ACCP Virtual Poster Symposium

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ORIGINAL RESEARCH

ADR/Drug Interactions

1E. Post hoc analysis of pooled safety data from eleven Phase 3 clinical trials to identify potential pharmacodynamic drug interactions between tapentadol and SSRIs/SNRIs. Vincent Brett, M.S., Pharm.D.[1], Christopher Sikes, Pharm.D.[1], Jim Xiang, Ph. D.[1], Charles Oh, M.D.[1], David Biondi, D.O.[1]; (1) Janssen Scientific Affairs, LLC, Raritan, NJ
Presented at Annual Meeting of the College of Psychiatric and Neurologic Pharmacist, April 29, Tampa, Florida.

Cardiovascular

2. Factors associated with early readmission of cardiothoracic surgical patients. Estella M. Davis, Pharm.D.[1], Jenna Stang, Pharm.D., Candidate[1], Pamela A. Foral, Pharm.D., BCPS[1], Thomas M. Baker, DNP, APRN-BC[2], Chris Destache, Pharm.D.[1]; (1) Creighton University School of Pharmacy and Health Professions, Omaha, NE; (2) Alegent Health Bergan Mercy Medical Center, Omaha, NE
PURPOSE: An initial retrospective, matched case control study at our institution identified chronic lung disease and peripheral vascular disease (PVD) as risk factors for early readmission (ER) following cardiothoracic surgery. This study's purpose was to expand the analysis to include all of the patients in the database and utilize multivariate analysis to identify risk factors associated with ER.
METHODS: A retrospective, case-control study was conducted on cardiothoracic patients from January 2009 to April 2010. Demographic, surgical and readmission data was obtained from the Society of Thoracic Surgeons (STS) Adult Cardiac Surgery Database. Appropriate statistical analyses were completed.
RESULTS: Patients readmitted (Readmit, n=64) within 30 days after discharge following a cardiothoracic procedure were compared to patients who did not require readmission (No Readmit, n=293). The majority of patients were male (72%) and mean age was 65 ± 11 years. Coronary artery bypass graft (CABG) surgery was performed on 65% of patients and 71% of patients had an on-pump cardiac procedure. Compared to No Readmit, Readmit patients had significantly more discharge medications (12.1 ± 5.3 vs 10.6 ± 4.9, p=0.021), higher STS risk score (0.045 ± 0.056 vs 0.026 ± 0.042, p=0.009), postoperative infection (5% vs 1%, p=0.039), PVD (30% vs 14%, p=0.002), previous CABG (9% vs 3%, p=0.037), previous carotid surgery (11% vs 3%, p=0.010), and preoperative beta-blocker use (77% vs 72%, p=0.007). More No Readmit patients had a concomitant atrial fibrillation correction surgery (9% vs 2%, p=0.052). The number of discharge medications, STS risk score, peripheral vascular disease, and prior CABG or carotid surgery were significantly (p<0.04) correlated with Readmit patients.
CONCLUSION: Numerous factors were correlated with ER. Based on these results, further research is necessary to understand if additional patient education targeting these populations may prevent ER after cardiothoracic surgery.

Community Pharmacy Practice

3E. Attitudes and perceptions regarding Immunization within San Joaquin and Sacramento Counties. Veronica T. Bandy, Pharm.D., M.S.[1], Jason L. Bandy, Pharm.D.[1], Eric Wee, Pharm.D. Candidate[1], Coreen Tsui, Pharm.D. Candidate[1], Melissa Jimenez, Pharm.D. Candidate[1], Sean Cualoping, Pharm.D. Candidate[1], Seth Gomez, Pharm.D. Candidate[1], Katherine Highsmith, Pharm.D. Candidate[1], Jacqueline Schnee, Pharm.D. Candidate[1]; (1) University of the Pacific, Stockton, CA
Presented at California Society of Health-System Pharmacists, Anaheim CA, November 3–6, 2011.

Drug Information

4E. Evaluation and ranking of consumer health and drug information smartphone applications. Amy M. Pope, Pharm.D.[1], Patrick J Bryant, Pharm.D., FSCIP[2], Heather A Pace, Pharm.D.[2], Morgan L Sperry, Pharm.D.[2]; (1) University of Missouri-Kansas City School of Pharmacy Drug Information Center, Kansas City, MO; (2) University of Missouri – Kansas City School of Pharmacy Drug Information Center, Kansas city, MO
Presented at Presented at the Midyear Clinical Meeting and Exhibition of American Society of Health-System Pharmacists, New Orleans, LA, December 6, 2011.

Education/Training

5E. An NIH sponsored pharmacist curriculum on onterventions for SIDS risk reduction. Hanan Kallash, M.S.[1]; (1) Eunice Kennedy Shriver National Institute of Child Health and Development, Baltimore, MD
Presented at Presented at Association of American Colleges of Pharmacy, San Antonio, Texas, July 9–13, 2011.

Emergency Medicine

6. Long-acting neuromuscular blocker use during pre-hospital transport of critically ill trauma patients. Kathryn Elofson, Pharm.D.[1], Sarah Girardot, Pharm.D.[1], Andrew Tang, M.D.[1], Joshua Gaither, M.D.[1], Asad E. Patanwala, Pharm.D.[1]; (1) University of Arizona, Tucson, AZ
PURPOSE: The purpose of this study was to determine the rate of long-acting neuromuscular blocker (NMB) use and evaluate the concurrent use of sedatives in intubated trauma patients during pre-hospital transport.
METHODS: This was a retrospective cohort study conducted in a tertiary care, academic emergency department. Consecutive adult trauma patients who were intubated in the pre-hospital setting and brought to the emergency department during a 2-year period, were included. The primary outcome measure was to determine the rate of long-acting NMB use in these patients. Patients were categorized into two groups: (1) long-acting NMB and (2) no long-acting NMB. The use of post-intubation sedatives was compared between the groups using a Wilcoxon rank-sum test or a Fisher's exact test for continuous or categorical variables, respectively.
RESULTS: A total of 51 patients were included in the final analyses. Of these, 86% (n=44) were given a short-acting NMB (succinylcholine), 10% (n=5) were given a long-acting NMB (rocuronium) and 4% (n=2) were not given any NMB for rapid sequence intubation. After intubation, 75% (n=38) received an additional long-acting NMB such as vecuronium (n=22) or rocuronium (n=16) to prevent patient movement. Overall, 82% (n=42) of patients received a long-acting NMB during transport. There was no difference in the rate of post-intubation sedative use during transport between the long-acting NMB and no long-acting NMB groups (79% vs 67%, respectively, p=0.42). The long-acting NMB group received sedatives less promptly after intubation compared to those who did not receive a long-acting NMB (16 vs 7 minutes, respectively, p=0.04).
CONCLUSION: The use of long-acting NMB is common during the pre-hospital transport of trauma patients. Some of these patients may not be given sedatives or may have delays in receiving sedatives after intubation.

Family Medicine

7. Payment status influences hypertension control rates in a family medicine clinic. Tibb F. Jacobs, Pharm.D.[1], Jamie M. Terrell, Pharm.D.[1], Breanne Peyton, Pharm.D. Candidate[1], Leanna Darland, Pharm.D. Candidate[1], Savanah Posey, Pharm.D. Candidate[1], Roy Parish, PharmD[1]; (1) University of Louisiana at Monroe, Shreveport, LA

PURPOSE: Adherence to prescribed regimens is an important factor in the management of hypertension. With rising costs of medications, a patient's ability to pay is a constant barrier to adherence with their prescribed therapies. Primary objective of this study was to evaluate whether medication payment status (Medicaid, private insurance or self pay) influences blood pressure control rates in a family medicine clinic. Secondary objectives were to evaluate impact of payment status on stage of hypertension as well as on blood pressure values.

METHODS: A retrospective chart review was conducted including patients with a diagnosis of benign essential hypertension (ICD-9401.1) and seen in clinic between January 1, 2011 and July 1, 2011. Patients were excluded if there was not at least one documented blood pressure during the specified time period. Data collected included: age, payment status, and lowest recorded blood pressure value. A convenience sample of 150 patients was selected with 50 patients in each group (Louisiana Medicaid, private insurance, and self pay). JNC 7 guidelines were used to classify blood pressure stages and goals. A chi-square test was performed on blood pressure goal and classification. Continuous variables were compared using ANOVA.

RESULTS: Significant differences were found between insurance vs self pay (p=0.006) and insurance vs Medicaid (p=0.02). ANOVA results showed no significant differences in systolic blood pressure between groups. However, there was a significant difference seen in diastolic blood pressure with insurance vs free care and insurance vs Medicaid.

CONCLUSION: It appears that payment status can influence blood pressure control rates. In order to maximize blood pressure control, providers should be aware of a patient's method of paying for prescriptions prior to selecting a medication regimen.

8. Effect of group diabetes education classes on clinical outcomes and patient satisfaction in a family medicine clinic. Brittany R. Cogdill, Pharm.D.[1], Sarah P. Shrader, Pharm.D., BCPS[2]; (1) South Carolina College of Pharmacy-Medical University of South Carolina, Charleston, SC; (2) South Carolina College of Pharmacy/MUSC Medical Center, Charleston, SC

PURPOSE: This study was performed at a family medicine outpatient clinic to determine the effect of group diabetes education classes on patients' hemoglobin A1c (A1c), blood pressure (BP) and low-density lipoprotein (LDL) cholesterol. Patient satisfaction was also assessed.

METHODS: Pharmacists offered four group education classes to clinic patients over the course of one year using the American Diabetes Association Diabetes Conversation Maps®. Patients were encouraged to attend all four education sessions to be exposed to the entire curriculum; however, many were only able to attend a single class. If available, patients' A1c, BP and LDL were monitored before the first and after the last class attended. Paired t-test and descriptive statistics were used for data analysis.

RESULTS : Thirty two patients attended at least one of the group classes, with nine returning for more than one class. Baseline characteristics for all patients included a mean age of 58 years, baseline A1c of 9.4%, systolic BP of 140.6 mm Hg, diastolic BP of 77.2 mm Hg and LDL of 99.1 mg/dl. An average decrease of 1.1% in A1c, 5.1 mm Hg in systolic BP, 1.9 mm Hg in diastolic BP and 4.6 mg/dl in LDL was seen when comparing all patients before and after participation in the classes. For patients that attended more than one class, a statistically significant decrease of 3.6% occurred with A1c ($p<0.05$). The majority of patients (84%) reported more satisfaction with the group diabetes classes than with individual education sessions and that they would most likely return to another class.

CONCLUSION: Clinical outcomes including A1c, BP and LDL improved when patients attended group diabetes education classes led by pharmacists. Furthermore, A1c was significantly reduced when patients attended more than one class. These data support offering group diabetes education classes as a method of patient education at a family medicine clinic.

Infectious Diseases

9. Risk factors for clinical failure in patients hospitalized with cellulitis/cutaneous abscess. Jenana Halilovic, Pharm.D., BCPS, AAHIVP[1], Brett Heintz, Pharm.D., BCPS-ID, AAHIVE[2], Jennifer Brown, MD[2]; (1) University of the Pacific TJL School of Pharmacy and Health Sciences, Stockton, CA; (2) University of California, Davis Medical Center, Sacramento, CA

PURPOSE: To evaluate clinical outcomes and risk factors associated with clinical failure in patients hospitalized with cellulitis with or without cutaneous abscess.

METHODS: We performed a retrospective cohort study of consecutive adults admitted for cellulitis/cutaneous abscess July 1, 2009 through June 30, 2010. Descriptive statistics were used to summarize the demographics, microbiologic etiology, and antimicrobial therapy utilization. Binary logistic and multivariate stepwise regression analyses were performed to identify risk factors for treatment failure among evaluable patients.

RESULTS: A total of 210 patients met inclusion criteria during the study period. Our patient population was relatively obese (average weight = 101 kg and BMI = 34) with multiple co-morbid conditions. Among evaluable patients, clinical failure occurred in 34 (32.1%) patients. Factors associated with clinical failure upon univariate regression analysis included weight over 100 kg (OR = 5.89, p=0.014), trauma (OR = 4.68, p=0.048), inadequate empiric therapy (OR = 11.66, p=0.025), previous antimicrobial therapy in last 90 days (OR = 5.10, p=0.010) and low discharge dosing (OR = 3.10, p=0.049). Morbid obesity (BMI $\geq$ 40), MRSA on culture, duration of therapy of 7 days or longer, and low empiric dosing trended towards being risk factors for clinical failure. Independent predictors of clinical failure upon multivariate regression analysis were weight greater than 100 kg, severity of illness, recent antimicrobial therapy, and inadequate empiric therapy. Further subgroup analysis demonstrated that morbidly obese patients with cellulitis were at higher risk for clinical failure if they were discharged on a low oral dose of clindamycin or trimethoprim/sulfamethoxazole (p=0.0019).

CONCLUSION: Appropriate antimicrobial selection and dosing are essential to optimize clinical outcomes among patients with cellulitis/cutaneous abscess. Obese individuals may be at particular risk for clinical failure secondary to inadequate dosing of antimicrobial therapy.

10E. Evaluation of the emetogenic potential of tigecycline 50 mg twice daily versus 100 mg once daily. Nehal G. Hashem, Pharm. D.[1], Greg Mateyoke, Pharm.D.[1], Meghna Vallabh, Pharm.D., BCPS[1], William R. Judd, Pharm.D., BCPS[2], Mark Dougherty, M. D.[3]; (1) Saint Joseph East, Lexington, KY; (2) Saint Joseph Health System, Lexington, KY; (3) Lexington Infectious Disease Consultants, Lexington, KY

Presented at Presented at the 46th American Society of Health-System Pharmacists Midyear Clinical Meeting and Exhibition. December 4–9, 2011. New Orleans, LA. [Abstract #7132].

Medication Safety

11. Incidence, type and causes of dispensing errors: a study from the community pharmacy. Martinez A. Sanchez Sr, Ph.D.[1], Gómez Barrera Manuel Sr, Ph.D[1]; (1) San Jorge University, Zaragoza, Spain

PURPOSE: To evaluate the incidence, type and potential causes of dispensing errors.

METHODS: A Prospective study was conducted at a community pharmacy in Madrid (Spain). Every prescription filled while the investigator was present was inspected. A sample of will-call prescriptions (filled before the arrival of the investigator and waiting to be picked up) were inspected. Investigators compared the physician's written order to the contents and label of each new prescription (patient presented a new prescription to the pharmacy staff). Any deviations from the prescribed order were noted as errors. Errors observed during the study were categorized according to into two major groups: content and labeling errors. Absolute and relative frequencies as percentages for qualitative variables and the mean, for quantitative variable age were calculated. To compare whether the number of errors is distributed evenly across the dichotomous variable "team member who makes the mistake" was used chi-square test by setting p=0.05.
RESULTS: In all, 12,000 prescriptions were dispensed and 55 incidents were recorded during the 3-months study period. The rate of incidents per 1000 items dispensed was 4.58 (95% CI 4.22–0.25). Seventeen incidents (31.5%) were classified as a dispensing the wrong drug strength error (rate per 1000 items dispensed 4.22), followed by others dispensing errors (25.9%). The main reported causes of the incidents involved misreading the prescription (15, 27.3%), similar drug names (10, 18.2%) and similar packaging (9, 16.4%). Dispensing errors were significantly more likely to be made by the pharmacy technician.
CONCLUSION: The total dispensing error rate in the study sample was independent of other comparative studies. The categories "labeling error" represented a small influence on the total error rate. Misread prescription, similar drug name and similar packaging were the most prevalent causes of dispensing.

12. Evaluation of two medication safety-related interventions for cardiovascular inpatients in a German teaching hospital: standardized discharge education and simplification of complex therapies. Dorothee C. Dartsch, Ph.D.[1], Damaris Nehrdich[2], Dorit Stange[2], Claudia Langebrake, Ph.D.[2], Michael Baehr, Ph.D.[2]; (1) Hamburg University, Hamburg, Germany; (2) University Hospital Hamburg-Eppendorf, Hamburg, Germany
PURPOSE: Clinical pharmacists are a valuable addition to the clinical team in hospital. However, in order to convince hospital administrations to employ clinical pharmacists, clinical pharmacy services and their benefit need to be defined and investigated in much more detail.
METHODS: Two randomized controlled prospective studies were performed by clinical pharmacists in a German university hospital. Details are listed in the following Table:

Study	Patients	Intervention	Endpoints
Study A	200 cardiovascular patients	Standardized pharmaceutical discharge education (duration limit 30 minute)	Self-reported adherence (MARS), medication knowledge, patient satisfaction, quality of life (SF-12)
Study B	240 patients of the internistic and urologic Wards	Pharmaceutical counselling of physicians to reduce Medication complexity	Self-reported adherence (MARS), medication Complexity (MRCI), patient satisfaction, quality of life (SF-12)

RESULTS: The studies showed the feasibility of the respective service within the clinical routine, both of the pharmacist and of patient management processes (such as arranging the counselling appointment of pharmacist and patient directly before discharge). Patient satisfaction and medication-related knowledge were significantly improved (study A). The complexity of discharge medications could be reduced by 15% after recommendation of combination or extended release drugs by the pharmacist (study B). Part of this effect, however, was lost in subsequent ambulatory prescriptions, possibly due to financial reasons affecting prescription behaviour of general practitioners. Although adherence was not influenced, patients advised by the pharmacist rated their quality of life as better than control patients who had been advised solely by a physician.
CONCLUSIONS: Both clinical pharmacy services are practicable within the structure and organisation of a German teaching hospital. They have good potential to increase the safety of patients in pharmacotherapy across the interface between hospital and ambulatory care by enhancing patient knowledge and by decreasing medication complexity, respectively.

13E. Medication discrepancies and drug-related problems in the ambulatory oncology setting. Shirin Abadi, B.Sc.(Pharm.), ACPR, Pharm.D.[1], Dennis Jang, B.Sc.(Pharm.)[1], Mariode Lemos, B.Sc.(Pharm.), M.Sc.(Clin.Pharm.), Pharm.D., M.Sc.(Oncol)[1], Paul Koke, B.Sc.(Pharm.)[1], Susan Walisser, B.Sc.(Pharm.), ACPR[1], Roxana Ho, B.Sc.(Pharm.)[1], Kimberly Kuik, B.Sc.(Pharm.)[1], Winnie Cheng, B.Sc.(Pharm.)[1], Crystal Amos, B.Sc.(Pharm.), ACPR, BCPS[1], Neilde Haan, B.Sc.(Pharm.)[1], Sue Fuller Blamey, RN, BScN, MBA[1], Charles D. Blanke, M.D., FACP, FRCPC[1]; (1) BC Cancer Agency, Vancouver, BC, Canada
Presented at National Oncology Pharmacy Symposium, Quebec City, QC, November 4–6, 2011 CSHP BC Branch Annual General Meeting, Vancouver, BC, November 18–19, 2011 Annual Cancer Conference, Vancouver, BC, December 1–3, 2011.

Oncology

14. An open label phase I pilot study of continuous intrapleural infusion of escalated doses of methotrexate in malignant pleural mesothelioma Lamia Mohamed El Wakeel, Ph.D.[1], Mahmoud Abbass Ellithy, M.D., Ph.D.[2], Noha Salah El Din M. El Baghdady, B.Sc[3], Osama A. Badary, Ph.D.[4], Karim Ahmed Abdeltawab, M. Sc[5]; (1) Department of Clinical Pharmacy, Faculty of Pharmacy, Ain Shams University, Cairo, Egypt; (2) Department of Interventional Radiology, Ain Shams University, Cairo, Egypt; (3) Ain Shams University, Cairo, Egypt; (4) Ain shams University, Cairo, Egypt; (5) Department of Interventional Radiology, Faculty of Medicine, Ain Shams University, Cairo, Egypt
PURPOSE: The aim of this study was to evaluate the toxicity from escalated methotrexate doses infused intrapleural over five days and determine pleural and systemic drug levels with this cemotheraputic approach .
PATIENTS AND METHODS: Five patients with malignant pleural mesothelioma were treated with three cycles of intra pleural methotrexate infused through a pig tail catheter inserted in the pleural space. Methotrexate levels were estimated in the pleural fluid and serum once daily throughout the treatment cycles. Fourteen days between cycles were calculated from the last day of the previous one.The total dose for each cycle was infused over five days with simultaneous intravenous calcium folinate. The total cycle dose for the first, second and third cycles were; 300, 501 and 750.5 mg/m^2 respectively.
RESULTS: The mean serum methotrexate level was 1.72 μM while that of the pleural fluid was 503.224 μM. The mean serum/pleural ratio was 0.00396, while the pleural/serum ratio was 396.21. No remarkable toxicity was observed in the five patients except for; patient 1 who developed fluid leakage around the puncture site. Patient 2 developed grade I hepatotoxicity and both patients developed grade I pleuritic chest pain and dry irritative cough.

CONCLUSION: This study demonstrates no grade II toxicity from 750.5 mg/m^2 of methotrexate infused intra pleural over five days. This approach allows attaining methotrexate pleural levels that are 95–3000 times higher than systemic serum levels, with minimal toxicity.The results mandate performing this trial on a wider scale as a preliminary step for a formal phase II study.

15. Oxaliplatin for elderly patients: dosing regimens in a German secondary care hospital, safety and quality of life. Goentje-Gesine Marquardt, Ph.D.[1], Klaus Meier[1], Dorothee C. Dartsch, Ph.D., Prof.[2]; (1) Heidekreis Klinikum Soltau, Soltau, Germany; (2) Hamburg University, Hamburg, Germany
PURPOSE: There are many chemotherapy protocols, for example FoLFOx, to guide dosing. However, dose reductions due to severe side effects (ADR) are common and information on the doses really administered is scarce. Our hypothesis was that especially elderly patients receive lower doses than younger ones. The aim of our study was therefore to test this hypothesis and to investigate safety and quality of life (QoL) in elderly patients treated with an oxaliplatin-based chemotherapy (CTx).
METHODS: Observational field study with colorectal cancer patients receiving oxaliplatin in the outpatient oncology ward of a German secondary care clinic. Specified labs and ADR as well as self-reported QoL were obtained by a clinical pharmacist until therapy was ended.
RESULTS: Our study included 214 CTx courses for 18 patients, four of which were <65 years (median 58.7, "younger") and the remaining ones 65 years and above (median 73.4, "elderly"). Younger patients received 100% of the target oxaliplatin dose until course 7 and linear dose reductions in the following courses, reaching a mean of 25% of the target dose at course 12. In contrast, elderly patients received slightly reduced doses right from the beginning, but in spite of further subsequent dose reductions the level stayed above 50% of the target dose. The reason for 82% of dose reductions in younger patients was neurotoxicity, whereas in elderly patients, neurotoxicity caused 27%, thrombopenia 23% and "old age" per se 21% of reductions. Predominant ADR in younger patients were neurotoxicity, nausea and vomiting, while elderly patients showed higher degrees of thrombopenia and alopecia. Self-reported global QoL was lower in younger than in elderly patients.
CONCLUSIONS: Oxaliplatin therapy is feasible, with manageable toxicity and acceptable QoL, in elderly patients. It remains to be investigated whether the different dosage time-courses in younger and elderly patients yield outcome differences.

Pain Management/Analgesia

16E. Comparison of intravenous acetaminophen with adjunct opioids versus standard pain management in postoperative patients. Mabel H. Truong, Pharm.D.[1], Greg Mateyoke, Pharm.D.[1], Alissa Langley, Pharm.D.[1], John Peppin, D.O., FACP[1], Lauren Cottingham, Pharm.D.[1]; (1) Saint Joseph East, Lexington, KY
Presented at Presented at the ASHP Midyear Clinical Conference, New Orleans, LA, December 4–8, 2011.

17. Relationship of hospital room design to pain medication usage and pain perception. Timothy Reilly, Pharm.D, BCPS, CGP, FASCP[1], Janice Allunario, RPh[1]; (1) University Medical Center at Princeton, Princeton, NJ
PURPOSE: To determine if architectural improvements in hospital room design affect opiate usage after orthopedic surgery.
METHODS: IRB approval was obtained. Patients aged 18–65 years receiving a total hip arthroplasty or total knee arthroplasty were randomly assigned to a standard private hospital room (standard room) or a private hospital room with architectural improvements (redesigned room); for the purposes of this analysis, patients who were not opiate naïve were excluded from the data set. Patients in the standard room were compared to patients in the redesigned room based on mean opiate usage during hospital stay and mean percent reduction in pain scale, both stratified by use of adjunctive analgesia; standard statistical tests were used.
RESULTS: At the end of the preliminary review period, 49 patients were enrolled, 25 patients in the standard room and 24 patients in the redesigned room; 35 patients received a peripheral nerve block; the average length of stay was 70.8 hours (SD = 18.44 hours). During hospital stay, patients in the standard and redesigned room used a mean (SD) of 0.92 (0.90) morphine equivalents per hour and 0.74 (0.40) morphine equivalents per hour, respectively (p=0.36). Patients in the standard room experienced a mean (standard deviation) reduction in pain scale of 65.8% (18.5) and patients in the redesigned room experienced a 73.4% (21.8) reduction in pain scale (p=0.19). All results were not significant when stratified by use of peripheral nerve block.
CONCLUSION: Architectural improvements in hospital room design did not significantly impact pain medication usage or patient perception of pain in our preliminary data set.

Pharmacoeconomics/Outcomes

18. Cost-effectiveness analysis of dexmedetomidine versus propofol for sedation in mechanically ventilated patients after cardiovascular surgery; an institutional perspective. Matthew Wanat, Pharm.D., BCPS[1], Kalliopi Fitousis, Pharm.D., BCPS[1], Fariedeh Bostan, Pharm.D.[1], Faisal Masud, M.D., FCCP[1]; (1) The Methodist Hospital, Houston, TX
PURPOSE: Dexmedetomidine and propofol are commonly used for sedation after cardiovascular surgery. Coronary artery bypass graft and/or aortic/mitral valve surgeries are often fast tracked to extubation and require short term sedation. Dexmedetomidine and propofol have attractive pharmacokinetic profiles that make them excellent sedative agents in this patient population, but there is a significant difference in their cost. Despite increased use of dexmedetomidine in the ICU setting, there is limited data directly comparing both agents from a cost perspective in cardiovascular surgery patients. This study will analyze the cost-effectiveness of dexmedetomidine vs propofol for sedation in mechanically ventilated patients after cardiovascular surgery from an institutional perspective.
METHODS: Efficacy and safety data were used from a previously conducted trial comparing dexmedetomidine and propofol at our institution. Duration of mechanical ventilation after surgery, addition of a second agent for sedation, and incidence of delirium while on sedation were the efficacy and safety endpoints used in this analysis. Corresponding medication costs, cost of mechanical ventilation and cost associated with delirium were also accounted for in our analysis. Data was analyzed by TreeAge Software to create a pharmacoeconomic decision tree that determined the most cost effective option for sedation.
RESULTS: The average cost of sedation for patients receiving dexmedetomidine was 1647 USD compared to 1849 USD for patients receiving propofol. Results from a tornado analysis on all cost variables indicated that the cost associated with delirium had the most impact on overall cost outcomes. Findings from a sensitivity analysis varying the cost of delirium found no difference in end cost outcomes.
CONCLUSION: Dexmedetomidine was found to be the more cost-effective option for sedation in cardiovascular surgery patients compared to propofol. Although the cost of dexmedetomidine was higher, it reduced time on mechanical ventilation and need for a second sedative agent.

19. Rural patient's willingness to use mobile phone technologies for accessing pharmacy services. Jayashri Sankaranarayanan, M. Pharm., Ph.D.[1], Rory E. Sallach, Pharm.D., Candidate[1]; (1) University of Nebraska Medical Center College of Pharmacy, Omaha, NE

PURPOSE: This pilot study documents patient's willingness to use mobile phone technologies for accessing pharmacy services in rural areas in the U.S. to evaluate the potential to use health information technology in delivery of patient centered pharmacy services.
METHODS: An anonymous IRB approved survey was completed voluntarily by patients visiting two rural pharmacies in Nebraska from August to October, 2011. The 2-page survey collected data on their demographics, health status, mobile phone use, and willingness to use and give time for accessing mobile phone based pharmacy services.
RESULTS: Twenty four patients responded to the survey. Respondents were 19–40 year olds (52%), female (88%), married (63%), with $\geq$\$35,000 annual income (55%), excellent to very good health status (63%), with $\leq$\$100 monthly medication expenses (80%), with private insurance (78%), and living within 5 miles of their pharmacy (71%). Majority reported that mobile phone based health services are important to them (75%). Respondents had access to a mobile phone (91%), voice mails (81%), text messaging (73%), and mobile phone applications (55%). Respondents were willing to receive telephone/mobile phone messages by a pharmacist for various services: new or refill prescription reminders (63%), contact by pharmacist for medication problems (61%), review and monitor medication use (54%), medication information and self-manage medication use (50%). Of 44% respondents that were willing to give time for mobile phone based services, 83% were willing to give 15 minutes and 17% were willing to give 30 minutes every month.
CONCLUSION: The potential patient demand for mobile phone based pharmacy services could be a novel use of health information technology to deliver patient centered pharmacy services in rural areas. The study findings and pharmacist's willingness to supply these services need to be evaluated in larger populations.

Pharmacoepidemiology

20. Assessment of antihypertensive drug use among hypertensive patients presented with acute coronary syndrome. Bhavik Shah, M. Pharm, PhD[cont.1], Bharat Patel, M.Sc, PhD[2], Keyur Parikh, MD, FCSI, FACC[3]; (1) Institute of Health Management Research IIHMR, Jaipur, India; (2) Institute of Science & Technology for Advanced Studies & Research ISTAR, Vallabh Vidyanagar, India; (3) Care Institute of Medical Sciences CIMS, Ahmedabad, India
BACKGROUND: Aggressive blood pressure (BP) control is essential for secondary prevention in hypertensive, particularly diabetic-hypertensive, patients with established cardiovascular disease (CVD).
PURPOSE: To assess current prescription scenario of antihypertensive medications among diabetic and non-diabetic hypertensive patients presented with acute coronary syndrome (ACS).
METHODS: This was a cross-sectional observational study conducted at The Heart Care Clinic, Ahmedabad (INDIA), from August 2007 to January 2008, among patients presented with ACS. The data, including demographic information, vital signs, personal particulars, details of risk factors for ACS and medications prescribed at discharge, was analyzed.
RESULTS: Of 369 patients (81.84% male), 208 (56.34%) were found to be hypertensive. Prevalence of diabetes among hypertensive patients was 37.02%. The most of the hypertensive patients were prescribed multiple antihypertensive agents (polytherapy) irrespective of presence of diabetes (monotherapy 10.39% and 15.27%; and polytherapy 89.61% and 84.73%, from diabetic and non-diabetic hypertensive patients, respectively, p=0.3197). Among patients on polytherapy, proportion of patients on combination of three antihypertensive drugs was significantly higher among diabetic hypertensive patients (44.93% vs 19.82%, p=0.0003). Except for diuretics and calcium channel blockers (CCBs), there was no difference in proportion of patients receiving various antihypertensive agents from different classes in diabetic and non-diabetic hypertensive patients. From diabetic-hypertensive patients, significantly higher proportion of patients were on diuretics and CCBs (for diuretics: 24.43% vs 46.75%, p=0.0009; for CCBs: 25.97% vs9.92%, p=0.0022).
CONCLUSIONS: Typically diabetes is more prevalent in hypertensive ACS patients from India. Combination therapy is preferred over monotherapy to treat hypertension in both diabetic as well as non diabetic patients with CAD. Current prescribing for antihypertensive drug classes is fairly consistent with current recommendations adhering evidence-based practice. Apparently, more frequent use of combination of three antihypertensive drugs among diabetic-hypertensive patients reflects efforts for aggressive BP control in this sub-group of patients to meet stricter targets for BP.

21. Acute pancreatitis associated with GLP-1 Agonists (Exenatide and Liraglutide) exposure: a meta-analysis of published randomized controlled clinical trials. Carlos Alves, Pharm.D.[1], Francisco Batel-Marques, Pharm.D., Ph.D.[2]; (1) School of Pharmacy, University of Coimbra, Coimbra, Portugal; (2) Health Techonology Assessment HTA Centre – AIBILI, Coimbra, Portugal
PURPOSE: Post-marketing surveillance – spontaneous reports – of exenatide (Byetta), a GLP-1 agonist approved for type 2 diabetes mellitus, raised the possibility for its association with acute pancreatitis (AP). Latter, in 2010, another new GLP-1 agonist, liraglutide (Victoza), was approved by the FDA. This study was aimed at identifying the risk of developing AP in patients exposed to exenatide or liraglutide, according to published data from randomized clinical trials (RCT).
METHODS: A meta-analysis was carried out pooling data from studies identified on a Medline and on a Cochrane Library search. Abstracts from scientific meetings were also searched. Studies were included if they were randomized controlled clinical trials (RCT), evaluating exenatide or liraglutide in type 2 diabetes mellitus, using active or placebo as control. Peto's odds ratio (OR) was estimated. Results obtained were compared with both fixed and random-effects models.
RESULTS: Of the 219 retrieved publications, eight met the inclusion criteria. Five AP were identified in the exenatide RCTs, two of which in exenatide-treated patients. Peto's OR for exenatide exposure and AP risk was 0.66 (0.11, 3.83). Of the six AP identified for liraglutide RCT's, five were found in liraglutide-treated patients. Peto's OR for liraglutide exposure and AP risk was 2.12 (0.39, 11.56]. Both fixed and random-effects models didn't reveal different results.
CONCLUSION: These findings don't provide evidence for increased AP risk and GLP-1 agonists exposure. However further experimental and observational studies are needed to confirm such findings due to the limitations of currently available data: number of patients exposed, length of exposure and lack of effectiveness outcomes under real clinical practice conditions.

Pharmacogenomics/Pharmacogenetics

22. Impact of *CYP2C19*2* loss-of-function polymorphisms on platelet reactivity after loading dose of clopidogrel in healthy Malaysian volunteers. Yanti N. Sani[1], Sheau C. Lim[1], Luen H. Lim[1], Elyana Y. Edwin[1], Nurzalina A.K. Khan, Ph.D.[1], Teck H. Goh, M.D.[2], Victor L. Serebruany, M.D., Ph.D.[3], Kah H. Yuen, Ph. D.[1]; (1) School of Pharmaceutical Sciences, Penang, Malaysia; (2) Loh Guan Lye Hospital, Penang, Malaysia; (3) John Hopkins University, Towson, MD
PURPOSE: CYP2C19*2 loss-of-function (LoF) allele is associated with reduced antiplatelet effect of clopidogrel. This study was aimed to assess the association between CYP2C19*2 LoF alleles and platelet reactivity in healthy Malaysian volunteers.
METHODS: Genotypes of 23 healthy human volunteers were assessed for wild-type CYP2C19*1 and CYP2C19*2 LoF alleles, using polymerase chain amplification. Polymorphism screening was performed by direct sequencing. The volunteers were classified into two groups on the basis of CYP2C19 genotype, namely Good Metabolizer (GM, CYP2C19*1/*1, n=10) and Reduced Metabolizer (RM, CYP2C19*1/*2, n=8 and CYP2C19 *2/*2, n=5). They received a 300-mg oral loading dose (LD) of clopidogrel and platelet reactivity was assessed at 4 hours post-LD using VerifyNow-P2Y12 assay. The results were reported in P2Y12

Reaction Units (PRU), mean PRU change and percent inhibition (%). Platelet function measurements according to genotype were analyzed using independent t-test or one-way ANOVA using SPSS, version 17.0 software (SPSS. Inc., Chicago, Illinois).
RESULTS: Mean BASE platelet reactivity for GM and RM were 299.00 ± 32.60 and 323.31 ± 45.38 PRU, respectively (p=0.167). When treated with 300-mg oral LD, RM had significantly higher mean PRU than GM (226.31 ± 68.20 vs 105.70 ± 63.51 PRU, p<0.001). Mean PRU changes and percent inhibition were the lowest in RM group (97.00 ± 85.88 vs 193.30 ± 60.34 PRU, p=0.007; 29.38 ± 21.67 vs 64.80 ± 19.50%, p=0.001). Gene-dose trend, observed as mean PRU, differed significantly according to number of CYP2C19*2 allele presence (105.70 ± 63.51 in*1/*1 vs 199.13 ± 66.59 in *1/*2 vs 269.80 ± 48.49 PRU in *2/*2; overall p<0.001). The same trend was observed for percent inhibition and mean PRU changes.
CONCLUSIONS: The CYP2C19*2 LoF allele is associated with a marked decrease in platelet responsiveness to clopidogrel in healthy Malaysian volunteers particularly in CYP2C19*2/*2 carriers. As the number of reduced alleles is important, the observed effect warrants a further investigation in a clinical setting as it may be an important contributor to clopidogrel resistance.

Pharmacokinetics/Pharmacodynamics/Drug

23. Novel method to maximize levofloxacin pharmacodynamics for the treatment of systemic gram negative infections based on the population distribution of patient demographics at a community hospital. Andras Farkas, Pharm.D.[1], Catherine Hoffman, MT, ASCP[1]; (1) Nyack Hospital, Nyack, NY
PURPOSE: To develop institution specific LVX dosing guidelines based on the population distribution of patient demographics and the MIC distribution of gram negative bacterial isolates at a community hospital.
METHODS: Previously published pharmacokinetic model incorporating a variety of patient demographics was used in this analysis. Probability of Target Attainment (PTA) at different levels of renal function was established with Monte Carlo Simulation (MCS) for MIC ranges of 0.125–1 μg/mL. Then, Cumulative Fraction of Response (CFR) was calculated targeting a AUC /MIC ratio of at least 125 for PI recommendations. Additionally,administration of LVX at alternative dosing intervals were evaluated to assess their population PTA. The degree of change in drug accumulation with alternative dosing intervals was estimated to assess for it'smagnitude by comparing the median, 5th and 95th percentiles of Cpmin for 750 mg LVX q24 h at CrCl of 51 ml/minute with the median, 5th and 95th percentiles of Cpmin for the alternative dosing regimens at the respective renal function categories.
RESULTS: PI LVX dosing regimens are expected to achieve suboptimal CFR at all renal function categories from 20 to 120 ml/minute. Estimated CFRs showed minimal improvement when LVX regimens with a PTA of 0.9 or more at an MIC of 0.25 μg/mL were compared with regimens reaching a PTA of 0.9 or more at an MIC of 0.5 μg/mL.Drug accumulation due to more frequent dosing intervals is expected to be similar or lower in magnitude at all levels of renal function than the estimated Cmin median,5th and 95th percentiles for the 750 mg LVX q24 h at CrCl of 51 ml/minute.
CONCLUSION: We conclude that for the treatment of gram negative infections to achieve the optimal pharmacodynamic index in our patient population,the PI approved dosing regimens provide insufficient coverage. Moreover, treatment of gram negative infections would require the use of more frequent dosing intervals for isolates with an MIC of 0.5 μg/mL.

25. Comparison of the relative oral bioavailability of tolvaptan administered via nasogastric tube to tolvaptan tablets swallowed intact. Elizabeth B. McNeely, Pharm.D.[1], J. Heyward Hull, Pharm.D., M.S.[1], Kirkwood F. Adams Jr, M.D.[2], Jasmine Talameh, Pharm.D.[1], Brian Simmons, Pharm.D.[1], Jill Henry, Pharm.D.[1], Kim L. R. Brouwer, Pharm.D., Ph.D.[1], J. Herbert Patterson, PharmD, FCCP[3]; (1) University of North Carolina, Eshelman School of Pharmacy, Chapel Hill, NC; (2) University of North Carolina, School of Medicine, Chapel Hill, NC; (3) University of North Carolina, Eshelman School of Pharmacy and School of Medicine, Chapel Hill, NC
PURPOSE: Compare the relative bioavailability and pharmacokinetics (PK) of tolvaptan 15-mg, administered via nasogastric (NG) tube vs orally in healthy adults.
METHODS: In this randomized, two-treatment crossover study, 28 healthy fasted adults (providing 80% power) received two 15-mg single doses of tolvaptan each given with 240 ml of water (one tablet swallowed intact, and one tablet crushed and given by NG tube), with a ≥7-day washout period between doses. During each period, 15 blood samples were collected at designated times for 36 hours and urine output collected for 24 hours after tolvaptan administration. Plasma tolvaptan concentrations were analyzed using a validated LC-MS/MS assay. Individual plasma tolvaptan concentration-time data were analyzed using non-compartmental methods. Relative tolvaptan absorption by the two routes was compared using a repeated-measures, mixed-effects ANOVA. Results for PK parameter estimates were reported as CI90% about geometric-mean ratios.
RESULTS: Of 29 subjects enrolled, 28 completed both periods and were included in the analysis (Table). Although only a modest decrease was seen in Cmax ratio, an ~25% decrease was seen in both AUCt and AUC∞ (but only a 2.8% decrease in 24-hour urine output) after tolvaptan administration by NG tube.

Parameter (n=28)	Geometric means NG ORAL	Ratio (%)	$CI_{90\%}$
AUC_t (ng*hour/mL)[a]	381, 512	74.3	68.1–81.0
AUC_∞ (ng*hour/mL)[a]	391, 527	74.2	68.1–80.9
C_{max} (ng/mL)[b]	77.6, 87.3	88.9	80.1–98.6

[a]areas-under-the-curve to time of last measured concentration & infinity [b] maximum concentration.

CONCLUSIONS: After dedicated NG tube administration of a 15-mg crushed tablet, CI90% for AUCs were not within 80–125%, therefore bioequivalence to an oral tablet cannot be concluded. Nevertheless, with appropriate clinical monitoring, NG tube administration appears to be a viable alternative for tolvaptan administration. Analyses are underway to determine the basis for reduced tolvaptan absorption when given by NG tube.

26. Development of a pharmacokinetic model for oseltamivir in ferrets using iterative two-stage analysis. Kuo-Hsiung Yang, Pharm.D, M.S.[1], Micaela Reddy, Ph.D[2], Chandra Pamulapati, Ph.D[2], Craig R. Rayner, Pharm.D[2], Alan Forrest, Pharm.D[3]; (1) SUNY Buffalo (Buffalo, NY), Hoffmann-La Roche (Nutley, NJ), Rutgers University (Piscataway, NJ); (2) Hoffmann La-Roche (Nutley, NJ), Nutley, NJ; (3) SUNY-Buffalo School of Pharmacy, Buffalo, NY
PURPOSE: Oseltamivir phosphate is an orally available prodrug, and is metabolized to its active species, oseltamivir carboxylate. It is an inhibitor of influenza A and B neuraminidase. Ferrets are useful animal models frequently used in studying influenza. We sought to develop a simple PK model to describe the active metabolite PK in the ferret without explicitly including prodrug in the model.
METHODS: In the extensively sampled PK ferret group, animals were infected with low inoculation doses of A/SZ/406H/06 H5N1 and dosed with 5 or 12.5 mg/kg of oseltamivir free base, while uninfected ferrets were dosed at 5 mg/kg. PK samples were collected at 0, 0.5, 1, 1.5, 2, 4, 6, 8 and 12 hours after dosing. In the sparse PK ferret groups, animals were infected with H5N1 and were dosed either at 0, 12.5, or 25.0 mg/kg twice daily for 5 days. PK samples were collected at 1, 4, 49, and 52 hours after the first dose. The candidate PK model was fitted to the data using iterative 2-stage analysis (ADAPT 5); weighting was by the inverse of

the error variance; model discrimination was by Akaike's information criterion.
RESULTS: The final PK model had a drug administration compartment and two transit compartments (transit rate constant K_t) leading to the appearance (K_a) of active metabolite in the plasma (V_c) and the tissue (V_p) compartments. Distribution (CL_d) and elimination (CL_t) clearances were linear.

	K_t (/hour)	K_a (/hour)	CL_d (L/hour)	CL_t (L/hour)	V_c (L)	V_p (L)
Mean	1.0	0.52	0.15	3.0	0.23	1.8
CV	0.54	0.53	0.15	0.63	0.15	0.17

The overall mean R^2 was 0.84.

CONCLUSION: The PK model proposed fits both rich and sparse PK data well. This simplified model can be used to perform PK/PD analysis and design optimal sampling strategies.

27. Application of pharmacokinetic and pharmacodynamic analysis to support the selection of a 40 mg dose for the immediate-release omeprazole formulation in PA32540. Laurene Wang-Smith, Ph. D.[1], John G. Fort, M.D.[2]; (1) INDAPharma, LLC, Chapel HILL, NC; (2) Pozen, Inc., Chapel Hill, NC
PURPOSE: An investigational product was designed to release IR omeprazole into the stomach, followed by EC aspirin released when the gastrointestinal tract pH exceeds 5.5. Data are limited to determine a gastroprotective dose for immediate-release (IR) omeprazole to be combined with enteric-coated (EC) aspirin in a single tablet intended for patients at risk of aspirin-induced gastric ulcers.
METHODS: A pharmacokinetic and pharmacodynamic analysis was conducted to establish the relationship between plasma exposure to omeprazole and its effect on intragastric pH, using literature data and recent Phase 1 study results from EC omeprazole formulations. The pharmacokinetic measure was mean daily plasma exposure (AUC0 24) to omeprazole following once daily doses of 10, 20, or 40 mg EC omeprazole; the pharmacodynamic measure was the mean/median percent time that gastric pH exceeds 4.0 over 24-hour continuous intragastric pH monitoring following once daily doses of 0 (baseline), 10, 20, or 40 mg EC omeprazole.
RESULTS: The PK-PD relationship can be described by a typical pharmacological Emax model, with the maximal effect estimated as 97.5% time and the baseline effect estimated as 6.9% time with gastric pH >4.0 over 24 hours. The steady-state AUC0 24 of omeprazole required to achieve half the maximal response was estimated to be 2212 hour*ng/mL. This relationship was used to predict the pharmacodynamic measure from an observed AUC0 24 (2187 hour*ng/mL) following once daily doses of a PA32540 tablet containing 325 mg EC aspirin + 40 mg IR omeprazole to be 51.9%, which is consistent with the observed 50.5% time with gastric pH >4.0.
CONCLUSION: A lower IR omeprazole dose (20 mg) in the combination tablet would produce only 33.9% time with gastric pH >4.0 over 24 hours, which may be suboptimal for gastric mucosal protection. The PK-PD analysis supports a 40 mg IR omeprazole dose.

28. Application of a mechanism-based, population pharmacodynamic model on the time-course of platelet aggregation when naproxen and aspirin are administered alone and in combination. Lance Wollenberg, Ph.D.[1], Varsha Iyer, Ph.D.[1], Matt Robson, B.S.[2], Mike Gengo, B.S.[2], Francis M. Gengo, Pharm.D.[2], Michelle Rainka, Pharm.D.[2], Alan Forrest, Pharm.D.[1], Don Mager, Pharm.D., Ph.D.[1]; (1) University at Buffalo School of Pharmacy, Buffalo, NY; (2) Dent Neurologic Institute, Amherst, NY
PURPOSE: To apply a mechanism-based, population pharmacodynamic model to the inhibitory effect of naproxen on the reversible inactivation of cyclooxygenase-1 (COX-1) by aspirin.
METHODS: Two separate, complete three-way crossover studies were conducted. In both studies, eleven patients received 325 mg of aspirin, either 220 or 440 mg of naproxen sodium and co-administration of both naproxen and aspirin. Whole blood platelet aggregometry was utilized to measure the aggregatory response of platelets in the presence of both collagen (1 μg/mL) and arachidonic acid (0.5 mM) at 0, 2, 4, 8, 12, 24, 48 and 72 hours after drug administration. Pharmacokinetic parameters from the literature were utilized to simulate expected concentrations of drug within each subject. Pharmacodynamic modeling of the aggregatory response was analyzed using ADAPT V maximization likelihood expectation maximization (MLEM) algorithm using an additive error model.
RESULTS: Inhibition of platelet aggregation after administration of aspirin occurred at 2 hour and platelet function returned to baseline between 72–96 hour. Following administration of naproxen alone, inhibition of platelet aggregation occurred at 2 hour and platelet function returned to baseline between 8–24 hour. Platelet aggregation after concomitant administration of aspirin and naproxen occurred in 2 hour and returned to baseline function between 12–24 hour. The final pharmacodynamic model was based the turnover of COX-1 (kout) and integrates the irreversible effect of aspirin (K) with the reversible effect of naproxen binding on COX-1 activity. Fitted parameter values for K (0.102 hour-1 (10.3% RSE)) and kout (0.022 (17.1%RSE)), with the standard deviation of inter-individual variability equal to 0.0093 (mg/L)-1•h-1 and 0.006 hour-1 and respectively, were found with the current pharmacodynamic model.
CONCLUSION: A mechanism based-pharmacodynamic model has been applied to a concomitant dose of naproxen and aspirin. This study suggests that naproxen has an inhibitory effect on the time-course of aspirin based anti-platelet effect.

29. Development of a pharmacokinetic population model for atazanavir on a drug user population. Benjamin Guiastrennec, Pharm.D.[1], Alan Forrest, Pharm.D.[1], Qing Ma, Ph.D.[1], Gene Morse, Pharm.D.[1]; (1) University at Buffalo, Buffalo, NY
PURPOSE: Atazanavir (ATV) is one of the most frequently used antiretroviral in the treatment of AIDS. This study primarily aimed to develop a structural pharmacokinetic population model for ATV. Additional analysis focused on the development of a covariate model for an HIV-infected drug user population.
METHODS: A structural model was developed using NONMEM VII on the full profiles of 20 non-HIV infected subjects who were given a single oral dose of ATV/ritonavir (200 ATV measures). The model discrimination was based on the objective function value (OFV), the goodness of fit plots, and parameter estimates. A covariate model was developed using the forward inclusion backward elimination method ($p<0.05$) on a second dataset with 66 HIV-infected subjects (315 ATV measures) who were given atazanavir daily in addition to their pre-existing anti-HIV treatment.
RESULTS: A two-compartment model with first order absorption, lag time, inter-subject variability (ISV) with log-normal distribution and heteroscedastic residual error, was found to be a better fit (R^2 = 97.4 with IPRED) than a one-compartment model with the same properties (−62.4 OFV). Using the HIV-infected population, an effect of ritonavir on the clearance and an inter-occasion variability were added to the model before the covariate selection. Over our primary analysis, numerous covariates were found to have an effect on the clearance and on the first order absorption rate constant ($p<0.05$). However, no significant effect was found on the volume of distribution.
CONCLUSION: Most of the papers found in the literature on ATV describe one-compartment pharmacokinetic models. Our study showed that the pharmacokinetic predictions of ATV concentration could be improved by the use of a two-compartment model and significant covariates especially in a drug user population.

30. Therapeutic drug monitoring in interstitial fluid: a feasibility study using a comprehensive panel of drugs. Tony KL Kiang, Ph. D.[1], Veronika Schmitt, BSc[1], Urs O. Häfeli, Ph.D.[1], Beverly Chua, DVM[2], Mary HH Ensom, Pharm.D., FASHP, FCCP, FCSHP,

FCAHS[3]; (1) Faculty of Pharmaceutical Sciences, The University of British Columbia, Vancouver, BC, Canada; (2) Animal Care Centre, The University of British Columbia, Vancouver, BC, Canada; (3) The University of British Columbia, Children's & Women's Health Centre of British Columbia, Vancouver, BC, Canada

PURPOSE: This study compared drug concentration-time profiles in interstitial fluid (ISF) and blood, using an established animal model and a comprehensive panel of drugs, in order to examine the feasibility of therapeutic drug monitoring (TDM) in ISF and to design alternative drug sampling methods for the clinic.

METHODS: An intravenous bolus of vancomycin (20 mg/kg), gentamicin (50 mg/kg), tacrolimus (0.1 mg/kg), mycophenolate (40 mg/kg), cyclosporine (5 mg/kg), phenytoin (10 mg/kg), phenobarbital (30 mg/kg), valproic acid (50 mg/kg), carboplatin (19 mg/kg), cisplatin (3 mg/kg), methotrexate (15 mg/kg), digoxin (0.02 mg/kg), or theophylline (12 mg/kg) was administered into the ear vein (n=4–6) of rabbits. Serial (0–72 hour post-dose) blood and ISF concentrations (collected via an ultrafiltration probe) were determined by validated analytical assays. Area-under-the curves (AUCs) were generated by non-compartmental pharmacokinetic (PK) analysis.

RESULTS: Vancomycin (mean ± SD, 75.3 ± 3.9 vs 89.8 ± 7.8 μg h/mL), gentamicin (176.1 ± 22.1 vs 188.8 ± 18.3 μg h/mL), and carboplatin (5667.3 ± 716.7 vs 5004.1 ± 836.9 μg h/L) showed no significant difference in AUCs in ISF and blood, respectively. Other AUCs were lower (phenobarbital, valproic acid, cisplatin, methotrexate, digoxin, and theophylline) or not measureable (tacrolimus, mycophenolate, cyclosporine, and phenytoin) in ISF with our extraction technique. When a drug was detectable, a reduced Cmax and increased Tmax were evident in ISF, but their concentration-time profiles were similar between the two matrices (except for gentamicin).

CONCLUSION: Using a comprehensive panel of drugs in a single experimental setting, we have identified agents that can be quantified in ISF. The similarity between concentration-time curves for most drugs in the two matrices suggests feasibility of TDM in ISF. The apparent delayed Tmax can be corrected with pharmacokinetic modeling. Based on these findings, human studies examining feasibility of ISF monitoring are being planned in the clinic. The ultimate goal is to eliminate blood sampling in patients for whom it is difficult.

Pulmonary

31E. Long-term safety of budesonide/formoterol pressurized metered-dose inhaler and budesonide pressurized metered-dose inhaler in African-American patients with asthma: asthma exacerbations and adverse events. Randall W. Brown, M.D., MPH[1], Tom Uryniak, M.S.[2], Kathy L. Lampl, M.D.[2]; (1) Center for Managing Chronic Disease, University of Michigan, Ann Arbor, MI; (2) AstraZeneca LP, Wilmington, DE

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Rheumatology

32E. Adverse events in patients with blood loss: a pooled analysis of 51 clinical studies from the celecoxib clinical trial database. George H. Sands, MD[1], Briton Shell, PhD[1], Richard Y. Zhang, PhD[1]; (1) Pfizer Inc, New York, NY

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33. Response to nonsteroidal anti-inflammatory drugs in African American subjects with osteoarthritis of the knee. Margaret Noyes Essex, Pharm.D.[1], Michael A. O'Connell, M.D.[1], Pritha Bhadra, Ph.D.[1]; (1) Pfizer Inc, New York, NY

PURPOSE: Celecoxib is an effective treatment for osteoarthritis (OA); however, its efficacy and safety profile in African-Americans has not been specifically studied. Differences in therapeutic response between racial/ethnic populations are reported in other diseases but have not been thoroughly investigated in OA. This study was designed to compare analgesic efficacy, tolerability, and safety of celecoxib, naproxen, and placebo in an African American population with OA of the knee.

METHODS: African American subjects aged ≥45 years with OA of the knee in a flare state were randomized in a double-blind, parallel-group trial to receive celecoxib 200 mg qd, naproxen 500 mg bid, or placebo for 6 weeks. The trial had a non-inferiority design. Primary end point was change from baseline in the Patient's Assessment of Arthritis Pain. Secondary efficacy outcomes included other measures of pain, functionality, and quality of life assessments, evaluation of safety and upper gastrointestinal (UGI) tolerability.

RESULTS: Of 322 subjects [80% female, mean age 58 years (range 45–83), mean duration of OA >5 years] were randomized, 69 discontinued prematurely. For the primary end point, celecoxib was shown to be as effective as naproxen in reducing OA pain. Similar efficacy between celecoxib and naproxen was observed in secondary outcomes (Patient's Global, Physicians' Global, WOMAC, APS). Improvements in primary and secondary outcome measures were numerically greater in the active treatments compared with the placebo groups; however, few of these improvements reached statistical significance. Celecoxib demonstrated favorable UGI tolerability compared to naproxen; fewer subjects experienced moderate/severe nausea, abdominal pain or dyspepsia.

CONCLUSION: Celecoxib was as effective as naproxen in relieving pain associated with OA of the knee in African American patients in a trial designed to evaluate this population. Few significant differences were observed between the active treatments and placebo, possibly due to a strong placebo effect or differences in flares.

Substance Abuse/Toxicology

34E. Pathways to prescription opioid addiction. Beth A. Sproule, BScPhm, Pharm.D.[1], Bruna Brands, Ph.D.[2]; (1) Centre for Addiction and Mental Health and University of Toronto, Toronto, ON, Canada; (2) Health Canada and University of Toronto, Toronto, ON, Canada

Presented at College on Problems of Drug Dependence, 72nd Annual Meeting, Hollywood, Florida, June 2011.

AMBULATORY CARE

Clinical Pharmacy Forum

37. Implementation of a diabetes risk reduction program in a community health center. Molly Howard, Pharm.D., Candidate[1], Rachel Selinger, Pharm.D., BCACP[1], Jeana Partington, M.S., Candidate, BSN, RN, CPHQ[2]; (1) Piedmont Health Services, Inc., Carrboro, NC; (2) The Carolinas Center for Medical Excellence, Cary, NC

PURPOSE: The purpose of this project was to target at-risk patients with diabetes at a community health center in North Carolina in order to decrease their risk for future complications. The project was part of the Health Resources and Services Administration's Patient Safety and Clinical Pharmacy Services Collaborative. An intensive interdisciplinary team-based model was utilized, focusing on the identified individualized needs of each patient. The objective of this intensive health management model was to embed the concept of regular contact in the patient's routine in order to reinforce diabetic education and sustain the patient's engagement in his or her own care.

METHODS: The population of focus was those patients with Type II diabetes whose last HgbA1c was >9% and who had not been seen at the center for six months or more. The initial telephonic patient contact was conducted by the case manager who provided education and scheduled a patient visit to the center. Patient encounter at the center included clinical pharmacy time to conduct medication therapy management, medication adherence counseling, and insulin titration.

RESULTS: Data were collected from September 2010 through August 2011. Thirty patients from one physician's panel were identified for inclusion in this care model. The percentage of patients with HgbA1c >9% went from 100% in October to 59.4% in August, demonstrating a 40% decrease in patients with severely uncontrolled diabetes.
CONCLUSION: The improved outcomes evidenced through the use of an intensive interdisciplinary care management model, including clinical pharmacy services for high-risk patients with diabetes in this community health caner, has been sustained and has the potential for individualized spread to the other five centers within the system. These results indicate the significance of clinical pharmacy services in the management of those who are at high risk for complications as a result of having diabetes.

38E. Collaborative efforts between inpatient and ambulatory care pharmacists through the continuum of care in a small rural critical access hospital and clinic. Mariette Sourial, Pharm.D.[1], Patricia Lind, Pharm.D.[2]; (1) Palm Beach Atlantic University, Gregory School of Pharmacy, West Palm Beach, FL; (2) FirstLight Health System, Mora, MN
Presented at Presented at The Cornerstones of Rural Health, Minnesota Rural Health Conference, Duluth, MN, June 27–30, 2011.

39. Effect of intrathecal bupivacaine lidocaine combination on motor block,analgesia period and side effect profile. Saram Amin[1], Manal. h El-Hamamsy[2], Aza Abd-El Alim[2]; (1) Ain Shams Universitty (cairo,egypt), Cairo, Egypt; (2) Ain-Shams University, Egypt
PURPOSE: Assessing the effect of intrathecal Bupivacain-Lidocaine combination at different doses of Lidocaine (6 and 12 mg) on the onset &recovery of anesthesia; times to retain motor ability, postoperative analgesia required, the hemodynamic side effect & neurological complications especially transient neurological symptoms (TNS).
METHODS: Ninety patients who were scheduled for elective lower abdominal, anal surgery& Knee arthroscopy under spinal anesthesia were randomly allocated into three equal groups (30 patients each)Group I (control group): 1.5 ml hyperbaric 0.5% Bupivacaine + 0.6 ml saline). Group II:[1.5 ml hyperbaric 0.5% Bupivacaine + 0.6 ml 1% Lidocaine (6 mg)]. Group III: [1.5 ml hyperbaric 0.5% Bupivacaine + 0.6 ml 2% Lidocaine (12 mg)]. Peak sensory block level, times to peak sensory block, times to two-segment regression, S2 regressions from peak sensory block, motor blocks at peak sensory block & total motor block duration,PACU time, analgesia time,analgesia consumption, hemodynamic side effect & neurological complication were measured.
RESULTS: The median height of peak sensory block in Group III was higher than in Groups I or II. Times to two-segment regressions and S2 regressions from peak sensory block, motor block duration and PACU time were significantly reduced in Group II compared to Group I & III. No patient required general anesthesia. No patients experienced postdural puncture headache, TNS or other side effect.
CONCLUSION: 0.6 ml 1% Lidocaine (6 mg) mixed to spinal 1.5 ml hyperbaric 0.5% Bupivacaine (7.5 mg) can shorten the duration of Bupivacaine spinal anesthesia, therefore provide more rapid recovery from the spinal anesthesia

40. Building a home care medication therapy management practice at a visiting nurse agency. Shannon Reidt, Pharm.D., MPH[1], Jenifer L Morgan, Pharm.D.[1]; (1) University of Minnesota College of Pharmacy, Minneapolis, MN
PURPOSE: The purpose of establishing a home care medication therapy management (MTM) program at the Minnesota Visiting Nurse Agency (MVNA) was to create a practice integrated within the home care practice model to serve the medication-related needs of home care patients.
METHODS: Patients taking nine or more medications (including over the counter and herbal products) were offered a pharmacist home visit in which the pharmacist evaluated all medications for indication, effectiveness, safety, and convenience. Recommendations were communicated to clinicians and follow-up care was coordinated by the pharmacist, home care nurse, patient, and caregiver.
RESULTS: From January 1, 2009 to December 31, 2010, 165 patients received an MTM visit. The average patient was 61 years old, had seven medical conditions, took 15 medications and had three medication-related problems. The most common medication-related problems were related to convenience (37%) and indication (29%). Sixty-eight percent of recommendations made to clinicians were accepted while 29% were addressed at a subsequent appointment.
CONCLUSION: Integrating MTM home visits at MVNA allowed the pharmacist to conduct thorough medication evaluations, improving medication use and helping to keep patients safely in their homes. Providing services in homes allowed the pharmacist to understand environmental factors affecting a patient's ability to adhere to a medication regimen. Collaboration between clinicians, home care nurses, and the pharmacist was critical to the implementation of medication changes and therefore, the program's success.

41. Pharmacist Involvement in Management of Challenging Diabetes Patients in a Rural Clinic Group. Renee McCafferty, Pharm.D[1]; (1) University of Charleston, Charleston, WV
PURPOSE: Diabetes mellitus is a chronic disease which is common, especially in rural United States. Drug therapies required to treat DM are often complex. Multidisciplinary team health care has clearly been shown to enhance outcomes in diabetes treatment. The incidence of diabetes is high in many rural populations where team health care is less available to the patient. This project demonstrates a model of team health care for diabetes in rural West Virginia which has had a high rate of success.
METHODS: The pharmacist member of the team contributes to the patient's care with at least three core elements: basic diet counseling, glucose monitoring instructions and collaborative medication adjustments. Communication between pharmacist and physician, as well as other health care personnel, occurs through the electronic health record, by telephone and in person. The health care organization has multiple clinic locations within a 25 minute radius, each of which refers diabetic patients to the clinical pharmacist located at the central clinic. Patients are scheduled for consultation visits with the pharmacist with number and frequency of the visits being determined by therapy needs of the patient. The patient continues meeting with the pharmacist until two primary therapeutic purposes are met: achievement of HbA1c as low as possible without the occurrence of hypoglycemic events.
RESULTS: Between August 2010 and August 2011, 32 patients completed the program. Each of these patients improved with an average beginning HbA1c of 10.64% and average ending HbA1c of 7.72%.
CONCLUSION: This clinical pharmacist program for the management of difficult-to-manage diabetics involves not only diabetes education, but also collaborative medication adjustment with a high rate of success with rural patients being referred from affiliated clinics in the area.

42. Evaluation of a pharmacist-managed smoking cessation clinic. Kathy E. Komperda, Pharm.D.[1], Jaini Shah, B.S., Pharm.D.[1], Jill S. Borchert, Pharm.D., BCPS, FCCP[1], Brooke L. Griffin, Pharm. D.[1]; (1) Midwestern University Chicago College of Pharmacy, Downers Grove, IL
PURPOSE: At Mercy Family Health Center, a smoking cessation clinic is managed by the clinical pharmacists in collaboration with physicians. The group program is based on the "Courage to Quit" program designed by Respiratory Health Association of Metropolitan Chicago. The participants progress through six sessions over seven weeks. Each session is designed to teach participants the fundamentals of behavioral and pharmacotherapy for smoking cessation. Pharmacotherapy is selected for each participant based on medical history, smoking history, past quit attempts, and financial status. All patients who attended the class have been followed via

monthly phone calls. The aim is to describe abstinence rates for patients in the smoking cessation clinic.
METHODS: A retrospective chart review of all patients who attended the pharmacist-managed smoking cessation clinic since implementation in September 2009 was conducted. Patient demographics including age, gender, tobacco history were collected. Point prevalence and continued abstinence rates at 1, 2 weeks; 1, 3 and 6 months; and 1 year were collected. Not all participants have fully completed one year past their quit date; abstinence rates are determined based on the number of patients who have surpassed that time point since their original quit date.
RESULTS: Twenty-three patients have participated since implementation. Approximately 65% were female with an average age of 59.7 years. The 1 month, 3 month, 6 month and 1 year point prevalence rates were 65.2% (n=23), 66.7% (n=18), 55.6% (n=18), and 77.8% (n=9), respectively. The 1 month, 3 month, 6 month and 1 year continuous abstinence rates were 43.5% (n=23), 38.9% (n=18), 33.3% (n=18), and 44.4% (n=9), respectively.
CONCLUSION: This group smoking cessation program managed by pharmacists has maintained long-term abstinence rates. Collaboration with physicians allows the pharmacists to offer pharmacological therapy to participants in addition to behavioral modification counseling through the "Courage to Quit" curriculum.

Cardiovascular

43. Inappropriate dosing eptifibatide in renally insufficient, cardiology patients. Shannon Ludwig, Pharm.D.[1], Maureen Ghanem, Pharm.D.[2], Kyle Ludwig, Pharm.D., BCPS[1], Jack Morshazadeh, M.D.[3]; (1) University of Missouri Health Care, Columbia, MO; (2) University of Utah Hospital, Salt Lake City, UT; (3) University of Utah Hosptial, Salt Lake City, UT
PURPOSE: The American College of Cardiology and the American Heart Association (ACC/AHA) recommend that antiplatelet therapy be utilized for patients with acute coronary syndrome. The glycoprotein (GP) IIb/IIIa inhibitor, eptifibatide has renal dosing recommendations in the package inserts, as well as dosing recommendations in a variety of guidelines. We conducted a retrospective analysis to determine the incidence of inappropriate dosing of eptifibatide in cardiology patients with decreased renal function and adverse effects.
METHODS: After IRB approval, we performed a historical cohort study which included all adult cardiology patients with serum creatinine of 1.3 mg/dl or more and received eptifibatide between January 1, 2007 and April 1, 2010 (n=59). The electronic medical records were reviewed to collect dating including patient demographics, medication dosage, and data related to bleeding complications. Excessive dosing was defined as dosing >1 μg/kg/minute in patients whose creatinine clearance was calculated to be <50 ml/minute per Crockcoft-Gault equation.
RESULTS: There was no difference in baseline demographics. The percentage of patients excessively dosed on eptifibatide was 44.1% (26 out of 59 patients). The baseline demographics were similar (mean ± SD). The serum creatinine was 1.83 ± 0.6 mg/dl for excessively dosed patients (ED) and 1.91 ± 0.55 mg/dl for appropriate dosing (AD). The rate of infusion for the excessively dosed patients was 1.93 ± 0.3 μg/kg/minute. The patients experienced similar rates of hemorrhagic complications (42.4% AD vs 50% ED). Most common adverse effect was a decrease in hemoglobin of >2 g/dl. The number of patients experiencing overt bleeding was four in AD and five in ED patients. Two of the ED patients ultimately died.
CONCLUSION: Patients with renally insufficiency are often excessively dosed with eptifibatide. This dosing did not appear to increase the risk of hemorrhagic complications.

Clinical Administration

44. Pharmacist reporting of antimicrobial interventions post antimicrobial stewardship implementation. Sara Al-Dahir, Pharm. D., BCPS[1], Fatima Brakta, Pharm.D.[1], Jessica L. Johnson, Pharm. D., BCPS[1], Kathryn Cardwell, Pharm.D.[2], Kendrea Bryant, Pharm. D.[1]; (1) Xavier University of Louisiana, New Orleans, LA; (2) Louisiana State University, New Orleans, LA
BACKGROUND: An Antimicrobial Stewardship Program (ASP) is a team-based multidisciplinary approach to enhancing utilization of antimicrobials. According to the Infectious Diseases Society of America (IDSA) and the Society for Healthcare Epidemiology of America (SHEA), an appropriate ASP is one whose primary goal is to "optimize clinical outcomes while minimizing unintended consequences of antimicrobial use, including toxicity, the selection of pathogenic organisms and the emergence of resistance." The role of the ASP clinical pharmacist includes optimizing antibiotic regimens through: prospective audits of antimicrobial usage, drug information, de-escalation of therapy, dose optimization, and intravenous to oral conversions. In January of 2011, a multidisciplinary ASP was established at Interim Louisiana Hospital (ILH), a center of excellence teaching institution that provides medical care to indigent and uninsured patients in the New Orleans area.
PURPOSE: The purpose of this study is to evaluate the impact of clinical pharmacy team on the frequency and categories of antimicrobial interventions. A secondary outcome will be to determine the cost-savings benefit of the ASP team and stabilization of microbial resistance patterns.
METHODS: Antimicrobial interventions that were reported in the year of 2010, prior to ASP implementation, and 2011, post ASP implementation, will be obtained from Pharmacy OneSource® Quantifi®. Pharmacy OneSource® Quantifi® is a hospital based software that records interventions per pharmacist per day. The frequency of antimicrobial interventions per drug class will be compared using descriptive statistics and a Fishers Exact analysis using SPSS19. The cost savings impact of ASP implementation will be determined by evaluating pharmacy-purchasing data. Cost data will be compared using hospital wide and patient day utilization of antibiotics. Finally, microbial resistance patterns comparing the 2010 and 2011 antibiograms will be analyzed using ANOVA analysis to determine if the ASP initiative has contributed to stabilization of resistance patterns.
RESULTS: Pending.
CONCLUSION: Pending.

Geriatrics

45. Utilization review of frail Geriatric patients with Diabetes Mellitus in a pace program (program of all inclusive care for the elderly). Ushma A. Desai, Pharm.D., Candidate, 2013[1], Karen M. McGee, Pharm.D., CDE[1]; (1) South Carolina College of Pharmacy, Columbia, SC
PURPOSE: Treatment guidelines are difficult to apply to frail geriatric diabetic patients. The primary purpose of this retrospective cross-sectional chart review is to facilitate the generation of a feasible protocol for the care of geriatric diabetics at all inclusive-care day facilities. Objectives for this managed care program are (a) to evaluate how well the care of frail diabetic patients complies with the American Geriatric Society (AGS) Guidelines (2) to identify why frail elders often fail to use certain medications recommended by practice guidelines (3) to review the impact that diabetes has on the ability of frail elderly patients to reach goals.
METHODS: Plans of care for 70 diabetics were evaluated in compliance with the AGS guidelines. The care environment for these patients is a PACE (Program of All Inclusive Care for the Elderly) program that provides comprehensive health services for frail elderly participants to maintain them in the community, and out of nursing homes and hospitals. Data collection included assessments according to the American Diabetes Association Standards of Care 2011, polypharmacy, and geriatric syndromes. Participants' care plans were also reviewed for use of specific medications recommended in the AGS guidelines.
RESULTS: The seventy patients assessed were an average of 73 years old and were prescribed an average of 8.75 medications. Seventy-four percent of participants had a calculated creatinine clearance of less than 50 ml/minute classified as stage 3–5 chronic

kidney disease. Therefore, majority of patients require medication dose adjustments.
CONCLUSION: The PACE program allows geriatric diabetics to meet goals established in the American Geriatric Society guidelines. Frail elders often cannot tolerate medications recommended in the guidelines due to poly-pharmacy, co-morbidities, and other contraindications. These problems often affect treatment options in diabetic geriatric patients. Finally, initiation of specific drug therapies requires analysis of patient's renal function, adverse effects, drug-interactions, and life expectancy.

Health Services Research

46. Implementing a clinical pharmacy service in palliative care in a comprehensive cancer center in the Middle East. Sewar S. Alsalmany, MSc, BCPS[1], Lama H Nazer, Pharm.D, BCPS[1]; (1) King Hussein Cancer Center, Amman, Jordan
PURPOSE: There is limited data in the literature regarding the implementation of a clinical pharmacy service in palliative care in the Middle East. We describe our experience with implementing a palliative clinical pharmacy service at a comprehensive teaching cancer center in Amman, Jordan. In addition, we report on the impact of this service on patient care.
METHODS: In 2005, a pharmacist with clinical background was assigned to lead the palliative clinical pharmacy service. She started by receiving didactic and clinical training in the area of palliative care from local and international experts. The following year, she was appointed as a full time palliative care pharmacist. She attended daily interdisciplinary rounds, reviewed medical profiles, developed pharmaceutical care plans, conducted medication reconciliation, and provided bedside patient education upon admission and at discharge. Two years later, the palliative clinical pharmacy service was expanded to cover the palliative outpatient clinics, where the pharmacist directly interacted with the patients to enhance compliance with their medications. Other responsibilities include a wide range of educational, and research activities.
RESULTS: Five years after introducing the palliative clinical pharmacy service, the palliative care team continues to view the pharmacist as an essential member. About 500 patients per year are referred to the palliative service and about 450 patients per year are admitted to the hospital under their service. Over the 5 years, a total of 3452 interventions were reported and the physician acceptance rate was >95%. The most common were drug therapeutic recommendations (n=1209, 32%), patient counseling/drug information (n=761, 22%) and dose evaluation/adjustment (n=527, 15%).
CONCLUSION: In a country with limited resources, the implementation of a clinical pharmacy service in palliative care was feasible. In addition, the presence of a palliative clinical pharmacist had a significant impact on optimizing the therapeutic management of patients.

47E. Successes and challenges of clinical pharmacist practitioners in north carolina. Jonathan C. Hale, B.S.[1], Timothy J. Ives, Pharm.D., MPH, BCPS, FCCP, CPP[1]; (1) University of North Carolina, Eshelman School of Pharmacy, Chapel Hill, NC
Presented at American Pharmacists Association Annual Meeting, New Orleans, LA, March 9–12, 2012.

Hematology/Anticoagulation

48. Evaluating the effectiveness of a bivalirudin titration protocol in achieving therapeutic anticoagulation levels. Connie H. Yoon, Pharm.D.[1], Carla Williams, Pharm.D.[2], Mehrnaz Pajoumand, Pharm.D.[2], Jason Chui, Pharm.D.[2], Daniel Herr, M.D.[2]; (1) University of Maryland School of Pharmacy, Baltimore, MD; (2) University of Maryland Medical Center, Baltimore, MD
PURPOSE: Bivalirudin has been evaluated in retrospective studies for indications outside of the setting of percutaneous intervention (PCI). Titration guidelines for non-PCI use are unavailable at this time, therefore, in 2008, this institution implemented a dosing protocol for bivalirudin. We hypothesized that the use of a standardized protocol would lead to a more rapid achievement and improved maintenance of therapeutic levels.
METHODS: A retrospective chart analysis was conducted for patients who received bivalirudin prior to implementation of the protocol (PP) (January 2005-March 2008) and after implementation (AP) (April 2008-June 2010). The bivalirudin dosing protocol is as follows: for aPTT <30 seconds, increase by 50%; for aPTT 31–46 seconds, increase by 25%; for aPTT 47–76 seconds, no change; for aPTT 77–100 seconds, decrease by 25%. The aPTTs are monitored every 2 hours. Patients were included in the study if they were $\geq$ 18 years of age and received bivalirudin for $\geq$ 24 hours. Subjects were excluded if bivalirudin was prescribed for PCI or perioperative use. Data collected included: time to first therapeutic aPTT, aPTTs at 24 and 48 hours, and bleeding episodes.
RESULTS: Fifty-nine patients were evaluated. The average initial dose in the PP group (n=16) was 0.10 ± 0.12 mg/kg/hour vs 0.08 ± 0.10 mg/kg/hour in the AP group (n=43) (p=0.29). The AP group reached therapeutic aPTTs 2.3 hours sooner than the PP group (10.23 ± 26.7 and 7.99 ± 22.0 hour) (p=0.30). Although both groups were therapeutic at 24 hours, only the AP group was therapeutic at 48 hours (83.7% of AP group vs 43.8% PP group; p=0.004). More bleeding was documented for the PP group compared to the AP group (25% vs 16.3%; p=0.44).
CONCLUSION: Utilization of a standardized titration protocol for bivalirudin may lead to more rapid achievement of therapeutic levels and leads to persistent attainment of goal aPTTs.

49. Characteristics associated with consistently therapeutic International Normalized Ratios. Amanda S. Thompson, Pharm. D.[1], Brian Peek, Pharm.D.[1], Angela Porter, Pharm.D.[1]; (1) Asheville Veterans Affairs Medical Center, Asheville, NC
PURPOSE: To establish patient characteristics associated with an increased likelihood of an International Normalized Ratio (INR) in therapeutic range.
METHODS: A total of 200 patients who had anticoagulation therapy monitored at the Charles George VA Medical Center (CGVAMC) for 6 months with an INR range of either 2–3 or 2.5–3.5 were retrospectively reviewed. Characteristics evaluated for influence on INR stability included age >70, gender, primary indication for anticoagulation therapy, INR target range, diabetes mellitus, hypertension, heart failure, prior venous thrombosis, concomitant use of antibiotics, and number of concomitant medications.
RESULTS: A statistically significant difference was found showing greater INR stability in patients without diabetes in comparison to patients with diabetes (59 ± 16 vs 54 ± 17, p=0.0183). A multivariate regression analysis demonstrated concomitant use of antibiotics had a negative impact on INR stability. In patients >70 years old, a trend toward INR stability was shown in comparison to patients <70 years of age (59 ± 16 vs 54 ± 17, p=0.0532). No association with heart failure and INR stability was found.
CONCLUSION: Absence of diabetes can be used to identify patients eligible for extended monitoring intervals as this patient population was shown to have greater INR stability measured by number of visits with INR in therapeutic range. Recent evaluations suggest warfarin can remain the most cost effective anticoagulation regimen despite newer therapies that do not require monitoring. This study contributes to the basis for evaluating optimization of warfarin monitoring intervals which allows health systems to define cost effective alternatives to newer therapies. This material is the result of work supported with resources and the use of facilities at the Charles George VA Medical Center, Asheville, NC.

50. Evaluation of an argatroban nomogram for heparin-induced thrombocytopenia. Alexandra T. Centeno, Pharm.D.[1], Marta A. Miyares, PharmD[1], Ennie Cano, Pharm.D.[1], William Wolowich, Pharm.D.[2]; (1) Jackson Memorial Hospital, Miami, FL (2) Nova Southeastern University, Ft. Lauderdale, FL

PURPOSE: To evaluate clinical and laboratory outcomes of an argatroban nomogram in patients with confirmed or suspected heparin-induced thrombocytopenia (HIT).
METHODS: A retrospective cohort study was conducted at a large tertiary teaching hospital comparing patients treated according to an argatroban nomogram vs control. The control arm consisted of patients treated without a nomogram-based approach. Primary efficacy outcomes were the percentage of patients with therapeutic, supratherapeutic and subtherapeutic activated partial thromboplastin times at predetermined time intervals. Additional outcome measures were median time to stabilization and number of dose adjustments in each group. The incidence of thrombotic events, major and minor bleeding were also assessed. A subgroup analysis of critically-ill patients and those receiving fondaparinux was conducted.
RESULTS: Forty-nine patients were included, 31 in the nomogram and 18 in the control group. At 24 hours, fewer patients in the nomogram group were supratherapeutic, 3 (10%) vs 5 (36%), p=0.04. Median time to dose stabilization was 8 hours in the nomogram group vs 6 hours in the control group, p=0.33. The total number of dose adjustments in the nomogram vs control groups were 1.4 vs 0.4 respectively, p=0.02. No significant difference was observed in thrombotic or bleeding events between the nomogram vs control groups, thrombotic events 2 vs 0, p=0.12; major bleeding 1 vs 2, p=0.28; minor bleeding 4 vs 2, p=0.66, respectively. In the subgroup analysis of critically-ill patients, 2 (10%) vs 4 (44%) were supratherapeutic at 24 hours in the nomogram vs control groups respectively, p=0.005. The average fondaparinux to warfarin overlap was 2.6 days. No bleeding or thrombotic events were documented while on fondaparinux.
CONCLUSION: The implementation of an argatroban nomogram proved to be safe and effective, providing an effective tool for dosing and monitoring patients with HIT.

Infectious Diseases

51. Impact of pharmacist intervention on influenza vaccination rates. Jennifer H. Austin, Pharm.D.[1], Michael E. Wright, Pharm. D., BCPS[2], Rola M. Franks, Pharm.D., BCPS[3], Allison D. Provine, Pharm.D.[1]; (1) University of Chicago Medical Center, Chicago, IL; (2) Vanderbilt University Medical Center, Nashville, TN; (3) Franklin Woods Community Hospital, Johnson city, TN
PURPOSE: Influenza vaccination rates are a quality metric used to compare hospitals across the United States on the quality of care provided to their patients. Influenza vaccination rates at Emory University Hospital (EUH) were below average compared to other institutions in the Atlanta area and nationwide. In order to provide the best patient care possible and retain our status as a provider of high quality patient care, this project sought to implement an intervention to increase the compliance with this core measure at the institution.
METHODS: Adult patients who were admitted to EUH in November 2010 and refused an influenza vaccination were included in this pilot study. Patients were identified by a computer-generated report. Each patient was provided an influenza vaccine informational handout and counseled on the importance of vaccination by a pharmacy resident. If the patient decided to receive the influenza vaccine at that time, a new order was entered for a dose to be given that day. The interaction with the patient was documented in the electronic medical record (EMR), which included the reason for vaccination refusal.
RESULTS: Overall a total of 69 patients were identified as having refused the influenza vaccine and were counseled on the importance of vaccination. Of these, 23 (33%) patients consented to receive the vaccine, and an order was placed. Six patients were identified who had already received the influenza vaccine earlier in the season, and proper documentation was subsequently recorded in the EMR. Despite counseling, 33 patients still declined vaccination.
CONCLUSION: Pharmacists were able to increase the influenza vaccination rate during the pilot period by increasing awareness of the importance of the vaccination. Of patients who were documented as refusing vaccination, 33% were vaccinated after pharmacist intervention and 42% had proper documentation of vaccination status.

Managed Care

52. Descriptive Analysis of Quality Outcomes for Primary Care Clinical Pharmacy Service (PCCPS) Interventions. Rachel MF Heilmann, Pharm.D.[1], Stephanie M. Campbell, Pharm.D.[1]; (1) Kaiser Permanente Colorado, Denver, CO
PURPOSE: To investigate alternative methods for capturing value of Primary Care Clinical Pharmacy Service (PCCPS) at Kaiser Permanente Colorado utilizing documented clinical outcomes in the literature and applying them to PCCPS specialists daily interventions.
METHODS: A Quality Committee was formed to explore novel ways to capture value associated with PCCPS daily interventions that included impact on quality based outcomes. The committee focused on three main intervention types: hypertension, hyperlipidemia, and osteoporosis. In 2010, 3891 patients were identified from an internal database and were matched to pre-designated goals for each disease state: blood pressure <140/90, LDL decreased by 40 mg/dl, or initiation of an anti-osteoporotic drug. Utilizing available peer-reviewed literature and reported costs for cardiovascular procedures, heart attacks, strokes, and fractures prevented, the economic impact was calculated for patients that met the respective disease state metric. Mortality reduction was also analyzed for hypertension.
RESULTS: PCCPS achieved blood pressure <140/90 in 3334 patients resulting in a predicted 125 cardiovascular events and eighty deaths avoided over ten years and five strokes avoided per year. Sixty-five patients on statin therapy achieved >40 mg/dl LDL reduction resulting in a predicted two major cardiovascular or cerebrovascular events avoided per year. Anti-osteoporotic drugs were initiated in 492 patients >65 years old status post-fracture resulting in a predicted fifty-six fractures avoided (six hip, thirty-six vertebral, fourteen non-vertebral). A $919,000 annualized return on investment, defined as economic impact of event avoidance minus significant treatment costs of intervention, was calculated ($593,000 hypertension, $38,000 hyperlipidemia, $288,000 osteoporosis).
CONCLUSION: Utilizing available literature and reported costs, PCCPS interventions can have a favorable quality outcome and economic impact on hypertension, hyperlipidemia, and osteoporosis.

53. Improving the performance measures of medical therapy in patients with acute myocardial infarction by pharmacist. Meng-Xian Huang[1], Ting-Ting Wu[1], Shin-Chia Tsai[1], Yu-Mei Lin[1], Wuan-Jin Leu, M.S.[1]; (1) Department of Pharmacy, Shuang Ho Hospital, Taipei Medical University, New Taipei, Taiwan
PURPOSE: According to the 2008 ACC/AHA guideline of Performance Measures for Acute Myocardial Infarction (AMI), the use of five drugs, aspirin at arrival, and aspirin, clopidogrel, β-blocker, angiotensin-converting enzyme (ACE) inhibitor, and statin at discharge, can reduce reinfarction and mortality. We initiated an intensive intervention by pharmacist which aims to improve the prescription rate of the five drugs in post-MI patients.
METHODS: For June to December 2011, the cardiology team in our institution initiated intensive program to achieve the disease-specific care certification of AMI. A pharmacist involved in the team will determine whether the five drugs were all prescribed to the AMI inpatients without contraindication, and will remind the physician if there was an omission on prescription. Patient education was also provided to maintain the treatment compliance after discharge. We then compared the prescription rates of the five drugs before and after the intervention. Data before the intervention were obtained from the pharmacy record between January 2010 and May 2011. Subjects were excluded if they were

contraindicated to one of the five drugs, expired, transferred to another hospital, admitted from other hospital.
RESULTS: 354 patients were included in this analysis (226 in before and 129 in after group). The prescription rates of aspirin at arrival were 100%, in both before and after intervention. The prescription rates at discharge of aspirin, clopidogrel, ACEI, β-blocker and statin before intervention were 98.3%, 90.9%, 95.2%, 90%, respectively, and were all improved to reach 100% after intervention.
CONCLUSION: The prescription rate in the present study were fairly high than previous reports which may due to excluding patients from our data who have contraindication to drugs. This also demonstrated a great effect of performance measure of medical therapy in AMI via a strict management from a multidiscipline team including pharmacist.

Medication Safety

54. Does meperidine still have a place in pain control? The evaluation of meperidine use in adult patients in a teaching hospital. Fang-Tzu Hsu[1], Ting-Ting Wu[1], Hsin-Chia Tsai[1], Ting-Ting Huang[1], Ching-Hsuan Tsao[1], Meng-Hung Chen[1], Yu-Mei Lin[1]; (1) Taipei Medical University – Shuang Ho Hospital, New Taipei City, Taiwan
PURPOSE: Due to concerns about meperidine drug interactions and its metabolite normeperidine neurotoxicity, Taiwan FDA has issued "Meperidine Guideline" in order to reduce the use of meperidine as a first-line agent for analgesia in September, 2011. The study is designed to reduce meperidine use by means of providing physician education and pharmacist intervention.
METHODS: The study was executed at the Orthopedics Department in Shuang-Ho hospital in Taiwan. We included inpatients who received at least one dose of parenteral morphine or meperidine between September and December, 2011. Physician education and pharmacist intervention were provided. The study duration was divided into three periods: pre-education, post-education, and paharmacist intervention period. We compared the number of doses ordered between three periods, and assessed the change of pain score and respiration rate in whole period between two opioids.
RESULTS: The number of meperidine doses ordered was shown to decline by 18.1% (45.1–27%) in the post-education period. During the pharmacist intervention period, the number of meperidine doses ordered was decreased by an additional 2%. Physician acceptance rate of pharmacist recommendations were reached to 89.47%; 17 out of 19 pharmacist's recommendation of morphine usage were accepted. The changes in pain score and repiratory rate between meperidine and morphine in all periods were statistically equivalent with p-value of 0.74 and 0.47, respectively.
CONCLUSION: The changes in pain score and respiratory rate indicate that the effectiveness and respiratory inhibition of two opioids are not significantly different. Given the fact that neurotoxicity is associated with normeperidine, meperidine is not an appropriate first-line narcotic for pain management. Pharmacists have the responsibility to modify the habitual prescription with appropriate rationale. Pharmacists' active involvement in the collaborative care of patients with pain control has reduced the use of meperidine, and the possible risk of neurotoxicity as well.

55. Secure Messaging for Medication Reconciliation Tool (SMMRT): A "smart" approach to post-discharge medication reviews. Leonie Heyworth, M.D.[1], Allison M. Paquin, Pharm.D.[1], Max Stewart[1], Thomas Marcello[1], Tracey Martin, RN, BSN[1], Cliona Archambeault, MBA[2], Steven R. Simon, M.D., MPH[1]; (1) VA Boston Healthcare System, Boston, MA; (2) New England Veterans Engineering Resource Center (VERC), Boston, MA
PURPOSE: Medications frequently change during a hospital stay and are a key component of discharge plans. At home, patients may be nonadherent, confused about medicines, or experience drug-related problems. Adverse drug events (ADE) are among the most common healthcare-associated adverse events and often occur following a hospitalization. Additionally, lag time prior to primary care follow-up leaves patients vulnerable after discharge. The objective of this study is to design and pilot pharmacist-facilitated medication reconciliation via secure messaging in the post-hospital discharge period.
METHODS: Following revision and refinement of a Secure Messaging for Medication Reconciliation Tool (SMMRT) prototype, a pilot study will enroll 50 patients hospitalized at VA Boston. Patients will be recruited prior to hospital discharge, enrolled in the VA's secure personal health record and web portal, and trained in the use of SMMRT. A pharmacist will contact patients via secure message within 48 hours of discharge. Message content will include the discharge medication list and photos (e.g., tablets, inhalers) to promote interactive, two-way communication to review and reconcile the medication list. Pharmacists will address medication problems and discrepancies and will communicate directly with primary care providers.
RESULTS: Primary outcomes include qualitative assessments describing demographics of SMMRT users, details of their medical history and medication regimen (i.e., number of discharge medications, medication changes), and patient perceptions of the tool. Secondary outcomes include a comprehensive understanding of medication discrepancies, patient reported adherence, and drug-related problems (e.g., drug interactions, adverse drug events).
CONCLUSION: Pharmacist-facilitated medication reconciliation by secure messaging is a novel approach to improving medication safety among post-discharge patients. We anticipate this pilot study will highlight the implementation challenges of electronic medication reconciliation in preparation for large-scale SMMRT trial. Clinical pharmacists can triage, address or relay medication issues, which may reduce ADEs and healthcare utilization.

Oncology

56E. The effect of pegylated granulocyte-colony stimulating factor (GCSF; Pegfilgrastim, Neulasta ®) administration timing in relation to the CHOP or CHOP-like regimen administration timing in Non-Hodgkin's Lymphoma (NHL) patients on development of neutropenia. Zeyad Ibrahim[1], Jeff Hughes, Ph.D[1]; (1) Curtin University, Bentley, Australia
Presented at COSA AGM 2011, Perth WA Australia.

57. FLAG regimen with or without idarubicin in the treatment of refractory and relapsed acute myeloid leukemia: a single center experience. Rana A. Aljaber, Pharm.D.[1], Salah Abbasi, M.D.[1], Lina Marei, M.D.[1], Mohammad Dowairi, M.D.[1], Lama H. Nazer, pharmD, BCPS[1]; (1) King Hussien Cancer Center, Amman, Jordan
PURPOSE: To describe the efficacy and toxicity profile of the combination of fludarabine, high dose cytarabine and granulocyte colony stimulating factor, with or without idarubicin (FLAG+/-Ida), in a cohort of Middle Eastern patients with refractory/relapsed acute myeloid leukemia (AML).
METHODS: Patients treated with FLAG+/-Ida between January 2007 and December 2010, were identified through the pharmacy electronic database. Patient demographics, response to chemotherapy, and associated toxicities were recorded and evaluated. Complete remission (CR) was determined on day 21 post-chemotherapy. Hematologic and non-hematologic toxicities were evaluated until day 30 post-chemotherapy and were graded according to the common terminology criteria for adverse events V3.0.
RESULTS: During the study period, 24 patients with refractory/relapsed AML were identified. The median age was 33 years (range 18–56) and 79% were males. Thirteen (54.2%) patients were in first relapse, 3 (12.5%) were in second relapse, 6 (25%) had primary induction failure, and 2 (8.3%) were in relapse after bone marrow transplantation. CR was achieved in 9 (37.5%) patients; three of those patients subsequently received allogeneic stem cell transplantation, while 6 patients relapsed (median relapse free survival was 330 days). Eleven (45.8%) patients were refractory to FLAG+/-Ida and 4 (16.7%) patients died during reinduction therapy. Recovery of neutrophils ($\geq 500/\mu L$) and platelets ($\geq 100{,}000/\mu L$) required a median of 18.5 and 24 days,

respectively. Median overall survival was 109 days and treatment related mortality was (16.7%).The major complication associated with treatment was neutropenic fever, which was grade 3 and 4 in 19 patients and grade 5 in four patients. Nonhematologic complications were mainly grade 1 and 2 nausea, vomiting, and diarrhea.
CONCLUSION: In our center, FLAG+/-Ida regimen was associated with lower CR but similar toxicity profile to what has been previously reported. Further research is warranted to inform on the optimum regimen in this population.

58. Clinical pharmacy interventions in cancer services. Jarunee Rungwanonchai, BSPharm[1], Pakawan Thepsitthitharakorn, BSPharm[1], Nirachorn Kuchonthara, BSPharm, BCOP[1], Jirada Charoenmanop, BSPharm[1], Naree Thawanapong, BSPharm[1], Surudee Chattrimongkol, BSPharm[1]; (1) Bumrungrad international Hospital, Bangkok, Thailand
PURPOSE: Chemotherapy is high risk medicines. Medication errors in prescribing, preparation and administration may cause serious consequences morbidity and mortality. The objectives of this study was to evaluate clinical interventions made by pharmacists in cancer services.
METHODS: The study was conducted at Horizon Cancer Center in Bumrungrad International Hospital, during November 2010 to October 2011. Pharmacists evaluated cancer treatment to assure the quality of service and provide a better use of financial resources. Clinical interventions made by six pharmacists were collected from the hospital's computer program (Amalga®) and pharmacy intervention program. Pharmacists detected drug related problems and medication errors by using the daily medical chart review.
RESULTS: A total of 189 clinical interventions on 1855 prescriptions were documented within 12 months. Pharmacist's interventions were accepted by the oncologists 90.5% (N=171/189). The impacts of clinical interventions on patient care were rated to be significant, followed by very significant, minor significant and potential lifesaving. The four most frequent of interventions were incorrect dosing or failure of dose adjustment (42%), Drug formulations and preparations (17%), frequency and duration of administration (13%), and administration (9%). The cost saving from pharmacist's interventions were approximate 59,851$ per day and 61,202$ per cycle.
CONCLUSION: Pharmacist's interventions can improve the quality of patient care, reduce risk and prevent major toxicity. Clinical pharmacists can be beneficial to a multidisciplinary team in oncology and can potentially lead to decrease in healthcare costs.

Pharmacoeconomics/Outcomes

59. Intravenous admixture service: implementation of service in the neonatal intensive care unit patient, Bumrungrad international Hospital. Nirachorn Kuchonthara, BSPharm, BCOP[1], Jirada Charoenmanop, BSPharm[1], Pakawan Thepsitthitharakorn, BSPharm[1], Surudee Chattrimongkol, BSPharm[1], Naree Thawanapong, BSPharm[1], Jarunee Rungwanonchai, BSPharm[1], Yansey J. Wilson, BSPharm[1]; (1) Bumrungrad International Hospital, Bangkok, Thailand
PURPOSE: Pharmacy Intravenous Admixture Service (IAS) provides service for patients at neonate intensive care unit (NICU), Bumrungrad international Hospital, to improve therapeutic outcomes, control expenses and develop pharmacist roles in the management of high-alert medications in NICU.
METHODS: Standard concentration was created by IAS, Unit-specific formulary was created by Informatics pharmacist for the drug products used on NICU. Pharmacist detected Drug related problems (DRPs) and medication errors (MEs) of NICU patients during January 2011–January 2012 by using the daily medical chart review. All identified DRPs and MEs were categorized into types of DRPs and medication use processes. Pharmacist interventions were provided and those acceptances were recorded.
RESULTS: A total of 98 patients (64 male) with a mean gestational age of 34.7 weeks (26–40 weeks) were included. The mean length of hospitalisation was 31 days (2–88 days). On average, patients received 30 items (1–417 items). The majority of prescriptions were accounted for by antibiotics (n=1515), which were received by 76% of all patients, followed by IV fluid and electrolytes (n=323) and GI drugs (n=293). Of all the different drugs prescribed (n=855). 24 DRPs were identified in 11 patients. DRP types included five drug incompatibility, 12 inappropriate dosage regimen, three concentration too high and four need additional drug therapy. The MEs were categorized by medication use process errors being 24 prescribing errors, seven preparing errors, one administration errors and five transcribing error. A total of 24 pharmacist's interventions were provided based on 24 DRPs. All of them were accepted by the health care team.
CONCLUSION: Although most DRPs did not cause harm to patient, the pharmacist had a role in management of DRPs and MEs. The success of implemented service was not only improve the quality of patient's care but also decrease nurse workload and expenses (cost-saving 1.29 million Baht).

Psychiatry

60. Safer Samples with Pharmacist Care: An Innovative Program for Enhancing Medication Experience in Patients with Mental Health Conditions. Lisa McCarthy, BScPhm, Pharm.D., MSc[1], Thomas E.R. Brown, Pharm.D.[1], Natalie Crown, BScPharm, Pharm.D.[1], Valerie Taylor, M.D., FRCPC, Ph.D.[1]; (1) Women's College Hospital and University of Toronto, Toronto, ON, Canada
PURPOSE: Patients with mental illness often have multiple medical co-morbidities. They experience higher rates of adverse drug reactions compared to patients with no mental health diagnosis, and are at higher risk of experiencing toxicity from medications other than those required for their psychiatric diagnosis. Adverse effects are the leading cause of medication discontinuation in this population. Traditional medication sampling practices contradict essential elements of safe and effective medication use. As such, many facilities have implemented policies prohibiting their use. Yet, using medication samples is attractive for patients with mental health conditions as prescribers try to determine effective and well-tolerated medication regimens and alleviate the cost of multiple medications which may go partially unused.
METHODS: The Safer Samples program partners Pharmacy Services and the Mental Health Program at Women's College Hospital, Toronto, Ontario, Canada. Rather than providing the sample directly to the patient, prescribers provide patients with a voucher for a medication sample, which is then prepared by our outpatient pharmacy. Vouchers are redeemable for up to 28 days of medication at no cost to the patient. A best possible medication history (BPMH) is also conducted through a face-to-face visit between the patient and pharmacist.
RESULTS: On receipt of the voucher, the pharmacist reviews it (as they would any other prescription) for drug-therapy problems, appropriate labeling, and accurate dispensing. The BPMH and recommendations for optimizing pharmacotherapy are then shared with the prescriber. For eligible patients, there is a fee for the medication consultation that is paid by the provincial government.
CONCLUSION: A mixed methods evaluation of the program is ongoing and will explore: physician's beliefs around medication samples; characteristics of patients receiving medication samples; the number and types of drug-therapy problems and recommendations identified; and workflow factors including time for inventory management, dispensing and patient medication reviews.

ADULT MEDICINE

Resident and Student Research-In-Progress

61. Analysis of american diabetes association recommended chronic therapy inpatient interventions by pharmacists. Amanda K. Jensen, Pharm.D.[1], Tadd R. Hellwig, Pharm.D.[1], Megan Maddox, Pharm.D.[1]; (1) Sanford USD Medical Center, Sioux Falls, SD
PURPOSE: Evaluate the effectiveness of pharmacist interventions in initiating American Diabetes Association (ADA) recommended

therapies for prevention of long-term complications. The primary objective is to determine the baseline rates of ADA recommended therapies for all adult diabetic patients admitted to Sanford USD Medical Center during the month of January 2012. A secondary objective is to determine acceptance rates of recommendations prior to patient discharge.
METHODS: Prospective, single center, chart review of all adult inpatient diabetics on a daily basis during January 2012. An evaluation of the patient's medical record for ADA recommended therapies will take place. If a patient would be a candidate for ADA recommended preventative therapies (specifically use of aspirin, statins, and ACE inhibitors/ARB medications) a recommendation will be communicated to providers via the electronic medical record. Acceptance rates of recommendations will be collected at patient discharge.
RESULTS: An analysis of the first twenty patients in the study demonstrated a total of 19 recommendations to initiate ADA recommended therapies, approximately 1 recommendation per patient. Four of the 19 (21%) recommendations were accepted prior to patient discharge. Further data collection currently in progress.
CONCLUSION: Data collection currently in progress and scheduled to be completed by January 31st, 2012.

Ambulatory Care

62. Health literacy and adherence, do they vary by medication regimen? Sara J. Deppe, Pharm.D.[1], Mark T. Sawkin, Pharm.D.[2], Steven C. Stoner, Pharm.D., BCPP[1], Rafia S. Rasu, Ph.D.[3]; (1) University of Missouri-Kansas City School of Pharmacy, Kansas City, MO; (2) University of Missouri – Kansas City School of Pharmacy, Kansas City, MO; (3) University of Missouri Kansas City School of Pharmacy, Kansas City, MO
PURPOSE: It is known that achieving medication adherence is an obstacle for many patients after leaving a clinic visit. When patients do not receive their medication properly, a therapeutic intervention cannot be achieved, thus the patient is ultimately not treated properly for the indication which treatment was initially sought. The purpose in collecting this data, is to determine if a patient with a chronic disease (i.e. diabetes, hypertension, hyperlipidemia, HIV) and lower health literacy is less likely to be adherent to prescribed medication therapy.
METHODS: Patients treated in general medicine and HIV primary care divisions at an urban free health clinic will be surveyed regarding their adherence to prescribed medication, and complete a REALM assessment to determine their level of health literacy. From these results, patients' adherence profiles and health literacy level will be evaulted according to the conditions for which they are treated.
RESULTS: At this time, it is expected that those patients with lower health literacy will have poorer adherence rates to their medication regimen, but it is unknown if those with certain chronic conditions are less likely to be adherent (i.e. Are diabetic patients less adherent than hypertensive patients?).
CONCLUSION: Through this study we will be able to identify effectiveness of communication between the clinician and patient regarding prescription drug therapy, assess if there is a need for greater counseling of patients in regards to directions of use or acquisition of medication, and identify disease specific barriers to medication adherence. Through these discoveries, we may understand the rising cost of healthcare when chronic disease states go untreated or mismanaged, and learn innovative ways to to help pharmacists educate patients in self care, thus decreasing health care expenses and improving chronic disease outcomes.

63. Exploring the value of clinical pharmacy services for African American patients with diabetes in underserved settings. Yardlee S. Kauffman, Pharm.D.[1], Lauren J. Jonkman, Pharm.D., BCPS[1], Sharon E. Connor, Pharm.D.[1]; (1) University of Pittsburgh School of Pharmacy, Pittsburgh, PA
PURPOSE: The role of a pharmacist within underserved settings has not been well studied, and it is unknown how pharmacists can better meet the needs of African American patients with diabetes in these settings. The purpose of this qualitative study is to identify unmet diabetes management and medication-related needs of African American patients with Type 2 diabetes who are receiving care in underserved settings.
METHODS: Individual, semi-structured interviews will be conducted with patients from the Birmingham Free Clinic (BFC) and the Matilda Theiss Health Center (MTHC) located in Pittsburgh, PA. Inclusion criteria include: African American men and women at least 18 years old who currently have uncontrolled Type 2 diabetes (A1C > 7%) and are receiving health care services from either the BFC or the MTHC. Participants will be asked to answer questions related to the following four themes: (1) PatientsÕ perceived attitudes and perspectives about self-management of diabetes (2) Perceived medication-related needs (3) Perceptions of the role of their pharmacist, and (4) Attitudes concerning how pharmacists can be better integrated in their health care. All interviews will be conducted by the principal investigator and continue until model saturation occurs. Interview participants will also be administered a survey to gather demographic information.
RESULTS: Interview questions were developed based on a literature search and various experts in this area have validated questions. Upon completion of interviews, qualitative analysis will be conducted using the Principles of Grounded Theory. This project will be completed by April 2012.
CONCLUSION: Results will help to provide guidance for pharmacists working in underserved settings who are interested in expanding clinical pharmacy services for African American patients with diabetes.

64. Retrospective review of vitamin D treatment at veterans affairs medical center. Andrew J. Ventura, Pharm.D, Candidate[1], Jennifer N. Clements, Pharm.D., BCPS, CDE[1]; (1) Bernard J. Dunn School of Pharmacy, Shenandoah University, Winchester, VA
PURPOSE: The primary objective of this study is to evaluate the therapeutic regimens and laboratory monitoring of vitamin D prescribed in an outpatient setting of a Veterans Affairs facility. Adherence to published recommendations and guidelines will then be quantified and studied.
METHODS: A retrospective chart review of patients prescribed vitamin D at the Martinsburg Veterans Affairs Medical Center on an outpatient basis between October 1, 2009 and September 30, 2011 was conducted. Patients who were prescribed vitamin D from outside a non-VA provider and those received vitamin D therapy for less than 3 months are excluded from the study. Study endpoints included: vitamin D regimen, calcium regimen, serum 25-OH-D level, calcium level, and parathyroid hormone level. For measurement of the primary objective, the following information was documented: baseline and follow-up laboratory values, dosing regimen, and vitamin D related diagnoses.
RESULTS: This study is currently in progress. A total of 2144 patients were identified from computerized patient record system as having been prescribed vitamin D on an outpatient basis during the inclusion period. Data collection is currently in progression and results will be reported for the poster symposium.
CONCLUSION: The results will illuminate the vitamin D prescribing practices at this facility. Comparisons to published recommendations for treatment will be discussed. This information can be utilized to improve the quality of patient care.

65. Evaluation of factors II, VII, IX, X and proteins C and S following high-dose vitamin K supplementation. Jamie J. Cavanaugh, Pharm.D., CPP, BCPS[1], Betsy B. Shilliday, Pharm.D., CDE, CPP[2], Stephan Moll, M.D.[3]; (1) University of North Carolina, Chapel Hill, NC; (2) University of North Carolina Eshelman School of Pharmacy, Chapel Hill, NC; (3) University

of North Carolina School of Medicine, Department of Medicine, Division of Hematology-Oncology, Chapel Hill, NC
PURPOSE: Daily high dose vitamin K supplementation is used empirically by some individuals to improve their "vascular health" or "bone health". It is unknown if this practice leads to a procoagulant state secondary to increased carboxylation and activity of procoagulant clotting factors. The purpose of this study is to evaluate levels of procoagulant factors II, VII, IX and X and the anticoagulant factors protein C and S, as well as markers of increased thrombin generation [D-dimer, thrombin-antithrombin (TAT) complexes, endogenous thrombin potential] in healthy male adults taking once daily vitamin K 20 mg oral supplementation.
METHODS: Eight healthy male adults (age 20–34, 35–49, 50–64, and $\geq$ 65) with no prior history of arterial or venous thrombosis will undergo two baseline phlebotomy draws, 14 days apart, to measure levels of Factors II, VII, IX, X, D-Dimer, TAT complexes, Protein C and S activities, D-dimer and thrombin generation potential. Baseline levels will be analyzed to determine physiologic variability of the collected levels and activities. Following the second baseline draw, the participant will start oral vitamin K 20 mg daily for 14 days. On day 14, Factors II, VII, IX, X, D-Dimer, TAT complexes, Protein C and S activities, and thrombin generation potential will be re-measured. Baseline and post-vitamin K supplementation data sets will be analyzed to assess any changes.
RESULTS: This study has been approved by the Institutional Review Board of the University of North Carolina Hospitals. Subject recruitment is ongoing. Six subjects have completed the study with no thrombotic events. Blood samples are being batched for simultaneous testing. Anticipated enrollment completion and data evaluation is March 2012.
CONCLUSION: This pilot study will provide guidance as to whether daily high dose vitamin K supplementation leads to increased procoagulant activity. Results may assist in clinical decision making regarding the safety of vitamin K supplementation.

Cardiovascular

66. The in vitro effects of niacin on platelet aggregation when added to aspirin in normal volunteers. Ngozi G. Agbasionwe, Pharm.D., Candidate[1], Nicholas B. Norgard, Pharm.D.[1]; (1) University at Buffalo School of Pharmacy and Pharmaceutical Sciences, Buffalo, NY
PURPOSE: A poor pharmacodynamic response to aspirin has been associated with adverse outcomes in patients with cardiovascular disease. This has inspired investigation of alternative and/or adjunct agents to intensify platelet inhibition. Niacin is a dyslipidemia agent used to raise high-density lipoprotein cholesterol. Niacin may also inhibit platelet thromboxane A2 production and directly inhibit platelet reactivity. Therefore, it may work synergistically with aspirin and could be used to improve the aspirin response. The objective of this study was to test whether niacin increases platelet inhibition when added to aspirin.
METHODS: Four collection tubes of blood were obtained from five healthy volunteers. Appropriate amounts of aspirin and/or niacin were added to blood samples and incubated for 30 minutes at room temperature: tube 1 contained 10 mM aspirin, tube 2 contained 3 mM niacin, tube 3 contained 10 mM aspirin and 3 mM niacin, tube 4 was control. Platelet aggregation was measured using whole blood impedance aggregometry (measured in ohms) with collagen and arachidonic acid (AA). Data were analyzed with a paired t-test.
RESULTS:

Collagen induced platelet aggregation			
Control (mean ± 1 SD)	Aspirin	Niacin	Aspirin + Niacin
13.6 ± 3.1	5.4 ± 2.9	11.4 ± 3.1	4.5 ± 5.4
AA induced platelet aggregation			
Control	Aspirin	Niacin	Aspirin + Niacin
5.1 ± 3.7	0	2.7 ± 3.8	0

Aspirin significantly inhibited collagen induced platelet aggregation and completely inhibited AA induced platelet aggregation. Preincubation with niacin resulted in a significant inhibition of collagen-induced (p=0.007) platelet aggregation, but not AA induced platelet aggregation (p=0.108). The addition of niacin to aspirin did not significantly inhibit collagen (p=0.67) or AA induced platelet aggregation compared to aspirin alone.
CONCLUSION: Preliminary results show that niacin does not augment platelet inhibition when added to aspirin in normal volunteers. The study is ongoing. Final results will be presented during the poster symposium.

67. The utilization of American Heart Association heart failure guidelines for beta-blocker and angiotensin converting enzyme inhibitor/angiotensin receptor blocker optimization. Ian Haywood, B.S., Pharm.D., Candidate[1], Laura J.Van Deventer,[1], MaryAnn E. Birch, Pharm.D., Candidate[1], Emily K. McCoy, Pharm.D.[1], Kristi Kelley, Pharm.D.[1], Bradley M. Wright, Pharm.D., BCPS, CDE[1]; (1) Auburn University, Harrison School of Pharmacy, Birmingham, AL
The American College of Cardiology Foundation (ACCF)/American Heart Association (AHA) clinical guidelines recommend target doses of beta-blockers and angiotensin converting enzyme (ACE) inhibitors or angiotensin receptor blockers (ARBs) in patients with stage C heart failure (HF) and no contraindications. Because these medications have shown reductions in morbidity and mortality, it is important for providers to be educated on proper use and optimization of pharmacotherapy. This analysis evaluates the pharmacotherapy of patients in an outpatient clinic.
PURPOSE: The primary objective is to identify the percentage of patients in this population who are being treated appropriately according to guidelines. The secondary objectives are to determine why patients are not on optimal therapy and to evaluate other comorbidities present.
METHODS: A retrospective chart review is being performed at an internal medicine resident-operated, outpatient clinic. The patients included had an ICD-9 code indicative of systolic heart failure and were seen from July 2009-July 2010. Data was collected from patient charts including demographic information, vital signs, drug allergies, smoking habits, medications, laboratory values, and comorbidities. The data did not include identifiable, protected health information. Adherence to the 2009 ACCF/AHA updated treatment guidelines for heart failure will be evaluated based on the recorded medications, doses prescribed, and contraindications. The data will be analyzed using descriptive statistics. This study has been approved by the Institutional Review Board.
RESULTS: To this point, the total number of patients that have been evaluated is 26, and most patients are not being treated with target doses. Out of the 22 patients taking beta-blockers identified thus far, none were taking target doses. Out of the 19 patients taking ACE inhibitors or ARBs identified, five were taking target doses.
CONCLUSIONS: From the initial analysis, it is clear pharmacists have an opportunity to contribute positively to the care of heart failure patients.

68. Safety outcomes in high risk patients receiving triple therapy after percutaneous coronary intervention. Jacob Marler, B.S.[1], Shannon W. Finks, Pharm.D.[1], Kelly C. Rogers, Pharm.D.[1]; (1) University of Tennessee College of Pharmacy, Memphis, TN
PURPOSE: Individuals with coronary heart disease undergoing percutaneous coronary intervention may have compelling indications for anticoagulation with warfarin and may also require additional antiplatelet therapy such as clopidogrel and aspirin. The benefits of preventing thrombus formation must be carefully weighed against the risks of bleeding events in patients receiving triple therapy (TT). There is no consensus on how to best manage these patients, other than a careful individualized approach. This ongoing study evaluates safety outcomes in patients receiving TT with warfarin, clopidogrel, and aspirin concomitantly.
METHODS: A retrospective analysis of computerized medical records from veterans undergoing heart catheterization on

concomitant anticoagulation and antiplatelet therapies was performed. Indication for TT, CHADS2 scores, HAS-BLED scores, warfarin and aspirin dose, hospital admissions, and thromboembolic events were recorded. Bleeding was defined using TIMI and GUSTO classification.
RESULTS: Currently 26 patients have met inclusion criteria. Eighteen patients (69%) received drug-eluting stents, and 19 patients (73%) had atrial fibrillation. The average length of TT was 9.8 months ± 8.29. Fourteen patients (53.8%) had bleeding episodes that met one or both bleeding criteria. A total of 26 bleeds occurred in these 14 patients. Ten (40%) met TIMI major or minor and 2 (8%) met GUSTO severe or moderate criteria. Sixty-two percent of bleeds occurred within 90 days of initiating TT. INR range during bleeding episodes was 1.5–3.9. Seventy-two percent of patients receiving stents had bleeding episodes. Twenty percent of bleeding episodes resulted in hospital visits. No thromboembolic events or deaths occurred.
CONCLUSION: In this small population undergoing heart catheterization, bleeding while on TT was high and required additional hospital visits. Most bleeding events occurred early in therapy. Strategies to reduce bleeding events in patients requiring TT need further investigation. Evaluation of additional patients is in progress.

Community Pharmacy Practice

69. Improving prescription auxiliary labels to increase to increase patient understanding. Michelle Locke, B.S.[1], Elizabeth Gripentrog, B.S.[1], Jillian Helseth, B.A., Olayinka Shiyanbola, Ph. D.[1]; (1) South Dakota State University College of Pharmacy, Brookings, SD
PURPOSE: (1) To develop new, easy to understand prescription auxiliary labels, (2) To compare the effectiveness of existing auxiliary labels to newly created ones to determine which label most clearly states its purpose (and determine why) and (3) To compare the effectiveness of existing auxiliary labels to newly created ones by determining the relationship between ease of reading auxiliary labels and corresponding reading level.
METHODS: Adults from a minority background, who were able to understand English and did not have any hearing or vision loss, were the sample population. Existing and newly created auxiliary labels were showed to participants in a 10–15 minute interview and interpretations, level of understanding and literacy levels (using the REALM-R) were determined. The level of reading difficulty for all labels was determined using the Lexile Score¨, based on sentence length and word frequency. Data analysis included descriptive statistics and chi-square analysis for all quantitative data and inductive thematic analysis for all open-ended questions.
RESULTS: One hundred and twenty participants completed the study. Some existing auxiliary labels yielded Lexile¨ scores above the sixth grade reading level while all the newly developed labels were third grade level and below. Newly developed labels were either the best understood or second best understood across the auxiliary labels. There was a statistically significant difference in participants interpretation of the take with food and milk label based on level of education completed (χ^2= 20.857, p=0.02) and literacy level (χ^2 = 26.785, p=0.02). All other auxiliary labels did not have significant associations with REALM scores.
CONCLUSIONS: Incorrect interpretations of auxiliary labels occur across populations. Simpler auxiliary labels with improved patient comprehension can be developed. Pharmacies must consider how to include and use existing manufacturer auxiliary labels that meet the acceptable criteria for patients with low health literacy.

70. An assessment of utilization of pharmacists to educate patients on their chronic health conditions. Cheryl Abel, Pharm.D.[1], Kristine C. Willett, Pharm.D.[1], Cheryl R. Durand, Pharm.D.[1], David H. Lee, B.S.[1]; (1) Massachusetts College of Pharmacy and Health Sciences, Manchester, NH
PURPOSE: The objective of this study is two-fold: (1) to evaluate the utilization of the pharmacist to educate patients on their chronic health conditions and (2) to identify potential barriers to patients' willingness to speak with their pharmacists about their medications and chronic health conditions.
METHODS: Participants at a public downtown health fair held by pharmacy students and faculty were asked to complete a survey. The survey questions gathered patient demographic information as well as information on type of health insurance, current medical conditions, and the number of medications taken daily. Participants were also asked if they understood their medications, if they have ever spoken with their pharmacist about their medical condition or immunizations. Data was analyzed to determine correlations between patient characteristics, comprehension of medications used and willingness to speak with their pharmacist about their medications and chronic health conditions.
RESULTS: 65 participants completed the survey. The majority of patients were women (60%) aged 41–64 years old (64.7%). Approximately half of all patients reported having private insurance coverage, while others reported either coverage through Medicare or Medicaid or were without insurance (27.7% and 21.5%, respectively). The most commonly reported health conditions were hypertension, dyslipidemia and reflux disease. 61.5% of patients reported that they understood their medications and 32.3% and 20% of patients reported that they have spoken with their pharmacists about their medical conditions and immunizations, respectively. Data will be further analyzed for correlations related to patient utilization of pharmacists.
CONCLUSION: Utilization of pharmacists to provide patients with education about their medications and chronic medical conditions has been shown to improve overall control of chronic diseases. We hope to identify barriers to utilization of pharmacists to provide valuable health information to the patients they serve.

Critical Care

71. Antimicrobial Prophylaxis of Transsphenoidal Pituitary Resections. Victoria E. Sansom, Pharm.D., Candidate, 2013[1], Craig A. Martin, Pharm.D., BCPS[1], Aaron M. Cook, Pharm.D., BCPS[1]; (1) University of Kentucky College of Pharmacy, Lexington, KY
BACKGROUND: Endoscopic transsphenoidal surgery (ETS) is an emerging technique used in the removal of tumors from the pituitary gland and sellar region of the skull. Several risk factors for infection in ETS have been acknowledged in the literature, such as implantation of nasal splints and surgery in an area naturally contaminated with bacteria (the sinus). Antimicrobial prophylaxis is commonly used in patients undergoing ETS. While the importance of appropriate antimicrobial prophylaxis is acknowledged in the literature, there are no guidelines that specify the ideal antibiotic regimen. Extended prophylaxis is also commonly used after ETS, but is somewhat lacking in support.
PURPOSE: Primary Objective: 1. To characterize antibiotic prophylaxis in patients undergoing ETS. a. Describe the population that receives antibiotic prophylaxis for ETS b. Identify antibiotic regimens used prophylactically for ETS c. Identify duration of prophylactic antibiotic use for ETS. Secondary Objectives: 1. To identify risk factors for the development of infectious complications in 30 days following ETS. 2. To describe the rate for infectious complications in 30 days following ETS
METHODS: Retrospective electronic medical chart review of adult inpatients who underwent ETS January 1, 2009–December 31, 2010. Patient demographics included age, gender, weight, indication for surgery, and current disease states presenting risk for infection. Descriptive statistics and Chi Square test were used in the statistical analysis.
RESULTS: Results will be analyzed and presented. Preliminary results suggest no significant difference in infection and readmission rates in patients who received extended antibiotic prophylaxis vs patients who did not. There is also no association between post-operative corticosteroids and infection rate. Post-operative infec-

tion was rare and no adverse effects from outpatient antimicrobial were noted.
CONCLUSION: To be determined pending results.

Education/Training

72. Pharmacy student actual and perceived knowledge of issues related to underserved populations across the pharmacy curriculum. Ana Lupu, Pharm.D.[1], Sharon Connor, Pharm.D.[1], Lauren Jonkman, Pharm.D., BCPS[1]; (1) University of Pittsburgh School of Pharmacy, Pittsburgh, PA
PURPOSE: Pharmacists are in an important position to eliminate health disparities. Recent accreditation standards and guidelines for pharmacy education reflect the significance of introducing students to working with and effectively caring for underserved patients. The purpose of this study is to help faculty at the University of Pittsburgh School of Pharmacy identify gaps in student knowledge of medically underserved populations and determine what factors may influence this knowledge.
METHODS: All current pharmacy students enrolled in the professional program at the University of Pittsburgh School of Pharmacy were eligible to participate. Subjects were evaluated using the Underserved Knowledge Assessment completed through Qualtrics®, an Internet survey management website. The survey includes 10 demographic questions, 13 self-assessment questions, and 20 knowledge assessment questions.
RESULTS: A total of 158 first, second, and third year professional students have completed the survey with a 50% response rate in each year; fourth year students will complete the survey by March 2012. Results will be reported using standardized descriptive statistics. Actual and perceived knowledge scores on multiple choice questions will be calculated and compared across the years. Additionally factors that may influence this knowledge (i.e. family income, area where they grew up, etc.) and specific content areas where students need improvement will be identified. As this is a work in progress, results will be available by March 2012 and the data analysis complete by April 2012.
CONCLUSION: Results will help faculty at the University of Pittsburgh School of Pharmacy create opportunities to address gaps in student knowledge of underserved populations through the didactic and experiential learning curriculum. They will also provide insight to guide changes and develop strategies to better address and teach issues related to underserved populations.

73. Perceptions of students, standardized patients, and evaluators about a performance based assessment program. Melanie Hicks, Pharm.D., Candidate, 2012[1], Erin Timpe Behnen, Pharm.D, BCPS[1], Stacey Thacker, Pharm.D, BCPS[1], Janice Frueh, Pharm.D, BCPS[1]; (1) Southern Illinois University Edwardsville School of Pharmacy, Edwardsville, IL
PURPOSE: To obtain perceptions from students, standardized patients, and faculty evaluators about the initial offering of a performance-based assessment (PBA) program at Southern Illinois University Edwardsville School of Pharmacy (SIUE-SOP) during the fall 2011 semester.
METHODS: Three surveys were developed, approved by the SIUE institutional review board, and administered to each group of participants directly following their responsibilities on the assessment day. The PBA program required third professional year students to complete three 7-minute Objective Structured Clinical Exam (OSCE) stations with a standardized patient. Faculty were responsible for evaluating student performance and communication skills using an analytical checklist and global assessment form, respectively. The surveys consisted of eight Likert-type questions about the process and preparedness of the participant, followed by open ended questions about strengths and weaknesses of the assessment process.
RESULTS: There was a 100% survey completion rate. About 83% of students agreed that the curriculum at SIUE-SOP prepared them for the material included in the stations. Despite the preparedness, only 57% of students felt confident that they passed the assessment (96% of students actually passed). The faculty evaluators agreed that the training prior to the assessment was adequate; however, only 85% of faculty agreed that they felt confident in their ability to score the students performance with the global assessment form. All of the standardized patients agreed, or strongly agreed, that they received timely communication about the program and were adequately trained. Common comments from all participants suggested that the participants felt the assessment day was well organized, the use of standardized patients made the encounter more realistic, and the patient case scenarios contained commonly encountered problems.
CONCLUSION: The overall perceptions of the initial Performance-Based Assessment were positive. The constructive feedback on the strengths and weaknesses will be used to improve future PBA programs at SIUE-SOP.

74. Development of a resource manual for a student-run clinic for the medically indigent. Nasim Aghaienia, Pharm.D, Candidate[1], Nancy. C Brahm, Pharm.D[1], L. Janelle Whitt, DO[1]; (1) The University of Oklahoma, Tulsa, OK
PURPOSE: To develop a resource manual for use by the multidisciplinary healthcare team of students providing services to the medically indigent in a free, student-run evening clinic.
METHODS: Literature was accessed through Ovid, Google Scholar, MEDLINE, and PubMed (1965-September 2011) using the search terms indigent care, resource manual, safety net, and evidence-based. Reference citations from publications identified were also reviewed. All articles were limited to those available in English. Those identified from the data sources were evaluated.
RESULTS: Guideline or consensus-based modules for seven areas (patient assistance programs, formularies, diabetes, respiratory, cardiovascular/lipids/hypertension, psychiatry, and neurology) were developed. The clinical coordinator introduced the manual during the clinic orientation meeting. Both the medical director and clinical coordinator reported positive feedback and enthusiastic reception of the manual. Formal evaluation is planned.
CONCLUSION: Information on previous development of orientation manuals for student-run safety net clinics was not found. This is the first time such a manual has been developed for our clinic system. It contains the basic guidelines and protocols for treating the disease states most frequently encountered. Formal evaluation will help determine if this resource contributed to a more efficient team dynamic and established the pharmacist as a drug information resource for medication-related questions and concerns. Additional data on the length of the patient encounters is ongoing as is user feedback to improve the manual.

75. Student perception and satisfaction with the implementation of team-based learning in a landmark trials elective course. Christina P. Stier, Pharm.D.[1], Jill S Borchert, Pharm.D., BCPS, FCCP[1]; (1) Midwestern University, Downers Grove, IL
PURPOSE: Team-based learning (TBL) is a form of active learning that integrates smalls groups of students working together to complete an assignment. The purpose of this study is to evaluate students' perceptions and satisfaction with the implementation of TBL, and to compare student self-reported classroom engagement with TBL vs non TBL class sessions.
METHODS: This was a prospective study over one quarter throughout the fall semester. TBL was piloted in an elective course entitled "Landmark Trials in Primary Care." First, students were organized into permanent groups. Each TBL class began with an individual readiness assurance test where students individually took an in-class test based on course pre-readings. Next, students turned in their answers and retook the same test as a team. Lastly, the instructor provided a brief review of pre-class reading assignments. Descriptive statistics were used to report results for items on the post-course survey that did not appear on the pre-course survey. Wilcoxon Signed-rank will be used to compare the matched results on the pre- and post-

course survey for identical questions and to compare the student engagement survey results for TBL sessions and non TBL sessions.
RESULTS: Seventeen students enrolled in the ten week course, which included two TBL sessions on weeks seven and nine. Based on the post-course survey, a greater percentage of students both agreed and strongly agreed that TBL should continue to be utilized in elective courses (60.0%) and that TBL should continue to be utilized in other required courses (60.0%). Additionally, 50% of students agreed that TBL should continue to be utilized for more than two of the nine classes in this course, and 50% of students disagreed.
CONCLUSION: The results of the study will help to provide implications on the possible role of TBL in pharmacy education.

76. Assessing the application of cultural competence training during advanced pharmacy practice experiences. Loren-Ashley Cooper, Pharm.D.[1], Rosalyn Padiyara, Pharm.D., CDE[1]; (1) Midwestern University Chicago College of Pharmacy, Downers Grove, IL
PURPOSE: The racial and ethnic composition of the United States population is rapidly changing. With the increase in diversity, it is inevitable that pharmacists will interact with people from various cultural and ethnic backgrounds. Cultural competence is one strategy to providing comprehensive health care for multicultural patients as well as reducing health disparities and improving patient outcomes. Although studies have shown students learn what is taught and depict enhanced knowledge, none have addressed if the knowledge is applied. In this study, the student's assessment of their application of cultural competence training during Advanced Pharmacy Practice Experiences (APPE) will be explored. Primary endpoints included identifying what types of cultural competency events students experienced, describing how they applied their cultural competence knowledge, and identifying their perceived level of comfort in providing culturally competent care to patients.
METHODS: Fourth-year professional pharmacy students at Midwestern University Chicago College of Pharmacy were asked to complete a cross-sectional questionnaire during a mandatory class meeting at the end of their fourth rotation. The questionnaire contained four parts assessing the students' cultural competence experiences while on APPEs, level of comfort in a variety of cultural situations and encounters, the amount of training previously received, and student demographics. Surveys will be analyzed using descriptive statistics, Mann-Whitney U, Chi Square, and ANOVA analysis.
RESULTS: A total of 124 questionnaires were received. Average age of the respondents was 25.9 years; 66% were female. Approximately 75% specified English as their first language with 30% living in at least one other country. Most respondents described their household as upper middle class (39.5%) or lower middle class (36.3%). Two-thirds of the students considered themselves religious, and approximately 56% had community or retail experience.
CONCLUSIONS: Research efforts are on-going with projected completion date March 1, 2012.

Emergency Medicine

77. Pharmacy practice resident interventions in the emergency department and associated barriers to further expansion of pharmacy services. Julie M. Haase, Pharm.D.[1], Krysta Baack, Pharm.D.[1]; (1) Creighton University Medical Center, Omaha, NE
The American Society of Health-System Pharmacists released a statement in 2008 promoting the extension of pharmacy services to every hospital emergency department (ED). Several recently published articles have demonstrated that pharmacists are an asset in the ED in a variety of ways: optimizing medication usage, patient education and adherence, and reducing medication errors. Pharmacist roles are dependent upon the needs of individual hospitals and ED staff.At Creighton University Medical Center (CUMC), pharmacy practice residents are given the option to complete elective rotations in the ED. Currently there is no dedicated pharmacist presence in CUMC's ED, therefore the residents serve in this function during their one-month rotations. To date, no articles have been published examining the effect of pharmacy practice residents rotating in an ED with no dedicated pharmacist presence.
PURPOSE: The primary objective of this observational study is to identify the types of interventions made by a pharmacy practice resident and any barriers experienced during the rotation. Benefits of the residents' presence and perceived barriers from the perspective of non-pharmacy ED practitioners will be assessed after all residents have completed their rotations.
METHODS: Interventions and barriers were documented from September 1, 2011, through November 30, 2011. All patients presenting to the ED during the hours a pharmacy resident was present were eligible for inclusion. An electronic survey will be utilized to assess the views of the ED practitioners.
RESULTS: A total of 208 interventions were made, 95% percent of which were accepted by the ED practitioners. The most common interventions were provision of drug information, procurement of patient information including medical histories, and dose adjustments. Barriers encountered by residents included lack of dedicated workspace and ED practitioners' unfamiliarity with working with pharmacists. Results of the ED practitioner survey are under investigation.
CONCLUSION: Final data analysis and conclusions are underway.

Endocrinology

78. Evaluation of an intervention to increase utilization of a subcutaneous basal-bolus insulin protocol. Amber J. Mynakha, Pharm.D.[1], Douglas N. Carroll, Pharm.D., BCPS[1], Nathan A. Pinner, Pharm.D., BCPS[1]; (1) DCH Regional Medical Center, Tuscaloosa, AL
PURPOSE: To develop educational interventions to increase use of a subcutaneous basal-bolus insulin protocol. Secondary objectives are to (1) provide education about the use of basal-bolus insulin to medical, nursing, and pharmacy staff, (2) evaluate the safety and effectiveness of the basal-bolus insulin protocol compared to a sliding scale insulin protocol, (3) assess appropriate use of the basal-bolus protocol and (4) determine if educational interventions are adequate to maintain increased use of the basal-bolus insulin protocol three months after cessation of educational interventions.
METHODS: Educational in-services and handouts were presented to nursing staff, prescribers, and pharmacy staff on basal-bolus insulin use during November 2011. Patients admitted to four adult medical units who received one dose of insulin according to the basal-bolus insulin protocol or the sliding scale protocol during December 2011 and March 2012 were included. Demographics, blood glucose measurements, and information regarding inappropriately held scheduled insulin doses were collected.
RESULTS: Three patients received insulin according to the basal-bolus insulin protocol in December 2011 for a total of 17 patient-days of therapy. The mean blood glucose was 228 mg/dl with two episodes of hypoglycemia (blood glucose <70 mg/dl). In contrast, 174 patients received insulin according to the sliding scale protocol in December 2011. A random sample of three patients showed a mean blood glucose of 198 mg/dl with no episodes of hypoglycemia over seven patient-days. Data collection is on-going with a second evaluation period in March 2012. All data analysis will be complete by May 2012.
CONCLUSION: Utilization of the basal-bolus insulin protocol increased from a baseline of zero in July 2011 to three patients in December 2011 showing the impact of the educational interventions. Hospital wide utilization of the protocol has also increased. Full analysis of safety and effectiveness data will be available by May 2012.

Geriatrics

79. Beers criteria and STOPP/START criteria: medication evaluation with screening tools in elderly outpatients. Ashton E. Beggs, Pharm.D.[1], Alison M. Walton, Pharm.D.[1], Jessica E. Wilhoite, Pharm.D.[1], Diane W. Healey, M.D.[2]; (1) St. Vincent

Joshua Max Simon Primary Care Center, Indianapolis, IN; (2) St. Vincent Center for Healthy Aging, Indianapolis, IN

PURPOSE: Medication adverse effects can have profound medical and safety consequences for elderly patients. Strategies to identify both potentially inappropriate and appropriate medications have been developed. Tools utilized to identify potentially inappropriate medication are the Beers criteria and the Screening Tool of Older Person's Prescriptions (STOPP) criteria. Additionally, the Screening Tool to Alert doctors to Right Treatment (START) criteria is utilized to determine potentially appropriate medications in the elderly. Limited data is available comparing the Beers criteria and STOPP criteria, with most data coming primarily from the inpatient population. Additional data is needed to determine which criteria would be most suitable in an outpatient setting. The primary outcome of this study is to determine the most appropriate screening tool in the ambulatory setting for evaluating medication use in an ambulatory geriatric population comparing the Beers and STOPP criteria.

METHODS: This institutional review board approved retrospective chart review will include patients referred for geriatric assessments at the St. Vincent Center for Healthy Aging during the months of January 2011 through February 2012. Exclusion criteria include patients who present with no medications, patients in whom a medication list is unable to be obtained, follow-up appointments, or patients age less than 65 years. Each patient's medication list and medical history will be screened using the three tools described above (Beers criteria, START/STOPP criteria). Recommendations based on Beers criteria and STOPP criteria will be compared in regards to the number of potentially inappropriate medications, prescription cost savings, pill burden, and Anticholinergic Drug Scale scores. These factors will be modeled using multiple regressions and the adjusted means produced will be used to compare the criteria.

RESULTS: Data collection is ongoing.

CONCLUSIONS: Results and conclusions will be presented at the 2012 ACCP Virtual Poster Symposium.

80. Factors contributing to improved adherence rates following a clinical pharmacist intervention. Allison B. Riendeau, Pharm.D.[1], Jena L. Ivey, Pharm.D.[1], Mary T. Roth, Pharm.D., MHS[1], Morris Weinberger, Ph.D.[1], Denise A. Esserman, Ph.D.[1], Hayden B. Bosworth, Ph.D.[2]; (1) University of North Carolina, Chapel Hill, NC; (2) Durham VAMC Center for Health Services Research, Durham, NC

PURPOSE: The individualized Medication Assessment and Planning (iMAP) program provided comprehensive medication therapy management to older adults in a primary care clinic. In iMAP, clinical pharmacists working collaboratively with primary care physicians performed comprehensive medication reviews during scheduled visits at baseline, 3, and 6 months, to identify and resolve medication-related problems (MRPs). One MRP, nonadherence, was assessed by the clinical pharmacist for each prescribed maintenance medication based on clinical judgment following medication review and incorporated patient self-report of adherence. The prevalence of medication nonadherence was reduced from 41% to 23% between baseline and 6 months. This study sought to identify factors that may have contributed to improved adherence.

METHODS: We examined patterns of nonadherence over the 6-month study through audits of medication-taking behaviors recorded by pharmacists in the study database and patients' electronic medical records. We restricted our analysis to nonadherence problems identified at baseline and 3 months to allow us to observe subsequent changes in nonadherence. Descriptive statistics were used to characterize the findings.

RESULTS: For the 64 study patients, mean age was 75.4 years (range 65–93); 67% were white and 58% female. At baseline, patients were taking, on average, 13.9 (range 5–31) medications. Of the 64 patients, 33 (52%) were adherent to all of their medications throughout the study. The remaining 31 patients had documented nonadherence to at least one of their medications. Overall, there were 75 medications assessed as nonadherent at either baseline or 3 months. At 6 months, patients remained nonadherent to 17 of these medications (22.7%) and were now adherent to 58 (77.3%) medications. Factors potentially contributing to improved adherence include clinical pharmacist education (65.5%), medication discontinuation (12%), or therapeutic changes (12%) to decrease cost or improve ease of administration.

CONCLUSION: Clinical pharmacist intervention, particularly providing education, may improve medication adherence rates among older adults.

81. Evaluation of screening tools to assess inappropriate medication use in the elderly. Stephanie M. Callinan, B.S.[1], Timothy Reilly, Pharm.D, BCPS, CGP, FASCP[2]; (1) Rutgers, the State University of New Jersey, Piscataway, NJ; (2) University Medical Center at Princeton, Princeton, NJ

PURPOSE: Due to altered pharmacokinetic and pharmacodynamic parameters, elderly patients have an increased risk of experiencing an adverse drug reaction (ADR), and these reactions are a common cause of hospitalizations in this age group. The Beers criteria and the Screening Tool of Older Person's potentially inappropriate Prescriptions (STOPP) criteria list medications that have an increased risk of causing adverse events in the geriatric population. The purpose of this study is to determine which criteria are better predictors of adverse events for patients on the Acute Care for the Elderly (ACE) Unit at our institution.

METHODS: Exempt status was obtained from the appropriate institutional review boards for this retrospective chart review. Inclusion criteria consist of patients greater than 65 years of age, taking at least one drug before admission, and were admitted to the ACE unit at our institution between the dates of January 20 and May 20, 2011. The two primary endpoints of this study were length of stay (LOS) and number of ADRs. Statistical differences were detected using a Student's t-test and Mann Whitney test.

RESULTS: There were 340 patients who met the criteria, 143 (41.1%) of whom were prescribed a Beers criteria drug before or during admission. The most commonly prescribed Beers criteria drug was ferrous sulfate (>325 mg/day). Subjects taking Beers drugs had a significantly longer mean LOS (8.34 days vs 6.22 days, p=0.006) and an increased likelihood of experiencing an ADR (OR = 1.83; CI 1.10, 3.05). An analysis of patients prescribed STOPP criteria drugs is being conducted using the above methods.

CONCLUSIONS: Patients prescribed Beers criteria drugs were observed to have an increased LOS and likelihood of experiencing an ADR. A continuing evaluation of STOPP criteria drugs is in progress and will be completed by April 2012.

82. Associations between drug burden index and anticholinergic risk scale and the incidence of adverse outcomes in hospitalized patients. Lisa U. Nguyen, Pharm.D.[1], David P. Elliott, Pharm.D.[2], Richmond Rebecca, Pharm.D.[3], R Sankoff, Pharm.D., Candidate[2], M Emmett, Ph.D.[3], S Dean, Ph.D.[3]; (1) Charleston Area Medical Center/West Virginia University, Charleston, WV; (2) West Virginia University, Charleston, WV; (3) Charleston Area Medical Center, Charleston, WV

PURPOSE: 1. To evaluate the utility of Drug Burden Index (DBI) and Anticholinergic Risk Scale (ARS) scores in measuring the quality of drug therapy. 2. To assess whether higher total DBI and ARS scores were associated with higher incidence of adverse outcomes in hospitalized elderly patients.

METHODS: Retrospective chart review of patients $\geq$ 65 years of age with initial admission to medical services at our hospital between January 1, 2010 and December 31, 2010. Exclusion criteria included patients with <4 days of hospital stay and initial admission to surgery, trauma, or ICU service. Primary outcomes will examine the relationship between drug therapy quality measures (total ARS and DBI scores) and occurrence of fall (F), delirium (D), use of restraint (R), and use of a sitter (S). Secondarily, we will assess the impact of drug therapy quality on length of hospital stay (LOS) and all-cause mortality.

RESULTS: 515 patients were identified for the study. So far, data collected for 54 patients included a mean age of 80 years, 63% women, 26% nursing home residents, and 72% had abnormal baseline cognition. Primary outcomes were D = 10, R = 14, S = 4, D+R = 7, D+S = 4, and D+R+S = 3 patients. Twenty-eight patients had no documented adverse outcomes (mean DBI and ARS were 0.68 and 0.46, respectively) and 26 patients had at least 1 adverse outcome (mean DBI and ARS were 1.66 and 1.46, respectively). Mean LOS was 10 days with 1 all-cause mortality.
CONCLUSION: Compared with ARS, the use of DBI seemed to better quantify the amount of medication exposure in our patients. Those patients with at least one or more adverse outcomes were observed to have higher average DBI and ARS scores. The remainder of data collection and analysis is anticipated for completion by the end of March.

Health Services Research

83. Physician attitudes toward collaboration with health care professionals in Indiana. Siying Chen, Pharm.D.-Candidate[1], Cynthia P. Koh-Knox, Pharm.D.[1], Aleda M. H. Chen, Pharm.D., Ph.D.[2], Gloria P. Sachdev, Pharm.D.[1]; (1) Purdue University College of Pharmacy, West Lafayette, IN; (2) Cedarville University School of Pharmacy, Cedarville, OH
PURPOSE: The objectives of this study are to investigate physician attitudes towards collaboration, estimate the likelihood of collaborative practices, identify barriers to collaboration, and provide a basis for future studies in multidisciplinary collaborative practice.
METHODS: A total of 1141 physicians from Wishard Health Services were invited to participate in a 20-question survey that was developed and distributed electronically with two follow-up electronic reminders through Qualtrics software in September 2011. Questions included in the survey were physician and practice site background, physician attitude in terms of interprofessional trust, perceived value of other health care providers, likelihood of clinical task delegation and collaborations with other health care professionals. Physicians were also asked to identify causes of unsuccessful collaborations and barriers to effective collaboration. Data collections were completed in November 2011.
RESULTS: In the span of 2 months, 104 physicians (9.5%) completed the survey. Most commonly identified disadvantages of collaboration were miscommunication and extensive documentations. Among the respondents, 80% of physicians agreed that nurses were extremely important, while 40% of physicians consider pharmacists as extremely important healthcare team members. Among the 73% of physicians who did not currently have a Collaborative Drug Therapy Management (CDTM) agreement with pharmacists, 48% were likely to engage in CDTM if third-party payer reimbursed collaborative practices, and 12% would not engage in collaborative practice even if reimbursement exists.
CONCLUSIONS: Physicians believe that pharmacists and nurses are an important part of the healthcare team and are willing to collaborate regarding patient care. And improving third-party payer reimbursement for collaborative drug therapy management may further promote physician-pharmacist collaboration.

84. Quality of care for asthmatic patients at an urban federally qualified health center. Indrani Kar, Pharm.D., Candidate, 2013[1], Sharon E. Connor, Pharm.D.[1], Eletta L. Cameron, LSW[2], Dawna Woodyear, M.D.[2]; (1) University of Pittsburgh School of Pharmacy, Pittsburgh, PA; (2) UPMC Matilda Theiss Health Center, Pittsburgh, PA
PURPOSE: Asthma disproportionately burdens socioeconomically disadvantaged communities and is a leading cause of health disparities. Many underserved patients receive episodic treatment for asthma that does not follow current guidelines for care. This project was designed to develop baseline knowledge of asthma management in an urban federally qualified community health center.
METHODS: Medical records for all patients with a diagnosis of asthma seen between 5/1/10 and 4/30/11 are being reviewed. Several factors being assessed are demographics, spirometry, medication use, asthma severity, and peak flow monitor education. The UPMC Total Quality Council approved the work as a Quality Improvement project.
RESULTS: Of 1245 patients seen between 5/1/10 and 4/30/11, 221 (17.8%) patients have an asthma diagnosis. The 221 asthma patients were predominantly female (71%) and African American (84.6%). To date, 113 of 221 (51.1%) charts of asthma patients have been reviewed. Asthma severity was recorded for 13 (11.5%) patients, marked as one severe and two poorly controlled. One hundred and one patients (89.4%) are taking medications for asthma; 69 (61.1%) use corticosteroids; 28 (24.8%) use combination corticosteroids/LABAs; and 97 (85.8%) use short acting beta agonists. Spirometry scans were documented for four of 13 tested patients. Nineteen patients (16.8%) visited the ER for asthma. Peak flow meter counseling was provided to three patients.
CONCLUSION: According to the National Heart Lung and Blood Institute, the lifetime asthma prevalence in the United States is 10.5%. The health center has a prevalence (17.8%) 1.7 times that of the U.S. population, with the majority of asthma patients being African American (84.6%). Documentation of many components for appropriate asthma treatment is minimal. Pharmacists can play a unique role in improving asthma management and education at the health center, and suggestions will be given. (Expected completion of this project by April 2012.)

85. Implementation of pharmacist-run diabetes education in internal medicine resident clinics. Denise Kelley, Pharm.D., Candidate[1], Emily Bullington, Pharm.D., Candidate[1], Kristi Kelley, Pharm.D., BCPS, CDE[2]; (1) Auburn University Harrison School of Pharmacy, Auburn, AL; (2) Auburn University, Harrison School of Pharmacy, Birmingham, AL
PURPOSE: In 2010, according to the Center for Disease Control and Prevention (CDC), 8.3% of the United States population has been diagnosed with diabetes mellitus (DM). It is estimated that 11.7% of Alabamians have DM. It is well documented that lowering hemoglobin A1C by 1% reduces the incidence of microvascular complications by 40%. It is known that diabetes education is a powerful tool to provide patients with knowledge and self-management skills. However, estimates show that only 55.7% of DM patients in the United States have received diabetes self-management education (DSME). At an internal medicine resident clinic in Birmingham, Alabama, a formal means for diabetes education managed by pharmacists and pharmacy students was established in May 2010. The goal is to provide DSME to patients in the clinic where they receive medical care. Many of these patients would otherwise go without education due to challenges following up and inability to pay.
METHODS: This is a retrospective chart review where two pharmacy students and a faculty advisor analyzed the number of patients who received DSME and its impact on A1C trends and diabetes control. All patients that received DSME between May 2010 and November 2011 were evaluated and analyzed using descriptive statistics. In addition, we plan to evaluate the education topics covered in DSME in comparison to the National Standards for DSME and assess the diabetes related medication use by each patient. This study has been approved by the Institutional Review Board. Based on lessons learned, revisions to the program will be described.
RESULTS: Forty-seven patients received DSME, and twenty-five patients had adequate data to assess A1C trends. Twenty-four of twenty-five patients experienced an average A1C drop of 1.2% after DSME.
CONCLUSION: Working with other healthcare providers, pharmacists and student pharmacists play a vital role in providing this beneficial service to patients.

86. Rate of hepatitis B seroconversion in health science students enrolled at a single academic institution. Jenna L. Foster, Pharm.

D., Candidate, 2012[1], P. Brandon Bookstaver, Pharm.D., BCPS, AQ-ID, AAHIVE[2], April D. Miller, Pharm.D., BCPS[1], Amy D. Grant, Pharm.D.[1], Stephanie Burgess, Ph.D., APRN, BC, FAANP[3], JoshuaR Mann, M.D., MPH[4]; (1) South Carolina College of Pharmacy, Columbia, SC (2) South Carolina College of Pharmacy-USC Campus, Columbia, SC; (3) University of South Carolina College of Nursing, Columbia, SC; (4) University of South Carolina School of Medicine, Columbia, SC

PURPOSE: Requirements for proof of protective Hepatitis B virus (HBV) titers in students enrolled in health science schools affords a unique opportunity to assess HBV seroconversion rates. The purpose of this study is to determine the HBV seroconversion rate in healthcare students at an academic institution in the Southeastern United States.

METHODS: This study has been approved by the Institutional Review Board. A retrospective, non-interventional pilot study was conducted at the University of South Carolina in Columbia, South Carolina in all pharmacy, nursing, and medical students enrolled between 2007 and 2011. Demographic data, dates of HBV vaccinations, and HBV titer results, were collected by immunization chart review. The primary endpoint is the percentage of students with positive Hepatitis B titers ($\geq$10 IU/mL) after receiving the initial Hepatitis B vaccination series. Factors associated with Hepatitis B seroconversion results will be secondary endpoints. A detailed assessment will be performed on data from students with an initial negative titer at enrollment that required HBV "booster" series.

RESULTS: Preliminary results from the pharmacy student cohort show 83% (259/312) of students had positive titers and averaged 10 years between completion of HBV vaccination series and follow-up titer. Students with initial negative titers 17% (53/312), had 10.9 years on average between last vaccination and titer. Students with initial negative titers and one documented vaccination (4/53) averaged 7.5 years between vaccination and initial titer, whereas students with initial negative titers and two documented (3/53) vaccinations averaged 13.5 years between vaccination and titer. Students were predominantly female (67.5%).

CONCLUSIONS: Increased rate of seroconversion was seen among students who completed the primary HBV series, with less time between last HBV vaccination and titer. The rate of negative titers stresses the need for established guidelines and prudent record-keeping and follow-up for healthcare students.

Infectious Diseases

87. Evaluation of prescribed empiric cellulitis therapy at an academic medical center emergency department. Erwin H. Lam[1], Joseph M. Bissing[1], Satoru Ito[1], Asad E. Patanwala, Pharm.D., BCPS[1], Kathryn R. Matthias, Pharm.D., BCPS[1]; (1) University of Arizona, Tucson, AZ

PURPOSE: Cellulitis accounts for the majority of skin and skin structure infections in patients who present to the emergency departments in the United States. The primary objective of this study was to evaluate the appropriateness of empiric cellulitis therapy prescribed in an emergency department of an academic medical center. The secondary objective of the study was to compare the cost-effectiveness of the empirical cellulitis therapy prescribed at the institution.

METHODS: This retrospective chart review study has been approved by the Intuitional Review Board. Adult patients evaluated at an emergency department of a tertiary care, academic medical center, diagnosed with cellulitis and prescribed empiric antibiotic therapy between October and November 2010 were evaluated. Subjects were excluded if they required hospitalization or surgical intervention in an operating room or if they were diagnosed with necrotizing fasciitis, orbital cellulitis, or a diabetic foot infection. Data collected for each subject included type of cellulitis, therapy prescribed, and outcomes. Appropriateness of empiric cellulitis therapy was determined by expert opinion and guideline statements. A chi-square test was used to evaluate the statistical significance of treatment failure between the prescribed antibiotic groups. An independent t-test will be used to analyze the cost between the prescribed antibiotic groups. An incremental cost-effectiveness ratio will be used to determine the cost-effectiveness of the prescribed antibiotic groups.

RESULTS: The majority of patients were given a prescription for either clindamycin only (37%) or trimethoprim-sulfamethoxazole plus cephalexin (40%) as empiric therapy when discharged from the emergency department. While follow-up (either repeat emergency department visit or clinic visit within the academic medical healthcare network) was only available in 78% of subjects, there was no statistical difference (p=0.51) in therapy outcomes between these two empiric therapy options.

CONCLUSION: The pharmacoeconomic analysis is currently in progress and the project will be completed by the presentation date.

88. Evaluation of oral fluoroquinolone administration before and after implementation of computer generated medication administration record. Kevin Malina[1], Kurt Weibel, Pharm.D.[2], Kathryn R. Matthias, Pharm.D., BCPS[1]; (1) University of Arizona, Tucson, AZ; (2) The University of Arizona Medical Center – University Campus, Tucson, AZ

PURPOSE: Concomitant oral administration of fluoroquinolones with metal cations can decrease the absorption of the antibiotic and can lead to decreased blood concentrations and pharmacological effect. The primary and secondary objectives of this study were to determine the incidence of scheduled and actual co-administration times in handwritten and computer generated medication administration records of oral ciprofloxacin and oral moxifloxacin with interacting substances that can affect fluoroquinolone gastrointestinal absorption.

METHODS: This retrospective chart review study has been approved by the Intuitional Review Board. Patients over the age of 6 months who were prescribed either oral ciprofloxacin or oral moxifloxacin while admitted to an academic medical center during a one month period before (May 2010) and after (August 2010) implementation of a computer generated medication administration record were evaluated. Patients who did not receive any interacting substances known to affect oral fluoroquinolone absorption within 24 hours of an oral fluoroquinolone dose(s) were excluded. Data collected for each subject included demographic information, scheduled and actual times of oral fluoroquinolone administration, reason for change in time of administration if applicable, scheduled and actual time of administration of interacting substance(s), and use of enteral feeds. The scheduled and the actual time of administration oral fluoroquinolones and interacting substances will be compared before and after the implementation of a computer generated medication administration record.

RESULTS: At the medical center, 129 and 154 patients were identified who received oral ciprofloxacin or moxifloxacin during a one month period before and after implantation of a computer generated medication administration record. The times of scheduled and actual administration of oral fluoroquinolone agents and interacting substances during the two time periods to be evaluated.

CONCLUSIONS: Data analysis will be completed by the presentation date.

89. Evaluation of combination therapy for *Clostridium difficile* infection. Jacqueline R. Campbell[1], Theresa M. Stehmer[1], David E. Nix, Pharm.D., BCPS[1], Donna Wolk, Ph.D.[1], Kathryn R. Matthias, Pharm.D., BCPS[1]; (1) University of Arizona, Tucson, AZ

PURPOSE: Current treatment guidelines recommend the use of metronidazole or oral vancomycin to treat *Clostridium difficile* infection in the majority of patients depending on the severity of symptoms. The primary objective of this study was to determine significant factors associated with the use of combination oral vancomycin and metronidazole as initial therapy for moderate to severe *Clostridium difficile* associated diarrhea at an academic medical center. The secondary objectives of this study were to evaluate the incidence of non-response, recurrence, relapse, and rate of complications by treatment and strain type (NAP1/B1/027).

METHODS: This retrospective medical record review has been approved by the Institutional Review Board. Adult patients with stool specimens tested for detection of *Clostridium difficile* toxin

B by PCR between April 2010 and March 2011 at a tertiary care, academic medical center were evaluated. Patients were included in the study if diagnosed with moderate to severe disease and received either monotherapy with metronidazole, monotherapy with oral vancomycin, or combination therapy with metronidazole and oral vancomycin for at least 80% of the first 10 days of treatment. Patients who are discharged alive within 72 hours of admission or who received therapy for less than 48 hours were excluded. Data collected includes demographic information, *Clostridium difficile* PCR results and strain type, associated symptoms, prior antibiotic exposure, severity classification, and therapies prescribed. The rate of response will be compared between the three treatments using Chi Square.
RESULTS: All patients (N=411) with laboratory evidence of *Clostridium difficile* during the study time period have been evaluated and 56 patients received oral vancomycin along with metronidazole for at least 80% of the first 10 days of treatment.
CONCLUSIONS: Data collection is complete and data analysis will be completed by the presentation date.

Medication Safety

90. Implementation of a pharmacist provided discharge medication reconciliation process based on risk stratification: an evaluative pilot study. Sarah E. Hanson, Pharm.D.[1], Megan L. Maddox, Pharm.D.[1], Laura Stoebner, Pharm.D.[1]; (1) Sanford USD Medical Center, Sioux Falls, SD
BACKGROUND: Maintaining accurate and complete medication reconciliations across the continuum of patient care has been identified as an important step to improve patient safety. The Joint Commission has recently revised the National Patient Safety Goal on medication reconciliation to broaden the goal to "maintain and communicate accurate patient medication information". Elements of this goal include obtaining a medication history, identifying and resolving discrepancies, and providing the patient or family with accurate written information and education at discharge. Due to limited resources, one strategy proposed to maximize impact on patient safety is to identify patients at "high-risk" for potential medication errors and dedicate resources to this population.
PURPOSE: The primary objective of this study is to evaluate the implementation of a dedicated pharmacist to discharge medication reconciliation and patient education in a pre-defined "high-risk" patient population. Other objectives include determining the frequency of discrepancies, assessing the potential for harm related to discharge medication discrepancies, and to quantify the time required to provide discharge medication reconciliation services.
METHODS: This study will take place on one surgical and one cardiology unit. Patients will be deemed "high-risk" if they meet at least two of the following criteria: 65 years of age or older, discharge disposition to a skilled living facility, taking at least 10 medications (excluding vitamins/herbals), or having at least one high-alert medication prescribed. For patients meeting criteria, the investigator will review patient information and discharge medication orders. The physician will be contacted to clarify and correct any unintended discrepancies. Then the investigator will provide patient education on medications.
RESULTS: Analysis of the first 40 patients reviewed by the investigator, 35 patients had at least one discrepancy identified on discharge medication orders. Additional data collection is currently in progress.
CONCLUSION: Data collection currently in progress and will be completed by January 31st, 2012.

91. Pharmacist-managed discharge medication reconciliation and counseling. Katie Yabut, Pharm, D[1], Carl Heisel, Pharm D[1], Aimee Breitfelder, Pharm D[1]; (1) Legacy Health, Portland, OR
PURPOSE: The objectives for this pilot program are to examine the effect of a pharmacist-managed medication reconciliation and discharge counseling program on patient satisfaction, identification of medication discrepancies and cost savings associated with those discrepancies.
METHODS: This will be a before and after study design in hospitalized patients on the general medicine service, unit 55 at Emanuel Hospital in Portland, Oregon. Patients discharged before the intervention had their discharge medication reconciliation completed by a physician and their medication counseling provided by a nurse. Post-intervention patients will receive medication reconciliation and counseling by a pharmacist before discharge home, in addition to the physician performing their usual role.
RESULTS: The primary outcome will be change in patient satisfaction score based upon a phone survey done 7–10 days after discharge by an independent source. Secondary objectives are number and type of medication discrepancies and cost-savings associated with those discrepancies found upon medication reconciliation by a pharmacist. In the initial data collection, pharmacists have been successfully able to counsel 36% of all patients discharged home. Patient satisfaction scores are collected on a quarterly basis, thus are not available at this time. The largest intervention made by pharmacists has been answering basic medication questions for the patient and family. This occured more than 90% of the time during all counseling sessions.
CONCLUSION: Pharmacist lead discharge medication reconciliation and counseling has provided our patients an opportunity for questions and clarifications about their medications immediately prior to being discharged from the hospital. The expectation is that this will improve patient satisfaction, while also providing an avenue for pharmacists to intervene on medication discrepancies. Our complete results and conclusion will be available by April 2012.

Pain Management/Analgesia

92. Adherence of patient-controlled analgesia order form on an oncology unit. Tejal N. Patel, Pharm.D.[1], Zahra Khudeira, Pharm. D., M.A.[1], Anna Liza Rodriguez, MSN, MHA, RN, OCN[1]; (1) Sinai Health System, Chicago, IL
PURPOSE: Patient-controlled analgesia (PCA) provides several benefits including quicker patient access to pain relief. Successful inpatient pain management can also help improve patient satisfaction, increase the quality of care, and reduce length of hospital stay. The objective of this study is to assess the documentation of criteria to determine adherence to the PCA order set and the effectiveness of pain management.
METHODS: The health system's electronic medical record system will be used to identify patients who, over a six?month period of time, received PCAs on one unit. Baseline data will be collected to identify the number of patients treated with PCA pumps, appropriate pain assessments by physicians and nurses, occurrence of adverse events, and the use of ancillary medications for the treatment of adverse events. The PCA order set provides criteria for frequency of pain score measurement, vital signs and sedation scores which are at baseline, every 15 minutes for the first two hours, followed by every two hours for two measurements and then every four hours until the PCA is discontinued. The compliance with documentation will be analyzed by category and reported. If opportunities for improvement are identified, a multi-disciplinary effort with nursing, information systems, and physicians will be initiated to address the issues and formulate a collaborative plan.
RESULTS: A total of 33 patients were identified by generating a pharmacy report on the use of PCA pumps. Data reveals only a 45% documentation of pain scores for patients' prior to the initiation of the PCAs and no pain score, vital sign, and sedation level documentation at the specified times.
CONCLUSION: Systematic plans for improvement will best involve broad and multi-faceted changes in our approach to managing patients who receive PCA. The improvements utilized should incorporate the hospital information system, order form, policy, and staff education.

Pediatrics

93. Identification of the top-10 problematic pediatric medications. HyeJin Son, B.S.[1], Forrest L. Smith, Ph.D.[1], Jeanie M. Smith, Pharm.D.[1], Ashley E. Earley, Pharm.D.[1], Kalen B. Manasco, Pharm. D., BCPS, AE-C[2], Kenneth M. Yates, M.S., D.V.M.[1], Julie C. Kissack, Pharm.D., BCPP[1]; (1) Harding University College of Pharmacy, Searcy, AR; (2) University of Georgia College of Pharmacy, Augusta, GA

PURPOSE: This survey measured the consensus opinion of pediatric pharmacists on ranking medication categories from least to most problematic regarding patient safety, and the top-10 most problematic pediatric medications.

METHODS: Participants ranked 11 medication categories as least, moderate and most problematic regarding patient safety. Participants also ranked the top-10 from a list of 50 medications for three areas: medication problems in dosing, adverse effects and medication errors. Medications from each area were summed and ranked from 1 to 50 to identify the top-10 list. The 11 medication categories and 50 medications were drawn from expert consensus, the Institute for Safe Medication Practice (ISMP) high-alert medication list, and medication alerts/reviews of pediatric literature.

RESULTS: The survey was completed by 10.7% (67) of 624 ACCP Pediatric Practice and Research Networks (PRN) pharmacist members. Participants represent mostly clinical pharmacists (75%), working in children's hospitals (61%) or pediatric units (25%), from 25 states and three Canadian provinces. Seventy-percent are members of the Pediatric Pharmacy Advocacy Group. Regarding overall pediatric patient safety, participants ranked anticoagulants as most problematic, anticonvulsants as moderately problematic, and gastrointestinal medications as least problematic. The top-10 medications from first to tenth (including ties) were: 1-insulin, 2-warfarin, 3-heparin, 4-vancomycin, 5-(tied: digoxin & gentamicin), 6-potassium chloride, 7-morphine, 8-methadone, 9-(tied: fentanyl & potassium phosphate) and 10-calcium chloride.

CONCLUSION: ACCP Pediatric PRN pharmacists identified nearly the same medications reported as problematic in other publications of pediatrics. Franke et al. in 2009 reported on a top-10 open survey that physicians, nurses and pharmacists ranked 1-potassium, 2-heparin, 3-insulin, 4-digoxin, 6-calcium, 8-morphine, and 9-fentanyl as high alert pediatric ICU medications. Harm from medication errors in pediatrics reported to ISMP Canada in 2009 ranked 1-morphine, 2-potassium chloride, 3-insulin, and 4-fentanyl in the top five medications. This survey's consensus ranking by pediatric pharmacists is consistent with other healthcare professions.

Pharmacoepidemiology

94. Analysis of the economic impact associated with susceptibility patterns and antimicrobial treatment of Proteus infections at a community hospital over five years. Lindsay Thurman, Pharm.D., Candidate[1], Manuel Escobar, Pharm.D., Candidate[1], Donna R. Burgess, B.S.[2], Kurt R. Winkler, Pharm.D., MHA, BCPS[2], Tony Dasher, Pharm.D.[2], David S. Burgess, Pharm.D., FCCP[3]; (1) University of the Incarnate Word Feik School of Pharmacy, San Antonio, TX; (2) Methodist Hospital Department of Pharmacy, San Antonio, TX; (3) University of Texas at Austin College of Pharmacy and University of Texas Health Science Center School of Medicine, San Antonio, TX

PURPOSE: We previously reported a significant decline in susceptibility to Proteus species for several antibiotics, including ceftriaxone. Since the phenotypic susceptibility pattern from the automated system appeared to resemble an ESBL isolate, we performed susceptibility testing for several antimicrobials using E-test. Surprisingly, none of the isolates produced an extended-spectrum beta-lactamase. Furthermore, all of the isolates were susceptible to ceftriaxone with all MICs being <1 μg/mL. Upon further investigation, it was discovered that the algorithm selected in the automated system led to classifying ceftriaxone and other beta-lactams as resistant. Building on previously reported data, this study will evaluate a yearly antibiogram for seven antibiotics against Proteus species and determine the economic impact of resistant isolates.

METHODS: All susceptibility data for Proteus cultures from 2006–2011 were obtained and duplicate isolates removed to create a yearly antibiogram for ampicillin, amoxicillin/clavulanate, cefazolin, ceftriaxone, gentamicin, ciprofloxacin or levofloxacin, and trimethoprim/sulfamethaxozole. Patient information collected from the health system's electronic medical records included: admission and discharge dates, age, prescriber, culture site, hospital location, and antibiotic therapy (prior to and after culture results). Length of hospital stay and antibiotic therapy cost will be calculated for each patient. Multi-drug resistance (MDR) was defined as resistant to ceftriaxone plus two other antibiotic classes.

RESULTS: Overall, 1371 patients were identified of which 300 isolates were considered MDR. All antibiotics evaluated except ceftriaxone demonstrated a relative stable susceptibility pattern over the time period. Ceftriaxone susceptibility was 96% (2006), 85% (2007), 59% (2008), 64% (2009), 86% (2010), and 89% (2011). Amoxicillin/clavulanate displayed the highest percent susceptible (96%).

CONCLUSION: Selection of some algorithms in automatic susceptibility testing can lead to inappropriate susceptibility reporting and potential increased cost of therapy. The overall economic impact (i.e., cost of antibiotic therapy, hospital stay) of MDR Proteus infections will be presented.

Pharmacokinetics/Pharmacodynamics

95. Pediatric dosage calculation: valganciclovir pharmacokinetic profiling in pediatric renal transplant recipients. Ben L. Kong, Pharm., D., Candidate[1], Tammy Chan, Pharm., D.[2], Ali Olyaei, Pharm., D.[1], Myrna Munar, Pharm., D.[1], Amira Al-Uzri, M.D., MCR[2]; (1) Oregon State University and Oregon Health and Science University, Portland, OR; (2) Oregon Health and Science University, Portland, OR

PURPOSE: Investigate oral doses of valganciclovir administered to pediatric transplant patients. Calculate pediatric valganciclovir dosages based on body weight. Calculate pediatric valganciclovir dosages based on the manufacturer's dosing equation. Relate valganciclovir doses to patient outcomes post-transplantation. Calculate and model virtual valganciclovir pharmacokinetic behavior.

METHODS: Open-label, single-center, retrospective chart review. Study site: OHSU and Doernbecher Children's Hospital. Inclusion criteria: pediatric kidney transplant patients who required CMV prophylaxis with oral valganciclovir between 2006 to 2010. No exclusion criteria. Sample size: all patients who entered the study were considered for the analysis. Data were collected via computerized medical and prescription records of pediatric kidney transplant patients using valganciclovir for CMV prophylaxis: demographic and dosing data: Age, height, weight, serum creatinine (SCr), start and end dates of valganciclovir therapy, and the prescribed valganciclovir doses. Transplantation (Tx) data: Date of Tx, induction regimen, maintenance immunosuppression regimen, and presence or absence of transplant rejection and graft loss.

RESULTS: CMV status pre- and post-Tx, BK viral status post-Tx, blood or plasma urea nitrogen, SCr, white blood cell count, hemoglobin, and platelet count. Two patients (<10%) who received valganciclovir doses that were lower than weight-based or manufacturer's recommended dosing developed CMV viremia or infection. Eight patients (38%) developed leukopenia (WBC < 3.0 k/mm^3) during valganciclovir therapy, most likely due to chronic immunosuppressive therapy plus excessive val-

ganciclovir dosing. No patients developed nephrotoxicity or thrombocytopenia during valganciclovir therapy (data not shown).

CONCLUSION: Following the manufacturer's recommended valganciclovir dosing schedule can be associated with potential for overexposure, toxicity and greater drug costs compared to weight-based dosing. Ongoing studies include PK simulation to determine AUC arising from different dosing methods, comparison to target AUC of 40 50 μg/mL, and evaluating the relationship to outcomes.