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ABSTRACTS

## 2011 ACCP Annual Meeting

October 16–19, 2011

Pittsburgh, PA

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### ORIGINAL RESEARCH

#### ADR/Drug Interactions

**1. Comparison of online drug interaction databases to evaluate antiretroviral medication interactions.** *Tomasz Z. Jodlowski, Pharm.D., BCPS, (AQ-ID)<sup>1</sup>, Priti N. Patel, Pharm.D., BCPS<sup>1</sup>, Nicole M. Maisch, Pharm.D.<sup>1</sup>, Donna Mildvan, M.D.<sup>2</sup>; (1)St. John's University College of Pharmacy and Allied Health Professions, Queens, NY; (2)Beth Israel Medical Center, New York, NY*

**PURPOSE:** Treatment of the human immunodeficiency virus (HIV) is complex and clinicians often look to drug interaction evaluation tools to assist in daily patient care. Although technology has been shown to improve patient safety, the use of online drug interaction tools to evaluate antiretroviral interactions has not been evaluated. The purpose of this study was to compare online drug interaction databases with a focus on antiretroviral medications.

**METHODS:** Twelve online drug interaction databases were evaluated: Micromedex Thomson Healthcare Series (MM), University of Liverpool (UL), Clinical Pharmacology (CP), Clinical Care Options (CCO), AIDSmeds (AM), Medscape Drug Reference (MDR), Lexi-Complete (LC), Johns Hopkins HIV Guide (JHHIVG), Facts and Comparisons eAnswers Drug Interaction Interactive Tool (FC), Epocrates online free (EOF), HIV In Site (IS) and Drug Interaction Facts eBook (DIF). The databases were evaluated for scope (database correctly identify the presence of a drug interaction) and comprehensiveness (depth of information provided for a correctly identified drug interaction) using 40 drug pairs. Subsequently the databases were ranked based on scope and comprehensiveness scores (Excellent:  $\geq 90\%$ , Satisfactory: 89–60%, Poor:  $< 60\%$ ).

**RESULTS:** MM, UL, CP and CCO were considered excellent based on scope ( $\geq 90\%$ ) and MM, UL, CP, LC, MDR and CCO were considered satisfactory based on comprehensiveness score (89–60%). No database was ranked as excellent in comprehensiveness. There was no statistically significant difference in scope between free and subscription databases ( $p > 0.05$ ) or between HIV-specific and general databases ( $p > 0.05$ ). There was a statistically significant difference in comprehensiveness favoring subscription databases ( $p < 0.05$ ), however no difference was observed between general and HIV specific software ( $p > 0.05$ ).

**CONCLUSION:** MM, UL, CP, and CCO were the only databases in the study that achieved highest rank for both scope (excellent) and comprehensiveness (satisfactory). Clinicians should periodically evaluate their preferred database and consider checking multiple resources when evaluating drug interactions.

**2. Comparing the type and severity of drug interactions among different ICUs.** *Pamela L. Smithburger, Pharm.D., BCPS, Sandra L. Kane-Gill, Pharm.D., MSc, FCCM, FCCP, Amy L. Seybert, Pharm.D.; University of Pittsburgh School of Pharmacy, Pittsburgh, PA*

**PURPOSE:** Mortality and morbidity are increased in patients experiencing drug-drug interactions (DDIs), and there is a lack of literature describing clinically significant DDIs in the intensive care unit (ICU). It is also unknown if there are differences in severity and type of DDIs between different ICUs. Our objective is to identify DDIs occurring in the medical ICU (MICU), cardiovascular ICU (CCU), and the cardiothoracic ICU (CTICU) and compare the severity and types of medications involved in the DDIs between the units.

**METHODS:** This prospective, observational study was conducted for 4 weeks in each of the 3 ICUs (MICU, CCU, CTICU) of an academic

medical center. Patients  $\geq 18$  years of age and admitted to the ICU under observation during the month of study were included. Lexi-Interact™ and Micromedex® interaction databases were utilized daily to screen each patient's medication profile for interacting drug pairs. Severity of the DDI was assessed by each databases' severity rating scale.

**RESULTS:** Overall, 736 patient medication profiles were evaluated with 343 profiles possessing  $\geq 1$  DDI. There were a total of 1670 DDIs identified (2.27 DDI/patient-day) with 813 being unique interacting drug pairs. DDIs were major or contraindicated in 4.7% (14/296), 8.9% (19/213), and 2.5% (8/355) of the CCU, CTICU, and MICU DDIs, respectively. Upon evaluation of the agreement of severity ratings between the interaction databases, more variance was noted in the MICU DDIs. Differences also existed between the medications involved in the most common DDIs in the MICU compared to the other units.

**CONCLUSION:** DDIs occur frequently in the ICU setting, and the type and severity of DDIs may be influenced by the patient population, co-morbid disease states and reason for admission. When developing an alerting system for DDIs, patient characteristics and location should be taken into consideration to develop an optimal warning system.

**3. Incidence, characteristics, and outcomes of adverse drug events resulting in intensive care admission in oncology patients.** *Lama H. Nazer, Pharm.D., BCPS, Feras I. Hawari, M.D., Rana A. Eljaber, Pharm.D.; King Hussein Cancer Center, Amman, Jordan*

**PURPOSE:** to determine the incidence, characteristics, and outcomes of adverse drug events (ADEs) that necessitate admission to the intensive care unit (ICU) in oncology patients.

**METHODS:** This was a 5-month prospective observational study conducted between August 1<sup>st</sup> and December 31<sup>st</sup>, 2010 at a comprehensive academic cancer center. Patients admitted to the ICU were screened within 48 hours to determine if the admission may have been due to a drug related adverse event. An ADE was defined as an injury or patient harm resulting from medical intervention related to a drug. ADEs were characterized based on the suspected medication, organ system involved, and severity and preventability. Patient demographics, length of stay, and mortality were recorded.

**RESULTS:** During the study period, 249 patients were screened. The majority of patients had solid tumors ( $n=179$ ; 72.2%); the remaining had hematological malignancies ( $n=79$ ; 31.7%). Of the patients admitted, 134 (53.4%) were males and the average age was  $52.1 \pm 15.8$  (SD) (range: 19–88) years. An ADE was determined as the primary cause of 58 (23.3%) admissions. The most common medications associated with an ADE requiring an ICU admission were antineoplastics ( $n=38$ ; 62.3%) and analgesics ( $n=9$ ; 14.8%). Other medications associated with an ADE requiring an ICU admission were: anticoagulants, diabetes medications, corticosteroids, immunosuppressants, and contrast agents. The most common types of adverse events were hematological/immune ( $n=33$ ; 54.1%), neurologic ( $n=10$ ; 16.4%), and respiratory ( $n=7$ ; 11.5%). Five (8.6%) of the ADEs were considered preventable. The average length of stay for the patients admitted with ADEs resulting in ICU admission was  $5.95$  days  $\pm 9.43$ (SD) and the mortality rate was 27.1%.

**CONCLUSION:** To our knowledge, this is the first study to report on ADEs resulting in ICU admission in oncology patients. The incidence of ADEs in this patient population is high and often life-threatening and fatal.

**4E. Evaluating the occurrence of QT prolongation resulting from drug-drug interactions.** *Michael J. Armahizer, Pharm.D.<sup>1</sup>, Sandra Kane-Gill, Pharm.D., M.S., FCCM<sup>2</sup>, Pamela L. Smithburger, Pharm.D., BCPS<sup>2</sup>, Amy L. Seybert, Pharm.D.<sup>2</sup>; (1)UPMC Presbyterian, Pittsburgh, PA; (2)University of Pittsburgh School of Pharmacy, Pittsburgh, PA*

**PURPOSE:** Over 50 medications cause QT prolongation, which can deteriorate into Torsades de pointes. Information is lacking on the frequency of QT prolongation due to drug-drug interactions (DDIs) accounting for temporal sequence in intensive care units (ICUs). This evaluation is of particular interest to clinicians in cardiac ICUs, since there is at heightened risk for adverse outcomes. The primary objective was to determine the frequency of QT prolongation from potentially interacting drugs in the coronary ICU and cardiothoracic ICU.

the interventions made by the pharmacist using a scale that evaluates the importance and relevance of the intervention. The secondary outcome was the pharmacy intervention acceptance rate. Appropriate statistical analysis will be applied to the data set.

**RESULTS:** Research ongoing

**CONCLUSION:** Research ongoing

## Pediatrics

**453. Buprenorphine withdrawal in an infant after cessation of breastfeeding: A case report and review of the literature.** *Hani Elladki, Pharm.D., Candidate<sup>1</sup>*, Paul Thill, Pharm.D., BCPS<sup>2</sup>; (1)Ferris State University, Dearborn Heights, MI; (2)Ferris State University College of Pharmacy, Saginaw, MI

**PURPOSE:** To report a case of buprenorphine withdrawal in an infant after an abrupt cessation of breastfeeding and to review the published literature on the topic. It is well known that exposure to buprenorphine in utero, can lead to neonatal abstinence syndrome (NAS). We report here a 4-month old infant who displayed symptoms of withdrawal approximately 2 days after the mother stopped breastfeeding. Symptoms included frequent yawning, sneezing, pupillary dilation, agitation, sweating, hyperactive Moro reflex, myoclonic jerks, tremors and insomnia. The mother stated that she was using buprenorphine throughout her pregnancy and there were no signs of NAS at birth. Upon diagnosis the infant was placed on methadone and experienced immediate improvement of her withdrawal symptoms. Patient was discharged after 3 days on a methadone taper. The Naranjo scale suggests this is a probable adverse event.

**METHODS:** We performed a MEDLINE search (1966–May 2011) using keywords: buprenorphine, breastfeeding and withdrawal. Review articles, case reports and primary research publications were included in this search.

**RESULTS:** No case reports were found describing buprenorphine withdrawal in infants secondary to cessation of lactation. One case report found insignificant levels in breast milk for a child experiencing NAS. Two studies investigated buprenorphine concentrations in breast milk and determined the concentration was unlikely to have adverse effects on lactating infants. This case report represents an issue that has not been discussed extensively or studied in the literature and it is likely healthcare providers do not consider it in the care of newborn infants or education of breastfeeding mothers on buprenorphine.

**CONCLUSION:** Although buprenorphine has generally been considered safe during lactation, this case report is in contrast to that assumption. Until more evidence is published, healthcare providers should specifically counsel lactating mothers taking buprenorphine to watch for signs of withdrawal and avoid rapid cessation of breastfeeding.

**454. Evaluation of busulfan targeted therapy and pharmacokinetics in pediatric patients undergoing hematopoietic cell transplantation.** *Shirley Yan, B.S.*, Christopher C. Dvorak, M.D., Lisa Musick, Pharm.D., Jason Law, M.D., Morton J. Cowan, M.D., Biljana Horn, M.D., Janel R. Long-Boyle, Pharm.D., Ph.D.; University of California, San Francisco, San Francisco, CA

**PURPOSE:** Busulfan is an alkylating agent routinely used in the conditioning regimens of pediatric hematopoietic cell transplantation (HCT). Identifying covariates that influence busulfan exposure is important for the development of better dosing strategies in HCT. This study aims to evaluate patient-specific covariates as contributors to the variability of busulfan exposure in pediatric HCT recipients using a population pharmacokinetic (PK) approach, as these remain poorly defined.

**METHODS:** We retrospectively collected PK data from the routine therapeutic monitoring of busulfan levels in pediatric HCT recipients at UCSF Benioff Children's Hospital between January 2007 and January 2011. Patients were included in the analysis if they had undergone a related or unrelated HCT including busulfan therapy, were between 0 to 18 years of age, and had busulfan time-concentration data available for analysis. Busulfan drug levels and potential covariates influencing drug exposure will be analyzed with standard population PK methodologies using non-linear mixed effects modeling software (NONMEM).

**RESULTS:** This study will utilize busulfan time-concentration data

available in 52 pediatric HCT recipients (36 males/16 females) for a total of 117 individual PK profiles. Subjects range in age from 1 month to 18 years. Median weight is 20 kg (range, 3–101) and includes 10 subjects with an actual body weight less than 12kg. A total of 785 quantifiable concentrations are available for PK modeling. The range of observed busulfan concentrations is 0–3163 ng/mL. Forty-three subjects (83%) had intensive PK performed on more than one occasion.

**CONCLUSION:** Data collection is complete. PK analysis will be completed and results available at the time of the ACCP Annual Meeting.

**455. A retrospective descriptive study of combination antifungal therapies in pediatric oncology patients.** *Whitney L. Davis, Pharm.D. Candidate*, William L. Greene, Pharm.D., Jerry L. Shenep, M.D., Randal T. Hayden, M.D., Brandon M. Triplett, M.D.; St. Jude Children's Research Hospital, Memphis, TN

**PURPOSE:** Invasive fungal infections are a major cause of mortality and morbidity in immunocompromised patients such as those treated at St. Jude Children's Research Hospital. Though they have not been adequately evaluated in clinical trials, combination antifungal therapies are sometimes used to treat invasive fungal infections. The risk-to-benefit profile of antifungal therapies is unknown as they are more expensive than monotherapies and potentially more toxic. This study is an observational description of combination antifungal therapy administered to pediatric and adolescent oncology patients. Our goal is to identify practices which vary from currently published treatment guidelines, and to stimulate further study and performance improvement efforts involving treatment of these patients.

**METHODS:** We will conduct a retrospective chart review using an electronic medical record system. All medical records reflecting an admission between February 2006 and June 2011 during which a patient received concurrent therapy with two or more systemic antifungal drugs for more than 48 hours will be evaluated. Specific drug combinations, drug class combinations, dosages, routes, frequencies, durations of therapy, and serum concentrations will be described as well as perceived toxicities and breakthrough infections.

**RESULTS:** Initial review of the electronic medical record system shows 137 patients receiving combination antifungal therapy as it has been defined for this study. While most patients received one instance of combination antifungal therapy there are some patients that received multiple regimens involving different antifungal agents. Thorough data analysis will be completed by October 2011.

**CONCLUSION:** Combination antifungal therapy is utilized in clinical practice at St. Jude Children's Hospital. More definitive conclusions characterizing this practice will be available by October 2011.

**456. Improved safety of intermittent infusion delivery in the neonatal intensive care unit: establishing a need for the standardization of medication administration.** *Amy Mitchell, Pharm.D., Candidate<sup>1</sup>*, Thomas Young, M.D.<sup>2</sup>, Nancy Gary, RN<sup>2</sup>, Angela Peake, Pharm.D.<sup>2</sup>, Rhonda Zillmer, Pharm.D.<sup>2</sup>, Laura Hayn, Pharm.D., BCPS<sup>2</sup>; (1)Campbell University College of Pharmacy and Health Sciences, Buies Creek, NC; (2)WakeMed Health and Hospitals, Raleigh, NC

**PURPOSE:** Variations in medication administration can result in incomplete medication delivery, inappropriately rapid infusion times, and/or administration of excessive fluid volumes. This study is an interdisciplinary quality improvement project involving pharmacy, nursing and medicine that includes standardization of the medication administration process along with infusion and flush time practice in a neonatal intensive care unit (NICU).

**METHODS:** This study assessed variability in practice of drug infusion times, flush infusion times, and flush infusion volumes in a NICU via a voluntary, anonymous survey of nursing staff. Three drugs that require different infusion and flush times were used in the survey: ampicillin (slow push), gentamicin (30 minutes) and vancomycin (60 minutes). The nurses listed their current practice of drug infusion times, flush infusion times, and flush infusion volumes for each drug and responses were compared.

**RESULTS:** Overall, 34 out of 93 nurses completed the survey. A total of 33 (97%) respondents documented appropriate medication infusion rates. Only 2 (5.9%) respondents documented an appropriate flush

alcohol withdrawal.

## Transplant/Immunology

**470. Effectiveness and safety of influenza vaccine in first six months post-lung transplant.** *Kalynn A. Rohde, Student, John J.M. Moran, B.S., Mary S. Hayney, Pharm.D., M.P.H.; University of Wisconsin School of Pharmacy, Madison, WI*

**PURPOSE:** Clinicians may be reluctant to administer influenza vaccine to the recently transplanted because of hypothesized low immune responses and the possibility of inducing acute rejection. Because the influenza vaccine changes annually, all patients must be immunized each season. We hypothesized that individuals receiving influenza vaccine within the first six months following transplantation would have similar antibody responses and rates of acute rejection to those who had been transplanted up to 24 months ago.

**METHODS:** As part of a five-year study of influenza antibody response in lung transplant patients, we obtained serum prior to and 2-4 weeks following influenza immunization for each season. The recently transplanted group consisted of individuals who were immunized within six months of transplant date. The control group consisted of individuals who were immunized 6-24 months following transplantation. Influenza vaccine antibody concentrations in serum were measured using hemagglutination inhibition assays. Seroprotection (antibody titer at least 1:40) and seroconversion (four-fold increase in antibody concentration following immunization) rates between the two groups were compared. Rates of acute rejection in months following vaccination for the recently transplanted (November, December, and January) were compared to rates in months distant from vaccination for the control group (June, July, and August).

**RESULTS:** Seroprotection rates were similar between the two groups (Recently transplanted (n=15) vs. control (n=17) 87-93% vs. 88-94%; not significant (NS);  $\chi^2$ ). Seroconversion rates ranged from 7-33% in recently transplanted and 25-31% in controls (NS; Fisher's exact). Episodes of acute rejection rates were similar between the two groups (4 (27%) recently transplanted group vs. 3 (18%) control group; NS; Fisher's exact).

**CONCLUSION:** The rates of seroprotection, seroconversion, and acute rejection in the recently transplanted and control group are similar. Lung transplant patients should receive the influenza vaccine each season without regard to time since transplantation.

## Women's Health

**471. The pharmacokinetics of metoprolol during pregnancy.** *Tracy Yep, B.S.<sup>1</sup>, Sara Eyal, Ph.D.<sup>2</sup>, Thomas R. Easterling, M.D.<sup>3</sup>, Danny D. Shen, Ph.D.<sup>4</sup>, Edward J. Kelly, Ph.D.<sup>4</sup>, Gary D.V. Hankins, M.D.<sup>5</sup>, Steve Caritis, M.D.<sup>6</sup>, Linda Rislis, B.S.<sup>1</sup>, Mary F. Hebert, Pharm.D., FCCP<sup>3</sup>; (1)University of Washington Department of Pharmacy, Seattle, WA; (2)Institute of Drug Research, Jerusalem, Israel; (3)University of Washington Departments of Pharmacy and Obstetrics & Gynecology, Seattle, WA; (4)University of Washington, Department of Pharmacy, Seattle, WA; (5)University of Texas Medical Branch Department of OB/GYN, Galveston, TX; (6)Magee-Womens Hospital, Pittsburgh, PA*

**PURPOSE:** The objective of this study was to evaluate the steady-state pharmacokinetics of metoprolol during pregnancy.

**METHODS:** Plasma and urine concentrations of metoprolol and its metabolite,  $\alpha$ -hydroxymetoprolol, were measured in twelve women treated with metoprolol (25-750 mg/day) for therapeutic reasons. Maternal and umbilical cord blood samples were obtained at delivery from 4 mothers and breast milk samples were obtained over one dosing interval in 2 mothers. Pharmacokinetic parameters were assessed by non-compartmental methods.

**RESULTS:** Metoprolol apparent oral clearance is higher during pregnancy (549±576 L/hr (NS; n=6) mid-pregnancy and 978±702 L/hr ( $P<0.05$ ; n=9) late pregnancy) than in the non-pregnant state (249±132 L/hr (n=6) postpartum). Correspondingly,  $\alpha$ -hydroxymetoprolol formation clearance was higher during pregnancy (82.7±122.8 L/hr (NS, n=5) mid-pregnancy and 106.0±75.4 L/hr ( $P<0.05$ , n=8) late pregnancy) than in the non-pregnant state (13.6±9.0 L/hr (n=6) postpartum). Metoprolol umbilical cord plasma

concentrations ranged between non-detectable and 3.3 ng/mL. Relative infant exposure through breast milk to metoprolol and  $\alpha$ -hydroxymetoprolol combined, was less than 2% of the mother's weight-adjusted dose.

**CONCLUSION:** Metoprolol pharmacokinetics change during pregnancy and the magnitude of change is highly variable. Metoprolol is readily transferred across the placenta, but exposure to metoprolol through breast milk is low. Due to the large gestational changes in metoprolol pharmacokinetics, clinicians should consider using an alternative  $\beta$ -blocker in this patient population.

## 472. Computer algorithm: a more sensitive tool than standard visual scoring for analyzing immunohistochemistry staining of the placental vasculature.

*Michael P. Drozdowicz, Pharm.D., Candidate, 2012<sup>1</sup>, Katie Jaenecke, Pharm.D.<sup>1</sup>, Andrew Tong, Pharm.D.<sup>1</sup>, Albert Franco, M.D.<sup>2</sup>, Daniel Brazeau, Ph.D.<sup>3</sup>, Nilsa Ramirez, M.D.<sup>4</sup>, Thomas J. Barr, B.S., MBA<sup>4</sup>, William Beyer, BSEE, MSEE<sup>4</sup>, Patty Fan-Havard, Pharm.D.<sup>1</sup>; (1)University at Buffalo School of Pharmacy and Pharmaceutical Sciences, Amherst, NY; (2)Carolinas Medical Center, Charlotte, NC; (3)University of New England, Portland, ME; (4)The Research Institute at Nationwide Children's Hospital, Columbus, OH*

**PURPOSE:** The gold standard for interpreting immunohistochemistry (IHC) stains relies on the subjective visual score made by an experienced pathologist. Computer analysis of IHC staining may offer greater sensitivity and reliability in detecting changes in protein expression. The aim of this study is to assess and compare these two techniques in their ability to detect differences in protein expression of  $\beta$ -catenin and VE-cadherin within the placental vasculature.

**METHODS:** Tissue-micro-arrays were created from cores of placental samples from healthy mothers (control), gestational diabetic mothers (GDM), and mothers being treated for HIV (n=68) and then IHC stained for beta-catenin or VE-cadherin. Fetal capillaries were selected and analyzed for protein staining by a pathologist's visual inspection and Aperio ImageScope positive pixel count algorithm, which respectively yielded a visual score and pixel count that were based on the following scale: 1-negative; 2-weakly positive; 3-positive; and, 4-strongly positive.

**RESULTS:** Using ANOVA analysis, significant correlations were found between visual score and strong positive pixel count ( $p<0.05$ ) as well as intensity ( $p<0.05$ ) for  $\beta$ -catenin and VE-cadherin. Computer-aided analysis detected significant differences in staining between GDM and control groups for both beta-catenin and VE-cadherin and between HIV and control groups for beta-catenin; visual scores failed to detect these differences.

**CONCLUSION:** Our preliminary data suggest that while visual scores and Aperio analysis are correlative, the computer-aided quantitative method may be more sensitive in the detection of differences between exposure groups than visual examination by a clinical pathologist.

## LATE BREAKERS

### ADR/Drug Interactions

#### 473. Clindamycin induced acute kidney injury: Is this for real?

*Nidhi Bansal, MBBS, Jiwan Thapa, MBBS; SUNY Upstate Medical University, Syracuse, NY*

**PURPOSE:** Clindamycin is commonly associated with gastrointestinal side effects. There is paucity of literature on its potential renal adverse effects.

**METHODS:** We report a case of 70 yo man presenting with leg cellulitis. Past medical history was significant for DM2, nephropathy, MRSA infection and left foot ulcers. He recently took oral ciprofloxacin without much response. He was allergic to penicillin and cephalosporins. Thus he was empirically started on clindamycin pending cultures. On day 3, serum creatinine rose to 1.7 mg/dl from baseline of 1.2 mg/dl. There was low grade fever, myalgias, fatigue but no rash/ joint pains and no signs/symptoms of hypovolemia/dehydration. Medications were reconciled to discontinue any offending drugs. By day 5, creatinine rose to 2.2 mg/dl. Urine analysis showed hematuria and pyuria. Differential WBC count revealed eosinophilia. Other urine, blood and radiologic investigations couldn't pinpoint underlying etiology. Repeat medication reconciliation revealed that clindamycin was the only new drug added.

**PURPOSE:** To commemorate the thirtieth anniversary of the American College of Clinical Pharmacy (ACCP), all Practice and Research Networks (PRN) in ACCP were encouraged to document their history.

**METHODS:** A volunteer working group from the DI PRN gathered information from previous PRN officers, business meeting minutes, financial records, newsletters, and emails to develop a formal document recording the history of the DI PRN through 2009.

**RESULTS:** The DI PRN is relatively new, recognized in late 2002. As of 2009, DI PRN has over 200 members and represents practitioners from academia, clinical practice, health-systems, pharmaceutical industry, managed care organizations, medical information publishers, and medical education providers in the United States and abroad. The DI PRN has several goals among which is the opportunity to network, problem-solve, and discuss professional challenges related to drug information and informatics. The DI PRN provides educational programming for Focus Sessions at ACCP meetings and typically offers an educational program during the DI PRN business meeting at the Annual Meeting. Since 2007, educational programs at the business meetings have been provided through administration of a DI Resident Presentation Award which aims to provide a venue for an immediate-past resident to present the results of their residency research project. The DI PRN considers supporting the Frontiers Fund a priority.

**CONCLUSION:** The DI PRN represents a diverse group of pharmacists who develop, write, and provide drug information and we endeavor to represent all of these practitioners. We value the opinions of our members and continuously update our PRN initiatives based on member feedback. We support ACCP-directed research and legislative initiatives, especially when related to drug information practice and seek out opportunities to collaborate with other PRNs to promote clinical pharmacy practice.

## Infectious Diseases

**489. Opportunities to improve fluoroquinolone prescribing: A pilot study.** *Robert Eastin, Pharm.D., Amie Nguyen, Pharm.D., Maggie Brownell, Pharm.D., Donna Agan, Ed.D., Harminder Sikand, Pharm.D.* Scripps Mercy Hospital San Diego, CA; Scripps Memorial Hospital La Jolla, CA.

**BACKGROUND:** Fluoroquinolones (FQ) are frequently prescribed because of their broad spectrum of activity, dosing convenience, and favorable safety profile. Overuse of these agents leads to decreased bacterial susceptibilities and therefore, decreased efficacy. At Scripps Mercy Hospital San Diego (SM) and Scripps Memorial Hospital La Jolla (SL), FQs are the most common prescribed class of antibiotics with levofloxacin (LVQ) being the highest in the class. Despite decreased susceptibilities to FQs over the past ten years, most notably in gram negative organisms, FQ utilization continues to be high. The objective of this study is to investigate the efficacy of empiric levofloxacin, based on microbiology results, at an academic (SM) and community (SL) institution within the system, and to ascertain de-escalation practices.

**METHODS:** A retrospective review was conducted between October 2010 and April 2011. Patients were included if they received LVQ empirically, had positive cultures, and remained hospitalized until final cultures and sensitivities (C&S) were reported.

**RESULTS:** A total of 2000 patients were screened and 204 patients met study criteria; 104 at SM, and 100 at SL. Based on final

microbiological results, empiric FQ therapy could have been avoided in 46% of patients at SM and 39% of patients at SL ( $p=0.3$ ). The percentage of patients found to have an infection resistant to levofloxacin was 28% and 17% at SM and SL, respectively ( $p=0.063$ ). De-escalation occurred in 28% at SM vs. 23% at SL ( $p=0.42$ ), and de-escalation opportunities were missed in 20% at SM vs. 48% at SL ( $p=0.00003$ ).

**CONCLUSION:** At SM and SL combined, FQ therapy was not indicated in nearly half of patients. Both hospitals failed to de-escalate to narrower spectrum antimicrobial therapy when the opportunity arose at least 20% of the time. Additionally, de-escalation occurred more frequently at the academic institution.

## ADR/Drug Interactions

### 490. Prevalence of adverse drug events in three Veterans Affairs nursing homes

*Zachary A. Marcum, Pharm.D., M.S., Kelly L. Rovesti, Pharm.D., Michael C. Behrens, Pharm.D., Michael W. Logsdon, Pharm.D., Jill Myers, Pharm.D., Susan D. Francis, Pharm.D., Sean M. Jeffery, Pharm.D., Sherrie L. Aspinall, Pharm.D., M.S., Joseph T. Hanlon, Pharm.D., M.S., Steven M. Handler, M.D., Ph.D.* University of Pittsburgh, Pittsburgh, PA; Veterans Affairs Pittsburgh Healthcare System, Pittsburgh, PA; Durham Veterans Affairs Medical Center, Durham, NC; Veterans Affairs Connecticut Healthcare System, West Haven, CT; Veterans Affairs Center for Medication Safety, Hines, IL

**PURPOSE:** To describe the one-month point prevalence of and factors associated with adverse drug events (ADEs) in three VA Nursing Homes (NHs) detected by a Trigger Tool (allows for rapid manual chart review using abnormal laboratory values and potentially associated medications).

**METHODS:** This cross-sectional study assessed 321 Veterans residing in one of three VA NHs (Durham, NC; Pittsburgh, PA; West Haven, CT) between 10/01/2010 and 10/31/2010. Electronic medical records were screened to identify residents with  $\geq 1$  abnormal laboratory value specified in the Trigger Tool. An ADE was defined as the administration of medication that could cause the abnormal laboratory value. Descriptive statistics and multivariable Poisson regression models were used for statistical analysis.

**RESULTS:** One hundred sixty-two Veterans were included (mean age, 70.6 years; mean # of regularly scheduled medications, 13.3; mean # of chronic medical conditions, 9.7). Ninety-nine ADEs involving 146 medications occurred in 20.2% (65/321) of Veterans. The most common ADEs were acute kidney injury ( $n=30$  residents) associated with ACE inhibitors/ARBs and/or loop diuretics, hypokalemia ( $n=18$ ) related to loop diuretics and/or b-lactam antimicrobials, hypoglycemia ( $n=13$ ) in Veterans receiving insulin and/or b-blockers, and hyperkalemia ( $n=10$ ) associated with ACE inhibitors/ARBs and/or beta-blockers. While controlling for demographic and other health status factors, the total number of regularly scheduled medications (Incidence Rate Ratio [IRR] 1.04, 95% CI 1.01–1.08) and number of chronic conditions (IRR 1.06, 95% CI 1.02–1.11) were associated with an increased risk of ADEs.

**CONCLUSIONS:** ADEs detected using a Trigger Tool are common in Veterans residing in NHs and are associated with the number of medications and chronic medical conditions. Future intervention trials should be conducted to assess the impact of ADE detection and management in the nursing home setting using the Trigger Tool.

## - A -

- Acquisto Nicole M: Implementation and evaluation of a recombinant activated factor VII guideline for uncontrolled bleeding 318
- Agalu Asrat: Medication errors and associated factors in the intensive care unit Jimma University specialized hospital in Ethiopia, April, 2011 46
- Al-Dahir Sara: Pharmacists and pharmacy students knowledge and attitudes regarding patients with disabilities in Qatar 43
- Al-Dahir Sara: Qatar University pharmacy students interest and concerns related to international professional experience rotations 65
- Al-Fayoumi Suliman: ADME properties of [14C]-ACU-4429 following a single oral dose in healthy volunteers 228
- Al-Omar Suha M: Characteristics and clinical course of pediatric patients admitted with chemotherapy-related febrile neutropenia 181
- Alessi Thomas: Aliskiren/Valsartan combination is more effective than valsartan monotherapy in dipper and non-dipper hypertensive patients 26E
- Alhammad Ali: Drug-induced acute renal failure using the FDA adverse event reporting system database 458
- Allen Samantha M: Evaluation of statin therapy in patients over 40 years old with diabetes mellitus in a family medicine residency setting 420
- Als Salman Abdulkhaliq J: Is anemia associated with heart failure? NHANES database (2005–2006) analysis 476E
- Amelung Kyle A: Benzodiazepine use in alcohol withdrawal syndrome at an academic medical center 469
- Amy Donihi: Avoidance of sulfonylureas in hospitalized patients at high risk for hypoglycemia: Effectiveness of an email alert 376
- Ansara Alexander J: Impact of inappropriate vitamin K use for management of elevated international normalized ratios on hospital length of stay 279
- Anthes Ananth: Improving adverse drug event detection in critically ill patients through intensive care unit transfer summary screening 5E
- Armahizer Michael J: Comparing drug-drug interaction severity for clinician opinion to proprietary databases 352
- Armahizer Michael J: Evaluating the occurrence of QT prolongation resulting from drug-drug interactions 4E
- Armstrong Carrie M: Evaluation of smoking rates and nicotine dependence within Sullivan University System 426
- Arnold Lindsay M: Increasing the efficacy of heparin infusions through computer-calculated weight-based infusions with auto-populated infusion doses and partial thromboplastin time orders 38
- Asoh Ifeoma: Comparison of sodium acetate and sodium chloride on clinical outcomes in patients with intracranial injury 58
- Aspinall Sherrie: Impact of pharmacist-managed erythropoiesis-stimulating agents clinics for non-dialysis chronic kidney disease patients 174
- Assimon Magdalene M: Daily home hemodialysis versus conventional in-center hemodialysis: evaluation of biomarkers of vascular calcification and management of mineral and bone disorder 378
- Austin Megan E: Evaluation of a potassium replacement protocol in non-ICU patients at an urban safety net hospital 451
- Axford Katie L: A retrospective comparison of daptomycin thrice-weekly versus Q48H dosing in hemodialysis patients with vancomycin-resistant enterococcus or methicillin-resistant *Staphylococcus aureus* bacteremia 131

## - B -

- Baculik Tanya: CANVAS 1 and 2: Analysis of clinical response at Day 3 from 2 phase III trials of ceftaroline fosamil vs vancomycin plus aztreonam in the treatment of complicated skin and skin structure infections 146E
- Badal Robert E: Impact of NXL104 on ceftaroline MICs for bacteria producing extended-spectrum, AmpC, or KPC  $\beta$ -lactamases 137E
- Bahnassi Anas: The effect of integration of pharmaceutical care components in pharmacy schools curricula on medication adherence in Syria 479E
- Bailey Jennifer L: Evaluation of colistimethate use in the Shock Trauma Center at the University of Maryland Medical Center 162
- Baker William L: Does magnesium L-lactate improve quality of life in patients with an implantable cardioverter defibrillator? 31

- Baker William L: Safety of biologic treatments for moderate to severe plaque psoriasis: a systematic review, basic meta-analysis, and Bayesian mixed treatment comparison 59
- Bali Vishal: Knowledge and attitude of clinical pharmacy faculty towards, and issues related to behind-the-counter drug program 84
- Ballard Stephanie L: Meta-analysis of the tolerability of tapentadol 204
- Baniasadi Shadi: Isoniazid blood levels in patients with pulmonary tuberculosis at a tuberculosis referral center 163E
- Baniasadi Shadi: The first pharmacist based warfarin monitoring service in Iran 164E
- Bansal Nidhi: Clindamycin induced acute kidney injury: Is this for Real? 473
- Batel-Marques Francisco: Apixaban and rivaroxaban safety after hip and knee arthroplasty: a meta-analysis 166
- Bates Madalyn: Implementation of telepharmacy services in a multihospital health-system 297
- Becker Michael A: Febuxostat (FEB) vs. allopurinol (ALLO) in treating the hyperuricemia of gout in diabetic patients 254E
- Berger Jeffery S: Meta-analysis of the relationship between aspirin dosing and efficacy and bleeding outcomes in medically managed patients with acute coronary syndromes (ACS) 33
- Bergman Scott J: Simultaneous versus sequential combination therapy with vancomycin plus rifampin for *Staphylococcus aureus* biofilm infections 145
- Bergman Scott J: Tigecycline use and selection of *Pseudomonas aeruginosa* 155
- Besece Dina: Daptomycin use in neutropenic patients with documented MRSA bacteremia with high vancomycin MICs 152
- Bhatt Prachi D: A comparison of patients with *Klebsiella bacteremia* with imipenem-resistance to those with 3rd generation cephalosporin resistance 129
- Bickley A Rebecca: Evaluation of a standardized magnesium sulfate infusion protocol in aneurysmal subarachnoid hemorrhage 359
- Biesboer Ann N: Retrospective analysis of unfractionated heparin infusions in obese patients 117
- Biondi David: A post-hoc pooled data analysis to evaluate blood pressure (BP) and heart rate (HR) measurements in patients with a current or prior history of hypertension who received tapentadol ER, oxycodone CR, or placebo in chronic pain studies 202E
- Biondi David: A post-hoc pooled data analysis to evaluate the gastrointestinal tolerability profile of tapentadol extended release (ER) versus oxycodone controlled release (CR) in patients  $\geq 75$  years of age 201E
- Bishop Jeffrey R: Risperidone-associated prolactin elevation and markers of bone turnover during acute treatment 244E
- Bitton Bryce J: The combination of prothrombin complex concentrate, factor VIIa, and phytonadione to reverse elevated international normalized ratio 90
- Blaiah Salah M: The quest towards personalized medicine: overview of pharmacogenetics and safety of drug therapy 350
- Bollmeier Suzanne G: Impact of unlimited access to asynchronous online lecture viewing on student outcomes in a therapeutics course 76
- Bondar Anna: Ethnopharmacology comparison Nicaragua and Peru 428
- Bookstaver Davd A: Effect of CoEnzyme Q10 supplementation on HMG-CoA reductase inhibitor-induced myalgias 119
- Bosley James R: PK/PD modeling and simulations support development of MN-221, a novel, highly-selective  $\beta_2$ -adrenergic agonist for treatment of acute asthma 243
- Boudreau Samantha M: Assessing older adults' knowledge of safe medication use and practices 407
- Bourg Catherine A: Development of a medication therapy management service at a free clinic 291
- Brackbill Marcia L: Adjunctive sitagliptin therapy in postoperative cardiac surgery patients: a pilot study 321
- Bress Adam P: The effect of epithelial sodium channel genotype on loop diuretic requirements in systolic heart failure; interim analysis of the first 50 subjects 381
- Bridgen Christine M: Does in vitro resistance of *Streptococcus pyogenes* to erythromycin produce clindamycin resistance? 372
- Broders Jennie: COPD free medication initiative 323

- Brunetti Luigi: Association between vitamin D deficiency and diabetic retinopathy in the Third National Health and Nutrition Examination Survey 99
- Bryant Jacquelyn E: A retrospective cohort study on the use of dexmedetomidine in patients with traumatic brain injury 405
- Buchanan Melissa: Analysis of wait time disparities in the emergency department for patients reporting with a chief complaint of chest pain from 2003 to 2008 396
- Burckart Gilbert J: Comparison of pediatric versus adult safety studies for drug approval of antiviral and antipsychotic agents 208
- Burke Stuart L: Renin and B-type natriuretic peptide genetic polymorphisms and association with response to aliskiren in heart failure patients 460
- Bush Mark: The effects of repeat doses of albiglutide on the pharmacokinetics and pharmacodynamics of a low-dose oral contraceptive containing norethindrone and ethinyl estradiol 237
- Butera Anne M: Evaluation of CHF patients not prescribed an ACE/ARB in a family medicine residency Setting 421

## - C -

- Cabrera Marie Jett V: Promoting sustainability: advocating the implementation of a community-based, self-managed, pharmacist-led diabetes care program in a coastal community in the Philippines 457
- Capehart Krista D: Collaborative health risk assessment and management program between the university pharmacy clinic and city employees 287
- Carney Jessica C: Optimizing heparin dosing in patients with cardiac arrest undergoing therapeutic hypothermia 306
- Cavallari Larisa H: Association of the gamma-glutamyl carboxylase (CAA)16/17 repeat polymorphism with higher warfarin dose requirements African Americans 219
- Chan Alexandre: Impact of antiemetic regimens adherence on nausea and vomiting control among Asian breast cancer patients receiving anthracycline-based chemotherapy 180
- Chan Alexandre: Prevalence of the co-prescription of interacting drug combinations in cancer patients in Singapore 216
- Chan-Tompkins Noreen H: Ertapenem monotherapy versus cefotetan/metronidazole combination therapy in colorectal surgery patients 141E
- Chandra Rachel N: Effectiveness of a pharmacist managed hypertension shared medical appointment 475
- Chen Jack J: Rasagiline and antidepressant use in patients with Parkinson's Disease: assessing the occurrence of serotonin toxicity 178E
- Chhim Rebecca F: Evaluation of vancomycin use for pediatric Staphylococcal infections 210
- Chiu Holly H: Malignancy and warfarin-mediated anticoagulation: lower initial dose requirements, but greater long-term instability, adverse events, and intensity of management 16
- Cieri Nicole E: Obesity affects time to INR $\geq$ 1.5 in surgical orthopedic patients initiated on warfarin for venous thromboembolism prophylaxis 111
- Clairmont Megan A: Outcomes associated with enoxaparin use among patients with varying renal function 115
- Cleary John D: Pepper mould contamination risk to immunocompromised 265
- Clements Jennifer N: Endocrine and Metabolism PRN updates and report of the benefit with an online journal club 191
- Coley Kim: Student-created public service announcements: a novel approach to attaining public health competency in the pharmacy curriculum 75
- Congdon Heather B: Impact of a medication therapy management program on hemoglobin A1c values in a health resources and services administration patient safety and clinical pharmacy services collaborative 20
- Connor Sharon E: Homeless and housed patients' access to treatment at a pharmacist-led smoking cessation clinic 15
- Coppenrath Valerie A: Pre-pharmacy biomedical literature experience: a survey of pharmacy student self-perception and ability to identify literature types 86
- Crabb Katherine M: Simvastatin safety pharmacist intervention study 436
- Cribb Ashley H: Becoming an author during your residency: pharmacy resident publication rates and trends (2005-2010) 414
- Cribb Ashley H: Treatment of fever during the acute stroke period at a primary stroke center 444
- Cronic Lydia: Angiogenic and vasculoprotective potential of angiotensin receptor antagonists in the brain 450
- Culley Colleen M: Off-label, low-dose ketamine as an effective adjunctive therapy for postoperative analgesia 199
- Currie Janna L: North Carolina pharmacists' practices and opinions of smoking cessation counseling 409

## - D -

- D'Antonio Nicole: Evaluation of an electronic health record warfarin documentation system within a family medicine residency program 365
- Dager William: Determining optimal vitamin K dosing to reverse anticoagulation based on baseline INR, route of administration, and home warfarin dose 118
- Dager William: Evolution of an inpatient antithrombosis service including adaptation to the EPIC system and workload assessment 329E
- Dasta Joseph: Bupivacaine extended release liposome injection (DepoFoam® bupivacaine) vs. bupivacaine HCl: A meta-analysis of multimodal trials of doses up to and including 300 mg 198
- Dasta Joseph: Evaluation of the hospital resource utilization associated with tolvaptan usage among heart failure patients with hyponatremia from the Everest trial 213E
- Dasta Joseph: Trends in hyponatremia management and associated outcomes in hospital settings: Interim results from an observational, prospective, multi-center, global registry in hospitalized patients 95E
- Davis Kristen J: Utilization of home telehealth monitoring with active medication management by clinical pharmacists in poorly controlled diabetic patients 94
- Davis Susan L: Treatment of urinary tract infections: are cephalosporins associated with failure? 142
- Davis Whitney L: A retrospective descriptive study of combination antifungal therapies in pediatric oncology patients 455
- Deal Eli N: Implementation of a standardized computerized physician order entry set for warfarin reversal improves evidenced-based administration of vitamin K 110
- Devlin John W: Impact of quetiapine on the resolution of individual delirium symptoms: An a priori-designed analysis of a randomized, double-blind, placebo-controlled study 57E
- Dobesh Paul P: A comparison of management strategies in patients with acute coronary syndrome based on clopidogrel use 37
- Dougherty Tanya M: Incorporating pharmacy services within a family medicine residency home visit program 322E
- Douglass Mark A: Impact of a web-based learning module and faculty preceptor on experiential pharmacy students' pain management confidence and competence 67
- Dowling Thomas C: GFR equations overestimate creatinine clearance in elderly individuals enrolled in the NIA-Baltimore Longitudinal Study on Aging (BLSA) 102
- Drozda Katarzyna: Association between the CYP2C9\*8 variant and warfarin clearance in African Americans 459
- Durand Cheryl R: Assessing the appropriateness of proton pump inhibitor utilization in hospitalized elderly patients 104

## - E -

- Earl Grace L: Effectiveness of dietary sodium intervention provided by a clinical pharmacist to ambulatory patients with heart failure 13
- Eckburg Paul B: FOCUS 1 and 2: Analysis of clinical response at Day 4 from 2 phase III trials of ceftaroline fosamil vs ceftriaxone in the treatment of community-acquired pneumonia 147E
- Eckel Stephen F: Development of an automated tool to document clinic-based pharmacists' activities 288
- El Hajj Maguy S: Community pharmacists in the state of Qatar: a survey of their smoking cessation knowledge and educational interests 71
- El Hajj Maguy S: Pharmacy students' attitudes toward pharmaceutical care in Qatar 72
- El Hajj Maguy S: Qatar pharmacists' understanding, attitudes, practice

- and perceived barriers related to providing pharmaceutical care 190
- El Hajj Maguy S: Smoking cessation counseling in the state of Qatar: community pharmacists' attitudes and practices 44
- Elder Jodie L: Title: West Michigan Glycemic Collaborative (WMGC): Improving inpatient glycemic control and transition of care through interdisciplinary, inter-institutional collaboration 215
- Elder Joshua J: Characterization of cannabinoid usage in a pediatric oncology population 211
- Elewa Hazem F: Majority of patients treated with warfarin for atrial fibrillation are willing to switch to dabigatran 112
- Elliott Tracy S: Tranexamic acid and decreased blood utilization 277
- Elsasser Gary N: Identifying an optimal dose of vancomycin in morbidly obese patients 134
- Ensom Mary HH: Drug monitoring system in interstitial fluid: a preliminary study of vancomycin and tacrolimus drug concentrations 226
- Ensom Mary HH: Pharmacokinetics of mycophenolic acid and glucuronidated metabolites following mycophenolate mofetil and mycophenolate sodium dosing in pediatric renal transplant recipients 205
- Ensor Christopher R: Impact of rituximab on donor specific antibody burden in solid organ transplant recipients 267
- Eschenauer Gregory A: Pseudomonas aeruginosa (PSA) combination antibiogram: incorporating pharmacodynamic breakpoints (PDB) to identify most appropriate empiric regimens 135
- F -
- Fagan Susan C: Vascular protection with candesartan: beyond blood pressure reduction 232
- Falcone Bonnie A: Development and evaluation of a rubric to assess value of student WIKI contributions 89E
- Falcone Bonnie A: Improving prescribing and documentation of immunization and education in patients who undergo emergency splenectomy 153E
- Fan-Havard Patty: Computer algorithm: a more sensitive tool than standard visual scoring for analyzing immunohistochemistry staining of the placental vasculature 472
- Farinde Abimbola: Effects of pharmacist drug regimen reviews on physicians' compliance with recommended laboratory monitoring criteria for psychotropic medications at a state supported living center 486E
- Farkas Andras: Population probability of target attainment of Telavancin at different levels of renal function against Methicillin Resistant *Staphylococcus aureus* in US Medical Centers 221
- Farrell David J: Spectrum of activity of ceftaroline/NXL104 and beta-lactam comparator agents tested against methicillin-resistant *Staphylococcus aureus* carrying different SCCmec types and gram-negative bacilli with well-characterized resistance mechanisms 139E
- Feinstein Helen: Warfarin monitoring by pharmacists versus usual standard of care in a long-term acute care hospital 298
- Ferguson McKenzie C: The prevalence and quality of noninferiority studies in major medical journals 60
- Ferreira da Silva Sebastião: Pharmaceutical appointment in clinical trials 341
- Finch Christopher K: An evaluation of the management of non-life threatening COPD exacerbations in hospitalized patients 252E
- Fink Jodie M: Comparison of calcineurin inhibitor administration post-heart transplantation 268E
- Fiuzat Mona: Influence of global region on outcomes in large heart failure beta-blocker trials 40E
- Flowers Stephanie A: Sterol uptake in *Candida albicans*: a novel mechanism of fluconazole resistance 333
- Forinash Alicia B: Low molecular weight heparin use in the pregnant population 273
- Foster Megan E: Intranasal fentanyl and midazolam use in a pediatric emergency department 93
- Foster Megan E: Retrospective review of NPO status in children receiving ketamine for procedural sedation in the emergency department 91
- Fox Jeremy: Evaluation of newer equations for estimation of renal function for utility in drug dosing using an aminoglycoside pharmacokinetic model 240
- Frazer Erin N: Incidence of hyperglycemia in at risk medical intensive care unit patients upon cessation of intravenous insulin infusions 357
- Freytag Rachel L: The use of valproic acid or oxcarbazepine to treat dementia-related agitation 366
- G -
- Gabardi Steven: Efficacy and safety of six months of low- vs. high-dose valganciclovir for prevention of cytomegalovirus disease in high-risk renal transplant recipients 160
- Garner Melinda D: The effect of haloperidol loading dose on the duration of delirium 367
- Garwood Candice L: Chronic kidney disease and anticoagulation instability in warfarin-treated patients: insights into potential treatment strategies 113
- Gauld Andrea R: Assessment of insulin pens in an urban teaching hospital outpatient clinics 14
- Genovese Mark C: Long-term safety of tocilizumab in rheumatoid arthritis clinical trials 256E
- Gerlach Anthony T: Blood pressure control in the hospitalized elderly trauma population 358
- Gerrald Katherine R: Pharmacist-managed diabetes service in a rural free clinic 286
- Ghamrawi Riane J: Identified drug therapy problems in a federally qualified health center 390
- Ghodrat Mandana: Evaluation of an improved warfarin dosing guideline used by an inpatient pharmacy-managed anticoagulation service compared to physician's dosing 328
- Giannakos Maria: Utilization of cloud computing to aid experiential precepting at a tertiary academic medical center 314
- Gillis Louise-Marie: Evaluating dosing of erythropoiesis-stimulating agents on hemoglobin levels in bloodless medicine patients 51
- Giuliano Christopher A: Are proton pump inhibitors associated with the development of community acquired pneumonia: a meta-analysis 100
- Gleason Tara E: Use of low molecular weight heparin (LMWH) in pregnancy: a pharmacodynamic modeling study 17
- Goldberg Stuart: Association between chronic myeloid leukemia treatment responses and patient satisfaction, functioning, and quality of life: patient survey results 184E
- Gonyeau Michael J: Economic evaluation of clinical interventions from an integrated internal medicine and ambulatory care APPE 77
- Gorospe Gerry: ENESTnd 24-month follow-up of nilotinib versus imatinib in patients with newly diagnosed chronic myeloid leukemia in chronic phase 182E
- Gow James A: Bepotastine besilate ophthalmic solution 1.5% rapidly demonstrated near clearance of ocular itch in the conjunctival allergen challenge model of allergic conjunctivitis 196E
- Gow James A: Bepreve (bepotastine besilate ophthalmic solution) 1.5% improves reflective ocular itching scores in a placebo-controlled natural exposure study of subjects with a demonstrated history of seasonal allergic rhinoconjunctivitis (SAR) 197E
- Gow James A: Bromfenac ophthalmic solution for treating the signs of dry eye disease 193E
- Gow James A: Integrated phase 3 clinical trials of bromfenac sodium ophthalmic solution dosed once daily for ocular surgery 194E
- Gow James A: The ocular comfort of bepotastine besilate ophthalmic solution 1.5% in a safety clinical trial 195E
- Groo Vicki L: Determinants of worsening renal function with diuretic dose escalation in a chronic heart failure ambulatory population 39
- Groth Meghan E: Increased frequency and duration of elevated blood pressure measurements after IV thrombolytics for ischemic stroke is not associated with increased risk of symptomatic intracerebral hemorrhage 179
- Guarascio Anthony J: A matched-controlled evaluation of an antifungal bundle in the intensive care unit at a university teaching hospital 373
- Guerin Annie: Adherence patterns and dose adjustments with second-line nilotinib and dasatinib in patients with chronic myeloid leukemia: evaluation in a real-world setting 185E
- Gupta Nishi S: Evaluation of patient education on preventive health measures and poison control center awareness during senior brown bag medication reviews 424

Gupta Nishi S: Patient satisfaction and self-perceived knowledge gained during senior brown bag medication reviews 425

- H -

- Ha Belinda F: Efficacy and safety of abacavir/lamivudine plus raltegravir at week 96 in antiretroviral-naive HIV-1-infected patients in the SHIELD study 122E
- Ha Belinda F: Switch to fosamprenavir with addition of lovaza for management of hypertriglyceridemia in HIV-infected patients on boosted protease inhibitor regimens: a pilot study (BuLLET) 124E
- Haas Curtis E: Relative bioavailability of oral fosphenytoin sodium injection in healthy volunteers 231
- Hagopian Jennifer C: Bleeding rates among patients with morbid obesity treated with enoxaparin 116
- Haines Stuart T: Ready and willing: a self-assessment tool to determine student pharmacists' confidence to optimize drug therapy 61
- Hall Deanne L: Identification of reasons for discontinuation of dabigatran in an outpatient cardiology office 427
- Halton Kimberly: Characteristics of patients with de-escalated antibiotics based on culture and sensitivity data: impact on hospital re-admittance 149
- Hamby Christine: The impact of a gentamicin-citrate catheter lock intervention on outpatient hemodialysis catheter-associated bloodstream infections 136
- Hanania Nicola A: The safety and efficacy of roflumilast: a new treatment to reduce exacerbation risk in severe COPD patients 251
- Haney Jason S: Assessing the effect of multiple advanced cardiac life support simulations on pharmacy student performance 310E
- Hanselin Michele R: Description of antihypertensive use in patients with resistant hypertension prescribed four or more agents 30
- Harrison Chelsea M: Building a curriculum to combat obesity in elementary schools 411
- Hartung Daniel M: Alternative methods for disseminating evidence-based prescription drug information among primary care clinicians in rural Oregon: The rural Oregon academic detailing (ROAD) project 108
- Helmer Robert S: Use of an adherence estimator and individualized counseling for new chronic medication prescriptions 364
- Herring Holly: Identifying and removing usage barriers of infusion smart pumps 171
- Herring Holly: Impact of pharmacist involvement at discharge on compliance with The Joint Commission heart failure core measure 41
- Hilas Olga: Clinical interventions of pharmacy practice residents on an acute care for elders unit 484
- Hilas Olga: Pursuit of post-graduate training programs upon graduation 481
- Hill Robin R: Improving documentation of the value of clinical pharmacy interventions in an integrated healthcare delivery system 335E
- Hofmann Prudence: Compliance with NASPE monitoring guidelines for amiodarone 168
- Hoie Eric B: New dosing recommendations for vancomycin in premature infants 138
- Hollands James M: Continuous neuromuscular blockade and train-of-four monitoring in patients treated with therapeutic hypothermia 49
- Holm Michelle: Development of a pharmacy computerized inventory program (PCIP) in an emergency department/intensive care unit, outpatient care, and a pediatric hospital in Haiti 483
- Hope Charlene A: Evaluation of medication reconciliation for inpatients with uncontrolled diabetes: preimplementation study 274
- Horbowicz Karen M: Implementation of a herpes zoster immunization service at an independent community pharmacy 300
- Horn Edward T: Evaluation of a pre-emptive strategy for CMV disease prevention in cardiac transplant patients 258
- Horn Paula: Evaluation of pharmacist-run anticoagulation management service of ventricular assist device (VAD) patients 292E
- Hudson Joanna Q: Effects of a-lipoic acid on oxidative stress in ESRD patients receiving IV iron 177E
- Hudson Joanna Q: Evaluation of antibiotic prescribing patterns in patients receiving sustained low-efficiency dialysis 133

Hudson Joanna Q: Evaluation of the MDRD and Cockcroft-Gault equations for sitagliptin dosing 176E

Hughes Ashley R: Initial stages in the development of an antimicrobial stewardship program in a teaching hospital 326

- I, J -

- Ipema Heather J: Evaluation of risk factors for warfarin resistance following administration of vitamin K 172E
- Jennings Douglas L: Left-ventricular assist device implantation does not alter the pharmacodynamic response to warfarin 27
- Jennings Douglas L: Opportunities for clinical pharmacist intervention in the pharmacotherapy of patients with left-ventricular assist devices 293
- Jennings Phillip: Pharmacokinetic interactions of roflumilast with medications commonly prescribed for COPD patients 236E
- Jeppson Patricia A: Effects of standardization of urine alkalization for hematology and oncology patients 339
- Jernigan Meredith: Assessment of antibiogram use in patients with sepsis transferred to a tertiary care facility 150
- Jernigan Meredith: Doripenem and colistin is synergistic and demonstrates bactericidal killing against pandrug-resistant *Klebsiella pneumonia* isolates in vitro 374
- Jessmer Jill: Use of the clinical pulmonary infection score (CPIS) to guide duration of antibiotic therapy in Medical Intensive Care Unit (MICU) patients with healthcare-associated pneumonia (HCAP) 332
- Jodlowski Tomasz Z: Comparison of online drug interaction databases to evaluate antiretroviral medication interactions 1
- Jodlowski Tomasz Z: Implementation of medication reconciliation by a pharmacist in patients with human immunodeficiency virus or acquired immune deficiency syndrome on highly active antiretroviral therapy 165
- Johnson David: Preservation of renal function with angiotensin converting enzyme inhibitor or angiotensin receptor blocker therapy early after heart transplantation 387
- Johnson Heather J: Expanding residency opportunities through school of pharmacy collaborations 313
- Johnson Heather J: Use of HMG-CoA reductase inhibitors in liver transplant patients with recurrent Hepatitis C Virus 266
- Johnson Jessica L: Pseudoephedrine for neurogenic shock after acute spinal cord injury 304
- Johnston Curtis: Attenuation of vancomycin pharmacodynamics (PD) due to dense inoculum methicillin-resistant *Staphylococcus aureus* (MRSA) 467
- Jones Ashley E: Management of *Stenotrophomonas maltophilia* in pediatric patients: a retrospective evaluation 432
- Jones Peter H: Lipid target attainment by switching statin monotherapy to fenofibric acid + statin in patients with mixed dyslipidemia and at high-/highest-risk for coronary heart disease 21E
- Jones Terreia: Thiopurine-associated tumorigenesis: using thiopurine methyltransferase to identify important thioguanine-induced phenotypes in astroglial cells 189
- Jonkman Lauren J: A pharmacist-run collaborative care program in a free urban primary care clinic 282
- Juang Paul: Empiric anti-MRSA antibiotics for MRSA pneumonia in a community hospital 156

- K -

- Kallash Hanan: An NIH-sponsored pharmacist curriculum on interventions for Sudden Infant Death Syndrome (SIDS) risk reduction 209E
- Kalus James S: Creation of a risk score for predicting opioid harm in the inpatient setting 377
- Kane-Gill Sandra L: Severity and preventability of drug-induced hypotension 47E
- Kann Colleen S: Evaluation of pharmacist decision making and opinions involving prescriptions with a high probability of causing patient harm 173
- Kar Indrani: Do differences between quantitative viral plaque assays explain variability among pre-clinical respiratory syncytial virus studies in animals? 430
- Karaoui Lamis: Implementation of and experience with a locally-

- developed summative exit exam delivered to PharmD students prior to graduation 73
- Karr Samantha: Assessing interest in clinical pharmacy services within a unique community setting 389
- Kashyap Anita: A comparison of survey methods on vitamin, herbal, and over-the-counter product use in patients with heart failure 394
- Kauffman Yardlee S: Identifying medication-related needs of HIV patients: foundation for community pharmacist-based services 301E
- Kays Michael B: Evaluation of clinical outcomes and adverse events when administering alternative doses of linezolid to obese patients 154
- Kays Michael B: Pharmacokinetics and pharmacodynamics of meropenem in morbidly obese, hospitalized patients 158
- Kays Michael B: Pharmacokinetics and pharmacodynamics of piperacillin/tazobactam administered by prolonged infusion in morbidly obese, hospitalized patients 143
- Kelly Maureen T: Long-term efficacy and safety of fenofibric acid in combination with statins in patients with mixed dyslipidemia and type 2 diabetes mellitus 22E
- Kendrach Michael G: Faculty development activities in US pharmacy schools 85
- Kharidia Jahnnavi: Exposure-response analysis of eslicarbazepine acetate adjunctive treatment of patients with partial-onset seizures 223
- Kharidia Jahnnavi: Population pharmacokinetics of eslicarbazepine acetate in patients with partial-onset seizures 224
- Kiang Tony KL: Drug monitoring system in interstitial fluid: feasibility studies of valproic acid, methotrexate, gentamicin, and theophylline 225
- Kim Jenny J: Evaluation of an ipad to provide warfarin video education in the inpatient setting 7
- King S Travis: Analysis of outcomes and risk factors associated with extended-spectrum  $\beta$ -lactamase-production in bloodstream infections 157
- King S Travis: Pharmacokinetic and safety analysis of high-dose moxifloxacin in a morbidly obese individual 159
- Kipp Gretchen: Tacrolimus trough concentrations in heart transplant recipients during episodes of acute cellular rejection 383
- Klepser Michael E: Evaluation of a community pharmacy-based influenza screening and management program versus pharmacy screening and referral to standard of care 42
- Ko Yuan-Hsun: Pharmacist-led and interdisciplinary model for management of adult cancer pain in a medical center 343
- Koerner Pamela H: Examining utilization patterns of patients receiving oral therapy for multiple sclerosis (MS) treatment 379
- Kolehmainen Natalie J: Patients' perception of clinical pharmacy services in a federally qualified health center 391
- Korobey Matthew J: Pharmacy department commitment to a multidisciplinary stroke response team 11
- Krahe Dombrowski Sarah E: Impact of community pharmacy experience in a family medicine residency (student poster) 412
- Kruse Jaclyn A: Evaluation of an interprofessional approach to teaching medication therapy management (MTM) 406
- Kuo Grace M: Medication errors reported by US clinical pharmacists: the ACCP PBRN MEDAP study 170
- L -
- Laizure S Casey: Synuclein gene microsatellite length associated with alcohol and cocaine addiction 257
- Lamp Kenneth C: Experience with daptomycin for coagulase-negative staphylococcal bacteremia with elevated vancomycin MICs 151E
- Lamp Kenneth C: Viridans group streptococci treatment with daptomycin: multinational experience 148E
- Lancaster Jason W: A retrospective review of medication orders entered for emergency department patients within an academic teaching medical center for quality assurance 317
- Lancaster Jason W: Perception of advanced pharmacy practice experience students on inpatient internal medicine rotations: a healthcare provider perspective 64
- Lanham Kena: Clinical pharmacy technicians: impact in cardiology and critical care pharmacy services 296
- Lansangan Pio Juan: Inpatient management of warfarin therapy by pharmacists compared to physicians 395
- Law Amy W: The impact of possible undiagnosed heavy menstrual bleeding (HMB) on presenteeism and activities outside of work 214
- Le Thy: Candidemia pharmacotherapy over eight years at a tertiary medical center 127
- Leaders Edward D: Improving adherence to an intensive care unit sedation protocol and effects on patient outcomes 56
- Leandro Ana: Carbapenems selection by means of the SOJA method 308
- Leandro Ana: Cost-efficacy analysis of pemetrexed in first-line treatment of non-small cell lung cancer 348
- Lederhouse Lisa: Impact of a pharmacist sedation program on the medical and surgical mechanically ventilated patient population in a level II trauma center 54
- Ledford Travis: Predictors of mortality among elderly patients with Gram-negative bloodstream infection 128E
- Lee Hye-In: CYP2D6\*10/\*10 genotype significantly affected the pharmacokinetics of tamsulosin 464
- Lee Seok-Yong: Effect of CYP2D6\*10 allele on the pharmacokinetics of propranolol in Koreans 465
- Lee Seok-Yong: Effects of CYP2D6\*10/\*10 genotype on the pharmacokinetics of metoclopramide 463
- Lee Tzu-Ying (Yasmina): Impact of a pharmacist-managed diabetes clinic on glycemic control using concentrated U-500 regular insulin 281
- Leibowitz Mark T: Bioequivalence of immediate-release oxycodone with Aversion® Technology (IRO-A), IRO-A with niacin, and a commercially available oxycodone 227E
- Leitz Gerhard J: A multi-center, double-blind, parallel-group study to evaluate short-term safety and efficacy and long-term maintenance of two dose levels of rabeprazole sodium delayed-release pediatric bead formulation in 1 to 11 year-old pediatric subjects with Endosco 101E
- Lepage Jayne E: The process of assessing student performance; is creating a rubric the answer? 79
- Lepak Maryjoy R: Hemodynamic targets and vasopressor use in neurogenic shock 404
- Leu Wuan-Jin: Impact of pharmacist-led antimicrobial stewardship using a computerized system with prospective audit and feedback approach in a university hospital 106
- Lindsay Caroline A: Medications associated with delirium in hospitalized subjects 443
- Linnebur Sunny A: A pilot fee-for-service medication therapy management program in a geriatric primary care clinic 325
- Lipari Melissa: As needed intravenous antihypertensive therapy and blood pressure control 10
- Llanos Samantha R: Assessing the impact of an introductory biopharmaceutical industry elective on student rotation preferences and career choices 363
- Lo-Ciganic Wei-Hsuan: Can the risk of ovarian cancer be reduced by the use of aspirin, non-aspirin nonsteroidal anti-inflammatory drugs, or acetaminophen? A large population-based case-control study 217
- Loebel Antony: Lurasidone pharmacokinetics: assessment of the potential for drug-drug interactions 229
- Lohr Brian R: Assessment of fluoroquinolone-resistant urinary pathogens in patients admitted to an acute care hospital from a nursing home 132
- Lyons Kayley M: A mentoring program for clinical and operation supervisors 397
- M -
- Mack Diana R: Evaluation of infusion-related reactions with iron sucrose at a large tertiary medical center 485
- MacKay Kimberly: Effect of implementing an electronic order menu for trimethoprim-sulfamethoxazole on changing prescriber ordering behavior and decreasing adverse events in elderly outpatient veterans 161
- Maier Gary: Drug-drug interaction of eslicarbazepine acetate with antiepileptic drugs 222
- Malcom Daniel R: Prospective evaluation of student-led presentations as a successful teaching method for achieving critical care competency 68
- Malone Margaret: Impact of change in duration of therapy with

- Ursodiol after gastric bypass surgery 12
- Mankoski Raymond: Antipsychotic adherence and discontinuation outcomes in schizophrenia patients with metabolic comorbidities: analysis of 24 state Medicaid programs 245
- Marcotullio Nicole: Utilization of IPads to facilitate data collection during pediatric screening events 392
- Mariani Nicholas P: Financial impact of a community pharmacy based anticoagulation service 400
- Mark Liana: Gentamicin pharmacokinetics in neonates undergoing therapeutic hypothermia 207
- Marlowe Karen: Pharmacists perceptions and knowledge regarding opioid risk evaluation and mitigation strategies (REMS) in community and ambulatory practice 203
- Marrs Joel C: Increased goal attainment after conversion from rosuvastatin to simvastatin in a community health clinic 18
- Marshall Janene L: Argatroban dosing evaluation amongst medical patients in a community hospital 276
- Matthews Michele L: An interdisciplinary approach to reducing opioid analgesic misuse in patients with chronic noncancer pain in the primary care setting 344
- Mauro Michael: A survey of current practices in the management of chronic myeloid leukemia 186E
- McBride Ali: A comparative evaluation of single fixed-dosing and weight-based dosing of rasburicase for tumor lysis syndrome 327
- McConaha Jamie L: Assessing community pharmacist impact on over-the-counter medication selection 303E
- McConaha Jamie L: Community pharmacist clinical documentation intervention project 299
- McConaha Jamie L: Improving health outcomes and continuity of care in underserved, urban populations 399
- McConeghy Kevin W: Effect of home  $\beta$ -blocker use in patients presenting with subarachnoid hemorrhage 52
- McEwen Corey L: Lack of association between statin therapy and testosterone deficiency 439
- McKenzie Christina: Student college of clinical pharmacy provides community service for the Akron Area Agency on Aging 416
- Mehta Bella H: Evaluation of student pharmacists' awareness and perceptions of board certification 74
- Mersfelder Tracey L: BA4LL: Bounce around 4 larger learning. Utilization of exercise balls for chairs on an internal medicine APPE 66E
- Metzger Nicole L: Incidence of supratherapeutic trough concentrations in elderly patients with aggressive vancomycin dosing 331
- Meyer Allison: A multi-center characterization of antipsychotic use for the treatment of delirium in medical ICU patients 403
- Meyer Susan: Teaching emphasis within pharmacy residency programs 360
- Meyer Susan: Using standardized colleagues to develop interprofessional communication skills 81E
- Miller Monica L: Creation of a global health pharmacy residency in Kenya 312
- Mills Keri L: Post-FDA safety statement medication use evaluation of rosiglitazone 438
- Min David: The association between NF- $\kappa$ B gene polymorphisms and allograft survival in the Hispanic kidney transplant population 462
- Mitchell Amy: Improved safety of intermittent infusion delivery in the neonatal intensive care unit: establishing a need for the standardization of medication administration 456
- Mohammad Rima A: Impact of hospital-based pharmacist advocates in care transitions: identification and description of medication related interventions after patient discharge from hospital to home 278
- Momary Kathryn M: Critical literature evaluation and advanced pharmacy practice experiences: student preparedness 316
- Momary Kathryn M: The implications of clopidogrel black box warning on utilization of platelet aggregation testing in the community hospital setting 295
- Momper Jeremiah D: Clinical pharmacokinetics of low-dose cidofovir without and with concomitant probenecid used for the treatment of persistent BK viremia in renal transplant recipients 241E
- Montgomery Jamie: The role of a community pharmacy resident in expanding clinical pharmacy services within a traditional dispensing model 302
- Murphy John E: Student perceptions of large scale interprofessional education events 82

## - N -

- Nagappa Anantha Naik: Drug-related problems with antidepressants in a hospital setting in India 351
- Naim Ahmad: Examining knowledge and information seeking behaviors towards blood transfusion among individuals with Chronic Kidney Disease 345
- Naim Ahmad: Examining the patient-centered decision making attributes towards blood transfusion among individuals with Chronic Kidney Disease (CKD) 346
- Nazer Lama H: Incidence, characteristics, and outcomes of adverse drug events resulting in intensive care admission in oncology patients 3
- Neal Erin: The role of computerized clinical decision support in reducing inappropriate medication administration during epidural therapy 167
- Neill Jennifer L: Changes in RIFLE criteria after coronary artery bypass graft surgery in patients with recent exposure to angiotensin converting enzyme inhibitors and angiotensin receptor blockers 35
- Nelson Matthew S: Benchmarking enoxaparin use in the emergency department as a quality improvement metric for clinical pharmacy services 319
- Newton Michael: Current state of teaching oncology pharmacotherapy: focus on cancer as a chronic disease 80
- Nisly Sarah A: Dietary supplement education in a senior population 69
- Nolin Thomas: Knowledge, perceptions and adherence of ESRD patients receiving erythropoietic therapy and anemia management: A student-pharmacist based survey in an outpatient peritoneal dialysis clinic 442
- Nordstrom Beth L: Timing of venous thromboembolism following total knee or hip replacement 114
- Norgard Nicholas B: Compatibility of adenosine with iodinated contrast agents 230
- Norgard Nicholas B: The antiplatelet effects of sustained-release niacin 24

## - O -

- O'Connell Mary Beth: Assessment of student pharmacist learning from a multidisciplinary older adult home visit 408
- O'Connell Mary Beth: Classifications of drug related problems discovered during senior brown bag medication reviews 423
- O'Connell Mary Beth: Experiential value of an older adult medication assessment early in the pharmacy curriculum 410
- Oh Jung Mi: Effectiveness of palonosetron compared with the other serotonin antagonists in combination with aprepitant in preventing highly emetogenic chemotherapy induced emesis 447
- Oh Jung Mi: Management of serum calcium and phosphorous levels for the prevention of mineral bone disease in chronic kidney disease patients on dialysis by multidisciplinary team care 441
- Olyaei Ali: Comparisons of enteric-coated mycophenolate sodium and mycophenolate mofetil outcomes from the Mycophenolic Acid Observational Renal Transplant Registry 261
- Onel Erol: DepoFoam® Bupivacaine (DB; EXPAREL™; Bupivacaine Extended Release Multivesicular Liposome Injection) exhibits pharmacokinetic properties consistent with sustained release characteristics 200
- Oschman Alex: Comparison of single dose arginine hydrochloride to multiple doses of acetazolamide to correct metabolic alkalosis in pediatric patients 212

## - P -

- Pacheco María de la Paz: Selective decontamination in the cardiovascular intensive care unit: analysis of the consumption of different groups of antimicrobial agents 53
- Paciullo Christopher A: Pharmacist publications in critical care literature over a period of ten years 48
- Padley Robert J: Aspirin reduces transient flushing and glucose increases during therapy with niacin extended-release 25E
- Pakes Gary E: Pharmacokinetics, cord blood concentrations, and tolerability of boosted fosamprenavir in pregnancy 239E

- Pallotta Andrea: Development, implementation, and assessment of a pilot pharmacy vancomycin dosing service (PVDS) 330
- Parma Jennifer M: Acneiform rash does not predict response to neoadjuvant lapatinib monotherapy in breast cancer patients 446
- Patel Khusbu: Vancomycin serum levels and efficacy in methicillin resistant *Staphylococcus aureus* (MRSA) infections 370
- Patel Nishil P: Evaluation of a diabetic ketoacidosis protocol to improve quality and cost of care 275
- Patterson Mark E: Associations between communication climate and the frequency of medical error reporting among pharmacists within an inpatient setting 107
- Pearce Erica F: Role of a pharmacist in a patient-centered medical home for university employees 284
- Perry Lisa M: Frequency of aminophylline use for reversal of dipyridamole and regadenoson 294
- Personett Heather A: Review of anidulafungin utilization in patients with hepatic dysfunction at a large academic medical center 371
- Pesaturo Adam B: Combining a clinical pharmacy economic intervention tool with an intervention documentation system 109
- Pham Jacqueline T: Effects of dual blockade of the renin angiotensin system in diabetic kidney disease: a systematic review and meta-analysis 175
- Phillips Jennifer: An analysis of medication errors associated with the use of technology 338E
- Puong Lily: Evaluation of a fluticasone/salmeterol step-down program 375
- Pierce Wesly A: Survey of heparin-induced thrombocytopenia (HIT) laboratory testing and evaluation of a tailored HIT screening protocol based on the 4Ts scoring system 307E
- Pinchevsky Diana N: Blue genes: genetic variant of brain-derived neurotrophic factor associated with depression index in post-coronary artery bypass graft patients 468
- Poirier Therese: Assessment of students' readiness for self-directed learning 62E
- Poloyac Samuel: Cytochrome P450 eicosanoid levels in cerebrospinal fluid and delayed cerebral ischemia in subarachnoid hemorrhage patients 55
- Popa Jennifer: Developing a Senti7®-driven inpatient clinical pharmacy service 398
- Potts Lisa: Evaluation of two education methods for patient knowledge in patients recently started on warfarin 19
- Prince Aaron J: Incidence and characteristics of antithrombotic errors in the emergency department 92
- Prokopenko Alex J: Differential effect of IV iron compounds on intracellular reactive oxygen species (ROS) generation in aortic coronary endothelial cells 440
- Prom Rathasen: Simvastatin amiodarone drug interaction alert: adherence to dosing recommendations before and after the implementation of a new computerized drug-drug interaction alert 355
- Puschak Christine E: Pharmacists' role in evaluation of "as necessary" medications at a community hospital 449
- Q, R -
- Quinones Marissa E: Highlighting the work of the Ambulatory Care PRN in 2011 283
- Rable Katherine J: Evaluation of a pharmacy-driven renal dosing program 8
- Radwanski Przemyslaw: Blockade of sodium entry ameliorates arrhythmias during calcium overload 477
- Rafie Sally: Evaluation of a pharmacist oversight program for medication use in the emergency department of an academic medical center 320
- Regen Sloan M: Gender disparities in authorship of original research publications in pharmacy journals 415
- Relling Mary V: Dexamethasone systemic exposure is associated with hyperlipidemia in children with acute lymphoblastic leukemia 235
- Ribeiro Rama Ana C: Standard operating procedure to develop evidence-based information to support pharmacy and therapeutics committee decision for formulary management at a university hospital 309
- Riche Daniel M: Economic impact of ambulatory clinical pharmacy services 349
- Ripley Toni L: The impact of a clinical pharmacist on a cardiovascular surrogate endpoint: A pilot study 29
- Rogers Christin: Impact of conversion to sirolimus-based immunosuppression on fibrosis progression in HCV+ liver transplant recipients 487E
- Rohde Kalynn A: Effectiveness and safety of influenza vaccine in first six months post-lung transplant 470
- Rokas Kristina: Observational study of dexmedetomidine in trauma critical care patients 402
- Rolfe Stephen: Evaluation of pharmacy resident perceptions, knowledge and interventions following a trauma response training program 480
- Rolland Philip: Interdisciplinary approach to medication safety: collaborative care for developmentally disabled individuals 336
- Rowe A Shaun: Nephrotoxicity associated with weight based vancomycin dosing 233
- Ryan Gina J: Medication reconciliation: comparing a customized medication history form to a standard medication form. (CAMPPII 2) 169
- S -
- Sader Helio S: Antimicrobial activity of ceftaroline combined with NXL104 tested against a collection of organisms expressing multiple b-lactamases 140E
- Sakely Heather A: Pharmacist-physician interdisciplinary faculty development: get out of your silo! 315
- Salinitri Francine D: The effect of basal-bolus insulin vs. sliding scale insulin on quality indicators in hospitalized patients with type 2 diabetes mellitus on hemodialysis 98
- Salvo Marissa C: Implementation of a pharmacist-led medication reconciliation service in a federally qualified health center 289
- Salvo Marissa C: Incorporating a clinical pharmacist on a medical team serving the homeless 290
- San Roman Marie: Characterization of polymyxin B (PB) against *Acinetobacter baumannii* using pharmacokinetic and pharmacodynamic (PK/PD) approaches 466
- Saseen Joseph J: Persistent use of against label statin-fibrate combinations from 2003 to 2009 despite FDA dose restrictions 353
- Schmidt Nicole M: 10-Year experience with early corticosteroid elimination in kidney transplantation: analysis of patient and graft survival 385
- Schmidt Nicole M: Early corticosteroid withdrawal reduces risk for actual cardiovascular events in renal transplant recipients: a multivariate analysis 384
- Schonder Kristine S: Impact of immunosuppressant regimen on the onset of hyperlipidemia in kidney transplant recipients 270
- Scott James D: Comparison of clinical outcomes between ritonavir-boosted atazanavir and unboosted atazanavir in HIV patients on a regimen containing tenofovir 120
- Scott James D: Effects of darunavir, ritonavir and darunavir/ritonavir on T-cell activation and apoptosis using HIV-negative CD4+ lymphocytes 125
- Scoville Bridget A: Comparison of short-term pulmonary improvement associated with inhaled nitric oxide and inhaled epoprostenol for acute respiratory distress syndrome 45
- Sealy Patricia I: Surveillance of antibiotic resistance at a tertiary institution in Trinidad 334
- Selvage Jennifer T: Characteristics associated with clinical pharmacist interventions among home-based primary care veterans 324E
- Senbetta Mekre: Quality of life burden in chemotherapy-naïve and chemotherapy-experienced men with metastatic prostate cancer 347
- Sevin Alexa M: Impact of a student-implemented patient education campaign 413
- Shaefer Mark S: Changes in inflammatory biomarker levels and correlation with Framingham (FRAM) risk scores in antiretroviral-naïve HIV-infected patients through 144 weeks of abacavir/lamivudine-containing therapy in ARIES (EPZ108859) 126E
- Shaefer Mark S: Efficacy/tolerability of unboosted atazanavir versus atazanavir/ritonavir, each in combination with abacavir/lamivudine, after initial suppression with abacavir/lamivudine + atazanavir/ritonavir in HIV-1-infected patients: 144-week results of ARIES 123E

- Shaefer Mark S: Hepatic Safety profile of fosamprenavir-containing regimens in HIV-1-infected patients with or without Hepatitis C or B co-infection 121E
- Shamroe Caitlin L: Adverse drug events secondary to sulfamethoxazole/trimethoprim in HIV-infected hospitalized patients 431
- Sharma Bharti: Glyburide versus glipizide: a comparison of glycemic control in a selected veteran population 6
- Sharma Milan: The effects of adding liraglutide to an urban type 2 diabetic population 419
- Sharp Randall P: Lack of significance between use of statins and cardiovascular events in carriers of the Kinesin family member 6 gene 719Arginine allele 28
- Shaw Jennifer: Risks, rewards and the double-edged sword: pharmacogenetic testing and research in the Alaska Native/American Indian community 218
- Shen Li-Jiuan: Inadequate empirical vancomycin dose in non-elderly neurosurgical patients by conventional dosing regimen 238
- Shenoy Somanath PR: Candesartan for prostate cancer: A dose or a class effect? 234
- Sherman Rebekah E: Reimbursed medication therapy management services in a community health center for a Medicare population 285
- Shields Adele R: A prospective, single center, pilot study of pretransplant thymoglobulin administration and early corticosteroid withdrawal in living donor renal transplant recipients 264
- Shields Adele R: Cardiovascular events and CV-related mortality after renal transplantation: effect of maintenance steroid therapy and preexisting coronary artery disease 269
- Shields Adele R: Steroid-free, calcineurin inhibitor minimizing regimen with long-term mycophenolate mofetil monotherapy for HLA identical living donor kidney transplantation: long-term outcomes 263E
- Shin Jaekyu: Comparative effectiveness of endothelin receptor antagonists for the treatment of pulmonary arterial hypertension (A Pilot Study) 34
- Shirk Mary Beth: Insulin based glucose control audit for emergency department observation unit patients 417
- Shogbon Angela O: Communication of clinical recommendations during patient case-based cardiovascular therapeutics oral examinations 78
- Shogbon Angela O: Patient-focused pharmacotherapy notes in a cardiovascular therapeutics course: a standardized approach 70
- Sims J Jason: Dose escalation of  $\beta$ -blocker therapy following initiation of cardiac resynchronization therapy 23
- Skibowski Amanda: Risk for medication non-adherence and other drug therapy problems among ambulatory patients in a safety-net health-system 393
- Smallwood Gregory: Is valganciclovir a viable option for cytomegalovirus (CMV) prophylaxis in liver transplantation? 272
- Smith Andrew: Assessment of the prevalence, structure and function of "informal" student chapters of ACCP 482
- Smith Curtis L: Using non-bronchoscopic bronchoalveolar lavage-obtained respiratory cultures to guide antimicrobial therapy in patients with suspected pneumonia 305
- Smith Judith A: Evaluation of adverse drug events associated with liposomal doxorubicin in patients with renal insufficiency treated for gynecologic malignancies 188
- Smith Judith A: Evaluation of gemcitabine modulation of multidrug resistance in cisplatin resistant human ovarian cancer cell line 187
- Smith Lonnie: African American renal transplant one year outcomes from the Mycophenolic Acid Observational Renal Transplant Registry 262
- Smithburger Pamela L: Comparing the type and severity of drug interactions among different ICUs 2
- Soong Karen: Impact of a pharmacist as a member of an interprofessional team to identify and reduce medication related problems during transitions of care from skilled nursing facilities (SNFs) to home 422
- Spinler Sarah: National Cholesterol Education Program (NCEP) lipid goal achievement beyond low-density lipoprotein cholesterol (LDL-C) in patients with diabetes mellitus (DM): focus on non-high density lipoprotein cholesterol (nonHDL-C) in the practice innovation and CI 36
- Spycher Martin O: Investigation of potential neurological effects of stabilizers used in immunoglobulin products: comparison of proline and glycine 337E
- Steele Savanna: Endothelial nitric oxide synthase polymorphisms and endothelial function in coronary artery disease patients 220
- Stoudenmire Laura Leigh: Evaluation of obesity on achieving remission following induction therapy for acute myelogenous leukemia 448
- Stover Kayla R: Mitochondrial toxicity with caspofungin 130
- Strauch Susan: Deeper responses achieved with switch to nilotinib in patients with Philadelphia-positive chronic myeloid leukemia in chronic phase with suboptimal molecular response to imatinib 183E
- Sullivan Peter M: Development of a student pharmacist driven medication reconciliation discharge program 437
- Sun Shawn: Cost-effectiveness analysis of roflumilast/tiotropium combination therapy vs. tiotropium monotherapy in patients with severe to very severe COPD 250

## - T -

- Taitel Michael: A community pharmacy, diabetes management program to improve biometric and cardiac risk factors 478
- Tallian Kimberly: Impact of a pharmacist on length of stay and readmission rate at an academic inpatient psychiatric unit 247
- Thill Paul: Buprenorphine withdrawal in an infant after cessation of breastfeeding: A case report and review of the literature 453
- Tichy Eric: A single center experience with conversion between two generic tacrolimus formulations 271
- Tillman Emma M: Peroxisome proliferator-activated receptor alpha activity is altered by omega-3 polyunsaturated long-chain fatty acids in a cholestatic liver disease model 206
- Todorov Darko: Comparison of aPTT vs. anti-Xa assay for the therapeutic monitoring of unfractionated heparin 368
- Trinkley Katy E: Adverse drug reactions in ambulatory care with an electronic medical record and electronic prescribing: Identification and characterization 474
- Trivedi Meghana V: Effects of mobilization regimens on the incidence of tumor cell contamination of the hematopoietic stem cells in breast cancer patients undergoing peripheral blood stem cell transplantation 445
- Trujillo Angelina: Linagliptin effectively reduces HbA1c independent of age in patients with type 2 diabetes 97E
- Tsui Brian T: Vancomycin in combination with nafcillin demonstrates synergy against heteroresistant vancomycin-intermediate *Staphylococcus aureus* (hVISA) 433
- Tumlin Holly L: Assessment of recommendations made by a clinical pharmacist in a palliative care setting: A retrospective cohort study 452
- Turner Ted J: Determining rates of metabolic monitoring in clozapine-treated outpatients: evaluating the need for a collaborative metabolic monitoring service 246E

## - U -

- Ueda Stevenson Kimi: Corticosteroid withdrawal in renal transplant recipients: an analysis of the mycophenolic acid observational renal transplant registry 259
- Ueda Stevenson Kimi: Early analyses of renal transplant recipients who received expanded criteria donor kidneys from the mycophenolic acid observational renal transplant registry 260
- Underwood Julia M: Evaluation of bleeding risk using HAS-BLED scoring in patients with atrial fibrillation receiving enoxaparin bridging therapy 356

## - V -

- Vande Griend Joseph P: Targeting testosterone concentrations in elderly males using transdermal testosterone gel 103
- Vanguri Amulya: An apparent drug interaction between warfarin and the antiretroviral TRIO regimen 429
- Varenhorst Christoph MH: Cardiac events, infections and bleeds contribute to higher vascular and non-vascular mortality with clopidogrel compared to ticagrelor treatment in patients undergoing coronary artery bypass grafting 32E
- Varnado Sara: Assessing an institution-specific therapeutic

hypothermia protocol: outcomes and associated adverse events 401  
Venkataramanan Raman: Progesterone, a female sex hormone, inhibits CYP3A-mediated metabolism of 17-alpha hydroxyprogesterone caproate, an agent that prevents preterm birth 242

- W -

Walsh Kelly A: Risk factors for venous thromboembolism in patients with cirrhosis 9  
Watson Kristin: Factors that influence board certification among pharmacy practice faculty in the US 192  
Weitzman Elyse R: Glucose control in cardiac surgery patients following IV insulin discontinuation 418  
Wenger Philip J: Effect of pharmacy team interventions on monitoring rates for second-generation antipsychotics in a correctional setting 248  
Wesner Amber R: Prospective trial of a novel vancomycin nomogram 382  
Whaley Sarah G: The Hsp40 co-chaperone Jjj1 is a negative regulator of fluconazole resistance in *Candida glabrata* 434  
White John R: Dapagliflozin monotherapy and combination therapy reduces hyperglycemia in patients with type 2 diabetes 96E  
Whiteside Rachelle: Impact of the propofol shortage on patient outcomes in a cardiothoracic surgical intensive care unit 50  
Whiteside Rachelle: Isotope dilution mass spectrometry influence on calculating carboplatin doses 380  
Wiederhold Nathan P: Influence of serum and albumin on echinocandin pharmacodynamics 144  
Willett Kristine C: Improving student desires to advocate for the pharmacy profession after attendance to a state board of pharmacy meeting 63  
Wink Crystal J: Results of a pharmacist-managed cardiovascular risk reduction clinic at a Veterans Affairs Medical Center 280  
Wolfel Thomas J: A description of antibiotic-related laboratory interferences 388  
Woodard Susan C: Analysis of pharmacist-driven medication reconciliation services on hospital readmission rates, emergency room, visits, and hospital length of stay 342  
Wooding Fae: Evaluating the impact of implementing pharmacy cardiology rounds on student exam performance in a

pharmacotherapeutics course 88  
Woodis C Brock: Appropriateness of chronic obstructive pulmonary disease (COPD) management per global initiative for chronic obstructive lung disease (GOLD) guidelines at a family medicine practice 249  
Woodle E Steve: Multivariate analysis of risk factors that influence graft survival following proteasome inhibitor therapy for antibody mediated rejection 386  
Woods J Andrew: An evaluation of inhaled bronchodilator therapy in patients hospitalized for non-life-threatening COPD exacerbations 253E  
Woolley Adam B: Evaluation of pharmacy students' clinical interventions and estimated cost avoidance during a general medicine rotation 83  
Wright Kelly M: Evaluation of a 20-week longitudinal student program 311  
Wylie Douglas: Pharmacy student knowledge retention after completing a simulation utilizing high-fidelity mannequins compared to a written patient case 87  
Wytiaz Nicholas P: Identifying optimal dosages of drugs requiring weight-based calculations in over and underweight populations 435

- Y -

Yan Shirley: Evaluation of busulfan targeted therapy and pharmacokinetics in pediatric patients undergoing hematopoietic cell transplantation 454  
Yep Tracy: The pharmacokinetics of metoprolol during pregnancy 471  
Yu Bo: Cut down chemotherapy errors by clinical pharmacist in Shanghai Cancer Center 340  
Yuen Andrea N: Breast cancer patient understanding and knowledge of pharmacogenomic testing in Lineberger Comprehensive Cancer Center trial 0801 461

- Z -

Zhang Xiaoping: Pharmacokinetics and pharmacodynamics of tocilizumab in systemic juvenile idiopathic arthritis 255E  
Zillich Alan J: Evaluation of specialized medication packaging combined with medication therapy management: adherence, outcomes, and costs among Medicaid patients 105