Category: Original Research
Title: A Retrospective Review of Factors that Impact Performance in a Year-Long Top 200 Drug Course
Authors: Sophia DeBerry, Cortney Mospan PharmD, BCACP, BCGP, Christopher Gillette, PhD

Objectives: To assess the impact of pre-requisite GPA, semester that Introductory Pharmacy Practice Experience (IPPE) occurred, IPPE practice location, completion of practice quizzes (PQs), and campus attended on student performance in a Top 200 Drug course.

Methods: A retrospective observational analysis of performance in a Top 200 course was completed. Students were included if they were enrolled in both semesters of the course and completed their Community IPPE in 2016 -2017. Linear regression models were created to examine how pre-requisite GPA, semester that IPPE occurred, type of IPPE site, completion of $\geq$80% of practice quizzes, and campus location were associated with final course grade in both semesters.

Results: Students were significantly more likely to have higher Fall final course grades when they had a higher pre-requisite GPA (β=8.75, p<0.0001), were enrolled in IPPE (β=2.81, p=0.034), and completed $\geq$80% of PQs (β=4.15, p=0.005). Students who had higher pre-requisite GPAs (β=3.75, p=0.03), completed $\geq$80% of PQs (β=3.47, p=0.002), attended the satellite campus (β=-3.22, p=0.009), had completed IPPE at a grocery store or mass merchant (β=2.63, p=0.026), and had higher scores in the Fall semester (β=0.35, p<0.0001) had higher Spring course grades.

Conclusion: Several factors were identified that impacted student performance, some of which may not be expected. Students with a higher pre-requisite GPA and those who completed $\geq$80% of PQs performed better. Campus location and IPPE location also impacted student performance. Further investigations should assess how these factors improved student performance and if they can impact student performance in other courses.

Category: Original Research
Title: Implementation and Evaluation of a Pharmacist-led Hypertension Management Clinic
Authors: Andrew P. Clark, PharmD, BCPS, CDE, CPP; Kristie D. Clark, PharmD, CDE, CPP; Nick Wilkins, PharmD, BCPS, CDE, CPP
Institution: Carolinas HealthCare System NorthEast – Concord Internal Medicine

Objective: The primary objective was to assess the impact of pharmacist intervention on patients with hypertension. Secondary outcomes included systolic and diastolic blood pressure values and medication interventions including the number and type of medication-related problem interventions and percentage resolved by the clinical pharmacist, and average number of antihypertensive medications at three months after the last pharmacist office visit.

Methods: Medical records of 106 patients with hypertension from January 1, 2017 to December 31, 2017 were reviewed. Patients were included in the blood pressure outcome data if they had an office visit with the pharmacist at least once, and had at least one documented blood pressure at any visit three months after the last pharmacist visit. Medication-related problems were reported for all patients seen in 2017.

Results: 78 patients met criteria and were included in the analysis. The average systolic blood pressure in the study group improved from 145.5 mmHg to 140.4 mmHg ($p < 0.0417$) and the average diastolic blood pressure improved from 81.5 mmHg to 77.7 mmHg ($p < 0.0210$). 52.6% of patients met their age specific goals three months after meeting with the pharmacist, compared with 35.9% before intervention. Pharmacists made a total of 141 medication-related problem recommendations, of which 133 recommendations were implemented by the pharmacist. A total of 106 unique patients were seen for 153 visits by pharmacists in 2017. Patients did not take significantly more antihypertensive medications on average after meeting with the pharmacist – 2.14 medications per patient initially versus 2.31 medications on average at three months.

Conclusion: Patients who were seen by a clinical pharmacist at least once showed a statistically significant improvement in systolic and diastolic blood pressures. A greater percentage of patients achieved their age-appropriate BP goals without significantly increasing medication burden.

Category: Original Research
Title: Reducing 30-Day Hospital Readmission Rates by Utilizing Embedded Pharmacists for Discharge Follow-up in an Internal Medicine Practice
Authors: Amanda Woods, PharmD, BCACP, CDE, CPP, Kayla Morgan, PharmD, BCACP, CDE, CPP, Lindsay Sheehan, PharmD, CDE, CPP
Institution: Kannapolis Internal Medicine, Atrium Health

Objective: Medication-related problems (MRPs) are a significant cause of hospital readmissions and emergency room (ER) visits. This project aimed to decrease 30-day hospital readmission rates and ER visits by utilizing outpatient clinical pharmacists to conduct hospital follow-up visits.

Methods: This project consisted of three separate prospective, single-center, controlled, IRB-approved studies conducted at a hospital-owned internal medicine practice. Adult patients scheduled for a pharmacist hospital follow-up were compared to patients who only received routine hospital follow-up with their primary care provider. Patients were offered an in person, phone, or virtual follow-up visit with a pharmacist. The primary endpoint was 30-day hospital readmissions and ER visits. Secondary endpoints included MRPs identified, items that required provider intervention, and patient-identified barriers to care.

Results: A total of 239 patients were included in the study. The majority of the patients were >65 years of age with multiple chronic disease states and medications. There were statistically and clinically significant reductions in 30-day hospital readmissions for patients in the PharmD intervention group compared to the standard hospital follow up group (7% vs 18%, p=0.0104) and ER visits (8% vs 20%, p=0.0054). There was an overall 65% reduction in readmissions or ER visits in the PharmD intervention group (12% vs 34%, p<0.001). The potential savings to the health system exceeded $137,500. The pharmacist identified an average of 3.1 MRPs per visit and 72% were resolved by the pharmacist.

Conclusion: Clinical pharmacists can identify and resolve a variety of MRPs surrounding hospital discharge. Pharmacist intervention after hospital discharge potentially prevented one in five hospital readmissions or ER visits within thirty days, which was associated with a potential cost savings exceeding $137,500 over the course of the study periods. These results are further proof of concept for the use of clinical pharmacists to improve transitions of care.

Category: Quality Improvement Evaluations
Title: Efficacy and safety of sodium glucose co-transporter-2 inhibitors at three clinics within an educational health system
Authors: Casey Wells, BS, PharmD Candidate, Jennifer Kim, PharmD, BCPS, BCACP, CPP
Institution: Moses H. Cone Memorial Hospital, Greensboro NC; UNC Eshelman School of Pharmacy

Objective: To assess the efficacy and safety of sodium glucose co-transporter-2 inhibitors (SGLT2*i*) in diabetic patients in terms of glycosylated hemoglobin (A1c), blood glucose (BG), blood pressure (BP) and weight (Wt) reductions at three indigent clinics within an educational health system.

Methods: This was a deidentified, retrospective chart review medication use evaluation. Patients of one of three clinics prescribed Invokana (canagliflozin), Farxiga (dapagliflozin), or Jardiance (empagliflozin) before March 9th, 2018 were included. Of 139 patients screened, 42 were excluded for not having at least one of the following: Post-A1c, Post-BG, Post-BP, or Post-Wt due to recent initiation or loss of follow up.

Results: Of 97 patients, 49 (50.52%) were prescribed canagliflozin, 25 (23.71%) empagliflozin, and 23 (23.71%) dapagliflozin. The mean baseline A1c was 9.88% and BG was 232.51 mg/dL. The overall mean post-A1c was 8.83%, (-1.05%, p=0.0005). The overall post-BG was 179.29 mg/dL (-53.22mg/dL, $p < 0.0001$). There was no significant difference in BP [(systolic p=0.4605), (diastolic p=0.6644)] or Wt (p=0.7699). Dapagliflozin showed the greatest reduction in A1c (-1.44%) and BG (-91.83 mg/dL), followed by canagliflozin (-1.12%, -40.82mg/dL). Fifteen (15.46%) had concomitant heart failure while taking an SGLT2*i* for diabetes. Four patients on an SGLT2*i* had renal impairment contraindications. Four patients (4.12%) had a history of urinary tract infections prior to starting the SGLT2*i*. Four patients (4.12%) had amputations prior to starting SGLT2i. There were no reports of UTI or amputation after starting SGLT2*i*. Eleven patients (11.34%) developed vaginal candidiasis or yeast infections.

Conclusion: This study found a statistically and clinically significant reduction in A1c and blood glucose. Dapagliflozin was found the most effective SGLT2*i*. There was no significant difference in blood pressure or weight reductions after starting SGLT2*i* in this population.

Category: Original Research

Title: Characterization of Dormant Tumor Cells in Pancreatic Ductal Adenocarcinoma (PDAC) and Therapeutic Strategies

Authors: Sonya L Anderson, BA, PharmD Candidate[1]; Limei Shen, PhD[2]; Leaf Huang, PhD[2]

Institution: [1]University of North Carolina in Chapel Hill Eshelman School of Pharmacy; [2]University of North Carolina in Chapel Hill Department of Pharmacoengineering and Molecular Pharmaceutics

Objective: Pancreatic Ductal Adenocarcinoma (PDAC) is often resistant to most systemic/targeted therapies, facilitating the need for novel drug delivery. One such novel therapeutic treatment option is traps. Traps are fusion proteins that bind to chemokines in a manner similar to monoclonal antibodies. The traps are then formulated into nanoparticles which can be delivered to the pancreas. The trap can be formulated to target chemokines like CXCL13 which have been implicated in the suppression of the anti-tumor response through B-reg recruitment. The primary purpose of this study was to prove the CXCL13 trap (OT1) decreases PDAC tumor growth by reducing B-reg differentiation through analysis of known markers of B-reg expression.

Methods: To analyze OT1's effect on PDAC tumor growth and B-reg differentiation, a well-validated, clinically relevant mouse model (KPC) was used. KPC98207 cells ($1x10^6$) were injected into the tail of the pancreas. Mice were randomized into two treatment groups: PBS or OT1 (50 μg of plasmid). IV injections were performed every 3 days for a total of 3 doses. Tumor tissues were then harvested to be analyzed through western blot (WB) and flow cytometry (FC) for the presence of certain cytokines (pSTAT3, IL-35, IL-10) and vimentin.

Results: Through WB band intensity quantification, PDAC tumors treated with OT1 had significantly reduced presence of pSTAT3 ($p<0.05$), IL-35 ($p<0.01$), and vimentin ($p<0.01$) as compared to GAPDH control. Additionally, through FC quantification, PDAC tumors treated with OT1 had significantly reduced presence of IL-10 (0.79%) as compared to PBS control (8.91%) ($p<0.01$).

Conclusion: OT1 works to decrease tumor burden in PDAC by reducing differentiation of B-cells into B-reg cells, shown by the reduction of cytokines involved in suppressing the anti-tumor immune response (pSTAT3, IL-35, IL-10) and vimentin. Thus, OT1 represents a new PDAC treatment option to be used in conjunction with current chemotherapeutic drugs.

Category: Original Research
Title: Evaluation of Generational Influences Among 4th Year Pharmacy Students and Experiential Preceptors
Authors: Susan M Smith, BS, PharmD, BCPS, Megan Coleman, PharmD, BCPS, CPP
Institution: Wingate University School of Pharmacy, Wingate, NC

Objective: The purpose of this study was to evaluate the influence generational categories may have on patterns and commonalities that exist among pharmacy students and their respective experiential pharmacist preceptors during advanced pharmacy practice experiences (APPE).

Methods: Two hundred fifty-two multiple-choice surveys aimed at evaluating generational characteristics were sent to 87 pharmacy students during their first three APPE rotations and to their respective experiential preceptors. The questions focused on six key areas: preferred learning/teaching style, view on the role of career/work, communication style, view of technology, outlook on life, and personal characteristics. Each response option corresponded to a generational category (Veteran, Baby Boomer, Generation X, Millennial) to which students and preceptors were blinded. Students and preceptors were instructed to apply each question to themselves. Students were then instructed to apply the question to their preceptor, while preceptors applied the questions to students.

Results: Twenty-three of 87 students (26%) completed 45 generational surveys (18% response rate), and 61 of 172 preceptors (35%) completed 75 generational surveys (30% survey response rate). Students selected the option that corresponded to their actual generational category significantly more often compared to preceptors (2.133±0.815 versus 1.632± 1.132, $p < 0.05$). Although none of the respondents were born in the years covered by the Veteran category, responses corresponding to this generation represented the second highest number of responses selected by students and preceptors alike.

Conclusions: Students and preceptors identified with characteristics outside of their actual generational category. In addition, both groups selected options such as having a grateful outlook on life and working to make a difference that may correlate more with people who have chosen pharmacy as a profession rather than their generational category. Pharmacist awareness of these generational similarities is vital to the success of the preceptor-student relationship as well as the overall learning experience.

Category: Original Research
Title: Assessing the Impact of Pharmacists in Improving Quality Measures that Affect Physician Payment
Authors: Jessica Sinclair, PharmD; Olivia Bentley, PharmD, CFTS, AAHIVP; Amina Abubakar, PharmD, CFTS, AAHIVP; Laura Rhodes, PharmD, BCACP; Macary Weck Marciniak, PharmD, BCPS, BCACP, FAPhA

Objective: To assess the impact of pharmacists in a primary care practice on quality measures of MIPS and PCMH through the provision of face-to-face annual wellness visits and via phone calls for chronic care management

Methods: A retrospective analysis of specific quality measures was conducted by utilization of reports and by manual collection of data within the electronic healthcare record, AthenaNet. This data was reported by AthenaNet as the percentage of patients who have satisfied each measure, and descriptive statistics were utilized to analyze the data. Patients were included in the study if they were seen at the clinic between January 1, 2017 and February 2, 2018 and care provided met criteria for one of seven selected MIPS or PCMH quality measures. Patients were excluded if they were less than 18 years of age, deceased, or discharged from the practice during the study period.

Results: A total of 193 patients were seen by the clinical pharmacist for an annual wellness visit, chronic care management, or both services. For the first assessment of quality measures before and after pharmacist integration, improvements were only seen in two quality measures: the hepatitis C screening and influenza vaccination rate. When the population of patients seen by the pharmacist was compared to the entire Medicare population at the practice, the pharmacist cohort met more criteria for quality measure satisfaction; the greatest improvement was seen in hepatitis C screening (31%), influenza vaccination (29%), and colorectal cancer screening (23%)

Conclusions: The pharmacist integration model in clinic filled gaps in care and improved quality measures, which may contribute to higher potential reimbursement. Annual wellness visit services may increase the likelihood of quality measure satisfaction due to an increased number of patient interactions.

Category: Quality Improvement Evaluation
Title: Medication Reconciliation: Incorporating Resident Education and Discharge Instructions There By Lowering Errors (MR. IncREDIBLE)
Authors: Heather Kehr, PharmD, BCPS; Angela Pegram, PharmD, BCPS, CDE and Lara Pons, MD, FAACP

Objective: Complaints regarding inaccuracy on discharge medication instructions from the inpatient service sharply increased. The purpose of this study was to investigate errors on discharge instructions in our family medicine inpatient service, both in number and type to ascertain if there is a problem in this area.

Methods: For academic year 2017-2018, 3 charts were randomly chosen from different blocks of inpatient service for each first and second year resident (n=15) in our program. The discharge summary was compared with the patient discharge medication instructions for accuracy in medication name, dosage and instructions. Errors were recorded by residency year, week of service and type of error made for each incident found on review.

Results: Forty errors were found on the 45 charts reviewed, giving an error rate of 0.89 errors per chart reviewed. Omissions (n=30 or 75%) comprised the largest number of errors, which included omitting a new medicine on instructions, not addressing a dosage change or continuing a home medication, or not including the medication changes in the discharge summary. Week 2 (n=14 or 35%) and week 4 (n=20 or 50%) of our monthly service block correlated with the most errors. Residency year seemed to have no correlation with number of errors, with the interns having 52% (n=21) and the second-year residents having 48% (n=19) errors found on review.

Conclusions: Based on the findings of our pilot study, an intervention was needed right away to fix erroneous discharge medication instructions. As our new intern class begins, education on refreshing the discharge medication reconciliation was emphasized. Additionally, our attendings will be very closely checking the discharge summary and discharge medication instructions of all residents to catch errors before they reach the patient. Our review will be repeated to check for improvement and look for other possible problem areas in the discharge medication instruction process.

Category: Original Research
Title: Comparison of a two-phase pulmonary function test activity: Using learner self-confidence to determine activity revisions
Authors: Courtney L. Bradley, PharmD, BCACP, Christopher Houpt, PharmD Candidate, Kelly Odegaard, PharmD Candidate, Peter Gal, PharmD, BCPS, FCCP, FASHP, FPPAG
Institution: High Point University Fred Wilson School of Pharmacy, High Point, NC

Objectives: To evaluate whether pharmacy student confidence administering a pulmonary function test (PFT) after a skills laboratory session is further enhanced by adding a second laboratory session.

Methods: A two-week educational activity was designed. For week one, students prepared by completing readings and watching videos on proper PFT procedures. In skills lab, each student completed a PFT with an instructor coaching to assure proper performance. Week two occurred one week later, and in pairs, students again completed a PFT, but the paired student served as the coach. Instructors were present but only interjected when necessary. Students completed three surveys, a baseline before training, and after completing the laboratory sessions in week 1 and week 2, to assess confidence in performing PFT steps and interpreting PFT results. Surveys assessed confidence using a 0 to 10 scale and were statistically analyzed using the sign test.

Results: Forty-five students completed and consented to all surveys (78.9% inclusion rate). There was a significant increase in confidence for all items between the first and second surveys. However, between the second and third surveys, only two items increased significantly.

Conclusion: The educational intervention was successful in improving student self-confidence in performing PFTs and interpreting results. However, limited additional confidence was gained by adding a second week of training, especially in context of resource allocation required. These findings inform instructors that a 1-week PFT training session is sufficient and that resources needed for a second PFT training week would be better invested in another teaching opportunity.

Category: Original Research
Title: Student Pharmacist Attitudes Towards and Perceptions of the Role of the Pharmacist in Suicidal Ideation Assessment
Authors: Brandi Pierce, PharmD candidate; Miranda Johnson Benfield, PharmD candidate; Chris Gillette, PhD; Cortney Mospan, PharmD
Institution: Wingate University School of Pharmacy

Objective: To investigate first-year student-pharmacist attitudes toward suicide, perceived role of the pharmacist in assessing for suicidal ideation, and whether previous pharmacy work experience or gender are associated with attitudes toward suicide or the perceived pharmacist's role.

Methods: An anonymous online survey was administered to first-year student-pharmacists at one pharmacy program in North Carolina. Measures included gender, previous pharmacy work experience, personal contact with suicide, the perceived pharmacist's role in assessing for suicide, and Attitudes Towards Suicide (ATTS). Data are presented as medians or proportions, where appropriate. Bivariate associations were investigated using non-parametric statistical tests.

Results: Seventy-three student-pharmacists had usable survey data (response rate=75%). The median ATTS score was 69 (IQR = 7), indicating student-pharmacists were generally undecided in attitudes toward suicide. However, 91.78% (n=67) of student-pharmacists agreed or strongly agreed that suicide was a real disease. The majority of students (56.17%, n=41) agreed or strongly agreed that patients do not want to discuss suicide with a pharmacist; however, almost 80% (79.45%, n=58) agreed or strongly agreed that pharmacists have a professional responsibility to assess for suicidal ideation. A majority (53.43%, n=39) of students disagreed (or strongly disagreed) that patients with suicidal ideation receive all necessary information from a primary care provider or psychiatrist/psychologist. The majority of students (53.42%, n=39) were not aware of Mental Health First Aid and a small minority (12.33%, n=9) had completed Mental Health First Aid training. There was no association in attitudes toward suicide nor the perceived pharmacist's role in suicide based on genders or previous pharmacy work experience.

Conclusion: First-year student-pharmacists, while being undecided on his/her personal attitudes toward suicide, overwhelmingly agree that suicide is a disease and pharmacists are important in assessing for suicidal ideation. Schools and colleges of pharmacy should provide Mental Health First Aid training to support suicide intervention skills.

Category: Original Research
Title: A unique role for utilization of student pharmacists to assess pharmacokinetic quality improvement in a community hospital
Authors: Mason Holt, Daryl Blackburn RPh, MBA, Michael Willis, PharmD, MHA, BCPS and April Cooper, PharmD, Duke Regional Hospital, Department of Pharmacy and Campbell University, College of Pharmacy & Health Sciences

Objective: Based upon a literature review, no reports of student pharmacists engaged in experiential learning with a quality improvement (QI) projects existed.1,2,3 In 2017, Duke Regional Hospital (DRH) and Campbell University, College of Pharmacy & Health Sciences (CPHS) entered into an agreement which significantly increased the number of student pharmacists receiving clinical training at DRH. The purpose of this study was to utilize student pharmacists during an experiential rotation in a community hospital to assess pharmacokinetic quality improvement in an on-going Department of Pharmacy initiative.

Methods: A pharmacist provided orientation and training related to pharmacokinetic dosing, the DRH pharmacokinetics policy and the QI project to students completing an Advanced Professional Practice Experience (APPE). A report was developed to identify patients. Students underwent a 30 minute orientation to the project and a 2 hour pharmacokinetic training session. Twenty patients were randomly selected every month for review by each student. Utilizing REDCaps, a secure web application for building and managing an online database, students retrospectively captured information related to dosing and attainment of targeted goals. One student was selected to analyze the data and present the results to the pharmacy department.

Results: Ten pharmacy students collected data on 200 patients. Each student spent approximately 5 hours on data collection. One pharmacy student was involved with the data analysis and presentation of the results to the department.

Conclusions: With the help of pharmacy students we were able to double the number of patients reviewed in one year for our community hospital's pharmacokinetics QI initiative.

References:
1. Gonsenhauser I, Beal E, Shihadeh F, Mekhjian HS, Moffatt-Bruce SD. Development and assessment of quality improvement education for medical students at The Ohio State University Medical Center. J Healthc Qual. 2012;34(6):36-42. doi: 10.1111/j.1945-1474.2012.00160.x [doi].
2. Bergh AM, Bac M, Hugo J and Sandars J. "Making a difference" - Medical students' opportunities for transformational change in health care and
learning through quality improvement projects. BMC Med Educ. 2016 Jul 11;16:171. doi: 10.1186/s12909-016-0694-1. 3. Brannan GD, Russ R, Winemiller TR, and Mast E. Linking Community Hospital Initiatives With Osteopathic Medical Students' Quality Improvement Training: A Pilot Program.The Journal of the American Osteopathic Association, 2016 Jan, Vol. 116, 36-41. doi:10.7556/jaoa.2016.004

Category: Original Research
Title: Evaluation of Antibodies (NMDA, CASPR2, AMPA, LGI1, DPPX, and GABAB) Associated with Human Immune-Mediated Encephalitides in Canine Cerebrospinal Fluid
Authors: Emma G. Stafford PharmD, FSVHP, Amanda Kortum, Jeffery Yoder PhD, Natasha Olby Vet MB, PhD, MRCVS, DACVIM (Neurology)
Institution: North Carolina State University College of Veterinary Medicine (NCSU CVM)

Objective: The primary purpose of this study was to ascertain the underlying etiology of canine meningoencephalitis of unknown etiology (MUE) by evaluating autoimmune antibodies known to be predictive in human encephalitides including three receptor targets (NMDA, AMPA, GABA B) and three voltage-gated potassium channel-associated protein targets (CASPR2, LGI1, DPPX).

Methods: Cerebrospinal fluid (CSF) from thirty five (n=35) dogs was tested for against six possible antigenic targets (NMDA, GABAB, AMPA, DPPX, CASPR, LGI1) using a commercially available test kit that utilizes indirect immunofluorescent assay. Briefly, CSF samples were pipetted onto a proprietary TITERPLANE tray that recognizes IgA, IgG, and IgM antigens. In the second step, attached antibodies are stained with fluorescein-labelled anti-dog antibodies and visualized on a fluorescence microscope.

Results: Testing indicated that N-methyl-D-aspartate (NMDA) receptor antibodies were present in the CSF of three dogs (n=3/35). Control CSF from a clinically normal dog was included and was negative against all antigenic targets. No other antibody targets (AMPA, GABAB, CASPR2, LGI1, DPPX) were positive in any of the dogs evaluated.

Conclusion: To the best of our knowledge, this is the first published report of NMDA receptor encephalitis in the dog and only the second published report on this disease in veterinary medicine. Identification of the underlying autoantibody responsible for MUE in dogs leads to the potential for development of targeted therapies as well as the use of dogs as a naturally occurring animal model.

Category: Quality Improvement Evaluation
Title: Prothrombin complex concentrate (human) Kcentra® Medication Use Evaluation
Authors: Ashton Lee, PharmD Candidate, Rebecca Szymanski, PharmD, BCPS, Christopher Barringer, RPh
Institution: Carolinas Healthcare System Northeast, Concord NC

Objective: The purpose of this medication use evaluation was to evaluate the appropriateness of the prescribing of Prothrombin complex concentrate (human) Kcentra® (PCC) at Atrium Health facilities.

Methods: Retrospectively, the electronic medical records (EMR) of eighty-four patients at ten facilities who received PCC were reviewed. Data collected included indication for use, individual entering the order into the EMR, ordering provider, utilization of correct order set, dose, and utilization of vitamin K.

Results: Eighty-four patients at ten Atrium Health facilities who received PCC were included in the analysis. PCC was ordered for forty patients who were on warfarin (47.6%), nineteen who were on rivaroxaban (22.6%), fourteen on apixaban (16.7%), three on enoxaparin (3.6%). PCC was ordered and administered to eight patients who were not on any medications requiring reversal with PCC. (9.5%). Six patients on warfarin (15%) had PCC ordered and administered despite an INR less than 2.0. Three patients who were on warfarin (7.5%) did not receive vitamin K concurrently with PCC. The correct order set, warfarin or direct oral anticoagulant reversal, was utilized for 79 patients (94%). The appropriate dose based on package insert recommendations was ordered for 55 patients (65.5%). Three facilities had 100% correct order set utilization including correct dosing.

Conclusion: This evaluation indicates that there is room for improvement within Atrium Health facilities with prescribing PCC according to the FDA approved dosing strategies. Proper utilization of the facility's mandatory order sets would facilitate improved usage. Provider and pharmacist education following this MUE will focus on utilization of the proper order set, FDA approved dosing, appropriate INR limits, and the importance of providing vitamin K concurrently with PCC when reversing warfarin. Optimization of the use of PCC could reduce unnecessary costs at individual locations.

Category: Original Research
Title: Advancing Precision Medicine: Improving Attitudes and Confidence in Pharmacogenomics with Educational Programming and Personalized Genotyping
Authors: Deanna Rubin, PharmD Candidate; Olivia Dong, MPH; Rachel Howard; Oscar Suzuki, PhD; Cristina Benton, PharmD, PhD; Tim Wiltshire, PhD; Amber Frick, PharmD, PhD
Institution: University of North Carolina Eshelman School of Pharmacy

Objective: As pharmacogenomics (PGX) testing becomes increasingly widespread, it is vital for pharmacists to become proficient in applying this information to optimize pharmacotherapy and influence key healthcare stakeholders. This study sought to examine conference attendees' attitudes regarding the use of PGX and to discover how those attitudes change following educational programming, including personalized genotyping.

Methods: The 2017 UNC Pharmaceutical Sciences Conference focused on the role of pharmacy in precision medicine. Prior to the conference, 76 participants completed a survey and PGX testing with DNA2Rx. At the conference, participants received their PGX results for 18 relevant pharmacogenes. Twenty-eight participants also completed a post-conference survey. Demographic information and personal attitudes regarding PGX were collected and paired data was assessed with the Wilcoxon signed rank test using SAS.

Results: Participants self-identified as 41% female, 21% Asian, and 75% white with a median age of 41. Most participants had prior genetics training (61%), but only 2% had previously completed PGX testing despite many experiencing medication-related side effects (67%). Participants worked in healthcare (29%), academia (61%), and industry (13%). Following the conference, participants were significantly more likely ($p<0.05$) to believe PGX information should be stored in the patient's medical record and that PGX testing companies provide accurate results. They were also more confident in their ability to identify therapeutic areas where PGX testing is required, discuss benefits of PGX testing, and interpret PGX results ($p<0.05$). Agreement rates that most physicians, pharmacists, or patients can accurately interpret PGX results remained low (<20%).

Conclusion: With the rise of personalized medicine in healthcare, PGX education is critical for pharmacists to remain influential leaders in this field. Utilizing personal genomic testing could be a useful way to actively engage healthcare stakeholders in PGX and improve attitudes surrounding the use of PGX testing for the future.

Category: Original Research
Title: Comparison of a Two-Phase Pulmonary Function Test Activity Utilizing Nose Clips and Not Utilizing Nose Clips
Authors: Kelly Odegaard, PharmD Candidate 2020; Christopher Houpt, PharmD Candidate 2020; Courtney L. Bradley, PharmD, BCACP; Peter Gal, PharmD, BCPS, FCCP, FASHP, FPPAG
Institution: Fred Wilson School of Pharmacy, High Point University

Objectives: To determine whether a difference exists in pulmonary function test (PFT) results when participants wear a nose clip versus not wearing a nose clip. Our null hypothesis is that when participants do not use a nose clip while performing a PFT their results will be more variable and differ significantly from PFTs performed with nose clips.

Methods: A two-phase intervention was designed for which each participant served as their own reference. For phase one, participants either wore a nose clip to complete a PTF or did not. Participants completed PFTs three times; the values were compared to assure reproducibility. Values that were recorded included percent predicted and personal best for FVC, FEV1, FEV1/FVC, and FEF25-75. Phase two occurred one week later and participants that wore a nose clip in phase one did not wear a nose clip in phase two, and vice versa. The results were analyzed using a paired t-test to compare using a nose clip versus not using a nose clip, as well as week one versus week two to ensure there was no practice bias.

Results: Thirty-seven participants reported results and met the study criteria (64.9% response rate). There was no statistically significant difference between participants results when they wore a nose clip or not, or between week one and two.

Conclusions: This study demonstrated that PFT results do not vary widely if a participant does or does not wear a nose clip. These findings may be used by clinicians when writing protocols or developing clinics to avoid unnecessary spending and resource allocation on nose clips.

Category: Original Research
Title: Pay to Play: How Much It Costs to Complete the Prepharmacy Curriculum
Authors: Laura Bobbitt, PharmD Candidate, Jacqueline McLaughlin, PhD
Institution: UNC Eshelman School of Pharmacy, Chapel Hill, NC

Objective: To characterize current prepharmacy curricula and model the associated financial costs.

Methods: Prepharmacy course requirements for every Doctor of Pharmacy degree program accredited by the Accreditation Council for Pharmacy Education were collected from each school's website. Course cost data for community colleges, public in-state universities, and private non-profit universities were collected from the College Board, Trends in College Pricing 2017. The cost per credit hour was multiplied by the number of credits required by each school to estimate the costs of prepharmacy curricula for various pathways (e.g. community college, university).

Results: On average, schools require 67±8 (range 41 to 94) semester hours of prepharmacy coursework. At least 85% of programs require General Biology, General Chemistry, Organic Chemistry, and Calculus. Courses such as Anatomy & Physiology, Microbiology, Physics, Statistics, English Literature/Composition, Communication/Public Speaking, and Economics are required by approximately 60% to 80% of programs. Requirements for Biochemistry, Cellular Biology, Molecular Biology, Genetics, and Psychology vary widely. There is also large variation in liberal arts requirements, with some schools requiring courses in History, Philosophy, Political Science, Business/Accounting, and Critical Thinking. The cost to complete the prepharmacy curriculum can vary, depending on the student's pathway to pharmacy school. Students who completed the prepharmacy curriculum at a community college in 2017 paid on average $17,890 ± $2,259 (range $11,029 - $25,286) for tuition, fees, and room and board. At the other end of the spectrum, students who completed a bachelor's degree at a private university and later completed prepharmacy requirements at a public university paid on average $137,937 ± $5,843 (range $122,398 - $153,772).

Conclusion: There appears to be little agreement on what is core to the prepharmacy curriculum across Pharm.D. programs in the United States. Consideration should be given to the extent to which the prepharmacy curriculum financially burdens prospective students.

Category: Quality Improvement Evaluations

Title: Assessment of Student Pharmacy Internship Programs from Intern and Preceptor Perspectives

Authors: Sally Jagielski PharmD Candidate 2019[1], Jonathan Cicci PharmD, BCPS[1,2], Ashley Pappas PharmD, BCPS[1,2], Megan Clarke PharmD, BCPS, AQ Cardiology[1,2]

Institutions:
1) University of North Carolina Eshelman School of Pharmacy – Chapel Hill, NC
2) Department of Pharmacy, University of North Carolina Medical Center – Chapel Hill, NC

Objective: To characterize the roles and experiences of pharmacy interns in a variety of pharmacy settings.

Methods: Two 13-question surveys were emailed via Google forms. The first survey (S1) was sent to known pharmacy interns from the University of North Carolina (UNC) Eshelman School of Pharmacy (n=33). The second survey (S2) was sent to preceptors of pharmacy internships at the UNC Medical Center and to preceptors of external pharmacy internships from interns who completed S1 or those found via a web search (n=19).

Results: Thirteen pharmacy interns (39%) responded to S1, including nine (69%) UNC interns and four (31%) from other programs. Internship sites included acute care (15%), ambulatory care (46%) and administration (39%). Pharmacy interns completed an average of 4.9 projects (range 1-10). Eleven preceptors (58%) responded to S2 (UNC 73%, Other 27%). Sites included acute care (UNC 18%, Other 9%), ambulatory care (UNC 9%, Other 9%) and administration (UNC 46%, Other 9%). Interns had been accepted for an average of 3.9 years (UNC; 1 - 10 years) or 9.7 years (Other; 3 - 16 years) and completed an average of 6.2 projects (UNC; range 2 - 9) or 3 projects (Other; range 3 - 3). Pharmacy interns primarily shadowed preceptors (UNC 87.5%, Other 100%) and participated in administrative roles (UNC 100%, Other 100%). In general, students frequently completed quality improvement projects (UNC 75%, Other 67%) and delivered education to hospital staff (UNC 75%, Other 100%). However, fewer pharmacy interns at UNC had a drug monograph project (UNC 12.5%, Other 67%).

Conclusion: Pharmacy interns participate in both administrative and clinical roles. Additional opportunities may exist for UNC interns to work on drug monographs.

Category: Original Research
Title: Impact of Pharmacist-Led Anemia Management for Non-Dialysis-Dependent Renal Disease Patients
Authors: Jolynn Sessions, PharmD, BCOP, Nowshin Islam, PharmD Candidate, Ebose Ikheloa, PharmD Candidate
Institution: Mission SECU Cancer Center, Asheville, NC; UNC Eshelman School of Pharmacy – Asheville Campus, Asheville, NC

Objective: The primary purpose of this study was to evaluate the percentage of visits where Hb was maintained above 10 g/dl and the percentage of patients who required blood transfusions. Secondarily, the cost-effectiveness of pharmacists intervention will be assessed.

Methods: A retrospective chart review of patients' electronic medical records (EMR) with start period of April 1, 2015 through May 25, 2018 was conducted. Patients who did not present for initial clinic visit and patients who did not present for a follow-up appointment after their initial clinic visit were excluded. Data collected included patient demographics, initial ESA dose per protocol, baseline and follow-up hemoglobin levels, iron studies, type of insurance, time between follow-up visits, number of actual visits, as well as other comorbid factors.

Results: Fifty-three patients with a mean baseline Hb of 8.9 g/dL were included and seen for a cumulative 436 visits. They were able to maintain a Hb level above 10 g/dL for 32.8% percent of visits. Hb fell below 8 g/dL for 10.8% percent of visits and five patients required blood transfusions during their care. Of the fifty-three patient, twelve are still being seen by the pharmacist for anemia management. 21% percent of patients were lost due to lack of follow-up and 37% were released from the clinic either because they started dialysis, receive a transplant, or no longer needed ESA.

Conclusion: Anemia, in the setting of renal disease, may result in fatigue, myalgia, decreased concentration, cold intolerance, and poor appetite. Clinical pharmacists can help ensure non-dialysis dependent renal disease patients receive effective management of their anemia by appropriately monitoring Hb, initiating supportive- and therapeutic modalities, and adjusting doses of ESA.

Category: Quality Improvement Evaluation
Title: Identification of High-Impact Drug Classes during Formulary Standardization across a Multi-Institution Health Care System
Authors: Chelsea Day, PharmD Candidate, B.S., Gregory Heindel, PharmD, BCPS, Jennifer Cruz, PharmD, BCPS
Institution: University of North Carolina Medical Center, Chapel Hill NC

Objective: The primary objective of this evaluation was to identify drug classes with significant impact on formulary standardization efforts across a multi-institution health care system. The common qualities of high impact drug classes were also described.

Methods: Data were gathered from class reviews standardized between August 2017 and June 2018 by the UNC Health Care System Pharmacy and Therapeutics Committee, as part of a health care system drug formulary standardization initiative. The health care system drug formulary regulates 11 hospitals (including academic, community, and rural) and numerous outpatient clinics and infusion centers. Few drug formulary standardization efforts were completed prior to August 2017. The number of line items reviewed, total line items included in the system drug formulary, and number of existing ERX's removed were collected from each class review. A line item was defined as a single drug, dosage form, and strength. ERXs represent institution specific, individual drug files that were built within the electronic health record. Most line items equate to 1 ERX, however, some line items translate to multiple ERXs. Class reviews with greater than 50% ERXs removed were considered high impact. The percent of ERX's removed was calculated as the number of ERX's removed divided by the total line items reviewed for each class.

Results: Forty class reviews containing 939 line items were evaluated. As a result of standardization, 341 line items were included in the system drug formulary, while 346 ERX's were removed. High impact drug classes included amino and antipseudomonal penicillins (55%), non-iron phosphate binders (55%), amphotericin (67%), 5-alpha reductase inhibitors (75%), carbapenems (100%), natural and antistaphylococcal penicillins (100%) and echinocandins (217%).

Conclusion: Certain drug classes may contain more unnecessary site variability than others. It may be reasonable for health care systems to begin with these drug classes when initiating formulary standardization.

Category: Quality Improvement Evaluation
Title: Evaluation of Appropriate Anticoagulant Use and Monitoring in a Family Medicine Center
Authors: Sarah Mislan, PharmD Candidate, Kelsy Combs, PharmD, BCPS, Peter Koval, PharmD, BCPS, CPP
Institution: Family Medicine Center, Greensboro NC; UNC School of Pharmacy, Chapel Hill NC

Objective: The purpose of this medication use evaluation was to characterize anticoagulation use in a family medicine teaching clinic. The primary objectives were to evaluate direct-acting oral anticoagulant (DOAC) patients for appropriate indication, dosing, and to identify candidates for switching from warfarin to a DOAC. Secondary objectives included examining time within INR goal, monitoring for hemoglobin, yearly primary care physician visits (PCP), and compliance with INR monitoring.

Methods: The medical records of 105 patients receiving either warfarin or DOAC therapy were reviewed. Patients not seen by a PCP within the past year were excluded. Data collected for DOAC patients included patient demographics, anticoagulation indication, serum creatinine, and dose. Data collected for warfarin patients included anticoagulation indication, frequency of INR follow-up, percent time within a specific INR goal, and frequency of hemoglobin monitoring and PCP visits.

Results: A total of 59 patients were identified to be taking a DOAC and one patient was identified as having an incorrect dose prescribed. For the DOAC patients, 69% had hemoglobin monitoring within the past 12 months. A total of 46 patients were identified to be taking warfarin, with 76% receiving hemoglobin monitoring within the past 12 months. The 44 patients identified to have an INR goal of 2-3 had an average percent time within goal of 55.7%. The 2 warfarin patients with an INR goal of 2.5-3.5 had an average percent time within goal of 70%. There were 28 warfarin patients identified as potential candidates for switching to a DOAC.

Conclusion: Patients taking a DOAC at the family medicine teaching clinic are prescribed correct doses and are receiving appropriate monitoring of hemoglobin. A large number of warfarin patients are candidates for converting to DOAC therapy.

Category: Original Research
Title: Geriatric Task Force: How an Interprofessional Medication Self-management Program Can Impact Blood Pressure and Diabetes Goals in an Aging Population
Authors: Paige Cawley, UNC Eshelman School of Pharmacy PharmD Candidate; Jennifer Kim, PharmD, BCPS, BCACP CPP
Institution: Moses Cone Internal Medicine Center, Greensboro NC

Objective: To determine the impact of an interprofessional medication adherence support program for older adults with both uncontrolled hypertension (HTN) and diabetes (DM).

Methods: An internal medicine primary care residency clinic implemented an interprofessional medication self-management program including physicians, nurses, certified medical assistants, nurse technicians, a pharmacist, a social worker, and a dietician. The pharmacist identified patients 60 years or older with both uncontrolled HTN and DM. Six-month medication refill histories were obtained from pharmacies. Nurses evaluated adherence and provided findings to physicians prior to patient appointments. After each appointment, team members called patients every 1-3 months for ongoing medication self-management support. The primary outcome is the comparison of mean baseline blood pressure (BP) and A1C values. Secondary outcomes included percentage of patients achieving individualized goal BP and A1C values.

Results: A total of 32 patients completed the study, with a mean age of 67 years, 61% were female, 88% were Black or African American, 15.6% were smokers, 46.9% had a cardiovascular disease diagnosis, and 28.1% had chronic kidney disease. The mean systolic BP at baseline was 161.1mmHg and the mean A1C was 9.7%. At 6 months, mean systolic BP was decreased to 139.1mmHg ($P < 0.001$ compared to baseline), and at 12 months was maintained at 140.03 ($P < 0.001$ compared to baseline). Likewise, 6-month mean A1C was reduced to 8.79% ($P=0.0068$ compared to baseline), and by 12-months was down to 7.96% ($P < 0.001$ compared to baseline). At 12-month follow up, 69.6% of patients reached their systolic BP goal and 59.3% reached their personalized A1C goal.

Conclusions: Practicing in an interprofessional framework can enhance patient care by providing more thorough and coordinated care. The use of follow-up allowed both A1C and SBP to be lowered in the 12-month follow-up by addressing barriers to medication adherence.

Category: Original Research
Title: Transitions of care for chronic obstructive pulmonary disease: a pharmacist's collaborative service
Authors: Amy Lin, PharmD Candidate, Jennifer Kim, PharmD, Randy Absher, PharmD, Tanya Makhlouf, PharmD Candidate, and Casey Wells, PharmD Candidate

Objective: Approximately 20% of patients admitted with chronic obstructive pulmonary disease (COPD) exacerbation are readmitted within 30 days of discharge[1], which is significantly associated with increased mortality[2]. Furthermore, 30-day readmissions are associated with increasing health system costs, with average COPD related costs of $647 and $7242 per ED visits and simple (no intubation) COPD admissions, respectively[3]. The purpose of this study is to assess the impact of a clinical pharmacist led COPD transitions of care service within an internal medicine teaching team. The transitions of care services encompass therapy recommendations and implementation, discharge counseling, medication access help, and post-discharge telephone and clinic follow-up.

Methods: A retrospective cohort study was conducted from June 2015 to May 2018 with adult patients with a primary care provider in the practice site admitted with COPD exacerbation as the primary diagnosis. A matched cohort of patients receiving usual care was compared to the pharmacist intervention group using a Fischer's exact test. The primary outcomes were COPD readmissions and ED visits within 30 days of discharge from the index admission. Secondary outcomes included associated cost savings and a description of pharmacist interventions.

Results: A total of 38 usual care and 36 transitions of care patients admitted for a COPD exacerbation were identified. The transitions of care program significantly reduced 30-day COPD related readmissions from 26.3% to 2.8% (p=0.0068) and 30-day ED visits from 28.9% to 5.5% (p=0.0127). Furthermore, the reduction of the total number of 30-day COPD readmissions and ED visits can be attributed to an overall average cost savings of $81,478.

Conclusions: The clinical pharmacist led transitions of care service for COPD admissions within an internal medicine teaching team can significantly reduce 30-day readmissions and ED visits. This reduction is associated with improving patient mortality risk and healthcare system costs.

1. Goto T, Faridi MK, Gibo K, et al. Trends in 30-day readmission rates after COPD hospitalization, 2006-2012. Respir Med. 2017;130:92-97.
2. Guerrero M, Crisafulli E, Liapikou A, et al. Readmissions for acute exacerbation within 30 days of discharge is associated with a subsequent progressive increase in mortality risk in COPD patients: A long-term observational study. PLoS One. 2016;11(3):e0150737.
3. Dalal AA, Shah M, D'Souza AO, and Rane P. Costs of COPD exacerbations in the emergency department and inpatient setting. Respir Med. 2011;105:454-60.

Category: Original Research
Title: Community Pharmacist Attitudes, Perceptions, and Barriers in Performing Suicidal Ideation Assessment
Authors: Miranda Johnson Benfield, PharmD candidate; Cortney Mospan, PharmD; Chris Gillette, PhD; Brandi Pierce PharmD candidate
Institution: Wingate University School of Pharmacy

Objective: To investigate community pharmacists' attitudes toward suicide and perceived role in assessing for suicidal ideation, identify whether practice location or gender are associated with attitudes toward suicide, and describe pharmacist-reported barriers towards assessing for suicidal ideation.

Methods: An anonymous online survey was sent to all licensed pharmacists residing in North Carolina. Measures included gender, pharmacy practice setting, personal contact with suicide, perceived role in assessing for suicide, the Attitudes Towards Suicide (ATTS), and barriers in performing suicidal ideation assessment. Data are presented as means or proportions, where appropriate. Bivariate associations were investigated using non-parametric statistical tests.

Results: Two hundred fifty-eight pharmacists completed the survey (response rate=2.14%). Two did not consent and 125 were excluded (non-community pharmacy practice), providing 131 participants. The majority agreed or strongly agreed (n=121, 93.08%) that suicidal ideation and mental health conditions are real diseases. The average ATTS score was 69.79 (SD=6.20, range 31-89), indicating pharmacists are generally undecided towards suicide. A plurality (n=57, 43.85%) agreed or strongly agreed it is a community pharmacist's responsibility to assess for suicide, but many were undecided (n=47, 35.34%). Suicidal ideation assessment is uncommon with most rarely or never assessing (n=116, 87.22%). Mental Health First Aid training is rare (n=6, 4.51%), but most (n=106, 83.46%) would be interested if continuing education credit was offered. Practice location and gender were not significantly associated with ATTS score ($p>0.05$). Common barriers were lack of education in mental health screening (n=104), lack of knowledge and self-efficacy in suicidal ideation assessment (n=99), and lack of time to provide individual attention to patients (n=87).

Conclusion: Community pharmacists in North Carolina are undecided on personal attitudes towards suicide, but overwhelmingly agree that suicide is a disease. Barriers to suicidal ideation assessment were identified, with the majority of pharmacists being interested in continuing education to address these barriers.

Category: Original Research
Title: Comparison of Acute Kidney Injury in Hospitalized Patients Receiving Traditional- Versus Extended-Infusion Piperacillin/Tazobactam
Authors: David M. Laurent, PharmD,[1,2] Robert Tunney, PharmD, BCPS,[2,3] Ruthanne Baird, PharmD, BCPS,[1] Amy Pope, PharmD, BCPS,[1] Kristen Keen, PharmD,[1] Jason M. Moss, PharmD, BCGP, CPP,[1,2] Kimberly Kelly, PharmD, BCPS[1,2]
Institution: [1]Department of Pharmacy, Harnett Health System, Lillington, North Carolina; [2]Campbell University College of Pharmacy & Health Sciences, Buies Creek, North Carolina; [3]Vidant Medical Center, Greenville, North Carolina

Objective: To compare the incidence of acute kidney injury (AKI) between patients receiving piperacillin/tazobactam (P/T) either by traditional- or extended-infusion.

Methods: A retrospective, cohort study of patients admitted to a two-hospital, rural health system was performed. Demographic, comorbidity, and antibiotic use data were collected from adult patients without pre-existing renal dysfunction receiving P/T for at least 48 hours for the traditional- and extended-infusion cohorts from January to September 2016 and January to September 2017, respectively. The primary endpoint was the occurrence of AKI utilizing a chi-squared analysis for comparisons between the two cohorts. Secondary objectives, assessed by univariate analysis, evaluated for the effect of AKI in hospitalized patients with the following risk factors: concurrent use of select nephrotoxic agents, total number of nephrotoxic agents used, age > 60 years, and preexisting renal dysfunction.

Results: Among the 130 patients enrolled in each cohort, AKI was observed in 8.5% and 17.7% of patients in the traditional- and extended-infusion groups, respectively (p=0.027). Among patients experiencing AKI, the mean (± standard deviation) number of nephrotoxins per patient was 3.0 ± 1.1 versus 1.8 ± 1.0 in each cohort, respectively (p = 0.002). The univariate analysis of risk factors did not demonstrate a significantly higher risk of AKI between patients who developed and those who did not develop AKI.

Conclusion: We observed a higher incidence of AKI in the extended-infusion P/T cohort, suggesting nephrotoxicity may be associated with infusion duration. Future prospective studies should further evaluate our findings that extended-infusion piperacillin/tazobactam increases the incidence of AKI.

Category: Original Research
Title: Incidence of Nephrotoxicity and Readmission Rates in Patients Receiving Vancomycin-containing OPAT regimen
Authors: Heysel Lam, PharmD Candidate1,2 and Cassie Kuppelweiser, PharmD, CPP2
Institution: 1University of North Carolina Eshelman School of Pharmacy, Chapel Hill NC; 2 Moses H. Cone Memorial Hospital, Cone Health, Greensboro NC

Objective: The primary purpose of this study is to determine the rates of nephrotoxicity and hospital readmission for patients receiving a vancomycin-containing outpatient parenteral antimicrobial therapy (OPAT) regimen. The secondary objectives are to determine the rates of OPAT pharmacy consults and vancomycin trough levels checked prior to discharge.

Methods: This retrospective analysis consists of reviewing data of Advanced Home Care (Cone Health-affiliated home health care) patients who received a vancomycin-containing OPAT regimen between July 2017 and May 2018. Through Advanced Home Care databases, changes in SCr throughout OPAT regimen are tracked to determine the incidence of vancomycin-associated nephrotoxicity. Through Cone Health's EHR, the readmission rates as well as the rates of OPAT pharmacy consults and vancomycin trough levels checked prior to discharge are evaluated. Patients on hemodialysis are excluded in this study. Data to be collected includes, but is not limited to: concomitant nephrotoxic agents (diuretics, ACE inhibitors/ARBs, NSAIDs), vancomycin dosing interval, baseline SCr, and timing of SCr changes throughout OPAT regimen.

Results: Data is currently being collected and analyzed. Of 382 total patients receiving any OPAT regimen, 79 patients with a mean age of 61 years receiving vancomycin-containing OPAT regimen are included in the study. Most patients received combination regimen (54%), with ceftriaxone being the most common antibiotic added to a vancomycin-containing OPAT regimen (30%). One patient received combination regimen of vancomycin and piperacillin/tazobactam at discharge. 32% patients on vancomycin-containing OPAT regimen received OPAT pharmacy consults prior to discharge.

Conclusion: Currently, across Cone Health, IV vancomycin is the most common antibiotic used. Vancomycin-associated nephrotoxicity remains an ongoing challenge for many patients receiving vancomycin-containing OPAT regimen, often requiring suboptimal dosing or discontinuation of the antibiotic. The implication of this study can help guide current practice and establish future considerations when initiating vancomycin in an outpatient setting.

Category: Quality Improvement Evaluation
Title: Evaluation of compliance with obstetric related vaccinations within a health-system
Authors: John Brock Harris, Pharm.D., BCPS, BCPPS[1,2], Amy P. Holmes, Pharm.D., BCPPS[3], Rebecca Rainess, Pharm.D. candidate[1]
Institution: [1]Wingate University School of Pharmacy, Wingate, NC, [2]Novant Health Hemby Children's Hospital, Charlotte, NC, [3]Novant Health Forsyth Medical Center, Winston-Salem, NC

Objective: The Centers for Disease Control and Prevention (CDC) recommends specific vaccines for pregnant/postpartum women to ensure appropriate protection of neonates. The varicella vaccine contains live virus and is contraindicated during pregnancy. The CDC recommends all postpartum women who are varicella non-immune be vaccinated following delivery and prior to discharge. The CDC also recommends every woman receive tetanus toxoid, diphtheria toxoid, and acellular pertussis vaccine (Tdap) during each pregnancy between weeks 27 and 36 gestation. If a woman fails to receive the vaccine during pregnancy, it is recommended she get it following delivery and prior to discharge. The aim of this project is to determine the level of adherence with CDC recommendations for Tdap and varicella vaccine administration in pregnant/postpartum women within a health-system.

Methods: A selection of patients >17 years old who gave birth in January or December 2017 within a health-system were evaluated in this Institutional Review Board exempt review of Tdap and varicella vaccine administrations (VVA) compared to CDC recommendations. Data collected included institution, maternal age, birth gestation, immunity documentation, and vaccine administration dates. Selected patients were evaluated for VVA and only patients with health-system-based obstetricians were evaluated for Tdap administrations.

Results: 204 patients were evaluated for VVA; 127 were also included in the Tdap evaluation. The only difference between groups administered vaccines versus groups that did not, was gestational age in the Tdap subgroups ($p=0.0095$). 29% of patients in VVA groups had documented immunity. 71% of VVA patients should have received the varicella vaccine. None were given. 78% of patients received the Tdap vaccine with 64.6% receiving the vaccine between 27-36 weeks gestation.

Conclusions: Areas of improvement in pregnancy/postpartum immunizations within a single health-system exist. This review will be used as the basis for potential education and process changes to optimize immunization practices in obstetric patients within the health-system.

Category: Original Research
Title: Development and Implementation of a Community Pharmacy-Based Falls Prevention Service
Authors: Sarah Shockley, PharmD. Candidate[1], Jessica Robinson, PharmD.[1], Chelsea Renfro, PharmD.[2], Stefanie Ferreri, PharmD. [1]
Institution: University of North Carolina at Chapel Hill, Chapel Hill, NC; University of Tennessee Health Science Center, Memphis, TN

Objective: The purpose of this project is to (1) develop the processes, tools, and training resources for a community pharmacy-based falls prevention service, (2) validate their use in the community setting, and (3) develop a toolkit for public dissemination.

Methods: The Evidence-Based System for Innovation Support (EBSIS) Logic Model was used to guide the development of the processes, tools, and training for a falls prevention service. EBSIS focuses on four components of innovation delivery: tools, training, technical assistance, and quality improvement. Focus groups were conducted with community pharmacy and primary care stakeholders to develop workflow and communication processes, as well as tools for service implementation. These resources were used by pharmacy staff participating in a randomized-controlled trial within a North Carolina community pharmacy network. Participants will complete an online survey and participate in a semi-structured interview to identify key characteristics and challenges to guide the development of a community pharmacy falls prevention toolkit.

Preliminary Results: Thirty-one community pharmacies implemented the falls prevention service during their participation in a randomized-controlled trial from October 2017 to June 2018. Tools and resources underwent minor modification throughout the intervention, based on participant feedback. Surveys will be distributed in July 2018, with results to be analyzed in August 2018. Semi-structured interviews will be conducted in September-October 2018, with analysis completed by December 2018. Final results and the community pharmacy falls prevention toolkit are expected to be complete by December 2018.

Preliminary Conclusion: Initial results suggest that procuring pharmacy and primary care feedback led to the development of tools and resources that required minimal modification for effective use in the community setting. By gathering feedback via survey and semi-structured interviews, investigators will be able to develop a robust toolkit for dissemination to community pharmacists who wish to develop a falls prevention program in their own pharmacies.

Category: Original Research
Title: Impact of a pharmacogenomics educational intervention utilizing a next-generation sequencing platform on future pharmacists
Authors: Clara Kim, PharmD Candidate 2020; Olivia Dong, MPH; Rachel Howard, BS; Cristina Benton, PharmD, PhD; Robert Dupuis, PharmD; Tim Wiltshire, PhD; Amber Frick, PharmD, PhD
Institution: UNC Eshelman School of Pharmacy, Chapel Hill, NC

Objective: As leading discoveries in precision medicine are expected to transform healthcare, educating student pharmacists in pharmacogenomics (PGX) knowledge and its impact is becoming increasingly important. We examined the change of perception of student pharmacists in PGX after an educational intervention including optional PGX testing.

Methods: Second-year student pharmacists (N=142) were enrolled in an applied clinical pharmacology course at the UNC Eshelman School of Pharmacy in fall of 2017 and completed an educational intervention consisting of lectures with active learning exercises, navigation of PGX resources, and voluntary PGX testing with DNA2Rx free of charge. DNA2Rx is an in-house, next-generation sequencing panel testing for 22 genes associated with the actionable genome and specific drug dosing guidelines. A report was generated for each student detailing responses to over 100 drugs. Students were surveyed on their attitudes and confidence regarding PGX in clinical practice before and after the educational intervention. Paired pre- and post-intervention Likert responses were analyzed with the Wilcoxon signed-rank test. The results of this educational intervention were also compared to the previous year's educational intervention. Of note, this year's class had improvements in the genotyping process (e.g., received more advanced results for more genes and alleles).

Results: Of the 142 student pharmacists surveyed, 106 (75%) indicated their learning experience was enhanced by undergoing personal genotyping. Several self-efficacy indicators related to PGX testing were also significant from pre- to post-educational intervention in comparison to the previous year. For instance, there were significant increases in discussing the benefits ($p=0.0002$) and risks ($p<0.0001$) of PGX and interpreting the results of PGX testing for patients ($p<0.001$).

Conclusion:
PGX testing is a unique opportunity for student pharmacists to learn and engage in PGX. Results from this study affirm the positive impact of personal genome testing and more comprehensive reporting on perceptions of PGX.

Category: Quality Improvement Evaluations
Title: Evaluation of Patient Adherence in a Medicare Advantage COPD Population
Authors: Brittany Stone, PharmD Candidate, Dawn Pettus, PharmD, BCACP
Institution: Triad Healthcare Network, Greensboro, NC

Objective: The primary purpose of this study was to determine patient adherence to long-acting inhaled bronchodilator agents in a Medicare Advantage plan COPD population. Secondary objectives were to determine availability of rescue inhaler, concomitant steroid use, and compliance with recommended immunizations.

Methods: The study was a retrospective chart review of 518 patients with COPD from January 1, 2016 through March 31, 2018. To be included patients must have been part of the Triad Healthcare Network Accountable Care Organization, have insurance coverage through the HealthTeam Advantage Medicare Advantage Plan, have a diagnosis of COPD, and be participating in the CCIP COPD project. Insurance claims data was provided by the quality department at HealthTeam Advantage. Fill dates and days supply were reviewed for all COPD related medications to determine patient adherence.

Results: Patients were prescribed long-acting bronchodilators in varying combinations or alone, including 62 patients (12%) on LAMA alone, 17 patients (3%) only LABA/LAMA combo, 140 patients (27%) on LABA/ICS, 48 patients (9%) on triple therapy with LABA/LAMA/ICS, and 1 patient on LAMA/ICS. Overall, long-acting bronchodilators were prescribed to 268 of the 518 patients (52%) as part of their COPD regimen and only 108 of those patients (21%) were adherent. Only 299 patients (58%) were prescribed a rescue inhaler, 178 patients (34%) received an oral steroid despite having a long-acting bronchodilator prescribed, 147 patients (28%) received their 2017 influenza vaccine, 59 patients (11%) received the Prevnar13 vaccine, and 27 patients (5%) received the Pneumovax vaccine.

Conclusion: Many patients in our COPD population are not prescribed appropriate guideline-based therapy with a long-acting bronchodilator, and those who are continue to show poor adherence. Further intervention needs to be made to determine the cause of non-adherence, as well as the reason for such a low proportion of long-acting bronchodilator prescribing in this progressively worsening population.

Category: Quality Improvement Evaluation
Title: Implementing a Formalized Antimicrobial Stewardship Program in a Small Community Hospital
Author: Sara Shearin, Pharm.D, MSCR, BCPS
Institution: Carteret Health Care, Morehead City, NC

Objective: To improve the use and prescribing of antimicrobial agents through the formalization of existing antimicrobial stewardship efforts by decentralized pharmacists in a small community hospital.

Methods: During the initial planning phases of the formalization process, a gap analysis was conducted using the Core Elements of a Hospital Antimicrobial Stewardship Program (ASP) checklist published by the Centers for Disease Control. Other primary reference tools used in the process included the Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America Guidelines for Developing an Institutional Program to Enhance Antimicrobial Stewardship.

Results: The gap analysis was presented to hospital administration and multiple needs were identified, as our hospital had limited infectious disease resources. A hospital policy was then drafted describing the roles and responsibilities of the ASP. Administrative support was obtained and a wide range of options were explored. As a result, a formalized multidisciplinary ASP committee was developed.

Conclusions: Currently, ASP committee meetings are held monthly. A variety of ongoing improvement efforts are in place, many of which have already been implemented, including empiric treatment algorithms for sepsis and non-sepsis indications, and indication specific order sets. Additionally, multiple pharmacy driven policies and protocols are in place, including automatic renal dose adjustment, automatic IV to PO conversion, preferred antimicrobials, and dose optimization. Ongoing real-time data collection has also been made available, which has further aided pharmacists in antimicrobial therapeutic recommendations. As the concern for antimicrobial resistance and increasing antimicrobial related adverse effects continues to increase, the ASP at our hospital will continue to be stewards for our patients and community in combating this epidemic of inappropriate antimicrobial use.