# Resident Research
## 2017–18

PittPharmacy

## Mission

The School of Pharmacy is committed
to improving health through
excellence, innovation, and leadership
in education of pharmacists and pharmaceutical scientists,
in research and scholarship,
in care of patients,
and in service to our communities.

## 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 Resident Class of 2018,

Each and every one of you has distinguished yourself among pharmacy practitioners by completing a residency program. I congratulate you on completing this intensive year of learning—gaining pharmacy expertise and mastering elements of teaching and research that triangulate to better prepare you for your careers. As residents, you have enjoyed the best the academic and practice worlds have to offer through the collaborations between the School of Pharmacy and its partners— The UPMC hospitals including Presbyterian, Shadyside, Western Psychiatric Institute and Clinic, Magee-Womens, St. Margaret, McKeesport, Mercy, Hamot, and Childrens' Hospital of Pittsburgh, UPMC Health Plan, Rite Aid, Giant Eagle, Asti's South Hills Pharmacy and CVS Caremark.

You also have another distinction: as a class of residents, you made a commitment to learning clinical research skills through the Pharmacy Residency Research Program. During your career, you will be faced again and again with clinically important questions. The skills you learned created a foundation on which to build answers—and to become tomorrow's leaders in pharmacy.

We celebrate your distinction as a pharmacist who is completing your residency in one of the largest and finest programs in the country. Because of that, your personal experience has been enriched by your peers from Arizona, Colorado, Florida, Hawaii, Indiana, Kansas, Maryland, Massachusetts, Michigan, Missouri, New York, Ohio, Pennsylvania, South Carolina, Texas, Virginia, Washington, and West Virginia.

You have earned one more distinction! You each have just become an alumnus of our University of Pittsburgh School of Pharmacy Residency Program and will forever be a part of our community. It is my sincere hope that you carry with you fondly the rich experiences of this past year 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!

# Valuing Our Partners

The University Pittsburgh School of Pharmacy values our partnerships with the University of Pittsburgh Medical Center (UPMC), the UPMC Health Plan, Rite Aid, Giant Eagle, and CVS Caremark. It is through these partnerships that the Residency Program has grown in national reputation.

The University of Pittsburgh Medical Center is ranked among the top 10 of "America's Best Hospitals" according to the 2013 U.S. News and World Report rankings and is one of the leading integrated health care delivery systems in Western Pennsylvania. UPMC Presbyterian, UPMC Shadyside, UPMC Mercy, UPMC St. Margaret, UPMC McKeesport, UPMC Hamot, Childrens' Hospital of Pittsburgh of UPMC, and Western Psychiatric Institute and Clinic of UPMC participate in our residency programs.

UPMC Health Plan, the second-largest health insurer in western Pennsylvania, is owned by UPMC, an integrated global health enterprise. The integrated partner companies of the UPMC Insurance Services Division — which includes UPMC Health Plan, UPMC WorkPartners, LifeSolutions (EAP), UPMC for You (Medical Assistance), and Community Care Behavioral Health — offer a full range of group health insurance, Medicare, Special Needs, CHIP, Medical Assistance, behavioral health, employee assistance, and workers' compensation products and services to nearly 2.5 million members.

Rite Aid Corporation is one of the nation's leading drugstore chains with nearly 4,800 stores in 31 states and the District of Columbia, with a strong presence on both the East Coast and West Coast, and 97,000 associates. Rite Aid is the largest drugstore chain on the East Coast and the third- largest drugstore chain in the United States.

Giant Eagle Pharmacy is a leading regional pharmacy with departments in 216 Giant Eagle locations across four states. Customers with qualifying prescriptions benefit from programs including the Giant Eagle $4/$10 generic prescription program, free prenatal vitamins, and high-quality service from expertly trained pharmacists. Additional unique services include Specialty Pharmacy offerings, in-store immunizations, 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.

University Pharmacy, located in Nordenberg Hall, is available to all University of Pittsburgh students, faculty and staff, their dependents, and the public at large. The pharmacist team offers a wide variety of patient care services including: medication therapy management, preventive and wellness care, specialized OTC selection, medication education programs in collaboration with practitioners at the Student Health Services Clinic and Counseling Center.

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.

# Pharmacy Residency Research Program

## Sandra L. Kane-Gill, PharmD, MSc, FCCM, FCCP
## 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 infectious diseases, dysrhythmias, acute coronary syndrome, and shock states. There was a particular emphasis on medication safety evaluations of vasopressors, nephrotoxins, deliriogenic medications, antipsychotics and overall deprescribing. 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 at UPMC 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: Megan Baumgartner, Lucas Berenbrok, Ron Campbell, Megan Carr, Greg Castelli, Kim Coley, Brad Cooper, Amy Donihi, Heather Johnson, Julie Nowak, Louise-Marie Oleksiuk, Pam Smithburger, James Stevenson and Laura Wilson. The efforts of the program directors and research mentors are greatly appreciated. Amy Seybert, chair of the Department of Pharmacy and Therapeutics and Bryan Yourich, Regional Director of Pharmacy Operations, 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 fine administrative support of Matthew Freidhoff, Donna Ford and Sherri Peterson. Most importantly, this program is successful because of the commitment of our outstanding residents.

## Cost of treatment of low-risk venous thromboembolism (VTE) patients with direct-acting oral anticoagulants (DOAC) versus enoxaparin and warfarin

Asamoah BW, L'Altrelli A, Saul MI, Baumgartner MA, Kane-Gill SL

**PURPOSE:** Venous thromboembolism (VTE) is associated with high use of health care resources. Treatment in the outpatient setting is recommended for hemodynamically patients at low risk for adverse effects. Bridging with parental heparin and routine monitoring of warfarin present challenges to disposition of patients from the ED. Direct-acting oral anticoagulants have comparable efficacy to the VKAs, with significantly lower bleeding and no routine monitoring and bridging with parenteral agents which facilitates treatment without hospital admission. However, there are limited studies of outcomes and related costs in VTE patients at low risk for adverse effects with DOAC. The primary objective was to compare total healthcare charges 30 days after treatment initiation for low-risk VTE patients admitted to the hospital and those patients treated as an outpatient.

**METHODS:** A retrospective study was conducted to compare cost of treatment of low-risk VTE patients discharged from the ED with a DOAC or heparin and warfarin or admitted for inpatient management. Patients diagnosed with VTE were stratified into low and high-risk groups per simplified version of the pulmonary embolism severity index. The low-risk cohort was stratified into discharged and admitted patients for review of their anticoagulants and healthcare utilization and charges. Secondary objectives included healthcare utilization, predictors of high risk of complications and inpatient admission for low-risk patients, and anticoagulant used.

**RESULTS:** Overall 13,438 met the study criteria, 1,428 of whom were positive for chronic (296), acute (1045), and acute on chronic VTE (55). Further results pending.

**CONCLUSIONS:** Pending.

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## Benedicta Asamoah

Benedicta received her PharmD from the University of Maryland School of Pharmacy in 2017 and is completing a health-system pharmacy administration residency at UPMC in 2019. Upon completion of the residency, she plans to practice in a hospital setting.

**Mentor(s):** Sandra Kane-Gill, PharmD, MS, FCCM, FCCP; Alfred L'Altrelli, PharmD

## Outpatient medication burden of patients prior to hospital death

Ayers G, Pruskowski J, Sands R

**PURPOSE:** There is some literature surrounding the topic of polypharmacy burden in both palliative and hospice patients which identifies a high incidence of prescribing non-essential medications. However, there is limited research surrounding outpatient medications of patients prior to hospital death. The objective for this study was to explore outpatient medication burden in patients prior to hospital death and identify potential areas of improvement in prescribing patterns to focus future research efforts.

**METHODS:** A retrospective chart review was conducted to quantify outpatient medication use in all comfort measures only (CMO) patients who ceased to breathe at one of two hospitals between 1/1/2016 to 6/30/2016. Quantitative data was obtained using the medication reconciliation performed at hospital admission. We identified the number of medications, medication class, and medication subclass. Baseline characteristics were also obtained. Descriptive statistics were used to describe the results.

**RESULTS:** A total of 77 patients were included. Average age was 67 years old and average Charlson Comorbidity Index was 3. Most patients were on at least 10 medications prior to hospital admission. Over 50% of patients received either a proton pump inhibitor (PPI) or a histamine-2 receptor antagonist (H2RA). Other common medications included aspirin, antihypertensive agents, and statins.

**CONCLUSIONS:** Older adults within days of hospital death are often prescribed potentially non-essential medications. Future research efforts should focus on developing solutions to minimize medication burden in this vulnerable patient population.

*Presented at the AGS Annual Scientific Meeting in Orlando, FL, 2018.*

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## Gina Ayers

Gina is from Winchester, VA. She received her PharmD from Shenandoah University and bachelor's degree in biology from the University of Mary Washington. She completed her PGY1 residency program at UPMC St. Margaret. This year she is continuing her training as a PGY2 in geriatrics at UPMC St. Margaret. Gina's current professional interests include geriatrics, chronic disease state management, and interprofessional education. Other interests include spending time with friends and family and hiking. After completing her PGY2 in geriatrics, she will be a Geriatric Clinical Pharmacy Specialist at Cleveland Clinic.

**Mentor(s):** Jennifer Pruskowski, PharmD, BCPS, BCGP, CPE

## Normal saline vs. Plasma-lyte for resuscitation in septic shock

Bastacky ML, Benedict NJ, Kane-Gill SL

**PURPOSE:** The Society of Critical Care Medicine's Surviving Sepsis Campaign and Management Guidelines recommend crystalloid solutions, specifically normal saline (NS), for fluid resuscitation in septic shock. However, NS contains supraphysiologic concentrations of sodium and chloride and has led to acid-base disturbances, specifically, hyperchloremic metabolic acidosis. The inability to correct an abnormal base deficit is a surrogate marker of continued shock and poor outcomes. The purpose of this study was to describe chloride and other electrolyte level trends in septic shock patients receiving NS versus PL. In addition, we sought to determine the impact of fluid type on kidney function.

**METHODS:** This was a single healthsystem, multi-center, retrospective cohort study that included inpatients ≥18 years who received a bolus ( ≥ 500 mL) of NS or PL and a broad spectrum antibiotic for fluid resuscitation in the setting of septic shock (as indicated by a positive qsofa score within 24 hours of antibiotic administration). The primary outcome was change in plasma chloride levels prior to and after fluid resuscitation. Secondary outcomes included change in sodium, potassium, bicarbonate, creatinine, blood urea nitrogen, and pH within 24 and 48 hours of fluid administration. Presence of AKI based on KDIGO staging was also determined.

**RESULTS:** Sodium and chloride plasma levels were significantly increased from 137.33 mEq/L to 137.72 mEq/L and from 105.39 mEq/L to 107.43 mEq/L respectively after NS bolus administration ($p<0.05$), albeit this increase may not be clinically significant. Based on KDIGO AKI criteria, 36.5% of the PL group and 37.8% of the NS group had AKI ($p=0.64$). There was no statistically significant difference in severity of AKI between groups ($p=0.084$), as 39.7% were stage 1, 32.4% were stage 2, and 27.9% were stage 3 in the PL group, and 43.2% were stage 1, 22.2% were stage 2, and 34.6% were stage 3 in the NS group.

**CONCLUSIONS:** Fluid resuscitation with balanced electrolyte solutions like Plasma-lyte in the setting of septic shock may be a better alternative to avoid electrolyte disturbances and possibly a trend towards worsening AKI severity.

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## Melissa Bastacky

Melissa is a PGY1 Pharmacy Resident at UPMC Presbyterian-Shadyside Hospital. She completed her undergraduate and pharmacy school training at the University of Pittsburgh. Her current interests lie in immunology, pharmacogenomics, and oncology. She will be continuing her training next year at UPMC-Shadyside Hospital to specialize in oncology as a PGY2.

**Mentor(s):** Sandra L. Kane-Gill, PharmD, MS, FCCM, FCCP; Neal Benedict, PharmD

## Evaluation of discharge antibiotics in patients with community-acquired pneumonia

Batykefer BM, Wilson LM, Simonelli RJ

**PURPOSE:** The IDSA treatment guidelines for community-acquired pneumonia (CAP) state that patients should be treated with pathogen-directed antimicrobial therapy for 5 to 7 days. Many patients are initiated on antimicrobial therapy in the hospital and subsequently discharged with oral antibiotics. At our institution, patients are often prescribed a duration of therapy greater than recommended by the guidelines with the addition of the outpatient antibiotic prescription. This quality improvement (QI) project is designed to evaluate the need for an antimicrobial stewardship program focusing on pharmacist intervention to prevent an unnecessary extended duration of antimicrobial therapy for the treatment of CAP upon hospital discharge.

**METHODS:** This QI project was a retrospective chart review of patients treated for CAP and discharged from UPMC Mercy from January 2015 to December 2016. Inclusion criteria were greater than 18 years of age, diagnosis of CAP, and a hospital discharge with a prescription for oral antibiotics. Exclusion criteria were patients admitted from a long-term care facility or an outside hospital, inpatient diagnosis of a lower respiratory tract infection in the last 30 days, and cystic fibrosis. Data collection included patient demographics, allergies, inpatient antibiotics, duration of inpatient antibiotics, discharge antibiotics, duration of discharge antibiotics, infecting organism, and disposition upon discharge.

**RESULTS:** A total of 839 patients were screened, with 117 patients being included. According to IDSA treatment guideline criteria, 70/117 patients (59.8%) received an inappropriate duration of antimicrobial therapy. Of those, 99% received an extended total duration of therapy. The mean total duration of antimicrobial therapy was 8.79 days (IQR: 3 days). Initial inpatient antimicrobial therapy was ceftriaxone plus azithromycin for 90/117 (77%) of patients. The majority of patients (82/117 [70%]) were discharged from the hospital on a fluoroquinolone to complete therapy.

**CONCLUSIONS:** The inappropriate extended duration of antimicrobial therapy seen in this review suggests that an antimicrobial stewardship program with pharmacist intervention may be warranted. In addition, the majority of patients were treated inpatient with an intravenous β-lactam plus macrolide combination and subsequently discharged on an oral fluoroquinolone, which is a change in drug class. According to the IDSA guidelines, it is not recommended to change antibiotic drug class when switching from intravenous to oral therapy for a patient responding to the initial regimen.

*Presented at the 75th Annual ASHP Midyear Clinical Meeting and Exhibition, Orlando, FL, 2017.*

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## Bridget Batykefer

Bridget received her PharmD from Duquesne University Mylan School of Pharmacy in 2017 and will be completing a pharmacy practice residency at UPMC Mercy in 2018. Upon completion of her residency, she plans to continue to practice at UPMC Mercy and pursue a BCPS in Pharmacotherapy.

**Mentor(s):** Laura Wilson, PharmD, BCPS; Robert Simonelli, PharmD

## Evaluation of statin use in nursing home patients with diabetes given goals of care

Bobrzynski EM, Sakely HA

**PURPOSE:** The use of statins late in life is a clinical controversy. There is concern that statins are overprescribed in older adults, given increased risk of adverse events and prolonged time-to-benefit. Population health quality markers include the use of statins in patients with diabetes and atherosclerotic heart disease. This perspective fails to consider patient-centered goals that impact medical decision making. Utilizing goals of care can guide the optimization of medication regimens, especially when clinical data is lacking. This study aims to describe statin-prescribing trends in relation to goals of care in nursing home patients with diabetes.

**METHODS:** A chart review was performed on patients with diabetes in a skilled nursing facility over a 12-month period. The primary endpoint was the rate of statin prescribing in those meeting Centers for Medicare & Medicaid Services (CMS) criteria for Statin Use in Persons with Diabetes (SUPD). The Pennsylvania Orders for Life Sustaining Treatment (POLST) was used as a surrogate marker for goals of care, a document that outlines patients' wishes for medical intervention during a medical emergency and/or near end of life. Those with DNR code status were considered to have limited goals of care compared to CPR code status.

**RESULTS:** In preliminary analysis, we reviewed patient characteristics of available participants (n=70). There were 55.7% females (n=39) and 44.3% (n=31) males, with a mean age of 80.9 years. The responsible physician group included 14 providers. Twenty-four patients (34.3%) had a diagnosis of clinical ASCVD providing an additional indication for a statin. The average Charlson-Comorbidity Index score 6.6, corresponding to a 0% estimated 10-year survival. Medication burden was also high, with each patient taking 12 scheduled medications on average (range 6 to 25 medications). Forty-three patients (61.4%) were statin users. The most commonly utilized statins were atorvastatin (44.2%) and simvastatin (34.9%).

**CONCLUSIONS:** Based on preliminary analysis, we observed substantial statin prescribing, even among a population of advanced-age nursing home patients with a high comorbidity index. We anticipate determining the rate of statin prescribing as it aligns with patients' goals of care. There may yield an opportunity for de-prescribing in those identified as "DNR" on the POLST. This study aims to review trends in prescribing patterns which focus on patient-centered medicine and further the discussion surrounding potentially inappropriate prescribing in older adults.

*Presented at the American College of Clinical Pharmacy Virtual Poster Symposium, Pittsburgh, PA, 2018; Teaching and Learning in Academic Medicine (TLAM) Conference Series, Pittsburgh, PA, 2018.*

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## Emily Bobrzynski

Emily Bobrzynski is from Pittsburgh, PA. She received her PharmD from the University of Pittsburgh School of Pharmacy in 2017. Emily is a PGY1 pharmacy practice resident at UPMC St. Margaret where she is continuing as a PGY2 pharmacy resident in geriatrics next year.

**Mentor(s):** Heather A. Sakely, PharmD, BCPS, BCGP; Emily Kryger, PharmD, BCGP

## Evaluation of documentation for urinalysis indications in the emergency department

Bouchard JL, O'Brien CM, Oleksiuk LM

**PURPOSE:** Infectious Diseases Society of America practice guidelines generally recommend against screening for and treating asymptomatic bacteriuria (ASB) in an effort to curb unnecessary antibiotic use. Clear documentation of urinary symptoms, and indication for urinalysis (UA) or urine culture (UC), are thus needed to help limit unnecessary treatment of ASB. The goal of this quality improvement project is to describe UA ordering practices in the ED at UPMC Shadyside.

**METHODS:** This was a retrospective chart review of patients, who were not admitted, with a UA performed in the ED from 9/1/2017 to 9/15/2017 and 10/15/2017 to 10/31/2017. Patients who were under 18 years old, pregnant, scheduled for a urological procedure, or on antibiotics for prevention or treatment of UTI were excluded. The primary objective was to quantify the percentage of patients with a documented indication for UA. Secondary objectives were to enumerate the percentage of patients with classic urinary symptoms documented, the percentage of patients who received antibiotics for a UTI, and to compare reflex to culture criteria for UAs at the institution.

**RESULTS:** Two hundred seventy-four patients were included, with 133 (49%) having a documented indication for UA. Classic urinary symptoms were documented for 91 (33%) patients. Fifty-six (20%) patients received antibiotics for treatment of presumed UTI. Of those, 50 (89%) had a documented indication for UA, 51 (91%) had a positive UA, 32 (57%) had classic urinary symptoms documented, and 26 (46%) had a positive UC. Reflex to culture ordered UAs were utilized in 204 (74%) patients, with UAs screening positive in 108 (53%) and 23 (11%) of samples using established and proposed screening criteria, respectively.

**CONCLUSIONS:** The results of this study suggest areas for improvement in documentation of indications for UA ordering. While only 20% of patients received treatment for a UTI, a large proportion did not have classic UTI symptoms documented. Further research is needed regarding the impact of improved UA indication documentation and alternative reflex criteria on ASB treatment.

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## Jeannette Bouchard

Jeannette received her PharmD from the Regis University in 2017 and is currently completing a pharmacy practice residency at UPMC Shadyside. Upon completion of her PGY-1 residency, Jeannette will be continuing her training in South Carolina where she was accepted to a PGY-2 Infectious Diseases program at the University of South Carolina/Palmetto Health.

**Mentor(s):** Louise-Marie Oleksiuk, PharmD, BCPS; Casey O'Brien, PharmD, BCPS

## Impact of a deprescribing presentation on family medicine residents' knowledge of safe deprescribing

Carr ML, Jarret JB, Sakely H, Pruskowski J

**PURPOSE:** Deprescribing is the systematic process of reducing or stopping medications that may be harmful or no longer needed in patients. A provider-specific barrier to deprescribing that has been identified is uncertainty and lack of knowledge about how to safely deprescribe, particularly regarding eligible medications, tapering regimens, and appropriate populations. This study aimed to create a presentation for family medicine physician residents using algorithms for safe deprescribing. The primary outcome was impact on knowledge for safe deprescribing for family medicine physician residents.

**METHODS:** This was an educational intervention in which a deprescribing presentation, consisting of algorithms and recommendations from Deprescribing.org for proton pump inhibitors, benzodiazepines, and antipsychotics, was given to family medicine residents during an in-person didactic session at two family medicine residency programs. Residents were asked to complete a pre-test, a post-test, and an additional post-test 4 weeks after the presentation. There were five case-based questions that assessed eligible patient populations, medications, and appropriate tapering regimens for deprescribing. Baseline knowledge was measured by test score correctness. Change in knowledge was measured by the difference in correct responses between pre- and post-tests.

**RESULTS:** A total of 17 residents at two family medicine residency programs participated in the deprescribing presentation. The mean pre-test score for both residency programs was 3.41 out of 5.0, and the mean day 1 post-test score for both residency programs was 4.11 out of 5.0. Three total residents completed the day 28 post-test, and the mean test score at day 28 was 3.67 out of 5.0. Senior residents had a larger change in score from pre- to day 1 post-test compared to those residents in their first and second years of training.

**CONCLUSIONS:** There was an overall improvement in pre- and day 1 post-test scores after a deprescribing presentation was given to family medicine residents, and this improvement was demonstrated across two different family medicine residency programs. Further research is warranted to determine the impact on family medicine resident practice after implementation of an educational intervention for deprescribing.

*Presented at American Geriatrics Society 2018 Annual Scientific Meeting, Orlando, FL, May 4, 2018.*

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## Megan Carr

Megan is from Overland Park, KS, and received her PharmD from the University of Kansas School of Pharmacy in 2016. She completed her PGY1 at UPMC St. Margaret and is currently completing her PGY2 in Geriatrics at St. Margaret. She will start work as an inpatient geriatric clinical pharmacist after residency. Her professional interests include geriatric care, interprofessional education, and health literacy.

**Mentor(s):** Jennifer Pruskowski, PharmD, BCPS, BCGP, CPE; Jennie B. Jarrett, PharmD, BCPS, MMedEd; Heather Sakely, PharmD, BCPS, BCGP

## Discontinuation of antipsychotics post-ICU discharge

Cheng ED, Cooper BE

**PURPOSE:** Delirium is commonly treated in the ICU. Studies have shown that many times medications started in the ICU are continued on discharge. For geriatric patients with dementia, antipsychotics are known to increase mortality. At UPMC Hamot, a previous medication use evaluation (MUE) determined that 35% of patients initiated on antipsychotics for delirium continued these medications following hospital discharge. Ultimately, the aim of this project is to increase the rate of discontinuation of antipsychotics by the time of patient discharge from the hospital.

**METHODS:** This study was performed as a concurrent intervention. Patients initiating antipsychotics were identified using *Drug Informatics*. As patients treated for delirium were discharged from the ICU, the pharmacist followed up with hospitalists or primary physician to 1) document an antipsychotic tapering plan if one does not exist and 2) monitor patient progress while tapering antipsychotics. Identified patients were reviewed on the day of transfer and daily thereafter. Rate of antipsychotic continuation at discharge was calculated. Rate of continuation at discharge was compared with data collected from a previous MUE. Resulting data was tested using a chi-squared test for significance.

**RESULTS:** 50 patients were reviewed in the final analysis. 5 patients continued antipsychotics inappropriately, and 6 patients continued antipsychotics appropriately. 39 patients (89%) were discontinued from antipsychotics. Pharmacist intervention took place for 22 patients. The previous year's discontinuation rate was 64%. The difference was statistically significant at a p-value of 0.005.

**CONCLUSIONS:** More frequent pharmacy intervention yields increased rates of delirium antipsychotic discontinuation. Pharmacy education and coordination with non-critical care units yields increased rates of discontinuation. Potential ideas for improvement include more detailed documentation of antipsychotic tapering plans in patient discharge notes as well as more updated medication reconciliation for patients as they transition to lower levels of care.

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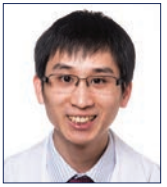

## Eric Cheng

Eric received his PharmD from the University of Maryland School of Pharmacy in 2017. He is currently a PGY1 pharmacy practice resident at UPMC Hamot in Erie, PA. Upon completion of his PGY1 residency in 2018, he will undergo a second year of residency training at the VA San Diego Healthcare System to specialize in pharmacy informatics. Upon completion of his professional training, he plans to practice as an informatics pharmacist in a hospital setting.

**Mentor(s):** Brad E. Cooper, PharmD, FCCM, MBA

## Identifying key factors associated with high-achieving chain pharmacy teams delivering quality care for patients in medically underserved areas

Cho KH, Coley KC, Berenbrok LA, Ossman K, Hopper A, McCullough J, Gilmore LA, and McGivney MS

**PURPOSE:** The purpose of this study is to uncover how high-achieving pharmacy teams in medically underserved areas (MUAs) provide patient care. Pharmacists improve patient outcomes and are readily positioned to positively impact the care of vulnerable patients in MUAs. This study aims to evaluate socioeconomic and demographic data, as well as the common qualities, workflows, and approaches to patient care present in high-achieving pharmacy teams, that all may contribute to improved patient care. Learning from pharmacists who are successfully achieving quality care metrics for patients in MUAs can assist others in learning to emulate these best practices.

**METHODS:** This study utilizes a mixed-methods approach and includes pharmacies within a traditional chain in Ohio and Pennsylvania in MUAs. Population- and pharmacy-level demographics were collected for each pharmacy. Each demographic covariate underwent univariate regression with pharmacy quality performance as the dependent variable. A final multivariate regression, including select covariates affecting quality, was conducted. Pharmacies were further categorized by clinical and quality metrics. Highest-performing pharmacies were invited for participation in recorded, semi-structured interviews based on the Theoretical Domains Framework. Key-informant interviews were conducted until saturation, transcribed, and coded by independent investigators for thematic analysis.

**RESULTS:** Statistical analysis of demographics suggests the percentage of population insured (>93%) was associated with a greater likelihood of high-quality care (OR = 1.83, p = 0.03, 95% CI = 1.15-33.77). Pharmacy team members at thirteen high-achieving pharmacies in MUAs were interviewed (n = 42). Transcript coding and thematic analysis of interviews are ongoing. Preliminary themes shared amongst these high-achieving pharmacy teams include cultural humility, positive team dynamics, and community engagement.

**CONCLUSIONS:** MUAs traditionally have low practitioner-to-patient ratios coupled with patients with lower achievement of health-related goals. This results in an intense need for practitioners who can meet their needs in their own communities. Pharmacists in these communities are well positioned to meet this need. Creating a framework of successful approaches by community pharmacists in MUAs to meaningfully achieve high quality patient outcomes can serve as a model for others to replicate nationwide and encourage thoughtful decision-making in the team building, hiring, and retention process.

*Presented at the American Pharmacists Association Annual Meeting in Nashville, TN, 2018.*

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### Katherine Cho

Katie received her PharmD from the University of Michigan College of Pharmacy in 2017 and is completing a community pharmacy residency with the University of Pittsburgh School of Pharmacy and Rite Aid Pharmacy. Upon completion of residency, she is pursuing PGY-2/ Fellowship in Ambulatory Care at the University of Michigan to continue research in issues in minority health.

**Mentor(s):** Kim C. Coley, PharmD, FCCP; Lucas A. Berenbrok, PharmD, MS; Kristine Ossman, PharmD; L Gilmore, PharmD; April Hopper, PharmD; Jesse McCullough, PharmD; and Melissa S. McGivney, PharmD, FCCP, FAPhA

## Drug-associated delirium identified in the Food and Drug Administration Adverse Events Reporting System

Choi S, Smithburger PL, Kane-Gill SL

**PURPOSE:** Drug toxicity and polypharmacy are major risk factors for delirium, especially in elderly patients with underlying comorbidities. Typically, benzodiazepines, opioids, antipsychotics, and anticholinergic agents were deemed highly deliriogenic, but the prevalence of delirium-related events varies in the literature. Also, numerous case reports have demonstrated that drugs with a lower suspicion may be deliriogenic. The objective of this study is to identify known and unknown deliriogenic drugs in the Food and Drug Administration Adverse Events Reporting System (FAERS) to broaden the public knowledge and understanding of deliriogenic drugs.

**METHODS:** FAERS reports from 2004 quarter 1 through 2015 quarter 3 were combined to create a dataset of around 7.3 million patients. These reports were reviewed for delirium-associated terms such as hallucination, confusional state, or acute psychosis, then the list was organized with SPSS Statistics Software to identify the drugs most frequently reported for delirium. Two drug information databases (Lexi-Comp, Micromedex), 1 reference book (Pai), and 1 review article (Clegg) were referenced to place those drugs into 3 categories: 1) medications known to be deliriogenic, 2) medications with potential to be deliriogenic, and 3) medications with new potential to be deliriogenic. Drugs with the highest number of reports associated with delirium terms will be analyzed using a reporting odds ratio (ROR).

**RESULTS:** 360,995 (4.9%) of 7.3 million FAERS reports were due to delirium-associated adverse events. Preliminary result without considering brand names or misspelled drug names showed that the top 10 most deliriogenic drugs are varenicline, natalizumab, duloxetine, interferon beta-1a, quetiapine, paroxetine, olanzapine, clozapine, risperidone, and aripiprazole.

**CONCLUSIONS:** This evaluation will provide a list of commonly known, potential, and newly possible drugs associated with delirium.

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## Seo-Hyun (Claudia) Choi

Seohyun (Claudia) received her PharmD from The Ohio State University in 2016. She received her PGY1 training at UPMC Mercy in 2017, and she is currently completing PGY2 Critical Care residency program at UPMC Presbyterian. Her professional interests include critical care, neurology, and transplant. She hopes to pursue her career goal as a critical care clinical pharmacist with teaching responsibilities at an academic institution.

**Mentor(s):** Sandra L. Kane-Gill, PharmD, MS, FCCM, FCCP

## Evaluation of the use of outpatient spirometry in the diagnosis and treatment of chronic obstructive pulmonary disease in family medicine practice

Copenhaver AM, Castelli G, Koenig ME, Sauereisen S, Friedlander MP, Farrah R

**PURPOSE:** The purpose was to assess the use of outpatient spirometry/pulmonary function testing (PFTs) being performed with the diagnosis and treatment of chronic obstructive pulmonary disease (COPD). With the use of diagnostic measurements, maintenance therapy was reviewed based on the Global Initiative for Obstructive Lung Disease (GOLD) guidelines. The goal of the study was to reinforce the use of in-office spirometry within a family health center and routine assessment of COPD symptoms.

**METHODS:** A retrospective chart review was conducted from a list of active patients at a family health center. Inclusion criteria included patients age 18 years or older who had an ICD-10 code related to a diagnosis of COPD or whose profile contained a current medication for the treatment of COPD. Exclusion criteria included a diagnosis of only asthma or only used an albuterol inhaler. The primary measure was prevalence of spirometry and PFTs with diagnosis and treatment of COPD in the primary care setting. Descriptive statistics were utilized to summarize the results.

**RESULTS:** The study population included 130 patients with an ICD-10 code or treatment of COPD with an average age of 61.5 years being approximately 63.8% (n=83) female. The primary outcome resulted in 60% (n=79) completing spirometry/PFTs with an average $FEV_1$/FVC ratio 0.63 (range 0.37 to 0.88). Among physicians, only 35% (n=46) provided assessment with Modified Medical Research Council (mMRC) Dyspnea Scale or COPDAsessmentTest™ (CAT) based on the last office visit. Approximately 57% (n=45) of patients who competed spirometry/PFTs (n=79) should be evaluated for potential step-down therapy based on the lack of symptom assessment and documented exacerbations.

**CONCLUSIONS:** The importance of the research is to improve the implementation of the GOLD guidelines and promote the utilization of in-office spirometry within family medicine practice. Improvement in COPD symptom assessment is an essential to proper COPD staging to improve COPD care, reduce number of COPD exacerbations/ hospitalizations, and provide cost-effective treatment for patients.

*Presented at the 51st Society of Teachers of Family Medicine Annual Spring Conference, Washington, DC, 2018.*

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## Ardis Copenhaver

Ardis received her PharmD from the South Carolina College of Pharmacy – Medical University of South Carolina in 2016 and completed a pharmacy practice residency at UPMC St Margaret in 2017. Upon completion of her PGY-2 Ambulatory Care Residency emphasis in family medicine, she plans to practice in an ambulatory care setting and continue to contribute to residency training and pharmacy education.

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

## Prophylactic enoxaparin dosing and anti-Xa levels in postpartum women: A pilot study

Cunningham ME, Beck S, Binstock AB, Braverman J, Burke CE, Haragan A, Hauspurg A, Nolin TD, Nowak JM, Seheult J, Twedt R, Serra A

**PURPOSE:** Changes to the clotting equilibrium, along with considerable hemodynamic changes in a woman's body during pregnancy and immediately postpartum, increase the risk of venous thromboembolism. The risk is further increased in obese patients and those who undergo a C-section. This combination of factors may create an environment of insufficient anti-Xa activity with standard doses of low molecular weight heparin (LMWH) products. LMWH products, such as Lovenox (enoxaparin), have been established as the anticoagulants of choice in obstetric patients. Unfortunately, data is lacking in order to determine the optimal dosing in obstetric patients to achieve anti-Xa targets because this population is usually excluded from studies. This applies especially to obese obstetric patients. Therefore, the goal of this study is to determine anti-Xa systemic exposure achieved with standard prophylactic dosing of enoxaparin in women after pregnancy.

**METHODS:** The main objective of this study is to measure anti-Xa levels (peak, trough, and two levels in between) in postpartum women who require prophylaxis with enoxaparin. A prospective, non-randomized, non-blinded, open-label pilot study will be performed. Each patient will have four serial blood samples obtained over either twelve or twenty-four hours, based on the dose and dosing frequency she is prescribed.

**RESULTS:** In Progress

**CONCLUSIONS:** In Progress

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### Meghan Cunningham

Meghan received her PharmD from Duquesne University in 2017 and is completing her PGY-1 pharmacy practice residency at Magee-Womens Hospital of UPMC. Upon completion of her residency, she plans to pursue a clinical pharmacy position in a hospital setting.

**Mentor(s):** Clayton Burke, PharmD; Thomas Nolin, PharmD, PhD

## Evaluating administration of as-needed psychotropic medications in the treatment of acute agitation in older adults

Dean TA, Joseph MP, Carr CN, Fabian TJ

**PURPOSE:** Older adults admitted to an acute psychiatric hospital are often prescribed psychotropic medications as needed (PRN) to manage acute behavioral disturbances including agitation. The objective of this study is to assess administration patterns and to evaluate appropriateness and safety of PRN psychotropic medications in the treatment of acute agitation in older adults.

**METHODS:** Patients discharged from the geriatric unit at Western Psychiatric Institute and Clinic of UPMC in 2017 were included in the descriptive statistical analysis. A retrospective chart review identified patients ≥65 years old with an ICD-10 diagnosis of major neurocognitive disorder and administered at least one PRN for acute agitation. PRN administration patterns and appropriateness were evaluated by medication, dose, route, and administration time in relation to Pittsburgh Agitation Scale (PAS) scores. Safety was assessed by incidence of falls 24 hours after PRN administration.

**RESULTS:** There were 89 patients administered 500 PRNs (5.7 PRNs per admission). The most common PRN used was olanzapine (n= 327). The IM to PO ratio was nearly doubled in the fall group (0.23 vs 0.45). The average total PAS score was 6.8 out of 16 points. Twenty-four patients had at least one fall. The average total PRNs per admission was 9.8 in the fall group. Additionally, the male to female ratio was higher in the fall group (0.9 vs 2.0). Furthermore, 41.7% (n=10) of the fall group had a history of falls compared to 23.6% (n=21) of the entire cohort.

**CONCLUSIONS:** In this retrospective study, PAS scores did not correlate to PRN administration as anticipated. Additionally, total PRNs per admission, intramuscular PRN administration, fall history, and patients' sex were identified as factors that may contribute to increased fall risk. Further investigation of PRN psychotropic administration in the treatment of acute agitation in older adults is needed to develop interventions to improve medication safety in this vulnerable patient population.

*Presented at University of Pittsburgh, Department of Psychiatry Research Day, Pittsburgh, PA, June 2018.*

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## Taylor Dean

Taylor received her PharmD from the University of Texas at Austin in 2017. Following graduation, she started a PGY-1/PGY-2 residency at Western Psychiatric Institute and Clinic of UPMC in order to begin an early focus in psychiatry. Her professional interests include acute psychosis, mood disorders, geriatrics, and underserved care. After completion of residency training, she plans to become board certified in psychiatry and practice in an inpatient psychiatric facility to continue gaining experience in these areas.

**Mentor(s):** Matthew P. Joseph, PharmD, BCPS; Chelsea N. Carr, PharmD, BCPP; Tanya J. Fabian, PharmD, PhD, BCPP

## Carfilzomib for allosensitization in heart transplantation

Demehin MO, Mangiola M, Schonder KS, Zeevi A, Shullo MA

**PURPOSE:** Preformed HLA-specific antibodies are a known risk factor for antibody mediated rejection and poor patient survival following cardiac transplantation. Standard desensitization protocols with plasmapheresis and intravenous immune globulin broadened the donor pool for prospective patients on the waitlist. While this strategy has proven helpful, the optimal treatment of anti-HLA antibodies remains unclear. Carfilzomib (CFZ) exerts its effects by binding to 26S proteasome leading to depletion of plasma cells, a primary source of antibody production. This evaluation was conducted to report the efficacy of the addition of CFZ to a standard desensitization protocol in patients awaiting heart transplantation.

**METHODS:** A retrospective case series of all heart transplant recipients older than 18 years of age treated with CFZ-based desensitization as part of the institutional standard-of-care protocol was conducted. Primary endpoints were reduction in neat IgG and C1q cPRA at 16 days, 1, 3 and 6 months post treatment. Secondary endpoints were rate of transplant, allograft function, antibody mediated rejection, acute cellular rejection, adverse drug events, infections, and death after carfilzomib.

**RESULTS:** Six highly sensitized patients received CFZ with five (83%) successfully completing CFZ therapy and being transplanted. Mean follow up was 28 months. Mean immunodominant anti-HLA antibody (MFI>4000) IgG cPRA fell from 74% to 25% at 16 days, 39% at 1 month, 48% at 3 months and 45% at 6 months after therapy. C1q cPRA fell from 33% to 0% at 16 days, 28% at 1 month, 28% at 3 months and 63% at 6 months after therapy. At last follow up, there was no evidence of graft dysfunction, two patients experienced an incidence of pAMR > 2, all patients experienced mild rejection (ACR grade 0-1R) and one patient had an ACR grade 2R which was treated with methylprednisolone.

**CONCLUSIONS:** Carfilzomib provides a novel avenue for desensitization in patients awaiting heart transplantation.

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## Moses Demehin

Moses received his PharmD from the University of Maryland School of Pharmacy in 2016 and completed a pharmacy practice residency at UPMC Presbyterian in 2017. Upon completion of his solid organ transplantation residency, he plans to practice as an abdominal transplant clinical pharmacy specialist.

**Mentor(s):** Kristine S Schonder, PharmD; Michael A Shullo, PharmD

## Evaluating the early implementation of pharmacist-provided patient care services of a statewide pharmacy network within a regional grocery chain pharmacy

Doong K, Berenbrok LA, Patel A, Coley K, Antinopoulos B, Carroll J, Richardson R, McGivney M

**PURPOSE:** The objective of this research is to evaluate the early implementation of pharmacist-provided comprehensive medication management (CMM) within a regional grocery chain pharmacy supported by a community pharmacy enhanced services network. Project aims are to (1) elicit pharmacists' experience engaging patients in CMM in their pharmacies; and (2) assess how patient engagement evolves over the initial 6-months of implementation of an initial health insurer contract.

**METHODS:** Key informant interviews with 16 pharmacists from 16 locations providing care at a regional, community pharmacy grocery chain were conducted. An interview guide was developed using domains from the Consolidated Framework for Implementation Research. The cohort of 16 pharmacists were interviewed every two weeks for three months during early implementation of a state Medicaid health insurer contract for CMM. Interviews of pharmacists who completed at least five interviews were transcribed verbatim. A codebook was developed. Transcripts were coded by two independent investigators and coding discrepancies were resolved. Thematic analysis and selection of supporting quotes are ongoing.

**RESULTS:** The following preliminary themes of successful approaches to implementation were identified: (1) identify patients who have established relationships as initial patients to engage in CMM; (2) offer the service to patients while they are picking up prescriptions; (3) add an alert to the patient's profile to facilitate patient engagement at prescription pick up and drop off; (4) ensure adequate staff training, consultation space, and staffing resources to provide CMM; and (5) set responsibilities for all team members to incorporate CMM within the workflow. Further investigation will uncover how pharmacy teams created and adapted their own implementation strategies for patient engagement.

**CONCLUSIONS:** The resulting themes provide insight on how to initially engage patients and pharmacy staff in the provision of CMM. Understanding the early implementation of reimbursable CMM services at a regional grocery chain pharmacy may serve as a framework for others to replicate and scale enhanced services within statewide networks.

*Presented at the American Pharmacists Association Annual Meeting and Exposition, Nashville, TN, 2018.*

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## Katie Doong

Katie Doong is from Mamaroneck, NY. She received her PharmD in 2017 from Northeastern University in Boston, MA. Katie is the current PGY-1 Community Pharmacy Resident with the University of Pittsburgh and Giant Eagle Pharmacy. Her professional interests include chronic disease state management, implementation of patient care services in community pharmacies, and precepting student pharmacists. Following residency, Katie plans to pursue a career as a community pharmacist providing innovative patient care services in Pittsburgh. In her spare time, Katie enjoys traveling, exploring new restaurants, and spending time with family and friends.

**Mentor(s):** Lucas A. Berenbrok, PharmD, MS; Kim C. Coley, PharmD, FCCP; Brandon Antinopoulos, PharmD; Joni Carroll, PharmD, BCACP; Renee' Richardson, PharmD; Melissa A. Somma McGivney, PharmD, FCCP, FAPhA

## DOAC and forget-it? Necessity of direct oral anticoagulant monitoring services in family medicine health centers

Fargo EL

**PURPOSE:** There is limited research that has evaluated the prescribing, monitoring, and patient compliance of direct oral anticoagulants (DOACs), yet it is important that gaps in care be identified to promote appropriate usage and safe practices by healthcare providers and patients. The purpose of this project is to determine if patients managed by providers of outpatient family health centers are receiving the appropriate initial dose, dose adjustments, and medication counseling of these high risk medications.

**METHODS:** A descriptive chart review was performed on all adult patients prescribed DOACs who received care from physicians of the UPMC St. Margaret family health centers from September 2017 to February 2018. The two primary outcomes evaluated include 1) the frequency of DOACs utilized for non-FDA approved indications, and 2) the frequency of DOACs dosed incorrectly. Secondary outcomes that are currently being gathered via telephonic interviews with patients include DOAC compliance and patient-reported adverse drug events. The results will be analyzed via descriptive statistics and multiple regression analyses.

**RESULTS:** There were 109 patients with active DOAC prescriptions. The only DOACs utilized were rivaroxaban (66.4%), apixaban (31.1%), and dabigatran (2.5%). 74.8% of patients had FDA-approved indications, while the rest were prescribed for non-FDA-approved indications (hypercoagulable state (19.3%), valvular atrial fibrillation (4.2%), history of stroke (0.8%), and status-post PVC ablation (0.8%)). Overall, there were 9 (7.5%) prescriptions that were not dosed appropriately, the majority being doses too low for apixaban and rivaroxaban. Data for secondary outcomes is still being collected.

**CONCLUSIONS:** Ten percent of all patients prescribed DOACs at the family health centers were not prescribed appropriate doses. Past literature suggests that up to 20% of patients do not administer rivaroxaban with food, and many people often miss more than one dose of their DOAC weekly, which places the patient at risk for unnecessary clots. DOAC monitoring services should be implemented to ensure appropriate dosing and patient compliance to prevent negative outcomes.

*Presented at the 51st Annual Society of Teachers of Family Medicine, Washington, DC, 2018.*

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## Emily Fargo

Emily Fargo, PharmD, BCPS is a PGY-2 Ambulatory Care Pharmacy Resident at UPMC St. Margaret. She is a 2016 graduate of the University of Pittsburgh School of Pharmacy and completed her PGY-1 Pharmacy Practice Residency at UPMC St. Margaret. Her primary clinical practice site is the UPMC St. Margaret Bloomfield-Garfield Family Health Center. Her professional interests include chronic disease state management, interprofessional education, and team-based care. Emily enjoys travelling, tennis, spending time outdoors, and being with family. At the completion of residency, Emily will begin her career with Cleveland Clinic as a primary care clinical specialist.

**Mentor(s):** Greg B. Castelli, PharmD, BCPS, BC-ADM

## Pharmacist-driven procalcitonin-guided algorithm for antibiotic use in ICU patients with pneumonia

Ferdock AD, Campbell R, D'Amico F, Pickering A

**PURPOSE:** Antibiotic use in non-bacterial respiratory tract infections is a common occurrence that may lead to unnecessary antibiotic exposure and side effects. Ordering a procalcitonin (PCT) laboratory test and following a specific algorithm may decrease this occurrence. Currently, PCT can be ordered for patients with pneumonia; however, there isn't a standardized algorithm in place (at UPMC St. Margaret) to help guide the physicians in regard to antibiotic use. This research project is designed to implement an algorithm to guide clinical based judgment in regard to ordering and responding to the PCT level.

**METHODS:** The study design is observational, involving adult ICU patients at UPMC St. Margaret with pneumonia. A PCT algorithm was implemented in February 2018 for clinician use to help guide antibiotic therapy. The primary outcome is PCT algorithm compliance post-implementation. Compliance was defined as PCT ordered within 24 hours of antibiotic administration and based on the value, appropriate antibiotic administration. A chart audit was performed to collect baseline characteristics and PCT values pre-and post-implementation. Descriptive statistics were used to describe pre-and post-groups. Prevalence rates of appropriateness (plus 95% CI) were calculated to compare groups.

**RESULTS:** Results are preliminary, as research is still in progress. The pre-implementation group from August 2017 – January 2018, 100 patients met inclusion criteria. PCT was ordered in 69% of patients. Antibiotics were administered 97% of the time. These PCT values were hypothetically applied to the algorithm, and 72% received appropriate treatment regarding antibiotics. Mean antibiotic duration was 6.2 days ± 2.5. Post-implementation data collection is still in process. For March 2018, 15 patients were reviewed. PCT was ordered in 93% of patients. The PCT algorithm was applied appropriately 93% in regard to antibiotic use. Mean antibiotic duration 5.5 days ± 2.8.

**CONCLUSIONS:** Implementing this algorithm will help guide medical decision making for providers, in regard to procalcitonin values and antibiotic usage. The standardized PCT algorithm, with pharmacist guidance, has the potential to decrease unnecessary antibiotic use, rate of antibiotic resistance, side effects, cost to the patient, and cost to the healthcare system. In addition, this implementation could be expanded to other hospital services with clinical pharmacists present.

*Presented at the 51st Society of Teachers of Family Medicine Annual Conference, Washington, DC, 2018.*

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## Ariel Ferdock

Ariel Ferdock is a PGY-1 Pharmacy Resident at UPMC St. Margaret. She received her PharmD from Nova Southeastern University in Palm Beach Gardens, FL; and she attended Towson University in her home state of MD, where she received her Bachelor of Science in Chemistry. Upon completion of her PGY-1 residency, she will continue at St. Margaret as a PGY-2 in Family Medicine.

**Mentor(s):** Aaron Pickering, PharmD

## Impact of pharmacist-led medication education on medication adherence and readmission rates in patients newly started on dual-antiplatelet therapy following percutaneous coronary intervention with stent placement

Gray EL, Kostka S, Hebda MF

**PURPOSE:** The use of dual antiplatelet therapy (DAPT) in patients who have received percutaneous coronary intervention (PCI) with stent placement is indicated to reduce the risk of myocardial infarction, stroke, and stent thrombosis. Medication adherence plays a key role in reducing these risks. Furthermore, previous studies have observed a beneficial impact of pharmacist-involved transitions of care programs on medication adherence and hospital readmission rates. The purpose of this study was to determine the impact of pharmacist-led medication education on readmission rates medication adherence in patients newly started on DAPT following PCI with stent placement.

**METHODS:** A retrospective chart review of patients who received a cardiac catheterization between 05/01/2017 and 12/01/2017 was conducted. Patients were included if they had undergone PCI with at least one stent placement and were newly started on DAPT. Patients were excluded if discharged to a skilled nursing or acute rehab facility. Patients were separated into two groups, one received pharmacist-led medication education and the other received usual care. The primary objectives were to assess the impact of pharmacist-led medication education on 30-day readmission rates. Secondary objectives were to assess the impact of pharmacist-led medication education on 90-day readmission rates and medication adherence.

**RESULTS:** One-hundred fifty-eight patients were included in this study, 68 (43%) were in the pharmacist-led medication education group and 90 (57%) were in the usual care group. Refills were obtained when the initial medication supply was exhausted by 56 (88%) and 75 (88%) patients in the pharmacist-led medication education group and the usual care group, respectively (p=0.892). A 30-day readmission occurred in 8 (12%) and 18 (19%) of pharmacist-led medication education group and usual care group, respectively (p=0.167). A 90-day readmission occurred in 16 (25%) and 22 (24%) of the usual care group and pharmacist-led medication education group, respectively (p=0.894).

**CONCLUSIONS:** Pharmacist-led medication education in patients newly started on DAPT and who have received PCI with stent placement showed no difference in 30-day readmission rates and medication adherence. However, 30-day readmission rate were numerically lower in the pharmacist-led medication education group. Further research is needed regarding the impact of pharmacist-led medication education on medication adherence and 30-day readmission rates in larger populations.

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## Erica Gray

Erica received her PharmD from Duquesne University in 2015 and completed a two-year fellowship in clinical development at Allergan and in collaboration with St. John's University. Erica is currently a PGY-1 pharmacy resident at UPMC Presbyterian-Shadyside: Shadyside Campus. Upon completion of residency Erica will work as a clinical pharmacist at an independent pharmacy that services correctional facilities and long term care facilities.

**Mentor(s):** Michele F Hebda, PharmD, BCPS; Shayna Kostka, PharmD

## Impact of respiratory virus positivity on duration of antibiotic therapy in children 2-36 months

Hanna SM, Crowley K, Michaels M

**PURPOSE:** Viruses account for about 30% of community acquired pneumonia, with increased incidence in the pediatric population. The likelihood of bacterial presence is approximately 20-25% after confirmation of viral infection with no clinical evidence of co-infection. Often patients will receive a full course of antibiotics when presenting with symptoms severe enough for admission. Using antibiotics without restriction in these patients can lead to bacterial resistance, but laboratory tests such as respiratory viral panels (RVPs) have the potential to reduce antibiotic use by identifying a viral cause of infection.

**METHODS:** Electronic records were reviewed for inpatients aged 2-36 months with positive RVP results at Children's Hospital of Pittsburgh of UMPC. Baseline characteristics, culture data, antibiotic duration, blood chemistries, and ventilation status were recorded. Patients were stratified by virus and divided into bacterial culture result cohorts. Patients with negative bacterial cultures were further assessed for signs and symptoms that would warrant antibiotic use. The primary outcome was determination of the duration of antibiotic therapy in relation to positive RVP and bacterial culture results. Descriptive statistics were used for this analysis.

**RESULTS:** 132 patients were prescribed at least 1 antibiotic. The population included 3 neutropenic patients, 1 solid organ transplant patient, and 1 oncology patient. 69 patients were mechanically ventilated and fifty required supplemental oxygen. 18% of patients prescribed antibiotics had a positive bacterial culture. Antibiotics stopped within 72 hours of RVP result in 67% of cases. The median duration of continued antibiotic therapy was 7 days if culture positive, 5 days if cultures were negative, and 6 days when no bacterial culture collected. Despite elevated WBC/CRP, antibiotics were frequently discontinued within 72 hours of positive RVP result.

**CONCLUSIONS:** When positive RVP results are available, providers are often comfortable discontinuing antibacterial therapy in pediatric respiratory illness.

*Presented at the 2018 ACCP Virtual Poster Symposium.*

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## Samantha Hanna

Samantha received her PharmD from Northeast Ohio Medical University in 2017 and is currently completing a pharmacy practice residency at Children's Hospital of Pittsburgh of UPMC. Upon completion of her residency, she has accepted a position as a pharmacist at Cleveland Clinic Children's Hospital.

**Mentor(s):** Kelli Crowley, PharmD, BCPS, BCPPS; Marian Michaels, MD, MPH

## Evaluation of direct oral anticoagulation prescribing and the role for pharmacist intervention

Harrell M, Miller T, Hall D

**PURPOSE:** Direct oral anticoagulants (DOACs) are often preferred alternatives to warfarin for a variety of reasons, including their lack of routine laboratory monitoring. However, recent publications suggest initial and ongoing assessment given the different dosing options available and possible changes in patient characteristics. The purpose of this evaluation is to assess appropriateness of currently prescribed DOACs and create a process for a pharmacist-led monitoring service.

**METHODS:** A retrospective chart review will be conducted for patients of Shea Medical Center. A report will be generated from the electronic medical record identifying patients prescribed apixaban, dabigatran, edoxaban, or rivaroxaban between 12/1/16 and 11/30/17. Appropriateness of the prescribed DOAC will be assessed regarding dosing, indication, and presence of drug interactions. A communication will be sent to the primary care physician identifying any potentially sub-optimal doses.

**RESULTS:** Seventy-seven patients were identified as being prescribed a DOAC during the study period. Data collection and final analysis are in progress.

**CONCLUSIONS:** This evaluation will identify patients who may benefit from DOAC dosage adjustment and provide an example of a process for a pharmacist-led DOAC monitoring service.

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### Mahalia Harrell

Mahalia is a PGY2 ambulatory care resident at UPMC Presbyterian Shadyside. She completed her PGY1 residency at UPMC McKeesport. Her areas of interests include primary care, transitions of care, pharmacy and medical education, and advocacy.

**Mentor(s):** Trisha Miller, PharmD, BCACP; Deanne Hall, PharmD, BCACP, CDE

## Nursing satisfaction improvements through automated medication tracking

Hoffman TD, L'Altrelli A, Kane-Gill SL

**PURPOSE:** Nursing satisfaction with pharmacy services is generally related to turn-around time of medications and frequency of missing or late medications. A pilot of patient-specific barcode-linked medication tracking technology was conducted on a nursing floor identified with an above average rate of missing or late intravenous or bulk medications. The purpose of this study was to determine the impact on nursing satisfaction from implementation of new technology used for physical tracking of medications during the medication delivery process.

**METHODS:** A survey administered to a representative nursing group on a floor with a high frequency of missing or late medications addressed availability of medications, frequency of missing medications, and other factors with associated impacts on a nurse's satisfaction with pharmacy services prior to and after the implementation of the medication tracking technology. The anonymous survey was made available to every nurse on the ward where the technology was piloted. Nursing satisfaction was compared before and after the intervention.

**RESULTS:** Ongoing. Study results are still being compiled and analyzed following the completion of the pilot.

**CONCLUSIONS:** This study is expected to show an improvement in nursing satisfaction with pharmacy services as measured by an anonymous digital survey following the implementation of technology utilizing patient-specific barcode tracking with a centralized application to aid in locating medications in the delivery process.

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### Tyler Hoffman

Tyler received his PharmD from the University of Pittsburgh School of Pharmacy in 2017 and is currently a PGY1 resident in the Health System Pharmacy Administration track. He will be staying at UPMC Presbyterian to continue for a second year of the HSPA program.

**Mentor(s):** Alfred L'Altrelli, PharmD; Sandra Kane-Gill, PharmD,MS, FCCM, FCCP

## Evaluation of direct oral anticoagulant dosing and monitoring in two geriatric outpatient clinics

Howerton MA, Suhrie EM, Gennari AS, Jones N, Ruby CM

**PURPOSE:** While warfarin was the mainstay of oral anticoagulation for many years, the direct oral anticoagulants (DOACs) are becoming much more popular options because of their convenience, fewer drug interactions, and less frequent monitoring. Studies have been conducted that assessed the appropriate use of DOACs across varying age groups, however limited studies have been conducted specifically examining the geriatric population, with many of those focused on an inpatient setting. The aim of this study was to retrospectively evaluate the prescribing practices for elderly patients on DOACs in an outpatient setting, specifically evaluating if FDA recommendations are followed for dosing and monitoring.

**METHODS:** This retrospective chart review was approved by the institution quality improvement committee. Subjects included were 65 years or older, had an office visit at UPMC Senior Care Institute or UPMC Benedum Geriatric Center from 09/01/2015 to 08/31/2017, and had a DOAC listed on their home medication profile. The primary objective was to evaluate the appropriateness of dosing based on FDA-labeled recommendations. Secondary objectives included describing common reasons for alternative dosing regimens, evaluating potential differences in appropriate dosing between geriatricians and other prescribers, and assessing the influence of insurance formulary on choice of anticoagulant. Objectives were analyzed using descriptive statistics.

**RESULTS:** Of 232 patients included in analysis, 42.7% were found to have dosing inconsistent with FDA-labeled recommendations. Apixaban, rivaroxaban, and dabigatran were dosed outside of FDA-labeled recommendations 47.3%, 35.8%, and 31.6% of the time, respectively. The majority (72.7%) were dosed lower than recommended doses. Of all patients, the most frequent reason (54.5%) for potentially inappropriate dosing was patients meeting only 1 of 3 dose-reduction criteria when prescribed apixaban. Occurrence of dosing outside of FDA-labeled dosing recommendations was similar between geriatrician and non-geriatrician prescribers (44.0% vs 40.8%, p=0.62). Insurances varied more than expected and could not be analyzed.

**CONCLUSIONS:** Results suggest that direct oral anticoagulants used in geriatric patients in an outpatient setting frequently do not follow FDA-approved dosing recommendations. However, other factors commonly seen in the elderly such as frailty and bleeding may have been factors considered by clinicians when deciding dosing that were not assessed by this review. Further research is needed regarding clinical outcomes in older patients on DOACs and in older patients with DOAC dose adjustments outside of FDA-labeled dosing recommendations.

*Presented in-part at the American Society of Health-System Pharmacists Midyear Clinical Meeting, Orlando, FL, December 2017.*

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## Michelle Howerton

Michelle received her PharmD from the West Virginia University School of Pharmacy in 2016 and completed a PGY1 pharmacy residency in Charleston, WV. Upon completion of her PGY2 Geriatric Pharmacy residency at UPMC Presbyterian-Shadyside, she will practice as an ambulatory care clinical pharmacy specialist at WVU Medicine in Morgantown, WV.

**Mentor(s):** Christine M. Ruby, PharmD, BCPS, BCGP, FASCP; Erin Suhrie, PharmD, BCPS, BCGP

## Impact of Smart Prior Authorization (PA) versus traditional PA programs on approval rates and cost

Jose A, Heasley J, Ni D, Yoo L

**PURPOSE:** The prior authorization (PA) process is one of the most common methods of utilization management programs used by managed care organizations to help ensure appropriate and cost-effective use of prescription drugs. Smart PA programs utilize automated claim submission based on 'smart' rule logic and is designed to bypass the need for manual intervention to make a PA determination. Smart PAs can help provide timely access to medications, improve the member experience, and decrease operational costs. The objective of the study is to evaluate and compare the impact of Smart PA versus traditional PA programs on approval rates and costs.

**METHODS:** A retrospective, observational analysis was performed comparing data from Smart PA to traditional PA programs on a cohort of non-Medicare Part D plans. Smart PA programs that did not have a corresponding traditional PA program for comparison were excluded. The top 5 highest volume Smart PA programs by total episodes were then identified and members with claim activity from June 1, 2017 to December 31, 2017 were included. The primary endpoint was an evaluation of overall PA approval rates for Smart PA and Traditional PA implementation. Secondary endpoints included a composite endpoint of PA denials and walkaways, and cost savings.

**RESULTS:** Smart PA implementation approval rate was significantly higher overall at 79.33% vs 54.10% compared to traditional PA implementation approval rates and in each individual drug class: gastrointestinal stimulants at 82.4% vs 76.43%, antidiabetic agents glucagon-like peptide-1 agents at 89.19% vs 58.55%, serotonin norepinephrine reuptake inhibitors at 79.69% vs 70.36%, topical immunomodulators at 62.63% vs 44.62%, and growth hormones at 93.73% vs 54.24% all statistically significant ($p < 0.0001$). An estimated operational PA cost savings was calculated at $66,760.00 for overall Smart PA implementation with an estimated cost savings per member per drug episode at $16.04.

**CONCLUSIONS:** There was a statistically significant higher percentage of PA approval rates for Smart PA implementation compared to traditional PA implementation overall and for each individual drug class: gastrointestinal stimulants, antidiabetic agents glucagon-like peptide-1 agents, serotonin norepinephrine reuptake inhibitors, topical immunomodulators, and growth hormones. The use of Smart PAs has potential to generate an estimated $16.04 per member per drug episode in overall operational PA cost savings. Additional studies evaluating setup costs, changes in drug spend with adoption of Smart PAs, and prescriber cost savings related to PA processing would provide further insight into overall cost evaluation.

*Presented at the AMCP Managed Care & Specialty Pharmacy Annual Meeting 2018, Boston, MA, 2018.*

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## Abraham Jose

Abraham received his PharmD from the University of Hawaii at Hilo Daniel K. Inouye College of Pharmacy in 2017 and will complete a managed care residency at CVS Health in 2018. Upon completion of residency, he plans to practice in a managed care/pharmacy benefit management setting and potentially pursue graduate training in business administration.

**Mentor(s):** Jennifer Heasley, PharmD; Danfeng Ni, PharmD

## Appropriateness of intravenous vancomycin usage based on risk factors and indication

Kasper WR, Ours RL

**PURPOSE:** Due to the rise in MRSA infections, resistance to vancomycin (VAN), and limited agents available for treatment, it is imperative VAN is used appropriately. VAN is also associated with several toxicities including nephrotoxicity. This study evaluated the appropriateness of VAN usage and assessed UPMC Hamot's dosing strategies to determine if there is a correlation to acute kidney injury (AKI).

**METHODS:** This study is a retrospective electronic medical record review of 100 adult inpatients treated with VAN at UPMC Hamot from January - April, 2017. VAN appropriateness was assessed upon initiation of therapy. For those patients who remained on VAN beyond 48 hours, pre-specified criteria needed to be met to be considered appropriate. This study also looked at patients rates of AKI in those treated with VAN as well as VAN + piperacillin/tazobactam (PTZ).

**RESULTS:** VAN was used appropriately 46% of the time. In 17% of cases it was started appropriately but then continued without culture proven beta-lactam resistant organisms. In 22% of patients VAN was initially inappropriate but appropriately discontinued. In 15% of cases it was initially inappropriate and continued inappropriately. Overall, the majority of VAN use was inappropriate (54%). The total rate of AKI was 12% in patients who received VAN + PTZ and 4.2% in patients who received just VAN.

**CONCLUSIONS:** Overall VAN was used inappropriately a majority of the time. A prevalent reason for VAN being used inappropriately was continuation of therapy beyond 48 hours without culture proven beta-lactam resistant organisms or documented severe penicillin allergy. Rates of AKI were higher in those patients who received both VAN and PTZ than VAN alone.

*Presented at Hamot Research Days for Pharmacy/Medical Residents and Preceptors, Erie, PA, April 11-12, 2018.*

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## William Kasper

Will is from Albany, NY, and received his PharmD from Albany College of Pharmacy and Health Sciences in 2017. Upon completion of his PGY1 year, he will be completing a two-year pharmacy administration fellowship at UPMC Presbyterian.

**Mentor(s):** Rachael Ours, PharmD

## An evaluation of potentially inappropriate medications for patients in bundled payment episodes in a skilled nursing facility: A needs assessment for adding a pharmacist to the interprofessional team

Kirpekar PA, D'Amico F, Kryger E, Sakely HA

**PURPOSE:** Medicare value-based healthcare reimbursement models seek to provide cost-effective, high-quality, coordinated care through use of healthcare teams; however, the role of a clinical pharmacist on the team is not clearly defined in current literature. This study aims to characterize the patient population that participates in bundled payment reimbursement models for postacute care at a skilled nursing facility and to identify the prevalence of potentially inappropriate medication prescribing at a time susceptible to medication errors—during the transition from hospital to skilled nursing facility.

**METHODS:** This retrospective chart review included patients discharged from a 250-bed hospital that is part of a larger health system to one skilled nursing facility with a geriatric-trained pharmacist as part of the care team. Eligible patients were enrolled in either the Comprehensive Care Joint Replacement (CJR) or Bundled Payments for Care Improvement (BPCI) reimbursement models during a two-year period. The Medication Appropriateness Index (MAI), a validated tool, was used to measure potentially inappropriate medication prescribing at the time of hospital discharge. The primary outcomes of the study are to determine the prevalence of inappropriate medication prescribing, identify the role of pharmacist interventions, and describe the population in these alternative payment models.

**RESULTS:** A total of 67 patients from the study period of April 1, 2015 to April 30, 2017 met inclusion criteria and were reviewed. The majority of patients (79%; n=53) were female and enrolled in the BPCI model (99%; n=66). The most common surgical procedure was left hip open reduction and internal fixation (ORIF) done in 24% of patients. Patients spent an average of 23 days in the SNF with a range of 1 to 77 days.

**CONCLUSIONS:** It is anticipated that the Medication Appropriateness Index (MAI) will detect inappropriate medication prescribing in post-acute care geriatric patients participating in bundled payment care. The findings of this study will illustrate the medication complexities of the bundled payment patient population and serves as a needs assessment demonstrating the necessity of the role of the pharmacist on the interprofessional team.

*Presented at 2018 ACCP Virtual Poster Symposium, May 2018, and Teaching and Learning in Academic Medicine (TLAM), UPMC St. Margaret, June 2018.*

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## Pooja Kirpekar

Pooja received her PharmD from Virginia Commonwealth University in 2017 and is completing a pharmacy practice residency at UPMC St. Margaret. She will stay on at UPMC St. Margaret to complete a PGY-2 in Ambulatory Care with focus in Family Medicine. Upon completion of residency training, she plans to practice as an outpatient clinical pharmacist while serving a preceptor role for pharmacy students.

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

## Incidence of nephrotoxicity in patients receiving at least 4 grams of vancomycin per day without pre-existing renal dysfunction

Koval, A, Ganchuk, S, Wilson, L

**PURPOSE:** Lodise et al. reported that patients receiving 4 grams or more of vancomycin per day are at an increased risk of nephrotoxicity compared to patients receiving a lower total daily dose of vancomycin. This study, however, did not exclude patients with pre-existing renal dysfunction, and investigators did not report an assessment of the appropriateness of the vancomycin regimen based on weight and renal function. The objective of this study is to determine the incidence of nephrotoxicity in patients who received appropriately-dosed vancomycin therapy of at least 4 grams per day that had no evidence of pre-existing renal dysfunction.

**METHODS:** This IRB-approved retrospective study examined the electronic medical records of patients from January 1, 2016 to September 1, 2017 who received at least 4 grams of vancomycin per day for at least 48 hours and had a creatinine clearance of at least 80mL/min. The primary outcome of this study is the incidence of nephrotoxicity in this patient population compared to the incidence identified in the Lodise et al. study patient population. The secondary outcome is the time to nephrotoxicity in those patients who developed the event. Exclusion criteria will include a diagnosis of cystic fibrosis and age less than 18 years.

**RESULTS:** Regarding the primary outcome, 18/121 (14.9%) of patients in the Mercy cohort developed nephrotoxicity compared to 9/26 (34.6%) in the Lodise cohort (P=0.001). The median time to nephrotoxicity in the patients who developed the event (n=18) was 5 days (IQR 4-6).

**CONCLUSIONS:** The patients in the UPMC Mercy cohort had a statistically significant lower rate of nephrotoxicity compared to the Lodise cohort. The median time to nephrotoxicity in patients who had an event was 5 days. The incidence of nephrotoxicity seen in this study (14.9%) is similar to other vancomycin studies suggesting that doses of 4 or more grams of vancomycin per day are safe to use in an appropriate patient population to achieve therapeutic concentrations of vancomycin. The median time to the development of nephrotoxicity implies that there could have been other potential causes of nephrotoxicity including sepsis.

*Presented at the 75th Annual ASHP Midyear Clinical Meeting and Exhibition, Orlando, FL, 2017.*

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## Alaina Koval

Alaina received her PharmD from the Duquesne University School of Pharmacy in 2017 and completed a pharmacy practice residency at UPMC Mercy in 2018. Upon completion of this residency, she plans to practice in a hospital setting in the Pittsburgh area.

**Mentor(s):** Steven Ganchuk, PharmD; Laura Wilson, PharmD, BCPS

## Evaluation of four-factor prothrombin complex concentrate (Kcentra®) use in patients with coagulopathy due to liver disease

Lapierre K, Voycik M, Wilson L

**PURPOSE:** Kcentra is indicated for urgent reversal of coagulopathy induced by warfarin in patients with major bleeding or need for urgent surgery. Within UPMC, Kcentra has been administered to patients with coagulopathy for bleeding or emergent surgery as an off-label use. Patients with liver dysfunction are often perceived to be at risk for bleeding due to decreased clotting factors and elevated INR. However, these patients also have a decrease in natural anticoagulants resulting in a potential increased risk of thrombosis. The safety and efficacy is unknown in this population and review will provide data to guide optimal use.

**METHODS:** Retrospective chart review occurred for all patients who received Kcentra for reversal of elevated INR with no documented use of anticoagulant, within the UPMC health-system beginning in 2013. The following data was collected from each patient chart: patient demographics, INR prior to and following Kcentra administration, and indication for Kcentra usage. Furthermore, incidence of adverse events, including thrombosis and bleeding following Kcentra administration, was recorded. Lastly, administration of vitamin K and other blood products was documented. Analysis of data was completed via SPSS version 25 and descriptive statistics were reported.

**RESULTS:** 82 patients were included in the analysis and of those patients, 63 (76.8%) had one or more adverse events. 68.3% (56/82) of patients experienced in-hospital mortality. 7.3% (6/82) of patients experienced a bleed following Kcentra administration. Lastly, 9.8% (8/82) of patients experienced a thromboembolic event.

**CONCLUSIONS:** Kcentra has been used across the UPMC health system for patients with coagulopathy associated with causes other than oral anticoagulation such as chronic liver disease, acute liver injury, DIC, and malignancy. While these patients may be predisposed to in-hospital mortality due to their disease state, the incidence of patients experiencing thromboembolic complications was greater than what has been reported in the current literature. Off label use of Kcentra may not be a safe option for patients with coagulopathy not receiving oral anticoagulation when the hemostasis of these patients is unknown.

*Presented at the 75th annual American Society of Health-System Pharmacists Midyear Clinical Meeting, Orlando, FL, 2017.*

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## Kimberly Lapierre

Kimberly is originally from Berlin, CT, and received her PharmD from St. John's University College of Pharmacy and Health Sciences in 2017. Following completion of her PGY1 year, Kim plans to pursue a full time clinical pharmacist position at an academic medical center. Outside of pharmacy, Kimberly enjoys reading, trying new restaurants, and traveling.

**Mentor(s):** Meaghan Voycik, PharmD, BCPS; Laura Wilson, PharmD, BCPS

## Potentially avoidable hospitalizations associated with medications for skilled nursing facility residents

Lees J, Pardini RA, Kane-Gill SL

**PURPOSE:** Patient readmissions to hospitals within 30 days are potentially preventable and an unnecessary cost to an institution. Although there have been studies of 30-day hospital readmissions related to specific disease states such as congestive heart failure, assessments of readmissions associated with medications are limited. This evaluation was conducted to identify the number of unplanned readmissions within 30 days that are attributed to medications for residents in skilled nursing facilities.

**METHODS:** A retrospective, observational study design was used to compare the proportion of 30-day hospital readmissions associated with medication events to 30-day hospital readmissions caused by other etiologies. Readmissions were limited to those occurring at hospitals within the UPMC Health System. Planned admissions were excluded. Readmissions for residents at four skilled nursing facilities during a one-year period were included. Hospital notes for residents' readmissions within 30 days of their previous hospitalization were reviewed for medication-related causes. Medication-related admissions were assessed for probability of event causality using the Naranjo criteria, for severity using the MedMARX harm scale, and preventability using the OIG Preventability scale.

**RESULTS:** Thirty-five patients met criteria for inclusion. Of note, 43% of 30-day readmissions to an institution were attributed to be medication-related. Furthermore, 34% of all hospitalizations were determined to be preventable, and therefore, potentially avoidable. Approximately 60% of these preventable readmissions were deemed to be medication-related.

**CONCLUSIONS:** Medication management during transition of care from the hospital to skilled nursing facility may be a possible strategy to prevent unplanned 30-day hospital readmissions.

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### Julia Lees

Julia received her PharmD from Temple University in 2017 and completed a pharmacy practice residency at UPMC Presbyterian in 2018. Upon completion of her residency, she plans to practice in a hospital setting and serve as a transitions of care clinical pharmacist.

**Mentor(s):** Sandra Kane-Gill, PharmD, MS, FCCM, FCCP

## Less is more: Decreasing anticholinergic burden in patients on antipsychotic medications

MacCamy K, Lupu A, Brar J, Carr CN, Fabian T, Gannon J, Chengappa KN

**PURPOSE:** Benztropine and trihexyphenidyl are often prescribed for extrapyramidal symptoms (EPS) due to antipsychotic medications. Guidelines recommend against prophylactic use of anticholinergics for EPS and for periodically reevaluating their need due to the potential for additive side effects, pill burden, and decreased quality of life. The objectives of this quality improvement (QI) project were to identify factors leading to successful discontinuation or dose reduction of anticholinergic medications to treat EPS and thus improve quality of life in patients on antipsychotics.

**METHODS:** This was a multidisciplinary QI project conducted at Western Psychiatric Institute and Clinic of UPMC's outpatient psychiatric clinic. Patients on benztropine or trihexyphenidyl and concomitant antipsychotics were identified through a pharmacy report. Education on deprescribing was disseminated to outpatient psychiatrists through email prior to enrollment in the study, and patients were referred to a clinical pharmacist for medication review. Scales were used pre- and post-medication changes to assess anticholinergic burden (Anticholinergic Cognitive Burden Scale, ACB), anticholinergic side effects (Pittsburgh Anticholinergic Symptom Scale, PASS), word recall (Memory Impairment Screen, MIS), and quality of life.

**RESULTS:** The fifty-one patients were prescribed a total of 156 anticholinergic medications; 41% antipsychotics, 59% non-antipsychotics; 67% were highly anticholinergic (ACB score 3). Thirty-nine (76%) of the patients either discontinued (n=31), or decreased (n=8) benztropine or trihexyphenidyl use. Thirty-two patients were evaluated by the clinical pharmacist; 26 completed pre- and post-medication change assessments. There were statistically significant improvements on ACB scale, PASS, MIS, and in quality of life.

**CONCLUSIONS:** It is essential that clinicians periodically assess the need for EPS treatment for patients on first- or second-generation antipsychotics. This QI project demonstrated it is possible to stop or decrease anticholinergic medications regardless of patient demographics, antipsychotic generation, daily antipsychotic dose, and formulation. This finding led to improved clinical outcomes and quality of life.

*Presented at ASHP Midyear Clinical Meeting and Exhibition, Orlando, FL, December 2017, and University of Pittsburgh, Department of Psychiatry Research Day, Pittsburgh, PA, June 2018.*

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### Katie MacCamy

Katie received her Bachelor of Science from Western Washington University in Bellingham, WA, in cellular biology and chemistry and Doctor of Pharmacy from Washington State University in Spokane, WA. She is currently a PGY1 pharmacy resident at Western Psychiatric Institute and Clinic of UPMC in Pittsburgh, PA. Her future plan is to practice as an inpatient psychiatric clinical pharmacist upon completion of her PGY2 psychiatry pharmacy residency at Avera Behavioral Health in Sioux Falls, SD.

**Mentor(s):** Ana Lupu, PharmD

## Outcomes of relapsed and/or refractory acute myeloid leukemia patients treated with sequential decitabine and cytarabine

Maples SA, Mascara GP, Natale JJ, Brenner TL

**PURPOSE:** Relapsed and/or refractory (R/R) acute myeloid leukemia (AML) patients have a poor prognosis with few treatment options. A phase II study at University of Pittsburgh Medical Center (UPMC) Shadyside evaluated sequential intravenous (IV) decitabine and cytarabine in newly diagnosed AML patients unable to tolerate intensive induction therapy. Complete response (CR) plus CR with incomplete hematologic recovery rate was 67% with a median overall survival (OS) of 10.8 months. No data is available on this regimen in R/R AML patients. The objective of this study is to evaluate the outcomes of R/R AML patients treated with this regimen at UPMC Shadyside.

**METHODS:** Patients admitted to UPMC Shadyside Hospital from January 2012 to November 2017 with R/R AML that received IV decitabine 20mg/m$^2$/day for five days followed by cytarabine 100mg/m$^2$/day continuous IV infusion for the next five days were retrospectively included. The primary objective was to evaluate the response rate to this regimen in R/R AML patients. Secondary objectives included OS at 4, 8, and 12 weeks, median OS, inpatient mortality, intensive care unit admission, hospital length of stay, time to discharge, readmission rate, incidence of documented infection and neutropenic fever, and transfusion requirements. Descriptive statistics were reported for all outcomes.

**RESULTS:** Fifteen patients were included. Patients had a median age of 64 years with majority having both relapsed and refractory AML. The CR rate was 13% (n = 2); the majority of patients (74%, n = 11) had persistent disease. Only 27% (n = 4) received two cycles, and one patient underwent subsequent allogeneic stem cell transplant. The median OS for all patients was 126 days, and those achieving CR had a median OS of 635 days (data cut-off 03/10/18). The median time hospitalized was 34 days before subsequent treatment, 90 days following treatment, or death (whichever came first).

**CONCLUSIONS:** Sequential IV decitabine and cytarabine demonstrated a 13% CR rate in patients with R/R AML. The majority of patients did not receive a second cycle despite having persistent disease after the first cycle. This regimen was associated with prolonged hospitalizations and a median OS of 126 days. Further investigation is required prior to routine recommendation of sequential IV decitabine and cytarabine in R/R AML patients.

*Presented at the 14th Annual Hematology/Oncology Pharmacy Association meeting in Denver, CO, on March 22, 2018.*

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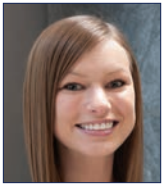

### Samantha Maples

Samantha received her PharmD from St. Louis College of Pharmacy in 2016 and completed a pharmacy practice residency at Via Christi Hospitals in Wichita, KS, in 2017. Following completion of her PGY-2 hematology/oncology residency, Samantha plans to work in malignant hematology and bone marrow transplant.

**Mentor(s):** Gerard P. Mascara, PharmD, BCOP; James J. Natale, PharmD, BCOP; Timothy L. Brenner, PharmD, BCOP

## The incidence of tachycardia in patients receiving norepinephrine plus epinephrine versus norepinephrine plus vasopressin

McHugh C, Ganchuk S, Wilson L

**PURPOSE:** The 2016 Surviving Sepsis Campaign recommends the addition of either vasopressin or epinephrine to norepinephrine in hypotensive patients who are refractory to norepinephrine alone. At our institution, prescribers have commonly selected vasopressin due to concern for tachycardia and subsequent arrhythmias associated with epinephrine. However, a recent change in system formulary guidelines suggests consideration of epinephrine due to an increased financial burden of vasopressin. The objective of this study is to evaluate the clinical impact of the formulary guidelines by investigating the incidence of tachycardia in patients receiving norepinephrine plus epinephrine (NE+E) versus norepinephrine plus vasopressin (NE+V).

**METHODS:** This QI project was a retrospective chart review of patients admitted to the ICU from September 2015 - September 2017. Eligible patients received infusions of NE+E or NE+V for at least 6 hours. The patient's heart rate (HR) was recorded before and after the addition of the second vasopressor. The primary outcome was the incidence of tachycardia in both groups; tachycardia defined as a HR > 90 bpm or a change in HR > 20% from the patient's baseline. Secondary outcomes included reduction in lactic acid levels, addition of antiarrhythmic drugs, and diagnosed tachyarrhythmias.

**RESULTS:** A total of 87 patients were included, 22 in the NE+E group and 65 in the NE+V group. Clinically significant tachycardia occurred in 31.8% of patients in the NE+E group vs. 3.1% in the NE+V group ($p = 0.001$). When the mean change in HR was compared, there was no statistically significant difference ($p = 0.196$). A statistically significant increase in the addition of antiarrhythmic drugs in the NE+E group ($p = 0.039$) was noted, however, there was no statistical difference in the diagnosis of tachyarrhythmias ($p = 0.221$) or reduction in lactic acid levels ($p = 0.728$).

**CONCLUSIONS:** Patients who received NE+E had a statistically significant increase in the incidence of clinically significant tachycardia versus the NE+V group. A statistically significant greater proportion of patients received antiarrhythmic drugs in the NE+E group versus the NE+V group, but there was no significant difference in the diagnosis of tachyarrhythmias or reduction in lactic acid levels. This study did not assess the clinical impact of the outcomes measured, and prospective data collection with a larger cohort may be better suited to assess clinical impact.

*Presented at the 75th annual American Society of Health-System Pharmacists Midyear Clinical Meeting, Orlando, FL, 2017.*

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## Caitlin McHugh

Caitlin received her PharmD from Duquesne University in 2017 and is currently completing her PGY1 pharmacy residency at UPMC Mercy. Prior to pharmacy school, she received a Bachelor's of Science degree in Health Sciences from James Madison University is Harrisonburg, VA, where she was a member of the division I women's lacrosse team. Following her PGY1 residency, she will complete a PGY2 in Critical Care at UPMC Presbyterian.

**Mentor(s):** Steve Ganchuk, PharmD; Laura Wilson, BCPS, PharmD

## Pre-exposure prophylaxis (PrEP) HIV therapy access in a family medicine residency program

Mittereder AF, D'Antonio N

**PURPOSE:** The purpose of this project is to identify patients at Latterman Family Health Center, an academic teaching facility for family medicine residents from UPMC McKeesport Hospital, who would benefit from pre-exposure prophylaxis (PrEP) therapy. This project will determine if a formal protocol will increase the number of at risk patients identified and treated with PrEP. Currently there is no formal protocol in place which causes inconsistency with care.

**METHODS:** Based off of the PrEP guidelines, a formal survey and protocol was created to address the issue of patient initiation of PrEP at Latterman. A pre- and post-initiation group was reviewed; and demographic data (age, sex, race) was gathered. All surveys that were received back also became a third group for comparison. Demographic data was descriptively compared to see if any differences were found that may have caused a difference in number of patients started on PrEP.

**RESULTS:** There were no differences in demographic data between the pre- and post-intervention group or between the pre intervention and survey group. 1 patient was started on PrEP in the pre-intervention group and 3 patients were found to be potentials for starting PrEP in the survey group; 1 never had labs drawn, 1 could not be started due to impaired renal function, and 1 was started on PrEP.

**CONCLUSIONS:** Implementing a formal protocol for initiating PrEP did not cause an increase in patients started on PrEP. This may be due to our limitations which included not all patients in the intervention group receiving the survey and not all completed surveys being returned. Further education and research needs to be completed to determine the best way to start at risk patients on PrEP.

*Presented at the 51st Society of Teachers of Family Medicine Annual Spring Conference, Washington, DC, 2018.*

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## Ashley Mittereder

Ashley received her PharmD from the University of Pittsburgh School of Pharmacy in 2017 and is completing a pharmacy practice residency at UPMC McKeesport. Upon completion of a drug information residency, she plans to practice in a clinical setting focusing on behavioral health and addiction medicine.

**Mentor(s):** Nicole D'Antonio, PharmD, BCPS; Gordon Liu, MD, AAHIVS

## Identifying drug-associated cardiac arrhythmias using the Food and Drug Administration Adverse Event Reporting System (FAERS) database

Moreland L, Kane-Gill SL

**PURPOSE:** Drug-induced $QT_c$-prolongation is a well-known and monitored adverse drug reaction (ADR) of various medications, however there are limited data on other drug-induced arrhythmias. The objective of this study is to determine drug-associated arrhythmias other than $QT_c$-prolongation by determining the frequency of reported cardiac arrhythmias from the FAERS database.

**METHODS:** FAERS reports from 2004 quarter 1 through 2015 quarter 3 were combined to create a dataset of approximately 7.3 million patients. Search terms for ADRs associated arrhythmias were selected from the Standardized MedDRA Queries (SMQ) Version 12.0—bradyarrhythmias, cardiac arrhythmias non-specific, and tachyarrhythmias. Counts of the reported ADRs and associated medications were determined. Reported causal medications were categorized into: 1) known association; 2) potential association; and 3) unknown association or newly identified. Medications reported with cardiac arrhythmia events will be cross-referenced using Micromedex, Up-To-Date, and package inserts to determine if the cardiac arrhythmia adverse event deemed known.

**RESULTS:** A total 122 drug-associated arrhythmias were analyzed from the FAERS database for atrioventricular block, atrial fibrillation/atrial flutter, bradyarrhythmia, bundle branch blocks, and ventricular fibrillation. Twenty (16.4%) of the drug-associated arrhythmias were known adverse effects of the drug. Thirty-four (27.9%) of the drug-associated arrhythmias were considered to be a potential association. Sixty-eight (55.7%) of the drug-associated arrhythmias are considered to have an unknown association or newly identified. Odds ratios of the drug-associated arrhythmias will be compared to all other drug-associated events reported in FAERS.

**CONCLUSIONS:** We will gain knowledge about potential causes of drug-induced arrhythmias filling a gap in the literature. Also, we will use these data to identify new potential drug causes that have not been reported previously.

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## Lindsay Moreland

Lindsay Moreland is from Evansville, IN, and received her Doctorate of Pharmacy from Purdue University College of Pharmacy. She is a PGY1 at UPMC Presbyterian. Following her PGY1, Lindsay will be completing a PGY2 in cardiology. Her other professional areas of interest include public health and academia. Outside of pharmacy, she enjoys being outdoors, hiking, and spending time with friends and family.

**Mentor(s):** Sandra Kane-Gill, PharmD, MSc, FCCM, FCCP

## Evaluation of a pharmacist-led consult service for long-acting injectable antipsychotics

Pasquale JF, Carr CN, Fabian TJ

**PURPOSE:** Relapse prevention is a challenge in the treatment of psychosis. Patients with psychiatric disorders have poorer medication adherence when compared to the general population. Long-acting injectable antipsychotics (LAIAs) can be used in place of oral antipsychotic therapy to help improve adherence; however, there are some challenges with LAIA therapy including access to care and potential increased cost. Our institution implemented a pharmacist-led LAIA consult service to ensure safe and appropriate use of LAIAs in the inpatient setting.

**METHODS:** In this retrospective study, inpatient LAIA medications administered during FY14 and FY17 were collected through the electronic medical record. Patients were included if they were either prescribed a LAIA to continue therapy during inpatient treatment, or newly prescribed to initiate inpatient LAIA therapy. Patients also had to be greater than 18 years old at the time of LAIA administration. The number of inpatient LAIAs administered, drug expense, and 30-day readmission rates pre- and post-implementation of the consult service were compared. In a subset of patients receiving follow-up care from our institution, a mean medication possession ratio (MPR) was calculated.

**RESULTS:** In FY14, 673 injections were administered to 209 patients across 242 admissions resulting in a pharmacy drug expenditure of $349,717. In FY17, 338 injections were administered to 156 patients across 176 admissions resulting in a cost of $61,312 (a reduction of $288,405 or 82.5%). The 30-day psychiatric readmission rate following LAIA administration in FY17 was 7.4% which was reduced from 8.3% in FY14. In the subset of patients, the mean MPR was 65.49% and 65.74% for FY14 (n=34) and FY17 (n=40), respectively.

**CONCLUSIONS:** After initiation of a pharmacist-led LAIA consult service, we observed nearly a 50% decrease in number of inpatient LAIA injections administered, a significant pharmacy cost savings, and no increase in 30-day psychiatric readmission rates.

*Presented at the 21st College of Psychiatric and Neurologic Pharmacists Annual Meeting, Indianapolis, IN, 2018, and the 18th Annual University of Pittsburgh, Department of Psychiatry Research Day, Pittsburgh, PA, 2018.*

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## Jerome Pasquale

Jerome received his PharmD from Ohio Northern University in 2016 and completed a pharmacy practice residency at Mercy Health – St. Charles Hospital in 2017. Upon completion of a psychiatric pharmacy residency, he plans to practice as a psychiatric clinical pharmacist and pursue board certification.

**Mentor(s):** Chelsea N. Carr, PharmD, BCPP; Tanya J. Fabian, PharmD, PhD, BCPP

## Evaluation of Clostridium difficile testing in adult inpatients receiving laxatives or stool softeners

Persun NL, Andrzejewski C, Wilson L, Yassin MH

**PURPOSE:** Clostridium difficile infection (CDI) is the most common hospital-acquired infection at UPMC Mercy as identified by Infection Control Council. In response, a multidisciplinary C. difficile prevention team was created. A preliminary audit of concomitant laxative use and C. difficile testing revealed a potential target to decrease the frequency of inappropriate testing, as diarrhea in patients receiving laxatives may be due to the pharmacologic effect of the drug as opposed to CDI. The objective of this quality improvement project is to quantify the incidence of inappropriate C. difficile testing related to laxative use and identify associated patient characteristics.

**METHODS:** Retrospective chart review included patients admitted to UPMC Mercy Hospital within the last two years with a stool sample sent for C. difficile testing. The incidence of patients with laxative administration within 48 hours of an ordered C. difficile test was recorded. Data collected includes administration of a laxative or stool softener, time of laxative or stool softener administration in relationship to C. difficile stool test completion, and outcome of the test. The relationship between several patient characteristics and likelihood for C. difficile test completion were also investigated, including the presence of loose stools, leukocytosis, and fever.

**RESULTS:** Data collection is ongoing, and results were not available at the time of abstract submission.

**CONCLUSIONS:** No conclusions can be drawn until results of the research are analyzed.

*Presented at the 51st Annual ASHP Midyear Clinical Meeting, Orlando, FL, 2017.*

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## Nicole Persun

Nicole received her PharmD from the Shenandoah University, Bernard J Dunn School of Pharmacy in 2017 and is currently completing a PGY1 Pharmacy residency at UPMC Mercy. Upon completion of her PGY1 residency, she will be moving to Philadelphia to complete a Solid Organ Transplant PGY2 residency at The Hospital of the University of Pennsylvania.

**Mentor(s):** Christina Andrzejewski, PharmD, BCPS; Laura Wilson, PharmD, BCPS; Mohamed H. Yassin, MD, PhD

## Retrospective evaluation of the effects of increased member contribution for high-cost generic medications

Schartner ES, Lopata EM, Daw JR

**PURPOSE:** Shortages of raw materials, decreased number of manufacturers, manufacturing issues, and transfer of drug rights have led to increasing costs for generic medications. As a result of this generic price trend, a formulary management strategy was implemented in 2016 and 2017 to move expensive generics to higher cost-sharing tiers. This evaluation was conducted to determine the effect of increased member contribution for high-cost generics (HCG) on utilization and associated pharmacy costs.

**METHODS:** A retrospective review of de-identified pharmacy claims was conducted; the population included Medicare members with pharmacy and medical benefits. The evaluation assessed therapy areas in which medications were moved to higher cost-sharing tiers in 2016 or 2017. Medications for hypertension, BPH, osteoporosis, and cholesterol were defined as chronic. Steroid creams, narcotics, and NSAIDs were defined as acute. The study assessed the change in prescription claim utilization for medication tier changes in 2015-2017. A subset analysis was conducted in continuously enrolled Medicare members to identify shifts in utilization of chronic medications, including an evaluation of pharmacy per member per month cost.

**RESULTS:** The HCG change resulted in a decrease in the overall percentage of members using HCG medications between 2015-2017. Following the 2016 formulary change, 65.3% of members discontinued the targeted HCG and 34.7% remained on the HCG medication. Of those who discontinued the HCG in 2016, 53.1% switched to a therapeutic alternative. After the 2017 formulary change, 53.7% of members discontinued the HCG and 44.0% continued the medication. Of those who discontinued the HCG in 2017, 52.5% switched to a therapeutic alternative. There was an overall decrease seen in associated PMPM pharmacy cost post-formulary change in 2016 and 2017.

**CONCLUSIONS:** HCG utilization within the Medicare population decreased following the formulary change of moving expensive generics to higher cost-sharing tiers. For members who discontinued a HCG, a higher percentage switched to a therapeutic alternative than no medication in both years. The pharmacy cost associated with selected medication classes also decreased.

*Presented at the Academy of Managed Care Pharmacy 30th Annual Meeting, Boston, MA, April, 2018.*

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## Emily Schartner

Emily received her PharmD from the University of Pittsburgh School of Pharmacy in 2017. After completion of her managed care residency at UPMC Health Plan, she will be completing a 2-Year Pharmacy Administration Fellowship at UPMC Presbyterian.

**Mentor(s):** Erin Lopata, PharmD, MPH; Jessica Daw, PharmD, MBA; Amy Calabrese Donihi, PharmD, BCPS, FCCP

## Effect of dexmedetomidine versus non-dexmedetomidine based sedation on vasopressor requirements in mechanically ventilated patients with sepsis

Shen, J, Iasella, CJ, Groetzinger, LM

**PURPOSE:** Dexmedetomidine is frequently used for sedation in mechanically ventilated patients in the intensive care unit (ICU). However, its usage can be limited by its adverse effect profile, specifically hypotension and bradycardia. Patients with sepsis are at a higher risk of hemodynamic instability and hypotension, thus requiring vasopressors to restore vascular perfusion. Therefore, clinicians must be prudent to avoid factors that may further disrupt the hemodynamic status. The aim of this study is to determine if mechanically ventilated patients with sepsis require more vasopressor support when receiving dexmedetomidine compared to non-dexmedetomidine based sedation.

**METHODS:** This is a retrospective chart review of mechanically ventilated adult ICU patients who were admitted to UPMC Presbyterian hospital with a diagnosis of sepsis or septic shock between January 1, 2015, and December 31, 2016. Patients were stratified into two groups based on whether they received dexmedetomidine or another sedative. The primary outcome was to assess overall vasopressor usage between the two groups. Secondary outcomes include length of ICU and hospital stay, mechanical ventilation time, and mortality. Patients were matched on a 1:1 ratio based on age, weight, source of sepsis, stress dose steroid use, and SOFA score.

**RESULTS:** A total of 116 out of 260 patients were included and evaluated for matching criteria. From the pool of 116 patients, 60 of them matched for a final analysis, with 30 patients in the dexmedetomidine group and 30 patients in the non-dexmedetomidine group. Results are currently pending at this time.

**CONCLUSIONS:** Evaluations are currently pending at this time.

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## James Shen

James received his PharmD from the University of Michigan College of Pharmacy in 2017. He is currently completing a PGY-1 pharmacy practice residency at UPMC Presbyterian. Upon completion of his PGY-1 training, he is planning on pursuing a PGY-2 in infectious diseases.

**Mentor(s):** Lara Groetzinger, PharmD, BCPS, BCCCP

## Evaluation of anticoagulation for atrial fibrillation: Opportunities to streamline and improve care

Szymkowiak AM, Seybert AL, Iasella CJ, Coons JC

**PURPOSE:** Atrial fibrillation is the most prevalent arrhythmia worldwide with an estimated annual cost of care of $6.7 billion, with nearly three quarters of this cost due to hospitalizations. The aims of our study were to describe the patient population hospitalized for the management of non-valvular atrial fibrillation (NVAF) and atrial flutter (AFl) treated with a direct oral anticoagulant (DOAC) and to evaluate clinical outcomes.

**METHODS:** This was a retrospective, IRB approved, cohort study of patients admitted to two community hospitals within the UPMC system with the primary diagnosis of NVAF or AFl and treated with a DOAC between January 1, 2011, and December 31, 2015. International Classification of Diseases, Ninth Revision (ICD-9) and Tenth Revision (ICD-10) codes for NVAF and AFl identified patients for evaluation. Medication charge codes were used for DOAC identification. Stroke and bleeding risk was calculated for all patients using the $CHA_2DS_2$-$VAS_c$ and HAS-BLED scores respectively. Clinical outcomes included all-cause readmissions, as well as those related to a bleeding or thromboembolic event. Statistical analyses were performed using IBM SPSS Statistics 25.0.

**RESULTS:** In total, 4664 patient visits were screened, with 983 visits meeting criteria for inclusion. The median patient $CHA_2DS_2$-$VAS_c$ score was 3 (IQR 1,4) and the median HAS-BLED score was 1 (IQR 1,2). There were 383 readmissions (39%) within 90 days of initial NVAF/AFl admission, with 58% of these readmissions occurring within 30 days. The incidence of readmission within 90 days due to a primary admitting diagnosis of NVAF or AFL was 44.9%. The incidence of readmission within 90 days due to a thromboembolic event or bleeding event was 0.52% and 1.04% respectively.

**CONCLUSIONS:** The patient population was found to be at high risk for stroke as evidenced by a median $CHA_2DS_2$-$VAS_c$ score of greater than two and a relatively low risk for bleed. Evaluation of clinical outcomes demonstrated that the primary cause for readmission at both 30 and 90 days was NVAF or AFl with few readmissions for a primary diagnosis of thromboembolism or bleeding. These results suggest that opportunities may exist to improve the care of these patients through anticoagulation management, educational support, and/or adherence reinforcement. We hypothesize that a pharmacist led, team-based approach, treatment pathway can make an impact on readmission rates by improving transitions of care.

*Presented at the 67th Annual American College of Cardiology Scientific Session and Expo, Orlando, FL, 2018.*

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## Adrienne Szymkowiak

Adrienne received her Doctor of Pharmacy from Duquesne University in 2016, completed her PGY1 Pharmacy Residency at UPMC Presbyterian, and is currently the institution's PGY2 Cardiology Resident. Her professional interests include anticoagulation and heart failure management. After completion of her residency, Adrienne will be working as a Clinical Pharmacist in Cardiology at UPMC Presbyterian.

**Mentor(s):** James C. Coons, PharmD, FCCP, BCPS-AQ Cardiology; Amy L. Seybert, PharmD, FASHP, FCCP, CHSE

## An educational intervention to improve rates of hepatitis C treatment in the primary care setting

Turco, NJ

**PURPOSE:** The recent advent of highly effective and well-tolerated direct-acting antiviral medications for hepatitis C has shifted prescribing from specialists to family medicine physicians. Family medicine residency programs need to provide education and opportunities for residents to treat this growing patient population. Pharmacists embedded with a patient-centered medical home are poised to enhance the learning environment and to train physicians to effectively prescribe and manage these patients. A brief educational intervention on hepatitis C was provided to family medicine residents to evaluate the effect on their comfort in evaluating and treating patients for hepatitis C.

**METHODS:** A prospective design was used for this educational intervention in which family medicine residents (n=48) were asked to complete a pre-survey regarding their comfort in evaluating and treating patients with hepatitis C in addition to recalling available medications. A 25-minute educational intervention via slideshow presentation was provided by a pharmacist, immediately followed by a post-survey. Change in resident comfort in initiating treatment evaluation for hepatitis C was the primary outcome. Secondary outcomes included change in comfort in prescribing medications, recall of FDA-approved hepatitis C medications, and comparison of the number of patients evaluated for treatment pre- to post- intervention.

**RESULTS:** There were 13 responses to both surveys. Medical residents' comfort in initiating treatment evaluation improved for 69% and remained the same for 31% of residents. Comfort in prescribing medications improved for 92% and remained the same for 8% of residents. Recall of FDA-approved hepatitis C medications improved from a median of 1 to ≥ 3 medications. Actual treatment rates improved as well: During a 6-month period following the educational intervention, 28 patients were evaluated, 9 are undergoing treatment, and 2 already cured compared to 11 evaluated and 2 cured during the same 6-month period a year prior.

**CONCLUSIONS:** An educational intervention improved family medicine resident physicians' comfort in initiating treatment evaluation and prescribing direct-acting antivirals for hepatitis C. Rates of evaluation and treatment greatly improved compared to historical rates. Family medicine physicians represent an emerging opportunity for patients to receive treatment for hepatitis C. Education from and collaboration with pharmacists improves the comfort of family medicine residents in evaluating and treating hepatitis C.

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## Neil Turco

Neil is from Kittanning, PA, and received his PharmD from the University of Pittsburgh School of Pharmacy in 2016. He completed his PGY1 residency at UPMC St. Margaret. This year, he is completing a PGY2 residency in ambulatory care at UPMC St. Margaret. His professional interests include family medicine, interprofessional education, and transitions of care. Neil enjoys hiking, exercising, and spending time with family. He will be a Primary Care Clinical Specialist for Cleveland Clinic after completion of his PGY2 residency.

**Mentor(s):** Marianne Koenig, PharmD, BCPS

## Frequency of discharge medication reconciliation discrepancies

Ubinger CR, Moffett SM, Scholl M

**PURPOSE:** Medication reconciliation is an important aspect of patient care and is particularly important during transitions of care such as admission, transfer, and discharge. Errors in the medication reconciliation process can negatively affect patient care during a patient's hospital stay and after the patient is discharged. The purpose of this study was to examine the frequency and types of discharge medication reconciliation discrepancies at UPMC Hamot.

**METHODS:** Patients readmitted to UPMC Hamot within thirty days of hospital discharge between January 2017 - December 2017 were identified. Admission and discharge home medication lists were compared and evaluated for changes and discrepancies. Discrepancies were categorized by type, medication class, disease state, and were evaluated for appropriateness based on patient clinical status, disease states, and documentation.

**RESULTS:** Seventy-five patient cases were reviewed with an average of 12.5 (range 5-25) home medications on admission per patient. In total, 123 discharge medication reconciliation discrepancies were identified with an average of 1.6 discrepancies per patient. The discrepancies were categorized as 43 discontinued home medications, 39 inappropriately continued home medications, 15 dosage changes, 8 new medications, 8 interval changes, 8 duplications, and 2 formulation changes. The most common medication classes involved in discrepancies were antidiabetics, non-opioid analgesics, opioids, antibiotics, and supplements. Discharge medication reconciliation discrepancies were associated with one or more subsequent admitting diagnoses in 13 (17.3%) of reviewed patient cases.

**CONCLUSIONS:** This study revealed notable areas for attention at discharge medication reconciliation such as home medication continuation and discontinuation as well as dosage adjustments to home medications. Proposed changes from the results of this study include education to nurses, physicians, and pharmacists to standardize and improve the medication reconciliation process, increase usage of external resources to confirm home medications, and target patients at higher risk for discrepancies. Additionally, creation of documentation for outside hospital medication orders, development of discrepancy alerts at discharge medication reconciliation, and removal of the "continue all home medications" function may decrease the risk for medication reconciliation discrepancies.

*Presented at UPMC Hamot Research Days, Erie, PA, April 11-12, 2018.*

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## Carolyn Ubinger

Carolyn received her PharmD from the University of Pittsburgh School of Pharmacy in 2017 and is currently a pharmacy practice resident at UPMC Hamot. Upon completion of her residency, she plans to practice in a hospital setting.

**Mentor(s):** Sarah M. Moffett, PharmD, BCPS; Maryann Scholl, PharmD, MS, BCPS

## If the gene fits: Perspectives of pharmacogenomic use in family medicine practices

Weinstein SD, Klatt PM, Jukic S, McGivney MS, Cothrel SM, Baumgartner MA, Carroll JC

**PURPOSE:** Pharmacists in primary care practices are in a unique position to use pharmacogenomic data to drive personalized medical treatment for patients with depression. However, there is limited data exploring the implementation and utility of a pharmacist-run pharmacogenomic service in physician office practices. This project will explore pharmacist and physician perspectives of a pharmacist-run pharmacogenomic service to optimize pharmacotherapy and aid in informed decision-making when initiating treatment for depression in primary care practices.

**METHODS:** UPMC St. Margaret Family Medicine physicians and their associated pharmacists from multiple office practice sites were invited via email to participate in semi-structured, key informant interviews with a pharmacist investigator. Interview questions were informed using the Consolidated Framework for Implementation Research. Interviews were audio recorded and transcribed. Transcripts were independently coded by two investigators, and coding discrepancies were resolved. A thematic analysis was performed.

**RESULTS:** Twenty-one interviews were conducted. Five major themes emerged upon analysis: 1) Utilizing pharmacogenomics in the primary care setting may be a tool to help individualize initial medication selection for patients with depression; 2) Implementing a pharmacogenomics service begins with a prescriber-patient interaction and includes a subsequent team-based approach with open lines of communication; 3) Trained pharmacists who have collaborative relationships with an outpatient physician practice will interpret pharmacogenomic results and provide recommendations; 4) Appropriate patient selection, engagement, and education are critical; 5) Patient monitoring and follow-up responsibilities will be shared amongst team members in each practice.

**CONCLUSIONS:** Physicians and pharmacists view pharmacogenomics as a useful tool to individualize pharmacotherapy for patients with depression. Team-based care is required for patient engagement, effective communication, and follow-up. Pharmacists are key team members who will interpret pharmacogenomic results and provide requisite recommendations to the team regarding medication selection for patients with depression in primary care.

*Presented at: 51st Annual Society of Teachers of Family Medicine (STFM) Spring Conference, Washington, DC, 2018.*

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## Sara Weinstein

Sara received her PharmD from the University of Arizona College of Pharmacy in 2017 and is currently at UPMC St. Margaret completing a PGY-1 residency. Upon completion, Sara will be continuing her training at St. Margaret by completing at PGY-2 in Family Medicine.

**Mentor(s):** Joni C. Carroll, PharmD, BCACP

## Impact of international medical service on attitudes toward interprofessional collaboration

Welch HK, Connor SE, Jonkman LJ, Muzzio KB, Taylor AM

**PURPOSE:** Interprofessional education has been recognized in the health sciences as a way to foster collaborative practice and ultimately improve health outcomes. Although international medical service is increasingly common during professional training, little is known about the impact of interdisciplinary global health experiences on attitudes toward interprofessional collaboration. Twice each year, our institution sends groups of health professions students and residents to serve with a medical brigade providing primary care in rural Honduras. The purpose of this study was to evaluate the impact of this experience on student attitudes toward interprofessional collaboration using surveys and semi-structured interviews.

**METHODS:** This mixed-methods study included students and residents in medicine and pharmacy participating in brigades to Honduras during fall 2017 and spring 2018. The Readiness for Professional Learning Scale (RIPLS), a 19-item questionnaire using a 5-point Likert scale, was administered before and after each brigade. As RIPLS scores were anticipated to be high at baseline, individual semi-structured interviews were conducted with participants following each brigade to gain a better understanding of their experiences with interprofessional learning. Interviews were audio recorded and transcribed verbatim. A codebook was developed, and codes were examined to identify patterns and overarching themes.

**RESULTS:** In total, 20 learners participated in the brigades, including medical students (n=6), pharmacy students (n=6), medical residents (n=6), and pharmacy residents (n=2). All 20 participants completed a pre-departure RIPLS questionnaire, and 19/20 participants (95%) completed a post-brigade questionnaire. There was a significant improvement in mean RIPLS scores following the brigade experience (4.57 vs 4.35, p=0.02). To date, 16 interviews have been conducted. Preliminary analysis reveals several themes including: 1) Participating in another profession's patient care activities builds mutual respect; 2) Face-to-face interaction strengthens collaboration; 3) Shared activities outside of work contribute to interprofessional learning. Thematic analysis is ongoing.

**CONCLUSIONS:** Results from this mixed-methods study will shed light onto the value of medical service missions for learners. Specifically, we hope to provide insight into which aspects of international medical service contribute most to interprofessional learning and help educators to develop effective interprofessional experiences. We anticipate that the gain in interprofessional learning will come not just from collaborating in a clinical setting, but in building relationships outside of the clinic.

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### Hanna Welch

Hanna received her Bachelor of Science in Chemistry and French from the University of Alabama in 2011 and her Doctor of Pharmacy from the University of Michigan in 2016. She completed a PGY1 Pharmacy Practice residency at UPMC Presbyterian and is currently completing a PGY2 Ambulatory Care/Global Health residency through the School of Pharmacy. Following residency, she will join the University of Louisiana at Monroe School of Pharmacy as a Clinical Assistant Professor based in New Orleans.

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

## Antibiogram-based antibiotic algorithm for treatment of cystitis in a nursing facility

Wilson E, Kryger E, Pickering A, D'Amico F, Haver A

**PURPOSE:** Urinary tract infections are the most common infection in nursing homes; and while antibiograms are frequently used in hospital settings to guide empiric therapy, there is limited research in the use of these reports in nursing homes to guide therapy. This study aimed to evaluate a facility-specific antibiogram-based antibiotic algorithm in place for empiric treatment of cystitis by characterizing prescribed empiric antibiotics.

**METHODS:** This was a retrospective, cross-sectional study that included patients from a skilled nursing facility who received antibiotic therapy for cystitis. An algorithm for empiric treatment of cystitis was previously implemented at the facility in conjunction with an antimicrobial stewardship program. This algorithm used a facility-specific antibiogram in addition to the IDSA guidelines to recommend first and second-line empiric antibiotics for patients with suspected cystitis. The culture and susceptibility report for each patient was compared to the empiric antibiotic prescribed to determine if the antibiotic was effective or ineffective.

**RESULTS:** During the study period of 11 weeks, 39 urine cultures were performed and 26 patients had positive urine cultures. Fourteen patients were excluded, mostly attributed to not receiving antibiotics and receiving antibiotics after culture resulted, and 12 patients were included in the analysis. The prevalence rate of effective empiric antibiotic prescribing was 67% (95% CI 42%-92%). 58.3% of patients received either first or second-line antibiotics according to the algorithm. None of the patients' empiric antibiotics were changed after the culture resulted.

**CONCLUSIONS:** This exploratory analysis shows that while the majority of patients are receiving antibiotics that are effective for their cystitis, many patients' urine cultures result in resistant organisms. Despite a facility specific algorithm for empiric antibiotics being in place, antibiotics not included in the algorithm continue to be prescribed. Future work includes a comparison of antibiotic use prior to algorithm implementation.

*Presented at the Society of Teachers of Family Medicine 51st Annual Spring Conference in Washington, DC, May 2018.*

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## Erica Wilson

Erica received her PharmD from the University of Pittsburgh School of Pharmacy in 2017 and is currently a PGY1 pharmacy practice resident and faculty development fellow at UPMC St. Margaret. She will continue at St. Margaret next year and pursue a PGY2 geriatric pharmacy residency. Upon graduation, she plans to pursue an ambulatory care position with a focus in geriatrics.

**Mentor(s):** Amy Haver, PharmD, BCPS

## Evaluation of the *in vitro* activity of meropenem-vaborbactam against carbapenem-resistant *Enterobacteriaceae* (CRE)

Wilson WR, Shields RK

**PURPOSE:** Meropenem-vaborbactam is a novel antimicrobial combination designed to treat carbapenem-resistant *Enterobacteriaceae* (CRE) infections, for which there are few treatment options. Our objective was to determine the *in vitro* activity of meropenem-vaborbactam against CRE isolates from UPMC, including those that have developed resistance to our first-line agent, ceftazidime-avibactam. We also compared susceptibility testing methods to identify the best approach for clinical microbiology laboratories.

**METHODS:** Minimum inhibitory concentrations (MICs) were determined for meropenem, meropenem-vaborbactam, and ceftazidime-avibactam by reference broth microdilution (BMD) methods in triplicate. Vaborbactam and avibactam were tested at fixed concentrations of 8 and 4 μg/ml, respectively. Etests from two different manufacturers (Liofilchem and bioMérieux) were tested according to manufacturer recommendations. Susceptibility to meropenem-vaborbactam was also determined by disk diffusion. For each method, quality control strains were used and within expected ranges. Polymerase chain reaction (PCR) with DNA sequencing were used to detect resistance determinants, including the presence of *Klebsiella pneumoniae* carbapenemase (KPC) subtypes and porin gene mutations.

**RESULTS:** 117 CRE isolates were tested, including *K. pneumoniae* (n=83), *E. cloacae* (n=17), *E. coli* (n=10), and *E. aerogenes* (n=7). 79% of CRE isolates harbored $bla_{KPC}$. KPC subtypes included KPC-2 (n=32), KPC-3 (n=41), KPC-3 variants (n=16), and KPC [not typed] (n=4). Among 74 *K. pneumoniae,* 95% had a premature stop codon in *ompk35* and several *ompK36* genotypes were identified: wild-type (n=48), IS5 insertion (n=13), 135-136 DG duplication (n=9), and other mutations (n=4). Overall, 23%, 84%, and 98% of isolates were susceptible to meropenem, ceftazidime-avibactam, and meropenem-vaborbactam, respectively. Ninety-five percent of ceftazidime-avibactam resistant isolates were susceptible to meropenem-vaborbactam (median MIC=0.06 μg/mL, range: 0.06 – 16 μg/mL). By genotype, median meropenem-vaborbactam MICs were higher among KPC-2 than KPC-3-producing *K. pneumoniae* ($P$=0.0015), and among *K. pneumoniae* with *ompK36* porin mutations compared to isolates with wild-type *ompK36* ($P$<0.001). Across susceptibility testing methods, essential agreement with BMD was higher for bioMérieux (81%) than Liofilchem (47%) Etests ($P$<0.0001). Rates of categorical agreement with BMD were 95%, 92%, and 90% for bioMérieux-Etest, disk diffusion, and Liofilchem-Etest, respectively.

**CONCLUSIONS:** Meropenem-vaborbactam demonstrated *in vitro* susceptibility against genetically-diverse CRE isolates from UPMC. Notably, 95% of isolates demonstrating resistance to ceftazidime-avibactam remained susceptible to meropenem-vaborbactam. As this agent is introduced into the clinic, it will be important to identify *K. pneumoniae* isolates harboring KPC-2 with *ompK36* porin mutations that demonstrate higher MICs. In our experience, the best test to identify such isolates in the clinical microbiology laboratory is the bioMérieux Etest.

## William Wilson

Will received his PharmD from the University of Pittsburgh School of Pharmacy in 2016. He completed his PGY-1 Pharmacy Residency at UPMC Mercy Hospital and is currently the PGY-2 Infectious Diseases Pharmacy Resident at UPMC Presbyterian Hospital. Following completion of his PGY-2 year, Will is excited to continue his career as a clinical pharmacy specialist at Forbes Hospital in Monroeville, PA.

**Mentor(s):** Ryan K. Shields, PharmD, MS

## Anticoagulant adherence in atrial fibrillation – relevance of depression and quality of life in an ambulatory cohort

Yamazaki K, Gisi B, Hall DL, Magnani JW

**PURPOSE:** Medication adherence to anticoagulation therapy in atrial fibrillation (AF) is important in preventing thromboembolic events and/or ischemic stroke. Psychosocial factors and health perceptions have been reported as potential contributors to nonadherence. Although there is no gold standard for measuring nonadherence, a commonly used objective measure is medication possession ratio (MPR) which can be calculated using pharmacy claims data. Validated questionnaires exist to screen for depression (PHQ-9) and the effect of atrial fibrillation on quality of life (AFEQT). The purpose of this study is to determine if there is a correlation between MPR and either the PHQ-9 or the AFEQT scores.

**METHODS:** A retrospective chart review was conducted to examine prescription refill data for non-valvular AF patients prescribed warfarin and/or direct oral anticoagulants as part of an existing study at the University of Pittsburgh Medical Center (UPMC). Patient demographics, PHQ-9, and AFEQT scores have already been collected. MPRs were calculated for each patient's anticoagulation therapy over a 12-month period and will be truncated to a maximum value of 1.

**RESULTS:** MPRs have been calculated for the 119 subjects included in this study. Statistical analysis is currently in progress.

**CONCLUSIONS:** Research in progress

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### Karin Yamazaki

Karin is from Boston, MA, and received her PharmD from Northeastern University in 2016. She completed her PGY1 pharmacy residency at James J. Peters VA Medical Center in Bronx, NY. Her practice interests include anticoagulation, diabetes, heart failure, hepatitis C, and HIV. Upon completion of her ambulatory care residency, she hopes to practice as a clinical pharmacist in an outpatient clinic.

**Mentor(s):** Deanne L. Hall, PharmD, CDE, BCACP

## Pharmacist-led expansion of Opioid Overdose Education and Naloxone Distribution (OEND) for co-prescribed opioids and benzodiazepines

McCarthy R, Kozarian R, McQuillan A

**PURPOSE:** To address the safe and appropriate use of opioid analgesics, the Veteran's Health Administration (VHA) developed the Opioid Safety Initiative (OSI), which is also an Academic Detailing (AD) campaign. Opioid Overdose Education and Naloxone Distribution (OEND) began in 2014 with a goal of preventing fatal and non-fatal opioid overdoses in at-risk veterans. The objectives of the current study are to expand overdose risk minimization for patients co-prescribed opioids and benzodiazepines (BZDs) through a multi-faceted pharmacist-led intervention at VA Pittsburgh Healthcare System (VAPHS) and to determine if the implementation of a prior authorization consult for concomitant opioids and BZDs is warranted.

**METHODS:** In September 2017, 328 ambulatory care patients were identified as being co-prescribed an opioid and a benzodiazepine within VA Pittsburgh Healthcare System (VAPHS). Twenty-three patients had a Risk for Overdose or Serious Opioid-Induced Respiratory Depression (RIOSORD) score >8 and were excluded as these patients have been addressed in a separate initiative. The remaining 305 patients were evaluated for overdose risk, provided naloxone education, and offered a naloxone kit if appropriate. Patient charts were reviewed to evaluate appropriateness for concomitant therapy with opioids and benzodiazepines based on established criteria. Of those determined inappropriate, academic detailing was delivered to the providers.

**RESULTS:** Of 305 patients evaluated, 197 were appropriate for outreach and 152 (86%) accepted. Charts were reviewed for 145 patients, of whom 15 (10.3%) were appropriate for concomitant opioid and benzodiazepine therapy. Of the 8 providers identified for AD meetings, 4 (50%) responded, and all 4 (100%) expressed a commitment to change.

**CONCLUSIONS:** Pharmacist intervention via telephone outreach, chart reviews, and AD meetings effectively expands overdose risk minimization strategies. Given the study findings, implementation of a prior authorization consult for patients co-prescribed opioids and BZDs at VAPHS may be warranted.

*Presented at the 21st Annual College of Psychiatric and Neurologic Pharmacists (CPNP) Meeting, Indianapolis, IN, 2018.*

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## Rebecca McCarthy

Rebecca received her PharmD from the Duquesne University School of Pharmacy in 2013. She worked full time as a community pharmacist for two years before completing the PGY1 Pharmacy Practice Residency (2016) and the VA Interprofessional Advanced Fellowship in Addiction Treatment (2017) at VA Pittsburgh Healthcare System (VAPHS). She will complete the PGY2 Psychiatric Residency program at VAPHS, which has collaborated with the Western Psychiatric Institute & Clinic of UPMC, in July 2018. Rebecca plans to pursue a clinical pharmacy specialist position.

**Mentor(s):** Robert Kozarian, PharmD, BCPP; Amanda McQuillan, PharmD, BCPS, BCPP

## Implementation of a pharmacist-led benzodiazepine taper e-consult and clinic

Stacy CR, Greer DJ, McQuillan AD

**PURPOSE:** Benzodiazepines are commonly prescribed to treat a variety of conditions including seizures, spasticity, alcohol withdrawal, and insomnia. Risk of adverse events include falls, dependence, cognitive impairment, accidental overdoses, and poor psychotherapy outcomes. Benzodiazepine tapering can be challenging, as patients may experience withdrawal, rebound, or relapse. Factors increasing the likelihood of a successful benzodiazepine taper include provider involvement, patient education, individualized tapers, and close patient monitoring. Given the risks associated with chronic benzodiazepine use, the Veterans Affairs Pittsburgh Health Care System (VAPHS) developed and initiated pharmacist-led benzodiazepine taper e-consult service and clinic to assess the impact on the reduction of benzodiazepines.

**METHODS:** VAPHS providers were educated on the new service availability through one-on-one meetings, department emails, and staff meetings. Participants were recruited from VAPHS between December 2017 and April 2018 by provider referral. All patients identified received an individualized benzodiazepine taper through the e-consult service. Patients were eligible for enrollment in the benzodiazepine taper clinic if they have the following: an e-consult, VA provider, stable housing, active phone number, and an estimated taper schedule of 8 weeks. Patients requiring hospitalization, active cancer treatment, hospice care, or upon refusal to participate were excluded. Descriptive statistics was used to describe study data collected.

**RESULTS:** Ten out of 57 providers placed a total of 50 e-consults. Of the 24 completed consults, inappropriate benzodiazepine use decreased by 22.4% within 3 months. Pharmacist's outreach to providers and patients was associated with a 17.7-fold decrease in total benzodiazepine use and a 7.3- fold decrease in daily benzodiazepine dose per patient over 3 months.

**CONCLUSIONS:** Pharmacist-led service decreases inappropriate benzodiazepine use and increases non-BZD therapies for the treatment of various psychiatric diagnoses via phone outreach, patient education, chart reviews, and provider meetings - thus decreasing risks associated with chronic and inappropriate BZD use without negatively impacting interdisciplinary communication.

*Presented at the 21st Annual Meeting for College of Psychiatric and Neurologic Pharmacists, Indianapolis, IN, 2018.*

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## Candace Stacy

Candace received her BS in toxicology in 2012, BS in pharmaceutical sciences in 2014, and her PharmD from the University of Louisiana at Monroe in 2016. She completed her PGY-1 residency at the Veterans Health Care System of the Ozarks in Fayetteville, AR, and she will finish her PGY-2 psychiatric pharmacy residency training at the Veterans Affairs Pittsburgh Healthcare System in conjunction with the Western Psychiatric Institute & Clinic of UPMC in July 2018. Upon completion of a psychiatric residency, Candace plans to practice in a hospital setting and continue her involvement as a preceptor for pharmacy students and residents.

**Mentor(s):** Daniel J. Greer, PharmD, BCPP; Amanda D. McQuillan, BCPS, BCPP

# Residency Program Contact Information

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# Pharmacy Residency Programs

## Post Graduate Year 1 (PGY1)

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

**Pharmacy at UPMC Mercy**
Director: Robert Simonelli, PharmD

**Pharmacy at UPMC St. Margaret**
Director: Gregory Castelli, PharmD, BCPS, BC-ADM
Assistant Director: Patricia Klatt, PharmD, BCPS

**Pharmacy at UPMC McKeesport**
Director: Nicole D'Antonio, PharmD, BCPS

**Pharmacy at UPMC Shadyside**
Director: Stephanie Ballard, PharmD, BCPS

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

**Pharmacy at UPMC Hamot**
Director: Brad E. Cooper, PharmD, MBA, DPLA, FCCM

**Pharmacy at Magee-Womens Hospital of UPMC**
Director: Julie Nowak, RPh, BCGP, FASCP

**Pharmacy at Western Psychiatric Institute and Clinic of UPMC**
Director: Matthew Joseph, PharmD, BCPS

**Managed Care at UPMC Health Plan**
Director: Erin Lopata, PharmD

**Managed Care at CVS Caremark**
Director: Jennifer Heasley, PharmD

**Community Pharmacy: Rite Aid Pharmacy, Giant Eagle Pharmacy, Asti's Pharmacy**
Director: Melissa Somma McGivney, PharmD, FCCP, FAPhA

# Pharmacy Residency Programs

## PGY1/PGY2 Health-System Pharmacy Administration

**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 at UPMC Presbyterian Shadyside Global Health Track**
Director: Sharon Connor, PharmD
Assistant Director: Lauren Jonkman, PharmD, BCPS

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

**Cardiology at UPMC Presbyterian Shadyside**
Director: James Coons, PharmD, FCCP, BCPS-AQ Cardiology

**Critical Care at UPMC Presbyterian Shadyside**
Director: Pamela Smithburger, PharmD, MS, BCPS, BCCP, FCCP

**Geriatrics at UPMC Presbyterian Shadyside**
Director: Christine M. Ruby, PharmD, BCPS, BCGP, FASCP

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

**Infectious Diseases at UPMC Presbyterian Shadyside**
Director: Brian Potoski, PharmD, BCPS-AQ ID

**Oncology at UPMC Cancer Centers**
Director: James Natale, PharmD, BCOP

**Psychiatric Pharmacy at Western Psychiatric Institute and Clinic of UPMC**
Director: Chelsea N. Carr, PharmD, BCPP

**Solid Organ Transplantation at UPMC Presbyterian Shadyside**
Director: Kristine Schonder, PharmD