumab were matched 1:1 based on age and gender to patients who received SOC alone. Fischer-Exact and Wilcoxon signed-rank tests were utilized for demographic information. T-tests and Fischer-exact tests were used to analyze the results of this study.

Results: A total of 49 patients received tocilizumab. Co-infection incidence within 28 days was 42.9% in the tocilizumab group vs. 32.7% in the SOC group (95% CI 0.68-3.5, $p = 0.4$). Death within 28 days occurred at 32.7% vs. 22.4% (95% CI 0.68-4.11, $p = 0.37$), among tocilizumab and SOC, respectively. Antibiotics were administered in 53% of tocilizumab vs. 26.5% of SOC patients (95% CI 1.34-7.3, $p=0.01$). 32.5% vs. 11.1% of patients were intubated after administration of tocilizumab vs. SOC, respectively (95% CI 1.23-12.06, $p = 0.02$). The average hospital stay was 15.9 days (± 12.6 days) for tocilizumab patients vs. 10.6 days (± 7.1 days) for SOC patients ($p=0.01$).

Conclusions: The use of tocilizumab for the treatment of COVID-19 did not increase the incidence of coinfections compared to standard of care; however, there was a higher rate of antimicrobial use after tocilizumab administration than with SOC alone. Patients who received tocilizumab had a higher rate of mechanical ventilation likely attributed to higher baseline oxygen requirements among the tocilizumab group compared to SOC group.



Allison Tempo, PharmD

*Allison is from Greensburg, Pennsylvania, and earned her PharmD degree from Duquesne University School of Pharmacy in 2021. She is currently a PGY1 pharmacy resident at UPMC Mercy Hospital. She looks forward to staying in Pittsburgh after residency to pursue a career as a clinical pharmacist. She enjoys baking, exercising, and spending time with friends and family.

*Mentors: Josh Hendrickson, PharmD; Taylor Miller, PharmD

Evaluation of Screening and Referral for Substance Use Disorders in the Emergency Department

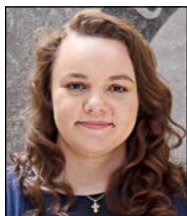
Emily Thacker, PharmD; Angela Morton, M.A.; Mandy Fauble, PhD, LCSW; Michael Lynch, MD; Tanya Fabian, PharmD, PhD, BCPP

Purpose: Emergency departments (EDs) are often 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). Those with SUD often seek medical care in the ED, but rarely receive treatment for SUD, demonstrating an important opportunity to connect them with care. The purpose of this study is to evaluate the current level of screening and referral for SUD that occurs in the ED of UPMC Hospitals, and to determine areas for possible targeted interventions which can increase screening and referral to treatment for SUD. We aim to determine patient characteristics such as age, gender, race, and comorbid conditions that impact screening and referral 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 one of several UPMC EDs during the calendar year 2021. Information collected included screening for SUD as evidenced by completion of relevant items in their ED assessment note (current or past drug/alcohol use). Additional information included patient demographics, chief complaint, discharge disposition, and dispensing of Naloxone.

Results: Preliminary results for one facility, UPMC Northwest, suggest that approximately 76% of emergency department visits had documented information regarding substance use history with 21% of patients endorsing lifetime drug use. Rates of referral to treatment for SUD, barriers to screening, drug use trends and results from other UPMC facilities is pending.

Conclusions: This study will help to inform policies and procedures regarding assessment of drug and alcohol use during emergency department visits. Trends and barriers for screening 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 is currently a PGY1 pharmacy resident at UPMC Western Psychiatric Hospital. She is from rural West Virginia and completed her Bachelor of Science in Chemistry and Biology from Radford University in 2017 and Doctor of Pharmacy from West Virginia University in 2021. Next year, she will be continuing to a PGY2 in psychiatric pharmacy at UPMC Western Psychiatric Hospital. Her professional interests include psychiatry, addiction medicine, and underserved care.

Mentor: Tanya Fabian, PharmD, PhD, BCPP

Efficacy of Prophylactic IVIG Administration for Post-transplant Hypogammaglobulinemia

Werner TS, Iasella CJ, Moore CA, Sacha LM

Purpose: Secondary hypogammaglobulinemia (HGG) often confers worse outcomes in patients following lung transplant. HGG is defined as a serum IgG level < 700 mg/dL and can be further classified as mild (IgG 400-700 mg/dL) or severe (IgG < 400 mg/dL). Approximately 63% of lung transplant recipients develop HGG with severe HGG occurring in around 15% of patients. Secondary HGG in solid organ transplant has been documented to increase 1-year all-cause mortality, and rates of infection. The role of IgG supplementation in HGG following solid organ transplantation has not been well defined. There is currently no uniform dosing strategy for intravenous immunoglobulin (IVIG) in lung transplant recipients with HGG. UPMC recently standardized the criteria for IVIG administration in HGG following lung transplantation. The purpose of this study is to evaluate the impact of the current IVIG strategy on infection rates and survival outcomes.

Methods: Patients were included if they were 18 years or older, received a lung transplant between June 2016 and December 2020, and had at least one serum IgG level collected posttransplant. Patients were excluded if they had a coexisting primary immunodeficiency, received IVIG initially for antibody mediated rejection, or if they died during index lung transplant admission. Patients were stratified into four cohorts based on transplant date, HGG, and receipt of IVIG: 1) transplanted after July 2019 with HGG and received IVIG, 2) transplanted after July 2019 without HGG, 3) transplanted after July 2019 with HGG and no receipt of IVIG, 4) transplanted between July 2016 and June 2019 with HGG and received IVIG. Primary endpoint was rate of infection in the first year posttransplant defined as positive culture, viral panel, or cytomegalovirus PCR. Secondary endpoints include mortality rate posttransplant, rate of CLAD, and the presence of donor-specific antibodies.

Results: A total of 382 patients were included in the study with 219 (55.8%) being male and 169 (44.2%) female. The mean age of included patients was 55 with a range of 20 to 73 years old. The majority of patients in the study identified as white (90.6%), while 5.2% and 0.5% identified as black or Indian, respectively.

Conclusions: Pending.



Taylor Werner, PharmD

Taylor is from Charlotte, North Carolina. She received a bachelor's degree in genetics from Clemson University and received her Doctor of Pharmacy from the University of North Carolina at Chapel Hill. Taylor is completing her PGY1 Pharmacy Residency at UPMC Presbyterian and next year, she will complete a PGY2 residency in Oncology at UPMC Shadyside.

Mentors: Lauren M. Sacha, PharmD, BCPS, BCTXP; Carlo J. Iasella, PharmD, MPH, BCPS, BCTXP; Cody A. Moore, PharmD, BCPS, BCTXP

Utilization Trends of Select Medications Used Off-label for the Treatment and Prevention of COVID-19

White A, Jose A, Hospodar A, Hobaugh C, Bartley J

Purpose: As of January 2022, there have been more than 60 million cases of COVID-19 resulting in over 800,000 deaths in the United States. The uncertainty of COVID-19 and limited FDA-approved treatments has led to approved prescription drugs being utilized as off-label treatments and preventative agents. During the pandemic, agents such as hydroxychloroquine, azithromycin, chloroquine, albuterol, and ivermectin have all been utilized off-label for the treatment and prevention of COVID-19. While it is known that the use of these agents increased at some point during the pandemic, what is unknown, is by how much. The primary objective is to identify utilization trends of select medications used off-label for the treatment and prevention of COVID-19.

Methods A retrospective, claims-based, observational study was completed identifying utilization trends of select medications used off-label for the treatment and prevention of COVID-19 in a select commercial-employer population over a three-year study duration, 2019, 2020, and 2021. The pre-pandemic period is defined as 1/1/2019 to 3/10/2020 and the pandemic period is from 3/11/2020 to 12/31/2021. Pre-pandemic claims will be identified as paid claims before March 11, 2020, the date the COVID-19 outbreak was declared a pandemic by the World Health Organization. The primary endpoint of the study analyzed overall utilization trends of albuterol, azithromycin, chloroquine, hydroxychloroquine, and ivermectin. Overall utilization was measured by the days supply per 1,000 members per month quarter-over-quarter. The secondary outcomes analyzed the overall gross cost per 1,000 members per month for each medication year over year and the percentage of pre-pandemic and pandemic total claims with a days supply associated with COVID-19 treatment.

Results: Utilization from Q4 2019 to Q1 2020 saw the greatest percentage increase in total days supply (TDS) per 1,000 members per month for albuterol (27%, 87 TDS), chloroquine (84%, 0.19 TDS), and hydroxychloroquine (18%, 11 TDS). Ivermectin experienced the steepest increase in overall utilization with percentage increases of over 150% in the Q1 2021 and Q3 2021. Ivermectin was also the only agent that experienced an increase in gross cost in 2021. Hydroxychloroquine and ivermectin both experienced a greater percentage of total claims filled with a days supply for the treatment of COVID-19 during the pandemic versus the pre-pandemic period.

Conclusions: The overall trend of utilization for albuterol, chloroquine, and hydroxychloroquine was very similar, with an initial increase from Q4 2019 to Q1 2020, during the beginning of the COVID-19 pandemic. Ivermectin differed from the other medications in regard to the quarter that the overall utilization and gross cost trend increased. Online search engine results showed a similar trend in the number of searches per drug and the timing of increased utilization. For example, ivermectin was most searched during Q3 2021, the same time utilization saw its greatest increase. A similar trend was seen with albuterol, azithromycin, and chloroquine.



Abigail White, PharmD

Abigail is from Pittsburgh, Pennsylvania, and received her PharmD from the University of Pittsburgh School of Pharmacy in 2021. Upon completion of her managed care residency program at CVS Health, she hopes to continue to work with various health plans to promote the use of cost-effective therapies and utilization management strategies that are focused on improving patient outcomes within a managed care organization.

Mentors: Abraham Jose, PharmD; Alexa Hospodar, PharmD; Carley Hobaugh, PharmD; Jennifer Bartley, PharmD, MBA, MS

Utilizing Theoretical Domains Framework to Determine Barriers to Evidence-based Recommendations in Non-valvular Atrial Fibrillation

White EM, Kane-Gill SL, Jain S, Medico C, Ansani N, Coons JC

Purpose: Implementation of evidence-based guidelines into patient care is inefficient. Only 14% of new research being adopted into clinical practice. The current atrial fibrillation (AF) practice guidelines recommend anticoagulation in men with a CHA2DS2-VASc score greater than or equal to 2 and in women with a CHA2DS2-VASc score greater than or equal to 3. Despite these recommendations, oral anticoagulation prescribing rates were found to be as low as 51%. Existing frameworks, such as the theoretical domain framework, are used in implementation science to identify behavior changes to overcome barriers to guideline adoption. In this study we explored behavioral themes and barriers that prevented adherence to evidence-based recommendations in patients with nonvalvular atrial fibrillation (NVAF) and developed interventions to overcome those barriers.

Methods: Nine focused interviews were conducted with stakeholders involved with NVAF care. Interview questions were based on TDF and designed to determine behavior changes necessary to increase appropriate anticoagulation prescribing and decrease unnecessary NVAF hospital admissions. The interviews were transcribed and coded using NVivo 12 qualitative data analysis software (released 2018). Themes were documented, and interventions were then developed to address the barriers.

Results: Four main barrier themes were identified that related to two theoretical domains relevant to the underutilization of anticoagulation in appropriate high-risk patients and unnecessary hospital admissions of NVAF patients. Barriers identified were lack of knowledge, cost of anticoagulation, patient refusal to take anticoagulation, and determinants of social health. The two related theoretical domains were knowledge and environmental context and resources.

Conclusions: Interviews based on TDF helped to elicit multiple barriers contributing to the underutilization of anticoagulation in patients with NVAF and unnecessary hospital admissions of stable NVAF patients from the emergency department. Use of TDF can serve as a valuable tool to identify barriers to evidence-based practice and aid in developing targeted interventions to promote guideline adherence.



Evan White, PharmD

Evan is from Charlotte, North Carolina, and received a BS in biomedical engineering from the University of South Carolina and his PharmD from the University of North Carolina at Chapel Hill in 2020. He is in the second year of the two-year Implementation Science and Pharmacoanalytics Fellowship at the University of Pittsburgh School of Pharmacy. His professional areas of interest include implementation science, cardiology, anticoagulation, and data analysis.

Mentor: James C. Coons, PharmD, FCCP, FACC, BCCP

Presented at the American College of Clinical Pharmacy annual meeting in the virtual poster presentation forum, October 2021

Evaluation of Apixaban Prescribed for Stroke Prevention in Patients with Atrial Fibrillation in Accordance with FDA labeling at UPMC Presbyterian Shadyside Hospital

Zhang H, PharmD, MBA; Szymkowiak AM, PharmD; Kane-Gill SL, PharmD, MSc, FCCM, FCCP; lasella CJ, PharmD, MPH, BCTXP, BCPS

Purpose: Current guidelines have recommended direct-acting oral anticoagulant (DOAC) use over warfarin for stroke prevention in DOAC eligible patients with atrial fibrillation or atrial flutter. Apixaban is among the FDA approved DOACs for this indication. The dose adjustment criteria for apixaban provided by the FDA labeling is extensive and commonly results in inconsistencies with recommended doses. Available literature suggested the inconsistencies of prescribed apixaban dosing ranges from 43.0% to 56.7%. Among the inconsistent dosing groups, underdosing was found to be associated with higher risk of stroke and thrombosis events, and overdosing was associated with higher risk of bleeding. At UPMC Presbyterian Hospital, such incidences and its associated clinical implications have yet to be assessed. Therefore, the objective of this study is to investigate the consistency with FDA-labeled apixaban dosing recommendations at UPMC Presbyterian Hospital and to evaluate the associated clinical adverse outcomes

Methods: A retrospective cohort study conducted in patients ≥ 18 years of age admitted to UPMC Presbyterian Hospital with the primary diagnosis of atrial fibrillation or atrial flutter and treated with apixaban between October 1st, 2015, through December 31st, 2020. Patients were identified through ICD-CM 10 atrial fibrillation/atrial flutter diagnosis codes along with apixaban charge codes. The primary endpoint was to determine the prevalence of inconsistencies in dosing apixaban and the associated rates of bleeding and thrombosis within thirty days. Dosing inconsistency was assessed by comparing prescribed apixaban doses versus FDA labeling. Baseline demographics were compared between patients with consistent dosing and patients with inconsistent dosing using chi square test or t-test as appropriate.

Results: A total of 2,698 patients who had a diagnosis of atrial fibrillation/atrial flutter and were prescribed apixaban for the indication of stroke prevention were included in the study cohort. The average age of the study cohort was 69 ± 11 years and 16.8% had an age greater than or equal to 80 years old. 40.2% of the patients were female sex and majority of the race were Caucasians (83.3%). The average length of stay were 10.5 days and 51 patients died during initial visit. Further analysis is ongoing.

Conclusions: Pending.



Heting Zhang, PharmD, MBA

Heting was born in China and moved to Houston, Texas, when she was 14 years old. Heting is completing her PGY1 Health-System Pharmacy Administration and Leadership (HSPAL) Residency at UPMC Presbyterian hospital. Heting will stay on at UPMC Presbyterian to complete her PGY2 HSPAL Residency training next year. Her professional interests are health system pharmacy operations and automations.

Mentors: Adrienne M. Szymkowiak, PharmD, Sandra L. Kane-Gill, PharmD, MSc, FCCM, FCCP, Carlo J. lasella, PharmD, MPH, BCTXP, BCPS

Evaluating the Impact of Clinical Benefit of a Medication Adherence Packaging Program

Zhu S, Bruno M, Aspinall M, Iasella C, Ruby Scelsi CM

Purpose: Poor medication adherence is shown to lead to poor clinical outcomes such as disease state exacerbations, hospitalizations, and death, in addition to increased health care costs. Medication adherence packaging programs (MAPP) can play a role in improving patients' medication adherence. There are several methods of measuring medication adherence. The Pharmacy Quality Alliance (PQA) recommends proportion of days covered (PDC) to be used in measuring adherence. However, PDC may not demonstrate clinical benefit of medication adherence. The clinical benefit of using MAPPs along with monthly pharmacist review as a method to reduce hospitalizations is undetermined. The objective of this study was to determine the clinical benefit of a MAPP one year before and after At Home program enrollment at Rx Partners LTC, LLC Pharmacy, a UPMC pharmacy.

Methods: This is a retrospective pre-post study to determine clinical benefit of a medication adherence packaging program (MAPP). Patients aged 25 – 120 years enrolled in the UPMC Health Plan and those who are enrolled in Rx Partners At Home MAPP between January 1st 2020 – December 31st 2020 for at least 12 months were included. Patients were required to be on 5 or more packaged (tablets/capsules) maintenance medications at time of enrollment in MAPP. Patients who were unenrolled from the MAPP or UPMC Health Plan less than 12 months after initial enrollment were excluded. Hospital visit-related data, emergency department (ED) visits, and skilled nursing facility (SNF) stays were collected for 12 months before and 12 months after patient enrollment in the MAPP. In July 2020, there was a process change with implementation of daily hospital admission and discharge reports. The primary outcome was the change in the number of hospitalizations. The secondary outcomes were the change in the number of 30-day readmissions, ED visits, and SNF stays pre-enrollment and post-enrollment. The secondary outcomes also included the frequency and type of pharmacist intervention in the post-enrollment setting. Primary and secondary outcomes were analyzed using Wilcoxon Signed Rank Test.

Results: Of the 445 patients included in the analysis, 121 patients had hospitalizations during their pre-enrollment period for a total of 166 visits compared with 108 patients in the post enrollment period for a total of 139 visits ($p = 0.14$). Of the hospitalizations, 30/166 were potentially preventable medication related in the pre-enrollment period and 22/139 in the post-enrollment period ($p = 0.001$). There were 21 patients who had skill nursing facility stays during their pre-enrollment period for a total of 32 visits compared with 11 patients in the post enrollment period for a total of 13 visits ($p = 0.02$). Pharmacists prevented 1 medication error for every 2 patients in the post enrollment setting.

Conclusions: Enrollment in the MAPP was associated with less hospitalizations, less SNF stays, and less ED visits. In addition, enrollment in the MAPP was associated with significantly less potentially preventable medication related hospitalizations. After the July 2020 process change with implementation of daily hospital admission and discharge reports, there were more pharmacist interventions, and most interventions were discontinuation of an inappropriate medication.



Sharon Zhu, PharmD

Sharon is from New York City and received her PharmD from Northeastern University in Boston, Massachusetts. She completed her PGY1 pharmacy residency at NYU Langone Hospital – Long Island in Mineola, New York. She is currently completing her PGY2 Geriatric Pharmacy residency at UPMC Presbyterian Shadyside. Upon completion of her residency, she plans to practice as a geriatric pharmacist in the ambulatory care setting.

Mentors: Matthew Bruno, PharmD, Monica Aspinall, PharmD, BCGP, Carlo Iasella, PharmD, MPH, BCPS, BCTXP, Christine Ruby Scelsi, PharmD, BCPS, BCGP, FASCP

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PHARMACY RESIDENCY PROGRAM

Post Graduate Year 1 (PGY1)

**Community Pharmacy: Rite Aid Pharmacy,
Giant Eagle Pharmacy, Asti's Pharmacy**

Director: Melissa Somma McGivney, PharmD,
FCCP, FAPhA

Managed Care at CVS Caremark

Director: Carley J. Hobaugh, PharmD

Managed Care at UPMC Health Plan

Director: Molly McGraw, PharmD, BCPS

Pharmacy at UPMC Chartwell Pennsylvania, LP

Director: Johanna Bezjak, PharmD, BCNSP

**Pharmacy at UPMC Children's Hospital of
Pittsburgh**

Director: Jennifer Shenk, PharmD, BCPPS

Pharmacy at UPMC Magee-Womens Hospital

Director: Julie Nowak, RPh, BCGP, FASCP

Pharmacy at UPMC McKeesport

Director: Nicole Likar, PharmD, BCPS

Pharmacy at UPMC Mercy

Director: Taylor Miller, PharmD

Pharmacy at UPMC Presbyterian Shadyside

Director: Heather Johnson, PharmD, BCPS

Pharmacy at UPMC Shadyside

Director: Michele F. Hebda, PharmD, CTTS, BCPS

Pharmacy at UPMC St. Margaret

Director: Gregory Castelli, PharmD, BCPS, BC-ADM,
CDCES

Pharmacy at UPMC Western Psychiatric Hospital

Director: Matthew Joseph, PharmD, BCPS

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: Lauren Jonkman, PharmD, MPH

Ambulatory Care Family Medicine at UPMC Shadyside

Director: Stephanie Ballard, PharmD, BCPS

Ambulatory Care at UPMC St. Margaret

Director: Roberta M. Farrah PharmD, BCPS, BCACP

Cardiology at UPMC Presbyterian Shadyside

Director: James C. Coons, PharmD, FCCP, FACC, BCCP

Critical Care at UPMC Presbyterian Shadyside

Director: Pamela L. Smithburger, PharmD, MS, BCPS, BCCCP, FCCP, FCCM

Geriatrics at UPMC Rx Partners

Director: Christine Ruby-Scelsi PharmD, BCPS, BCGP, FASCP

Geriatrics at UPMC St. Margaret

Director: Heather Sakely, PharmD, BCPS, BCGP

Oncology at UPMC Cancer Centers

Director: Timothy L. Brenner, PharmD, BCOP

Psychiatric Pharmacy at UPMC Western Psychiatric Hospital

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