Resident Research

2006–07

UNIVERSITY OF PITTSBURGH
School of Pharmacy
THE ART *and* SCIENCE OF EXCELLENCE
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Valuing Our Partners

The University Pittsburgh School of Pharmacy values our partnerships with the University of Pittsburgh Medical Center (UPMC), the UPMC Health Plan, the VA Pittsburgh Healthcare System (VAPHS), Rite Aid, and PharmaCare. 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 fourteen of "America's Best Hospitals" according to the 2006 U.S. News and World Report rankings and is one of the leading integrated healthcare delivery systems in western Pennsylvania. UPMC Presbyterian Shadyside and UPMC St. Margaret hospitals participate in our residency programs.

UPMC Health Plan is the second largest insurer in Western Pennsylvania and is ranked by U.S. News and World Report as the top-ranked health plan in Pennsylvania.

The VA Pittsburgh Healthcare System has a 128-bed tertiary care facility that serves as the referral center for other VA hospitals in Pennsylvania and West Virginia, and provides a wide range of inpatient and outpatient services.

Rite Aid Corporation is the third largest drugstore chain in the United States. It has annual revenues of more than $27 billion, more than 5,000 stores in 31 states and the District of Columbia, with a strong presence on both the East and West coasts, and approximately 116,000 associates.

PharmaCare is the country's fourth largest chain-based pharmacy benefits management firm, providing prescription benefits services along with cost-effective plan management.

School Mission and Vision

The School of Pharmacy is committed to improving health through excellence, innovation, and leadership in education, research, patient care, and service.

Our vision is to be an outstanding school of pharmacy, renowned for excellence in discovery and advancement of science-based use of medicines and other interventions to enhance the vitality and quality of life.

Message from the Dean

Patricia D. Kroboth, PhD

Dear Members of the Resident Class of 2007,

Congratulations! As individuals, you have distinguished yourselves among pharmacy practitioners by choosing residency training…and completing it. Further, you have placed yourselves among an elite few who have completed a school of pharmacy-based residency program. You have learned not only the basics of practice but also elements of teaching and research to prepare you for your careers. You have had the best of the academic and practice worlds because the School and its partners—UPMC, the VA Pittsburgh Healthcare System, Rite Aid, and PharmaCare—have provided the rich environments for your residency experiences and learning. You have enriched each other with pharmacy backgrounds from Pennsylvania, West Virginia, Ohio, Massachusetts, North Carolina, Kentucky, Florida, and Utah.

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. The commitment is an investment that has already reaped benefits for you and that will continue to bring you distinction. 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.

Your final distinction? You have each just become an alumnus of our University of Pittsburgh School of Pharmacy Residency Program and will forever by a part of our community. Congratulations, good luck, and keep in touch!

Patricia D. Kroboth, PhD

Pharmacy Residency Research Program

Blair Capitano, PharmD
James P. Tsikouris, PharmD

This year, the Residency Research Program at the University of Pittsburgh School of Pharmacy continued to build on an already successful research series. A longitudinal research working group program was established that fostered more focused interactive discussion, peer critique, and individual accountability for each resident project. Within the framework of the working groups, residents were responsible for the completion of all aspects of their project, from conceptualization to final manuscript preparation, with strict adherence to deadlines. A great deal of accountability was expected of the residents, and they responded in outstanding fashion, demonstrating a true sense of personal ownership for their projects.

In addition to the working group participation, residents are certified in research fundamentals through the University of Pittsburgh, participate in valuable lectures geared toward the scientific development and management of their projects, and learn to effectively communicate their project in both verbal and written formats. Overall, our Residency Research Program contributes to the diversity of residency training at the University of Pittsburgh School of Pharmacy, which ultimately results in well-rounded candidates eligible for a wide range of career opportunities.

The success of this program would not be possible without the working group facilitators: Kim Coley, Shelby Corman, Amy Donihi, Tanya Fabian, Christine Ruby, Sue Skledar, and Raman Venkataramanan. Robert Weber, chair of the Department of Pharmacy and Therapeutics, must also be recognized for his dedication to the program and his willingness to take time from his busy schedule to serve as a working group facilitator. We greatly appreciate the continued support of Dean Patricia Kroboth and Senior Associate Dean Randall Smith. The data management skills of Melissa Saul were invaluable, and we thank her for her efforts. We would be remiss not to mention the fine administrative support of Susan Parnell and Kathleen Woodburn. Most importantly, this program would not be successful if it were not for the commitment of our outstanding residents and faculty advisors.

2006–07 School of Pharmacy Residents

Name	Residency
Cassandra Bellamy, PharmD	Critical Care
Saira Choudry, PharmD	Infectious Diseases
Colleen Cook Tobia, PharmD	Pharmacy Practice
David Deen, PharmD	Pharmacy Practice
Shrina Duggal, PharmD	Oncology
Lauren Fields, PharmD	Pharmacy Practice
Joedell Gonzaga, PharmD	Pharmacy Practice Management
Bethany Heasley, PharmD	Pharmacy Benefit Management
Katie McMillen, PharmD	Pharmacy Practice Management
Lindsay Palkovic, PharmD	Pharmacy Practice
Jason Pogue, PharmD	Pharmacy Practice
Radhika Polisetty, PharmD	Pharmacy Practice
Christin Snyder, PharmD	Primary Care
Margie Snyder, PharmD	Community Practice
Andrea Wilson, PharmD	Pharmacy Practice

The Use of Medication Triggers to Detect Adverse Effects in the Medical Intensive Care Unit

AUTHORS:

Bellamy CJ, Kane-Gill SL, Verrico M, Saul MI, Handler SM, Weber RJ

PURPOSE:

Medications are a common cause of adverse events in hospitalized patients, contributing to 19.4% of all medical injuries. The occurrence of adverse drug reactions (ADRs) has a significant negative impact on patient morbidity and mortality and also results in an increase in resource use. Critically ill patients are at high risk for experiencing ADRs; however, there is limited information on optimal detection methods. One proposed method is the use of trigger tools such as medication antidotes. These trigger tools act as signals to alert clinicians to the possible occurrence of an ADR. Many hospitals use this method to identify possible ADRs, but the ability of a trigger to correctly identify an ADR in intensive care unit (ICU) patients is not known. The objective of this study was to evaluate the positive predictive value (PPV) of medication trigger tools for detection of ADRs in ICU patients.

Cassandra Bellamy, PharmD

Cassie is originally from Salt Lake City, Utah, where she earned her PharmD degree at the University of Utah in 2005. Cassie continued her training by completing a pharmacy practice residency at the Ohio State University Medical Center in 2006. She completed the critical care pharmacy practice residency at UPMC Presbyterian Shadyside and accepted a position as a clinical pharmacist in the medical intensive care unit at the Hospital of the University of Pennsylvania. When not at work, she enjoys reading, road biking, finding delicious vegetarian cuisine, and watching movies.

Faculty Mentor: Sandra Kane-Gill, PharmD, MSc

METHODS:

Adult patients admitted to the medical intensive care unit at a university medical center during a one-year period from July 1, 2005, through June 30, 2006, were eligible for this study. Patients receiving a specified trigger from the eligible sample were identified retrospectively from a medical records data repository. The specified triggers were those medications used frequently to identify ADRs by U.S. hospitals according to a published survey. The following six trigger groups were evaluated: injectable diphenhydramine, protamine, phytonadione, dextrose 50%, injectable methylprednisolone, and sodium polystyrene sulfonate. A random sample of 50 patients was selected from each trigger group with the exception of protamine since only 11 patients were available during the study period. These 266 patients were evaluated for the occurrence of an ADR through chart review by a clinical pharmacist using an objective instrument (Kramer algorithm). A PPV for each signal was calculated by dividing the number of true-positives by the sum of true-positives and false-positives. Patient demographics and laboratory values were collected and a Simplified Acute Physiology Score (SAPSII) on the day of admission and a Sequential Organ Failure Assessment (SOFA) score on the day of the ADR were calculated.

RESULTS:

Data collection and analysis are ongoing.

CONCLUSIONS AND CLINICAL IMPLICATIONS:

With these results, clinicians will be able to efficiently identify ADRs and possibly intervene in order to prevent patient harm. Having an active surveillance system that analyzes data from ADRs using trigger tools would aid systematic changes.

Assessment of Voriconazole Pharmacokinetics in Small Bowel Transplant Recipients

AUTHORS:
Choudry S, Bonner J, Capitano B, Abu-Elmagd K, Bond G, Costa G, Koritsky D, Martin D, Venkataramanan R

PURPOSE:
Voriconazole is the antifungal treatment of choice for invasive aspergillosis, which carries a mortality rate of up to 80%. Voriconazole therapy is implemented as part of the standard of care in small bowel transplant patients at the University of Pittsburgh Medical Center for the management or prevention of invasive aspergillosis. Due to the unique characteristics and physiological complications in small bowel transplant recipients, there is a potential for altered drug absorption, leading to variability in drug exposure after oral administration of voriconazole. Additionally, a high degree of interpatient variability is known to be associated with voriconazole pharmacokinetics, presumably due to saturable metabolism. Furthermore, polymorphism in the gene that encodes the cytochrome P-450 metabolizing enzyme, CYP2C19, has been shown to impact voriconazole pharmacokinetics. The objective of this pilot study is to characterize the plasma concentration versus time profile of voriconazole in small bowel transplant patients to determine the extent and variability in drug exposure after intravenous (IV) administration and to determine the bioavailability of voriconazole.

METHODS:
All small bowel transplant patients receiving voriconazole as part of their standard of care are eligible for study enrollment. Patients concomitantly receiving medications that will alter voriconazole plasma concentrations will be excluded. Patients will be studied for early IV exposure if receiving IV voriconazole ≤ 2 weeks after transplantation. Patients will be studied for late IV exposure if receiving voriconazole > 2 weeks after transplantation. Patients will undergo blood sampling (3ml) at 0, 0.5, 1, 1.5, 2, 4, 6, 8, and 12 hours, on two separate occasions, following IV and oral doses, respectively. A 1ml blood sample from the IV or oral study period will be used for genotyping of the CYP2C19 enzyme. Patients initiated directly on oral voriconazole will be administered a single equivalent IV dose to determine bioavailability. The student t-test will be used to determine the difference between early and late IV exposure. The student t-test will also be used to determine the difference between IV exposure and bioavailability in small bowel transplant patients and lung transplant patients. The ANOVA test will be used to determine the variability in the genotypic expression of CYP2C19 among patients.

RESULTS:
Data collection and analysis are ongoing.

CONCLUSIONS AND CLINICAL IMPLICATIONS:
The data collected will allow for a potential establishment of a voriconazole dosing regimen that will achieve therapeutic levels and overall will optimize therapeutic outcomes in this patient population.

Presented at the Making a Difference in Infectious Diseases (MAD-ID) Pharmacotherapy meeting in Orlando, Florida, on May 10, 2007.

Saira Choudry, PharmD

Saira grew up in the small town of Lansdale, Pennsylvania, and received her PharmD degree from the Philadelphia College of Pharmacy in 2005. Saira completed a pharmacy practice residency with an emphasis in ambulatory care at The Brooklyn Hospital Center in Brooklyn, New York. During this residency, she was involved in implementing an antimicrobial management program, which led to her interest in specializing in infectious diseases. Saira completed the infectious diseases pharmacy residency at UPMC Presbyterian Shadyside and accepted a position as a clinical associate professor specializing in infectious diseases at Rutgers, The State University of New Jersey. Her outside interests are tennis, table tennis, and traveling.

Faculty Mentors: Raman Venkataramanan, PhD, and Blair Capitano, PharmD

Appropriateness of Antibiotic Prescribing in Veterans with Community-Acquired Pneumonia, Sinusitis, and Acute Exacerbation of Chronic Bronchitis

AUTHORS:

Cook Tobia C, Aspinall S, Hanlon J, Good C, Fine M

PURPOSE:

Antibiotics have been associated with misuse/overuse, drug interactions, and improper dosing. Studies evaluating antibiotic appropriateness in respiratory tract infections with a likely bacterial etiology (e.g., pneumonia) have focused only on antibiotic choice. Only two studies of antibiotics have evaluated the appropriateness of multiple domains of prescribing. The objectives for this study are to determine the prevalence of inappropriate antibiotic prescribing in outpatient veterans with community-acquired pneumonia, sinusitis, or acute exacerbations of chronic bronchitis and to determine the predictors of inappropriate antibiotic prescribing in outpatient veterans with community-acquired pneumonia, sinusitis, or acute exacerbations of chronic bronchitis.

Colleen Cook Tobia, PharmD

Colleen is from Satellite Beach, Florida, and received her PharmD degree from the University of Florida in May 2006. She chose to complete the pharmacy practice residency at the VA Pittsburgh Healthcare System because of her interest in ambulatory care and the variety of other rotations offered by the program. Colleen has accepted a position as a clinical pharmacist at the VA Pittsburgh Healthcare System. In her spare time, she enjoys traveling, exploring Pittsburgh, and spending time with friends and family.

Faculty Mentor: Sherrie Aspinall, PharmD, MSc, BCPS

METHODS:

A retrospective cohort study of the appropriateness of antibiotic prescribing in outpatients with community-acquired pneumonia (CAP), sinusitis, or acute exacerbations of chronic bronchitis (AECB) who were evaluated in the Emergent Care Center (ECC) at the VA Pittsburgh Healthcare System (VAPHS) between June 15, 2003, and June 14, 2004, was conducted. Approximately 150 subjects were identified with a diagnosis of CAP, sinusitis, and/or AECB.

Data such as patient characteristics, diagnosis, comorbidities, concurrent medications, and antibiotic prescribed was collected. The antimicrobial appropriateness was then assessed using the Medication Appropriateness Index (MAI). The MAI rates the appropriateness of a medication along ten criteria: indication, effectiveness, dosage, directions, practicality, drug-drug interactions, drug-disease interactions, unnecessary duplication, duration, and expensiveness. A weighted MAI score for each antibiotic will provide a summary measure of appropriateness.

RESULTS:

There were 152 patients who received antibiotics as outpatients in the ECC with a diagnosis of CAP, sinusitis, and/or AECB. Preliminary results demonstrated that impractical directions, incorrect dosage, and failure to choose the least expensive alterative were the highest rated inappropriate classifications. The antibiotics with the highest MAI score were amoxicillin, amoxicillin/clavulanate, and azithromycin.

CONCLUSIONS AND CLINICAL IMPLICATIONS:

It is anticipated that approximately 35% of the antibiotic orders will be rated as inappropriate using the MAI based on reports in the literature. This project will clarify and demonstrate the predictors that contribute to inappropriate prescribing of antibiotics for the treatment of CAP, sinusitis, or AECB.

Presented at the VISN 4 Pharmacy Conference, State College, Pennsylvania, 2007, and the 26th Annual Eastern States Conference for Pharmacy Residents and Preceptors, Baltimore, Maryland, 2007.

Evaluation of the Role of Acute Rejection on the Oral Bioavailability of Tacrolimus in Isolated Small Intestinal Transplant Patients

AUTHORS:
Deen D, Bonner J, Capitano B, Abu-Elmagd K, Bond G, Costa G, Venkataramanan R

PURPOSE:
Small intestinal transplantation is the definitive treatment for patients with end stage intestinal failure due to either disease or trauma. Small intestinal transplant patients receive tacrolimus as the primary immunosuppressive drug, and it is metabolized by CYP3A enzymes in the gut and liver. We hypothesize that the functional capacity of the transplanted small intestine will be diminished during immunological and inflammatory processes such as acute rejection in these patients. We predict that acute rejection of the transplanted small intestine is associated with an increase in trough blood concentrations of tacrolimus due to decreased CYP3A and P-glycoprotein (PGP) activity mediated by the cytokines released during rejection. The purpose of this study is to evaluate the effect of acute graft rejection on the trough blood concentrations of tacrolimus following oral administration.

METHODS:
De-identified medical records of isolated small intestine transplant patients transplanted between 1998 and 2006 (N=83) were retrospectively evaluated to establish the relationship between acute graft rejection and the functional capacity of the graft, as measured by dose normalized tacrolimus whole blood concentrations, defined as level divided by dose. Daily dose normalized levels were compared starting from two negative biopsies before diagnosis of acute rejection, during the period of acute rejection, and extended to the resolution of acute rejection as evidenced by one negative biopsy. The exclusion criteria for this study were multi-visceral transplant patients, patients with concurrently administered drugs known to interact with tacrolimus, and patients with cytomegalovirus in the graft.

RESULTS:
Tacrolimus dose normalized blood levels rose significantly when a patient was in acute rejection. The magnitude of the increase was dependent on the severity of the rejection episode. Tacrolimus dose normalized blood levels were greater in severe rejection compared to moderate rejection and were greater in moderate rejection compared to mild rejection. The location of the acute rejection, whether it was in the ileum, ileum chimney, or the jejunum, made no difference. There was no significant difference in dose normalized tacrolimus levels when different modalities were used for treatment of the acute rejection episode. Finally, the average time from positive biopsy to a rise in tacrolimus levels was four days.

CONCLUSIONS AND CLINICIAL IMPLICATIONS:
The results of this study will be used to support further investigation into: (1) mechanisms to explain the increased dose normalized tacrolimus levels during acute rejection, (2) the effect of infections and/or sepsis on dose normalized tacrolimus levels, and (3) the effect of other drugs that either inhibit or induce CYP3A and P-glycoprotein metabolic enzymes in the gut on dose normalized tacrolimus levels. The immediate practical clinical application of these results would be to reduce doses of tacrolimus at the time of a positive biopsy as evidenced by the temporal relationship established.

Presented at the 26th Annual Eastern States Conference for Pharmacy Residents and Preceptors, Baltimore, Maryland, 2007.

David Deen, PharmD

David grew up in the Pittsburgh area, committed to service in the Air National Guard after high school, and moved to Texas. While in Texas, he received a BS in pharmacy with honors at The University of Texas at Austin in 1987. After a number of years in community practice in diverse settings, David made a career-focusing decision to return to school at The University of North Carolina at Chapel Hill, where he earned his Doctor of Pharmacy degree in 2005. While in school, he worked as a clinical nutrition support staff pharmacist at a community teaching hospital in Wilmington, North Carolina, and developed an interest in solid organ transplantation and critical care medicine. David completed the pharmacy practice residency at UPMC Presbyterian Shadyside and accepted a position as a critical care pharmacist at Memorial Health University Medical Center in Savannah, Georgia. His outside interests include traveling, fishing, boating, woodworking, mountain biking, skiing, staying fit, and hanging out with his two Labs, Gunner and Gabby.

Project Mentors: Jennifer Bonner, PharmD, Blair Capitano, PharmD, and Raman Venkataramanan, PhD

Comparison of the Efficacy of Serotonin Receptor Antagonists, Dolasetron and Palonosetron, in Prevention of Chemotherapy Induced Nausea and Vomiting During Acute and Delayed Phases in Breast Cancer Patients Receiving Moderately Emetogenic Chemotherapy

AUTHORS:

Duggal S, Corporon LJ, Brufsky A

PURPOSE:

Chemotherapy-induced nausea and vomiting (CINV) is a complicated and debilitating adverse effect of treatment for malignant conditions. CINV occurs in both the acute (0-24 hours) and delayed (24-120 hours) time periods after chemotherapy, and each is thought to have a slightly different mechanism. Current research is targeted toward developing preventative and treatment modalities for both the acute and delayed phases for CINV. The purpose of this study is to determine whether palonosetron (Aloxi®) is superior to dolasetron (Anzemet®) in the prevention of acute and/or delayed nausea and vomiting associated with chemotherapy when used in addition to corticosteroid therapy as part of a pre-medication regimen administered prior to chemotherapy with doxorubicin and cyclophosphamide for the treatment of newly diagnosed breast cancer.

METHODS:

Patients will be identified through the Breast Cancer Center at Magee-Womens Hospital based on their current treatment plan. Women must have a breast cancer diagnosis and be scheduled to receive their first treatment with doxorubicin and cyclophosphamide in the outpatient chemotherapy center. The number of patients to be included in the study is estimated to be 200. They will be distributed into two groups (i.e., 100 patients/group) based on a 20% difference in the complete response rate. Patients will be provided with daily diaries and a quality-of-life questionnaire at the beginning of the chemotherapy cycle. Functional living index-emesis (FLIE) questionnaires completed on day 2 and day 6 after chemotherapy will examine the effect of CINV on quality of life during the acute and delayed phases. Daily diaries will allow patients to record their level of nausea on a visual analog scale from 0-6 with 6 corresponding with the worst nausea possible. Patients will also record their daily use of medications for treatment of breakthrough nausea and vomiting, the number of episodes of nausea and vomiting, and the severity of nausea experienced. In addition to the primary endpoint of overall complete response (defined as no nausea or emesis), numerous secondary endpoints will be analyzed based on data obtained from the FLIE questionnaire and the daily diary. Secondary endpoints include the number of episodes of nausea and vomiting, the use of antiemetic agents (number and type of agent), the extent of the effect of nausea and vomiting on the quality of life (FLIE), the severity of nausea, and the time to treatment failure (based on time to first emetic episode).

RESULTS:

Data collection and analysis is ongoing. It is predicted that a greater number of patients in the palonosetron group will achieve a complete response compared to the dolasetron group. In addition, patients in the palonosetron group will have a smaller impact of CINV on quality of life based on responses to the FLIE questionnaire and will also use fewer doses of medication for breakthrough nausea and vomiting, particularly in the delayed phase.

CONCLUSIONS AND CLINICAL IMPLICATIONS:

The results of this study will help guide healthcare providers in the selection of a serotonin antagonist, along with corticosteroid therapy, for the prevention of acute and delayed chemotherapy induced nausea and vomiting in patients receiving moderately emetogenic chemotherapy.

Shrina Duggal, PharmD

Shrina is from Athens, Ohio, and received her PharmD degree from West Virginia University in 2005. A desire to broaden her clinical, research, and teaching knowledge and experience prompted her to pursue residency training. Shrina completed a pharmacy practice residency at the University of Pittsburgh in 2005. She chose to continue residency training and pursued the oncology pharmacy practice residency at UPMC Presbyterian Shadyside because of the variety of experiences and opportunities available. Shrina has accepted a position as a clinical oncology pharmacist at UPMC Cancer Centers, Shadyside Hospital. Outside of pharmacy, Shrina's interests include spending time with friends and family, playing tennis, traveling, and traditional Indian dancing.

Faculty Mentor: Lindsay J. Corporon, PharmD, BCOP

Assessment of Potential Factors in Diabetes Control in a Free Urban Clinic

AUTHORS:
Fields LJ, Connor SE, Scipio TM, Bui T

PURPOSE:
Diabetes complications are a significant burden to both patients and society. The medically underserved are more susceptible to complications secondary to lack of consistent access to medical and pharmaceutical care. By understanding the differences between patients in free clinics with type 2 diabetes who do and do not meet diabetes treatment goals, the investigators and others can create and tailor programs to address specific factors affecting control and may decrease the burden of this disease.

METHODS:
In this cross-sectional needs assessment analysis, patients with a diagnosis of type 2 diabetes were stratified by A1C (A1C of ≤ 7% versus A1C > 7%), and differences in demographic, medical, medication, and socioeconomic characteristics will be compared between the groups. All English-speaking patients with type 2 diabetes who receive care at the free clinic were eligible for inclusion in the study. Demographic data and medical history were gathered through chart review and during a face-to-face interview with a pharmacist. Survey instruments will be administered to measure diabetes knowledge, adherence, health literacy, self-efficacy, and social support. Differences between patients meeting and not meeting A1C goals were described using descriptive statistics and will be analyzed for significance at $p < 0.05$.

RESULTS:
To date, eight patients have been enrolled in the trial and interviewed. Of these eight patients, four patients have an A1C documented. Of the 4 patients with a documented A1C, factors that were associated with an A1C of > 7% were mean age (43.5 years for patients with an A1C > 7% vs. 53 years for patients with an A1C ≤ 7%), using insulin (100% vs. 0%), and mean duration of diabetes (15 vs. 1.75 years). Data collection and analysis are ongoing.

CONCLUSIONS AND CLINICAL IMPLICATIONS:
The investigator anticipates an association between poor control and low diabetes knowledge, poor adherence, low health literacy, low self-efficacy, and limited social support. The knowledge obtained from this study will assist the investigators and others in creating targeted programming aimed at increasing diabetes control in this and other free clinic populations.

Presented at the 26th Annual Eastern States Conference for Pharmacy Residents and Preceptors, Baltimore, Maryland, 2007.

Lauren Fields, PharmD

Lauren grew up in Bethlehem, Pennsylvania, and attended the University of Pittsburgh to pursue a degree in microbiology. After an incredible experience working in a family health center pharmacy as a student, she realized the impact she could make on people's lives. As a result, she changed majors, entered the School of Pharmacy, and received her PharmD degree in 2006. She completed the pharmacy practice residency of the two-year program at UPMC St. Margaret and will be entering the second-year family medicine pharmacy residency this summer. Her current interests include family medicine, community-oriented primary care, care to the underserved, and international health. Her interests outside of pharmacy include reading and watching the Pittsburgh Pirates play at PNC Park.

Faculty Mentors: Sharon Connor, PharmD, Tina Scipio, PharmD

Real-Time Data Reporting to Improve Medication Charging

AUTHORS:
Gonzaga J, Weber RJ, Mark S, Saenz R, Skledar SJ

PURPOSE:
The Scorecard is a quality improvement tool used to further a departmental or organizational mission and strategy by providing data on financial and quality indicators and operational processes in real-time. By disseminating these data to staff members directly involved in the process, employees are empowered to make changes to their tasks in order to achieve the projected goal. One goal for the pharmacy department at UPMC is to improve the drug charging process. Drug crediting is an important process that, when not done in a timely manner, can potentially cause problems with payment for services upon patient discharge and thus disrupt the flow of revenue for the hospital. The aim of this study is to determine if "real-time" data reporting to employees will reduce late medication charging.

METHODS:
Late credit reports sent by E-mail from the finance and accounting department to the pharmacy department are disseminated and transposed into the department balanced scorecard. Results of the current day late charging are compared to the previous day. A dashboard is used to communicate the late-charge information to the pharmacy staff. Changes to workflow are adjusted based on the results to meet the department goal of less than 2%.

RESULTS:
The data shows positive feedback and improvements in reducing late credits. Average late charge percent for the 4 month study period was 3.8%. Adjusting for computer system factors and staffing issues, the highest late charge was 8% and the lowest was 1.5%. However, as the returned medication charging processed improved, the range between the high and low was reduced to about 1%.

CONCLUSIONS AND CLINICAL IMPLICATIONS:
It is predicted that the real-time data reporting to employees will further improve late charging of medication. Process changes were made based on the results of the late-charge reports. By improving the late-charge process, we were able to show that there are other factors that attribute to the consistently high late-charge. Future initiatives to further decrease late-charges will apply real-time reporting to other hospital departments.

Presented at the 26th Annual Eastern States Conference for Pharmacy Residents and Preceptors, Baltimore, Maryland, 2007.

Joedell Gonzaga, PharmD

Joe was raised in Milwaukee, Wisconsin, and received a Bachelor of Science degree in political science from the University of Wisconsin–Madison. He earned a PharmD degree from Northeastern University in Boston, Massachusetts, in 2006. While attending Northeastern University, Joe was a member of APhA-ASP and ASHP and he continues to be an active member of the profession post-graduation. Joe completed the first year of the pharmacy practice management residency at UPMC Presbyterian Shadyside and will enter the second year of the program this summer. His professional interests include systems management, informatics, and quality improvement. In his spare time, Joe enjoys golf, tennis, cooking, and chess.

Faculty Mentor: Rafael Saenz, PharmD, MS

Analyzing the Impact of a Pharmacist-Run Health Management Diabetes Program on Markers of Disease Control and Economic Benefit

AUTHORS:
Heasley BL, Kubilius J, Legal J

PURPOSE:
One challenge for pharmacy benefit management organizations is to closely manage patients with chronic conditions, complex drug therapies, and high utilization rates, while still demonstrating cost-savings. Comprehensive health management programs for chronic conditions, such as diabetes, are a strategy used to achieve such clinical and economic benefits. There is currently, however, a lack of published data regarding clinical and economic outcomes of health management programs implemented by pharmacy benefit management firms. The objective of this study was to determine if pertinent markers of disease control for patients with diabetes will improve, with resulting economic benefit, from a comprehensive, pharmacist-run health management program.

METHODS:
A retrospective analysis was performed using data collected from patient consultations and prescription claims from members of PharmaCare's MyHealth Coach™ program. The program offers consultations with a pharmacist by telephone to members. Data collected included A1C, blood pressure (BP) categorized according to the JNC 7 report, and cholesterol values. Healthcare utilization data, including physician office visits, emergency room visits, and hospitalizations (days) were also collected. When available, these markers were recorded at each consultation throughout program participation. A comparison was performed on the clinical values and healthcare utilization data gathered at the baseline consultation and the 12-month consultation. The total and average cost of all medication claims and diabetes medication claims were also compared. Prescription claims data was collected 12 months prior to enrollment and 12 months post-intervention.

RESULTS:
The number of patients with an A1C of < 7% increased from 73% at baseline to 80% at the 12-month consultation. The average A1C at baseline was 6.6% (SD±0.8) and 6.5% (SD±0.8) at the 12-month consultation. Patients at BP goal increased from 13% to 21%, while those in the HTN 1 category decreased from 9% at baseline to 1% at the 12-month consultation. The average baseline BP was 130/73mmHg and decreased to 127/71mmHg. LDL was categorized into <100, 100-129, and 130-159 groups. The number of patients in the < 100 category increased from 67% to 79%, while the number in the 130-159 category decreased from 13% to 2% from baseline to 12 months later. The average LDL value at baseline was 91 and 84 at the 12-month consultation (p value = 0.05). The median of physician visits decreased from 11 (IQR 8-15) at baseline to 9.5 (IQR 5-14.5) at 12 months. The median number of ER visits and hospital days was 0 for baseline and 12 months. Consequently, the median cost of physician visits decreased from $999 (IQR $726-$1,362) at baseline to $863 (IQR $454-$1,294) at 12 months. ER visits and hospital visits remained at $0 from baseline to 12 months. As expected, the median cost of diabetes claims 12 months prior to enrollment to 12 months post intervention increased from $545 (IQR $177-$1,136) to $695 (IQR $188-$1,603) and the total cost of prescription claims increased from $4,968 (IQR $3,708-$7,683) to $5,538 (IQR $3,820-$7,398).

CONCLUSIONS AND CLINICAL IMPLICATIONS:
This study showed that pertinent markers of disease control for patients with diabetes improved, demonstrating positive clinical outcomes. Also, healthcare utilization was maintained for ER and hospital visits and reduced for physician visits, resulting in economic benefit despite an increase in prescription claim costs. Overall, a pharmacist-run health management program improved disease control in patients with diabetes while maintaining costs.

Presented at the AMCP 19th Annual Meeting and Showcase, San Diego, California, 2007.

Bethany Heasley, PharmD

Bethany received her PharmD degree from Duquesne University Mylan School of Pharmacy in 2006. She interned with CVS Pharmacy during pharmacy school. Bethany became interested in pharmacy benefits management after completing an advanced practice rotation at PharmaCare during her sixth year of pharmacy school. She completed the pharmacy benefits management residency at PharmaCare and is pursuing opportunities to work clinically in pharmacy benefits management and teach at a school of pharmacy. She enjoys shopping, traveling, and spending time with her friends and family.

Faculty Mentors: Susan J. Skledar, RPh, MPH, Robert J. Weber, MS, FASHP

Evaluating a Strategy for Electronic Bid Purchasing

AUTHORS:
McMillen K, Weber RJ, Mark SM, Nerti PJ, Skledar SJ

PURPOSE:
Expressive commerce is an electronic sealed proposal process used to encourage the lowest price and deliver the best value for purchasing pharmaceuticals and medical supplies. UPMC and CombineNet™ are undergoing a joint venture in developing a proprietary software program called CombineMed™ to create an advanced solution for purchasing in healthcare. Through this process, suppliers for the first time will be exposed to all purchasing data within groups of pharmaceuticals and medical supplies. In turn, this visibility can initiate an economy of scale response that was not previously present. This will enable suppliers to pick and choose which items they wish to compete on, create their own packages based on strengths (i.e. specialty), and offer alternative items based on similar specifications. This study would demonstrate the value of combining pharmaceuticals and supplies in an electronic bid purchase process to create opportunities for potential cost savings.

Katie McMillen, PharmD

Katie is from Pittsburgh, Pennsylvania, and earned a PharmD degree from the University of Pittsburgh in 2005. She worked as an intern and a pharmacist at UPMC Western Psychiatric Institute & Clinic prior to beginning residency training. Katie completed the first year of the Pharmacy Practice Management Residency at UPMC Presbyterian-Shadyside and will enter the second year of the program this summer. Her goal is to obtain a solid clinical background while developing her leadership and management skills. Katie's outside interests include shopping and watching the men's basketball team at the University of Pittsburgh.

Faculty Mentors: Robert J. Weber, MS, FASHP; Scott M. Mark, PharmD, MS

METHODS:
All bids for pharmaceutical and medical supplies submitted by pharmaceutical companies were collected, analyzed, and evaluated through an electronic bid purchasing process (CombineMed™) from August 2006 to February 2007. Each bid was evaluated for potential cost savings and constraints that may limit its potential use in our health system. An analysis comparing total projected bid spend to projected savings will be performed individually and collectively for pharmaceuticals and medical supplies. These results will then be compared to previous twelve-month spend immediately prior to the CombineMed™ process.

RESULTS:
Cost savings were realized for both pharmaceuticals and medical supplies. Pharmaceuticals demonstrated a projected cost savings of 1% as compared to baseline data. The top potential savings for pharmaceuticals were narrowed to six categories including: antifungals, colony stimulating factors, injectables, gases, propofol, and generics. Medical supplies results showed cost savings of 13% as compared to baseline data.

CONCLUSIONS AND CLINICAL IMPLICATIONS:
This project has demonstrated a decrease in total spend resulting from suppliers increased visibility of potential market share capture. At UPMC, this program can be used as a supplemental tool to the current contracting process to create and identify opportunities to further optimize contractual agreements.

Presented at the 26th Annual Eastern States Conference for Pharmacy Residents and Preceptors, Baltimore, Maryland, 2007.

Evaluation of Clinical Characteristics as Predictors for the Inappropriate Prescribing of Acid Suppressive Therapy in Internal Medicine Inpatients

AUTHORS:

Palkovic LB, Coley KC, Sokos DR

PURPOSE:

Acid suppressive therapy (AST), including proton pump inhibitors and histamine-2 receptor antagonists, is prescribed in 50%-70% of inpatients. These medications have few serious adverse effects; however, routine administration of AST contributes to polypharmacy, increases the risk of drug interactions, and is associated with community-acquired pneumonia and *Clostridium difficile* diarrhea. Physicians may inappropriately perceive clinical characteristics such as advanced age, multiple comorbidities, and increased medication burden as risk factors requiring AST. The study objective was to determine which characteristics are predictors for inappropriate AST use.

METHODS:

Deidentified medical records of inpatients admitted to an internal medicine teaching service between July 2005 and June 2006 were screened for medication charges and comorbidities. Patients with an appropriate indication for AST were excluded. Patients receiving inappropriate AST and those not prescribed AST were included in the case and control groups, respectively. Through electronic chart review, clinical characteristics including age, number of admission medications, comorbidities, and concomitant gastro-irritant and anticoagulant medications were collected. A multivariate logistic regression model was developed to determine predictors of inappropriate AST use.

RESULTS:

Of the inpatients prescribed inappropriate AST, 62.8% of patients were newly started on AST during hospitalization and 52.1% of patients were discharged on AST. Differences between the case and control group included mean age (57.4 years vs. 51.6 years, p=0.01), median length of stay (4 days vs. 3 days, p=0.001), median number of medications upon admission (6 vs. 4, p=0.001), and higher rates of cardiovascular disease, renal disease, and cirrhosis, respectively. Predictors of inappropriate AST use included proton pump inhibitor use prior to admission (OR 12.9; 95% CI 3.70-45.2), histamine 2 receptor antagonist use prior to admission (OR 9.8; 95% CI 2.10-46.0), increased length of stay (OR 1.10; 95% CI 1.02-1.19), and use of inpatient anticoagulants (OR 2.38; 95% CI 1.31-4.31).

CONCLUSIONS AND CLINICAL IMPLICATIONS:

AST use prior to admission was the strongest predictor for inappropriate inpatient AST use. Inpatient anticoagulant use was a predictor for inappropriate AST use. These findings will increase awareness and allow education and interventions to prevent further inappropriate prescribing of AST.

Presented at the 26th Annual Eastern States Conference for Pharmacy Residents and Preceptors, Baltimore, Maryland, 2007.

Lindsay Palkovic, PharmD

Lindsay received a PharmD degree from the University of Pittsburgh School of Pharmacy in 2005. While interning at the Lebanon VA Medical Center in Lebanon, Pennsylvania, she became interested in acute care. She completed the pharmacy practice residency at UPMC Presbyterian Shadyside and will pursue a critical care residency at Allegheny General Hospital this summer. She hopes to practice as a clinical pharmacist at an academic medical center. Outside of pharmacy, she enjoys cooking Italian meals and going to concerts.

Faculty Mentor: Denise Sokos, PharmD, BCPS

Risk Factors Associated with Linezolid Resistance in Vancomycin-Resistant Enterococcus (VRE)

AUTHORS:
Pogue JM, Potoski BA, Paterson DL

PURPOSE:
Linezolid has been an essential agent in the treatment of infections due to multi-drug resistant Gram-positive organisms, and is currently the drug of choice for vancomycin-resistant enterococcus (VRE) bacteremia. Unfortunately, rates of linezolid resistance in VRE have been steadily increasing. Determination of risk factors for linezolid-resistant vancomycin-resistant enterococcus (LRVRE) may lead to more appropriate initial empiric therapies for enterococcal isolates. We therefore designed this retrospective study in an attempt to elucidate any such risk factors.

METHODS:
VRE from clinical cultures were analyzed during our eighteen month study period, and susceptibility testing was performed on these isolates for linezolid resistance. This study employed a case-case control study design consisting of two separate case-control analyses followed by a comparison between the results of the individual case-control analyses. Data for each patient were obtained via comprehensive review of the microbiology and pharmacy databases, as well as electronic patient charts. Variables analyzed as potential risk factors for linezolid resistance were age, sex, race, location in hospital, length of stay, site of positive culture, steroid usage within the previous 14 days, comorbidities, Total Peripheral Nutrition (TPN) usage, receipt of a transplant, status post surgery, CVVHD usage, haemodialysis, transfer from an outside hospital, organism isolated, antibiotic exposures in the past 60 days, linezolid exposure, duration of linezolid exposure, and susceptibilities of isolated organisms.

RESULTS:
Linezolid resistance in VRE occurred at a rate of 20% during the study period, with the most common recovery site being the urine (40%). Risk factors found to be unique to linezolid resistance were peripheral vascular disease, solid organ transplant, receipt of TPN, piperacillin/tazobactam, and cefepime. Linezolid exposure was not found in the multivariate model to be a risk factor for LRVRE.

CONCLUSIONS AND CLINICAL IMPLICATIONS:
The results of this analysis favor a horizontal transmission of LRVRE in our institution and highlight the need for improved infection control measures. Furthermore, the high rate of LRVRE demands a reassessment of our empiric antibiotic selection in patients with VRE bacteremia.

Presented at the 26th Annual Eastern States Conference for Pharmacy Residents and Preceptors, Baltimore, Maryland, 2007. The manuscript is currently under review for publication.

Jason Pogue, PharmD

Jason graduated from the University of Pittsburgh School of Pharmacy in 2006. Through his various internships and clinical rotations during pharmacy school, he became extremely interested in critical care and infectious diseases. Jason completed the pharmacy practice residency at UPMC Presbyterian Shadyside and accepted an infectious diseases pharmacy residency at the University of Michigan. His career goal is to become an infectious diseases specialist at an academic medical center. Outside of the pharmacy world, Jason is completely devoted to his sports teams and is an avid Steelers and Penguins fan.

Faculty Mentor: Brian A. Potoski, PharmD

Evaluation of Interactions Between Voriconazole and Substrates of CYP 3A4, 2C19 and 2C9 in Human Liver Microsomes

AUTHORS:
Polisetty R, Capitano B, Reddy SM, Venkataramanan R

PURPOSE:
Voriconazole (VCZ) is a second-generation triazole with activity against several fungal pathogens. It is substrate of cytochrome P450 iso-enzymes, CYP2C19, CYP2C9, and CYP3A4. Since it is also a potent inhibitor of these enzymes, it is important to know the extent and mechanism of drug-drug interactions in order to safely and effectively dose co-administered drugs. The purpose of this study is to characterize the mechanism and relative magnitude of inhibition of the metabolism of substrates of various CYP iso-enzymes in the presence of VCZ.

METHODS:
Human liver microsomes were incubated with different substrates of CYP2C19 (s-mephenytoin), CYP2C9 (flurbiprofen), and CYP3A4 (testosterone) in the absence and presence of various concentrations (0-500 uM) of VCZ. The amount of substrate metabolized was measured by high performance liquid chromatography. The various enzyme kinetic parameters such as the velocity maximum (Vmax), affinity constant (Km), and inhibition coefficient (Ki) were determined. Based on observed Vmax and Km values, the mechanism of inhibition (competitive or non-competitive) can be determined. The magnitude of drug interactions arising from the inhibition of the enzyme was predicted using the ratio of inhibitor concentration ([I]) to the inhibition coefficient (Ki). Predicted magnitude of inhibition was compared to observed magnitude of inhibition, whenever possible.

RESULTS:
Studies conducted with CYP 2C19 and CYP 2C9 substrates revealed that the inhibition of CYP 2C19 and CYP 2C9 by voriconazole is competitive in nature because the inhibition of these iso-enzymes in the presence of voriconazole was overcome at high substrate concentrations. However studies conducted with CYP 3A4 revealed a non-competitive inhibition because the maximal velocity of the reaction was decreased in the presence of the inhibitor and was not overcome at high substrate concentration. Similar studies were conducted with immunosuppressive agents such as tacrolimus, sirolimus and cyclosporine. The magnitude of inhibition for these agents in presence of voriconazole will be compared to determine if the in vivo differences in bioavailability arise from in vitro interactions or other mechanisms.

CONCLUSIONS AND CLINICAL IMPLICATIONS:
This study will allow a better understanding of drug interactions involving VCZ and will help to minimize toxicity of drugs used in combination with VCZ. It will help to predict the magnitude of in vivo drug-drug interactions from in vitro data for drugs where no in vivo data is available (e.g., HMG Co-A reductase inhibitors and benzodiazepines). The study suggests that for substrates of CYP2C9 and CYP2C19, since the inhibition is competitive in nature, the magnitude of inhibition will vary over a dosing interval and will be greatest for drugs with shorter half-lives. For substrates of CYP3A4 where the inhibition is non-competitive in nature, the magnitude of inhibition is likely to be constant.

Presented at the 26th Annual Eastern States Conference for Pharmacy Residents and Preceptors, Baltimore, Maryland, 2007.

Radhika Polisetty, PharmD

Radhika received her PharmD degree from the University of Kentucky College of Pharmacy in 2006. During the third professional of pharmacy school, she developed a strong interest in clinical pharmacy because it combined her enthusiasm for teaching with clinical work. She decided to pursue a residency to enhance her skills as a clinician and also to gain experience in teaching and research. Radhika completed the pharmacy practice residency at UPMC Presbyterian Shadyside and will continue her residency training there as the infectious diseases resident. Outside of work, Radhika likes reading, basketball, music, and traveling.

Project Mentors: Raman Venkataramanan, PhD, Blair Capitano, PharmD, Jennifer Bonner, PharmD

Evaluation of INR Monitoring Frequency and Achievement of Therapeutic Goals

AUTHORS:
Snyder CM, Helms BE, Hall DL

PURPOSE:
The University of Pittsburgh Medical Center (UPMC) Anticoagulation Service utilizes an algorithm to guide warfarin management during the maintenance phase of therapy. Patients with therapeutic INR (International Normalized Ratio) measurements on 2 or more consecutive occasions are advised to have INR testing repeated within 2 to 6 weeks at the discretion of the pharmacist. This retrospective review was conducted to determine whether an increased frequency of monitoring impacts INR control among patients receiving stable doses of warfarin managed by an anticoagulation clinic.

METHODS:
Adult patients actively followed by the UPMC Anticoagulation Service between April 1, 2006, and September 30, 2006, were eligible for inclusion. Patients were receiving maintenance warfarin therapy. Electronic medical records were retrospectively reviewed to determine the date and result for each subsequent INR measurement. To compare the degree of INR control for patients monitored at intervals of < 21 days or ≥ 21 days, the percentage of INR measurements within the therapeutic range was calculated for each interval.

RESULTS:
During the six-month evaluation period, over 10,000 INR results were reviewed. A total of 2,222 INR results were obtained during maintenance therapy and thus evaluated. INR measurements taken within 21 days of the preceding test were within the target range 75.1% of the time whereas INR readings obtained at least 21 days after the antecedent INR test were within the desired goal range 79.9% of the time (_² = 7.16, p-value < 0.001).

CONCLUSIONS AND CLINICAL IMPLICATIONS:
While these findings suggest that INR monitoring at an interval of at least 21 days produced a statistically larger proportion of results within goal range, a clinically meaningful improvement of at least 10% was not realized. Moreover, these findings support the re-evaluation of the Anticoagulation Service management algorithm to reduce the frequency of INR measurements among patients receiving stable doses of warfarin.

To be presented at the American College of Clinical Pharmacy Annual Meeting, Denver, Colorado, 2007.

Christin Snyder, PharmD

Christin is originally from Belmont, Ohio, and graduated with a PharmD degree from Ohio Northern University in 2005. She then completed a pharmacy practice residency at West Virginia University Hospitals. During her clinical rotations and residency experience, Christin especially enjoyed working with patients and healthcare providers in the ambulatory setting. She completed the primary care residency at UPMC Presbyterian Shadyside and accepted a faculty position at the St. Louis College of Pharmacy. Christin spends much of her spare time playing with her puppy Maddie, reading, and cooking.

Faculty Mentor: Deanne L. Hall, PharmD, CDE

Development of Collaborative Relationships Between Pharmacists and Physicians

AUTHORS:
Snyder M, Somma M, Zillich A, Smith R

PURPOSE:
To develop a conceptual framework to illustrate the processes by which pharmacists and physicians establish excellent patient-care relationships in the community.

METHODS:
Experts in community practice, including experiential education program directors, pharmacy clinical services leaders, and leaders of pharmacy organizations, will be asked to identify community pharmacists who have excellent patient-care relationships with physicians. Pharmacists will identify their physician colleague and all participants will complete two survey items. The first collects information about their professional background and current practice. The second, The Physician Pharmacist Collaborative Index (PPCI), measures the strength of practitioner collaboration. Key informant interviews with select practitioner dyads will be used to collect data for the framework. Dyads will be ranked by pharmacist PPCI scores and those with the highest scores will be asked to participate in individual interviews. It is anticipated that up to 20 dyads will be asked to participate in key informant interviews. Enrollment will stop when identified themes repeat and no new themes are identified. The interviews include a standardized set of questions to extract information within domains demonstrated to influence relationship development.

RESULTS:
A total of 87 community pharmacists, representing 29 states and Puerto Rico, have been identified by experts. As of May 2007, 14 pharmacists and zero physicians have been included in the study. The mean age of these pharmacists is 42.9 ± 13.4 years. Four (28.8%) have a BS in pharmacy and 10 (71.2%) have a PharmD degree. Three (21.4%) have completed residency training. Of these pharmacists, 6 have undergone key informant interviews. Analysis of this qualitative work is ongoing, along with further enrollment of dyads.

CONCLUSIONS AND CLINICAL IMPLICATIONS:
Preliminary data imply that excellent pharmacist-physician relationships are found nationwide, among pharmacists with varied educational backgrounds. We anticipate that commonalities will emerge during the interviews with regards to processes used in relationship development. The results will be used to develop teaching tools for students and practitioners.

Presented at the 26th Annual Eastern States Conference for Pharmacy Residents and Preceptors, Baltimore, Maryland, 2007, and the American Pharmacists Association Annual Meeting, Atlanta, Georgia, 2007.

Margie Snyder, PharmD

Margie earned a PharmD degree at the University of Pittsburgh School of Pharmacy in 2006. Margie decided to pursue the community care pharmacy practice residency at the University of Pittsburgh because of the program's unique community practice opportunities, emphasis on leadership development, and excellent mentorship. Margie will stay on at the University of Pittsburgh to complete a community pharmacy fellowship that will enable her to focus her training on teaching and research. She is also currently enrolled part-time in the Multidisciplinary Master of Public Health Program at the Graduate School of Public Health. Her professional interests are in community/primary care practice, academia, public health, and working with underserved populations. Margie hopes to obtain a clinical faculty position after completing her training. As the youngest of seven children, Margie's time away from pharmacy is spent with family and traveling as much as possible.

Faculty Mentor: Randall B. Smith, PhD

Incidence of Serotonin Syndrome Diagnosed in Patients Using 5HT1 Agonists and SSRIs or SNRIs: A Retrospective Review in Veterans Affairs Hospitals

AUTHORS:
Wilson A, Good B, Crawford M, Cunningham F

PURPOSE:
In July 2006, the FDA published a MedWatch Alert regarding the use of selective serotonin reuptake inhibitors (SSRIs) or serotonin-norepinephrine reuptake inhibitors (SNRIs), combined with 5HT1 agonists due to the possibility of inducing serotonin syndrome (SS). The clinical impact of this alert is more than significant: these agents are often used as first-line therapy for common disease states which may occur concurrently in many patients. The possibility of a change, not only in guidelines, but in prescribing patterns could lead to suboptimal treatment for patients with depression or migraines. We hypothesize that a diagnosis of SS will be more common in patients where 5HT1 agonists and SSRIs or SNRIs are used in combination versus those where these agents are used individually.

Andrea Wilson, PharmD

Andrea received a PharmD degree from Duquesne University Mylan School of Pharmacy in 2006. She is devoted to helping patients through creating individualized, efficient, and effective medication regimens. She completed the pharmacy practice residency at the VA Pittsburgh Healthcare System and has accepted a position as a clinical pharmacist at Washington Hospital. In her free time, Andrea loves being outdoors, exercising, and watching kung fu and UFC (Ultimate Fighting Championship).

Faculty Mentors: Melissa Crawford, PharmD, BCPS, CDE, and Chester B. Good, MD, MPH.

METHODS:
A national retrospective administrative data review of pharmacy and hospital diagnoses was undertaken. Patients with an ICD-9-CM code of 333.9 (neuroleptic malignant syndrome and serotonin syndrome) were identified. The primary aim was to compare patterns of documented prescription use in VA patients with or without diagnosis of SS for calendar year 2000-2005. Prescription use of SSRIs (citalopram, escitalopram, fluoxetine, paroxetine, sertraline), SNRIs (duloxetine, velnafaxine) and 5HT1 antagonists (almotriptan, eletriptan, frovatriptan, naratiptan, rizatriptan, sumatriptan, and zolmitriptan) was collected. The following three rates will be reported: (1) Total number of patients with SS and receiving combination therapy divided by the total number of patients receiving combination therapy; (2) Total number of patients with SS receiving 5HT1 agonists only (no SSRI/SNRI) divided by the total number of patients receiving 5HT1 agonists only; and (3) Total number of patients with SS receiving SSRIs or SNRIs only (no 5HT1 agonists) divided by the total number of patients receiving SSRIs or SNRIs only.

RESULTS:
Data collection and analysis are ongoing.

CONCLUSIONS AND CLINICAL IMPLICATIONS:
Based on the study findings, we hope to implement possible national criteria to either support or refute the aforementioned MedWatch Alert. Our study will provide initial data to show the incidence of SS in patients receiving the combination of the study drugs and will serve as baseline comparator for future studies. Within the VA system, we hope to implement, if necessary, a serotonin syndrome treatment order set.

Presented at the VISN 4 Pharmacy Conference, State College, Pennsylvania, 2007.

Rite Aid: Community Care Pharmacy Practice Residency

The Community Care Pharmacy Practice Residency is a joint program offered by the University of Pittsburgh School of Pharmacy and Rite Aid Corporation. The goal of the residency program is to provide a structured, postgraduate training experience that focuses on the knowledge and skills needed to provide pharmaceutical care and develop medication therapy management practices for patients in the community setting.

The University of Pittsburgh School of Pharmacy and the Rite Aid Corporation have partnered to develop a comprehensive Medication Therapy Management (MTM) Service, Rite CareSM. Pharmacists provide individualized patient care to identify, prevent, and solve drug therapy problems in collaboration with the patient's physician(s). The service is based in four, specially designed Rite CareSM Centers of Excellence in the Pittsburgh area. Pharmacists interview patients utilizing a standard software documentation system. Pharmacists educate the patients on their drug regimen, provide therapeutic recommendations to the patients and/or their physicians, and ensure follow-up of patient care. Pharmacists collaborate with local physicians that may include actively seeing patients in a respective physician's office. In addition to the direct patient care activities in the pharmacy, pharmacists also do community-based talks and evaluations in their local area.

The four Rite Aid Corporation-Rite CareSM Centers of Excellence in Pittsburgh will serve as the primary teaching laboratories for the resident. The resident will gain patient care and management skills through active participation in the provision of medication therapy management services to patients, the development of community outreach programs, the development of collaborative relationships with medical practices in the community, and through projects with Rite Aid and School of Pharmacy executive teams. The resident will have a structured educational component in collaboration with School of Pharmacy faculty. The resident will also collaborate with clinical and research faculty from the University of Pittsburgh to complete a community pharmacy research project. The resident will hold an adjunct instructor position at the University of Pittsburgh School of Pharmacy and participate in teaching student pharmacists.

Program Director: Melissa Somma, PharmD, CDE

School of Pharmacy Residency Programs

UPMC Health Plan: Managed Care Pharmacy Residency

The University of Pittsburgh Medical Center (UPMC) Health Plan is the second largest health insurer in Western Pennsylvania. The National Committee for Quality Assurance and U.S. News & World Report listed UPMC Health Plan as the top-ranked health plan in Pennsylvania, and one of the top-20 health plans in the United States. The Health Plan is the only Pennsylvania plan to receive five stars in the categories of "Prevention" and "Treatment," and is the highest-ranked managed care company in the nation for breast cancer screening, for the second consecutive year.

The integration of resources from the Health Plan, UPMC Health System, Community Care Behavioral Health (CCBH), and the University of Pittsburgh School of Pharmacy, creates a challenging environment for the Managed Care Residency. Highly motivated pharmacy residents are provided the opportunity to apply safe and effective, evidenced-based medicine practices to individual patients and in populations throughout the Health Plan. UPMC Health Plan provides access to the complete health management of the plan members (i.e. inpatient admissions, out-patient laboratory values, diagnosis, etc.).

The training site for this residency is the Pharmacy Service Department of the Health Plan, located within the city of Pittsburgh. The pharmacy department is comprised of two main areas: clinical and operations. The clinical portion of the pharmacy department supports the development of pharmacy benefits for three distinct lines of business: Commercial, Medical Assistance and Medicare, with the new addition of the Children's Health Insurance Program (CHIP) under the Commercial line of business. The Managed Care resident will create criteria for drug utilization reviews and evaluations, develop clinical intervention activities in conjunction with disease management programs, participate in Health Plan Pharmacy and Therapeutics committee activities, and assist in formulary management and policy development. UPMC Health Plan develops and implements evidence-based formularies in order to provide high quality, cost-effective medicine to its members. This process occurs by working with physician sub-committees, the Pharmacy and Therapeutics Committee and the Quality Improvement Committee. In addition, the operational side of the department implements the pharmacy benefits via the pharmacy benefit manager, and responds to provider and physician requests through the pharmacy call center. Residents also have the opportunity to do off-site rotations with a pharmacy benefits manager.

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UPMC Health Plan: Managed Care Pharmacy Residency

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The residency is affiliated with the University of Pittsburgh. Residents will participate in journal clubs, present seminars, and complete a research project. In addition, residents receive an adjunct instructor position with opportunities for teaching, research and other scholarly activities.

The ultimate goal of the program is to enable residents to become competent in the knowledge, skills, and attitudes required to optimize pharmacotherapy outcomes and provide a high level of patient care to diverse populations in a managed care environment.

Program Director: Jessica Daw, PharmD

School of Pharmacy Residency Programs

PharmaCare: Managed Care Pharmacy Practice

The University of Pittsburgh and PharmaCare Management Services, Inc., one of the nation's largest pharmacy benefit management (PBM) firms, offers an opportunity to practice in a dynamic PBM environment and gain a clinical and administrative perspective in managing pharmacy benefit plans for a wide variety of clients. The resident will be involved in multiple aspects of the PBM including clinical intervention activities, Drug Utilization Review (DUR) criteria development, disease state management, Pharmacy and Therapeutics committee activities and clinical information systems development. In addition, the resident will also have an opportunity to obtain valuable insight about new business development, clinical account management, manufacturer contracting, and the proposals process. Academic activities, such as contributions to internal newsletters and professional journals, are encouraged. Furthermore, as a potential faculty member at the University of Pittsburgh School of Pharmacy, the resident will participate in undergraduate and graduate student instruction, as well as in the development of educational programs for the PharmaCare professional staff.

The training site for this residency program is the Clinical Operations Department of PharmaCare located in Pittsburgh, Pennsylvania. PharmaCare is a chain-based pharmacy benefits management firm that provides superior prescription benefit services, along with cost-effective plan management. The company's mission is to provide innovative products and services that deliver high quality, low-cost solutions. PharmaCare's customer relationships are based on value, trust and integrity.

In addition to being involved in the clinical activities of PharmaCare, the resident will also have the opportunity to participate in the professional activities of PharmaCare Direct, a pioneer in the mail service pharmacy industry with advanced robotics and radio frequency dispensing technology.

Program Director: Julie D. Legal, PharmD

UPMC Presbyterian Shadyside: Pharmacy Residency

The University of Pittsburgh Medical Center (UPMC) is the premier health system in Western Pennsylvania and one of the most renowned academic medical centers in the United States. The health system consists of tertiary, specialty and community hospitals, physician offices, and rehabilitation facilities. By integrating the resources of the University of Pittsburgh School of Pharmacy and UPMC, this residency program offers a challenging yet flexible environment where pharmacy residents learn to provide safe and effective, evidenced-based pharmacotherapy to individual patients.

Residents are actively involved in the design and participation of a residency project suitable for publication and the development and implementation of drug-use initiatives. Residents are members of multidisciplinary hospital committees, participate in journal clubs, and present seminars. A distinguishing aspect of this program is that each resident holds an adjunct instructor position with opportunities to prepare lectures for pharmacy students, lead student group discussions, and precept students during their clerkship rotations. Flexibility is provided to meet the individual resident's goals and objectives. Each resident is eligible for a financial stipend to attend professional meetings.

The goal of the pharmacy residency program is to gain the knowledge, skills, attitudes, and abilities necessary to independently and competently optimize pharmacotherapy outcomes through direct patient care and pharmacy practice management. Program objectives include: (1) demonstrate proficiency, confidence, and compassion in providing direct patient care to diverse populations; (2) demonstrate professionalism and effective communication skills in all components of pharmacy practice; (3) optimize pharmacotherapy and safe medication practices; (4) provide effective education to healthcare professionals; and (5) apply clinical and outcomes research concepts to professional practice. Highly motivated individuals with a strong interest in direct patient care in an academic medical center environment and the desire to complete a PGY2 residency are encouraged to apply.

Program Director: Denise R. Sokos, PharmD, BCPS

School of Pharmacy Residency Programs

UPMC St. Margaret: Pharmacy Residency

UPMC St. Margaret is a 250-bed community teaching hospital with a physician family medicine residency and fellowship program. The Pharmacy Residency at UPMC St. Margaret is ASHP accredited. This one-year, PGY1 pharmacy residency provides the resident direct patient care experiences in a variety of settings throughout the year, allowing mastery of the applications of pharmaceutical care principles to practice. The program curriculum is flexible to enable the resident to develop his or her own career interests in addition to participating in the longitudinal experiences of the residency. An opportunity to work on a casual basis in the hospital pharmacy also is available and encouraged.

The pharmacy resident will have numerous opportunities to give formal and informal presentations to healthcare professionals, precept pharmacy students, and teach at the University of Pittsburgh School of Pharmacy. A variety of practice-based research experiences exist and the resident is expected to present his or her research findings at a national pharmacy meeting.

As part of the University of Pittsburgh Pharmacy Residency Program, the residents at UPMC St. Margaret participate in resident group seminars and journal clubs with pharmacy residents in other training programs at the University of Pittsburgh. The purpose of the residency is to train a highly motivated, team-oriented pharmacy resident in advanced patient medication management skills, teaching techniques, and practice-based research methods to prepare him or her to be a leader in the medical/academic community.

Program Director: Patricia Klatt, PharmD, BCPS
Assistant Director: Roberta Farrah, PharmD, BCPS

VA Pittsburgh Healthcare System: Pharmacy Residency

The VA Pittsburgh Healthcare System (VAPHS), in conjunction with the University of Pittsburgh School of Pharmacy, offers a PGY1 pharmacy residency program. The VAPHS has a 128 bed tertiary care facility that serves as the referral center for other VA hospitals in Pennsylvania and West Virginia, and provides a wide range of inpatient and outpatient services.

The residency provides an integrated experience in acute care, ambulatory care, drug information and practice management with an emphasis on primary care. The pharmacy residency is tailored to address the needs of the individual resident, while providing the basic foundation necessary for a high level of clinical pharmacy practice. Under the guidance of clinical faculty members at the VAPHS, each resident gains invaluable experience in balancing their schedules to provide a "real-life" approach to pharmacy practice. Each resident is involved in the drug use evaluation committee, pharmacy and therapeutics committee functions, and didactic and experiential education. Residents participate in journal club, prepare pharmacy newsletters, and provide staff and patient education. Residents are also required to complete a research project suitable for presentation and publication and to present two seminars of interview quality to peers, faculty, students, and staff.

Program Director: Lauren Trilli, PharmD, BCPS

School of Pharmacy Residency Programs

UPMC Presbyterian Shadyside: Ambulatory Care Pharmacy Residency

The ambulatory care pharmacy residency at the University of Pittsburgh Medical Center (UPMC) is designed for the individual seeking to further develop skills necessary to assess, design, implement and monitor a safe and effective evidence-based individualized medication therapy plan in a collaborative setting. The UPMC is one of the leading integrated health care delivery systems in Western Pennsylvania consisting of tertiary, specialty and community hospitals, physician offices, and rehabilitation facilities. This setting allows the ambulatory care pharmacy resident to gain experience in both institutional and community-based clinics involved in direct care of a diverse patient population. The resident is expected to become proficient in the management of diabetes, anticoagulation, hypertension, and lipid disorders. In addition, the resident will gain expertise in managing special populations such as the elderly and immunosuppressed patients.

The ambulatory care pharmacy resident is also actively involved in the design and conduct of a residency project suitable for publication. Other activities include development/implementation of drug use initiatives, participation in resident journal clubs, and completion of two seminar presentations. Each resident holds an adjunct instructor position with the University of Pittsburgh School of Pharmacy whereby experience is gained precepting doctor of pharmacy students during their experiential rotations and leading small group practicum sessions within the therapeutic modules. Flexibility is provided to meet the individual resident's goals. The ultimate goal of the program is to enable the resident to become adept in the knowledge, skills, and attitudes required to optimize pharmacotherapy outcomes and produce proficient practitioners providing patient care to diverse populations.

Program Director: Deanne Hall, PharmD, CDE

UPMC Presbyterian Shadyside: Cardiology Pharmacy Residency

The cardiology pharmacy residency at the University of Pittsburgh Medical Center (UPMC) provides residents the opportunity to develop specialized clinical expertise in the management of patients with cardiovascular disease. UPMC is the premier health system in Western Pennsylvania and one of the most renowned academic medical centers in the United States. During the program, the resident will concentrate on cardiovascular patients and will be involved in ongoing department and independent research projects. Many opportunities to present formal seminars, patient cases, journal clubs, and in-service education for UPMC staff occur throughout the year. In addition, the resident will design and conduct a research project suitable for presentation and publication. The resident will gain experience in both didactic and experiential teaching as an adjunct instructor and preceptor at the University of Pittsburgh School of Pharmacy. At the conclusion of the program, the resident will have developed into an accomplished clinical pharmacy practitioner with expertise in cardiology, and will have gained valuable insight into the elements necessary to grow professionally.

Program Director: Amy L. Seybert, PharmD

School of Pharmacy Residency Programs

UPMC Presbyterian Shadyside: Critical Care Pharmacy Residency

The critical care pharmacy residency at the University of Pittsburgh Medical Center (UPMC) is designed for the individual interested in developing specialized clinical expertise in pharmaceutical care for critically ill patients. UPMC is the premier health system in Western Pennsylvania and one of the most renowned academic medical centers in the United States. The critical care pharmacy resident will gain expertise in interpretation of hemodynamic monitoring, pathophysiology of acute illness and resulting sequela, nutritional support, therapeutic drug monitoring, infusion therapy, support devices, and pharmacy practice issues of the intensive care unit.

The resident will be integrally involved in research opportunities and education of students and other healthcare professionals. Many opportunities to present formal seminars, patient cases, journal clubs, and in-service education for UPMC staff occur throughout the year. In addition, the resident will design and conduct a research project focused on critical care that is suitable for presentation and publication. The resident will gain experience in both didactic and experiential teaching as an adjunct instructor and preceptor at the University of Pittsburgh School of Pharmacy. Highly motivated individuals with a strong interest in critical care who are committed to providing optimal pharmaceutical care within a team-oriented setting are encouraged to apply. We invite you to learn more about this exciting opportunity.

Program Director: Amy L. Seybert, PharmD

UPMC Presbyterian Shadyside: Drug Information Residency

The University of Pittsburgh Medical Center (UPMC) is the premier health system in Western Pennsylvania and one of the most renowned academic medical centers in the United States. The technologically advanced UPMC Poison and Drug Information (PDI) Center is located in close proximity to the UPMC and the University of Pittsburgh School of Pharmacy.

This PGY2 drug information residency is an innovative and challenging program that will optimize the knowledge base, skills, and experience of those interested in a drug information career. Practitioners in the PDI Center provide unbiased, accurate and comprehensive drug and poison information to healthcare professionals from both within and outside the UPMC.

All aspects of drug information practice will be explored during the residency program. Principles of evidence-based medicine, information retrieval and analysis, and literature evaluation are applied to formulary management. In addition, the resident will participate in pharmacovigilance programs and drug use initiatives through the nationally-recognized Drug Use and Disease State Management Program at UPMC. The resident is an integral member of multidisciplinary hospital committees, participates in resident journal clubs, and presents seminars. Opportunities to educate students and other healthcare professionals exist through didactic and experiential teaching focused on drug information practices and principles. The resident is actively involved in the design and completion of a residency project suitable for presentation and publication.

Program Director: Colleen Culley, PharmD, BCPS

School of Pharmacy Residency Programs

UPMC St. Margaret: Family Medicine Residency

UPMC St. Margaret is a 250-bed community teaching hospital with a physician family medicine residency and fellowship program. This two year pharmacy residency at UPMC St. Margaret is a program in which the resident will actually complete two residency programs. Postgraduate year one (PGY1) comprises an ASHP-accredited Pharmacy Residency with conditional continuation to year two (PGY2) which is a Specialty Residency in Family Medicine. The two year experience offers the benefit of continuity of learning environment and opportunities. After building a strong foundation the first year, the resident will accomplish the establishment of an independent practice in the second year. The resident will have numerous opportunities to give formal and informal presentations to health care professionals, precept pharmacy students, and teach at the University of Pittsburgh School of Pharmacy. A variety of practice-based research experiences exist and the resident is expected to present his or her research findings at a national pharmacy meeting. The program curriculum is flexible to enable the resident to develop his or her own career interests in addition to participating in the longitudinal experiences of the residency. An opportunity to work on a casual basis in the hospital pharmacy is also available and encouraged.

As part of the University of Pittsburgh Pharmacy Residency Program, the residents at UPMC St. Margaret participate in resident group seminars and journal clubs with pharmacy residents in other training programs at the University of Pittsburgh. The purpose of the residency is to train a highly motivated, team-orientated pharmacy resident in advanced patient medication management skills, teaching techniques, and practice based research methods to prepare him/her to be a leader of change in the medical/academic community.

Program Director: Patricia Klatt, PharmD, BCPS
Assistant Director: Roberta Farrah, PharmD, BCPS

UPMC Presbyterian Shadyside: Infectious Diseases Pharmacy Residency

The infectious diseases pharmacy residency at the University of Pittsburgh Medical Center (UPMC) is designed for the individual who is interested in developing specialized clinical skills in the area of infectious diseases pharmacotherapy. UPMC is the premier health system in Western Pennsylvania and one of the most renowned academic medical centers in the United States. The resident will gain expertise in many aspects of pharmaceutical care including the interpretation of microbiological culture and susceptibility data, antimicrobial pharmacokinetics and pharmacodynamics, antimicrobial therapy in general and specialized patient populations, and research. The resident will work in close collaboration with pharmacist practitioners and physicians from the Division of Infectious Diseases

The resident will gain experience in both didactic and experiential teaching as an adjunct instructor and preceptor at the University of Pittsburgh School of Pharmacy. The education of students and other health care professionals is an integral component of this residency. In addition, the resident will complete an infectious diseases-focused research project through participation in a mentored residency research training program. Highly motivated individuals with a strong interest in infectious diseases who are committed to providing optimal pharmaceutical care within a team-oriented setting are encouraged to apply. We invite you to learn more about this exciting opportunity.

Program Director: Brian Potoski, PharmD

School of Pharmacy Residency Programs

UPMC Presbyterian Shadyside: Pharmacy Management Residency

The PGY2 pharmacy management residency at the University of Pittsburgh Medical Center (UPMC) provides opportunities for the resident to develop leadership and expert pharmacy management skills in an academic medical center. Residents will develop a strong foundation in pharmacy services management through flexible rotations in health-system and hospital pharmacy operations management, outcomes research, information technology, automation, finance, asset management, drug use management, and medication safety and education. Integration with the University of Pittsburgh School of Pharmacy will allow for interaction with faculty and students and other experiences necessary for success in an academic health system.

The resident will be integrally involved in research opportunities and education of students and other healthcare professionals. Formal seminars, management cases, journal clubs, and education for UPMC pharmacy staff are mandated throughout the year. Through affiliation with the University of Pittsburgh, the resident will have didactic and experiential teaching responsibilities to PharmD candidates during their clinical clerkships. One pharmacy management-focused research project suitable for presentation and publication is required. In addition, the clinical rotations offered in the PGY1 pharmacy residency are available as electives based on preceptor availability and resident interest.

Highly motivated individuals with a strong interest in pharmacy management who are committed to providing optimal pharmaceutical care within a team-oriented setting are encouraged to apply. We invite you to learn more about this exciting opportunity.

Program Director: Scott Mark, PharmD, M.S., M.Ed., FACHE, FASHP, FABC

Residency Program Contact Information

University of Pittsburgh School of Pharmacy
Department of Pharmacy and Therapeutics
Pharmacy Residency Program

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