ABSTRACTS

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ORIGINAL RESEARCH

ADR/Drug Interactions

1E. Prevalence of coadministration of a triptan and an antidepressant in the United States: a risk for serotonin syndrome. *David A. Sclar, B.Pharm., Ph.D.*, Linda M. Robison, M.S.P.H., Tracy L. Skaer, B.Pharm., Pharm.D.; Washington State University, Pullman, WA.

PURPOSE: In July, 2006, the U.S. Food and Drug Administration warned patients and healthcare professionals to be aware that use of a triptan in combination with an SSRI or an SNRI may result in a potentially life-threatening problem known as serotonin syndrome. The objective of this study was to discern the prevalence of concomitant use of a triptan and a selective serotonin reuptake inhibitor (SSRI) or a selective serotonin/norepinephrine reuptake inhibitor (SNRI) in the U.S.
METHODS: We used weighted data from the U.S. National Ambulatory Medical Care Survey for years 2003, and 2004, to derive national estimates of the number of office-based visits documenting concomitant use of a triptan and an SSRI or an SNRI.
RESULTS: During the time-frame 2003–04, an annualized mean of 3,874,367 patients were prescribed a triptan, and 50,402,149 patients were prescribed an SSRI or an SNRI. An annualized mean of 694,276 patients were simultaneously prescribed or continued use of a triptan along with an SSRI or SNRI.
CONCLUSIONS: Our study documents that 1.3% of patients prescribed a triptan or an SSRI or an SNRI were prescribed the potentially fatal combination. While this is a small fraction overall, the actual number of patients on a nationwide basis is significant (n = 694,276).
Published in Published in European Neuropsychopharmacology 2007;17(Suppl 4):S348.

2. Evaluating the incidence of serotonin toxicity related to the use of linezolid in a community hospital: an evaluation of linezolid and concomitant serotonergic agents (ELSA). *Dana L. Lorenz, Pharm.D.*, Arti Bhavsar, Pharm.D.; Florida Hospital, Orlando, FL.

BACKGROUND: Linezolid (Zyvox®) is similar in structure to monoamine oxidase inhibitors (MAOIs) and demonstrates weak reversible monoamine oxidase A and B inhibitory effects. The administration of MAOIs with serotonergic agents is associated with serotonin syndrome. There is ongoing controversy regarding the significance of the drug-drug interaction between linezolid and concomitant serotonergic agents.
OBJECTIVES: The purpose of this study is to evaluate the incidence of serotonin toxicity related to the drug-drug interaction between linezolid and concomitant serotonergic agents in the community hospital setting.
METHODS: A twelve month retrospective chart review was conducted on 50 patients greater than 18 years of age who were prescribed either a selective serotonin reuptake inhibitor (SSRI) or a serotonin-norepinephrine reuptake inhibitor (SNRI) and linezolid during the same admission. Patients were identified by means of drug utilization reports. Charts were reviewed for any signs or symptoms of serotonin toxicity as defined by the Hunter Serotonin Toxicity Criteria Decision Rules; a standard method of patient evaluation.
RESULTS: No patients meet the criteria for a diagnosis of serotonin syndrome.
CONCLUSION: Linezolid may be used concurrently with an SSRI or SNRI with careful monitoring for the signs and symptoms of serotonin syndrome.

Ambulatory Care

3. Risk factors and complications of subconjunctival hemorrhages in patients taking warfarin. Lindsey L. Leiker, Pharm.D.[1], *Jennifer L. Rodis, Pharm.D.*[2], Bella H. Mehta, Pharm.D.[1], Maria C. Pruchnicki, Pharm.D., B.C.P.S.[2]; (1)The Ohio State University College of Pharmacy Clinical Partners Program, Columbus, OH; (2)The Ohio State University College of Pharmacy, Columbus, OH.

PURPOSE: To identify patients with subconjunctival hemorrhage (SCH) on warfarin therapy, describe risk factors that may contribute to developing an SCH, and identify complications related to SCH.
METHODS: Two pharmacists at a university anticoagulation clinic performed a retrospective chart review including patients managed at the clinic between 1/1/04–1/1/06, a total of 4,334 patient visits. Data collection included the month SCH occurred, patient age, indication for warfarin therapy, INR goal (range), most recent INR, INR (if obtained) at time of event, INR following event, risk factors or comorbid conditions that could increase risk of bleeding, and patient-reported complications related to SCH. Recent changes in medication use and warfarin dosage adjustments made in response to the event were collected. Data was summarized using descriptive statistics, with frequencies described as percentages.
RESULTS: Fifteen SCH events identified between 1/1/04 and 1/1/06, an event rate of 0.35%. 2 were excluded due to related surgeries near the time of SCH events. Of the thirteen events included in the analysis, the average patient age was 67.3 years (range 51–82). 76.9% (n = 10) of patients had an INR within goal range at the appointment prior to reporting the SCH. 46.2% (n = 6) of patients reported an alteration in their medication regimen during the month preceding their event. Patient conditions that may have increased the risk of developing an SCH included hypertension, coronary artery disease, breast cancer, history of stroke and renal transplant, lupus, type 2 diabetes, peripheral vascular disease, and chronic obstructive pulmonary disease (COPD). No ophthalmic complications were associated with any event.
CONCLUSIONS: SCHs occurred in patients of a university anticoagulation clinic at an event rate of 0.35%. Many factors may have precipitated these events; however, ophthalmic complications were uncommon.

4. Characterization of the indication for use of spironolactone and frequency of laboratory evaluation in ambulatory patients. *Rosalyn S. Padiyara, Pharm.D.*, Jill S. Burkiewicz, Pharm.D., BCPS, Jennifer J. D'Souza, Pharm.D., CDE; Midwestern University—Chicago College of Pharmacy, Downers Grove, IL.

PURPOSE: Spironolactone can be used in the treatment of heart failure, hypertension, acne, and hirsutism. The rate of prescriptions for heart failure has increased over the past decade; however, the rates for other conditions have been relatively unexplored. The objectives of this randomized, retrospective chart review is to characterize the indications for spironolactone use in an ambulatory care population, describe variations in laboratory monitoring of spironolactone by indication, and determine the incidence of hyperkalemia in patients on spironolactone by indication within a managed care organization.
METHODS: Electronic medical records of patients receiving spironolactone from January 1, 2005 through October 1, 2006 were retrospectively reviewed. Serum creatinine and potassium laboratory evaluation within 7 months and 13 months was reviewed. Rates of hyperkalemia ($K \geq 5.5$ mEq/L.) were documented. Monitoring frequency was characterized by indication.
RESULTS: Of 693 patients, 674 were confirmed as receiving spironolactone during the study period. Three-quarters (n = 509, 75.5%) of patients were female with an overall mean age of 52.5 (range 13 to 99). Common indications for spironolactone use were: acne (n = 176, 26.1%), heart failure (n = 143, 21.2%), edema (n = 58, 8.6%), and hypertension (n = 57, 8.5%). Of those patients who continued spironolactone for the 13 month period (n = 327), potassium was evaluated in 53.2% within 7 months and 69.1% within 13 months. Serum creatinine was evaluated in 51.7% within 7 months and 67.0% within 13 months. Monitoring differed by indication ($p<0.001$), with potassium monitoring in 18.3% of patients with acne, 78.3% with heart failure, 90% with edema, and 60.5% with hypertension. Overall rates of hyperkalemia were low (6.1%).
CONCLUSIONS: Of ambulatory patients taking spironolactone, a clinically significant number of patients are taking spironolactone for indications other than heart failure with acne as the most common indication. Improvements in laboratory monitoring, particularly in patients taking spironolactone for acne, are needed.

Basic Science Model Organism

5. Drosophila melanogaster: a model organism for anti-aging pharmacology. *Mahtab Jafari, Pharm.D.*; University of California, Irvine, Irvine, CA.

PURPOSE: The field of anti-aging pharmacology is expanding and we need model systems and pharmacological assays for time efficient and cost-effective screening of anti-aging compounds. There are a number of potential confounds and errors that can arise in such research programs. Using Drosophila as our model organism, we developed and validated pharmacological assays to evaluate the impact of such compounds on the mortality rate, life span, and the confounds of aging.
METHODS: The impact of four Chinese herbals, Lu Duo Wei (LDW), Bu Zhong Yi Qi Tang (BZYQT), San Zhi Pian (SZP, Three Imperial Mushrooms), Hong Jing Tian (Rhodiola) on the mortality rate and life span were evaluated. Compounds that resulted in a decrease in mortality rate were assayed for their impact on other confounds of life span extension such as fecundity, metabolic rate, and diet.
RESULTS: Only Rhodiola fed flies exhibited decelerated aging. The observed extension in life span was associated with no reduction in fecundity and metablic rate. Since the anti-aging effects of Rhodiola was not dependent on dietary manipulation, Rhodiola does not act as a mere dietary restriction mimetic.
CONCLUSION: While this study does not reveal the causal mechanism behind the effect of Rhodiola, it does suggest that this botanical compound is worthy of continued investigation.

Cardiovascular

6. Root cause analysis for patients with acute coronary syndrome (ACS) experiencing a Major Bleed. *Sharan Lail, BSc, Phm*, Kertland Heather, Pharm.D., Jeffrey Jana, BScN, Bhojwani Ramola, Pharm.D., David Fitchett, M.D.; St. Michael's Hospital, Toronto, ON, Canada.

BACKGROUND: While root cause analysis (RCA) has traditionally been used to investigate sentinel events, it has also been used to study causative factors relating to serious adverse events. In the treatment of ACS, patients who experience a bleeding event have an increase in 30 day mortality, and we used RCA to identify the root causes of bleeding related to the processes and delivery of patient care.
METHODS: Patients admitted to the Coronary Care Unit from June 2005 to 2006 with ACS experiencing a TIMI major or GUSTO severe/life threatening bleed were identified through hospital databases. Patient charts were retrospectively reviewed, and a timeline of events created for evaluation. Root causes contributing to bleeding were organized into 6 categories: communication, training, scheduling, environment, policies/procedures, and barriers. In each case, findings were validated by a multidisciplinary team consisting of a nurse, pharmacist and cardiologist.
RESULTS: Eight patients experiencing a major bleed were reviewed. Each patient had multiple pre-existing risk factors such as: elderly, female, and renal insufficiency. Factors contributing to bleeding were related to staff training (e.g., pre-printed physician orders not used), medication reconciliation (e.g., no record of loading dose administration at transferring institution or time of last drug administration), and inappropriate medication dosing and combination of drugs on admission (e.g., excessive dosing at a transferring facility). An overall theme of vulnerability during the time of transfer, both from another hospital and within the hospital, was determined. In particular, lack of adequate information for patient assessment and furthermore reevaluation of medications having not taken place.
CONCLUSIONS: In addition to pre-determined risk factors, RCA identified factors related to the processes surrounding health care delivery which should be addressed to minimize the risk of bleeding. These identified factors should be systematically corrected and policies put in place with a process for re-evaluation.

7E. Impact of thienopyridines on re-operation rates, bleeding outcomes and hospitalization in ACS patients requiring CABG surgery. *Carla B. Frye, Pharm.D.*[1], Jeffrey Berger, M.D.[2], Qing Harshaw, M.D., Ph,.D,.[1], Steven R. Steinhubl, MD[3], Fred H. Edwards, M.D.[4], Richard C. Becker, M.D.[2]; (1)EPI-Q, Inc., Oak Brook, IL; (2)Duke University Medical Center, Durham, NC; (3)University of Kentucky, Lexington, KY; (4)University of Florida, Jacksonville, FL.

OBJECTIVE: The objective of this retrospective medical record analysis was to examine the impact of preoperative administration of clopidogrel on re-operation rates, incidence of life-threatening bleeding, inpatient length of stay (LOS) and other bleeding-related outcomes in ACS patients requiring CABG in a broad cross-section of US hospitals.
METHODS: A cohort analysis of ACS patients requiring CABG surgery during index hospitalization was completed. Included sites randomly selected 40–50 cases divided into the two comparison groups which consisted of patients exposed to clopidogrel versus those not exposed to clopidogrel within 5 days prior to surgery.
RESULTS: Data from 598 patients in 14 hospitals are reported. The two groups were comparable at baseline in terms of age, gender, and co-morbidities. The rate of re-operation in the exposed group was 6.4% vs. 1.7% (p=0.004) in those not exposed within 5 days. The number of patients who experienced major bleeding was higher in the exposed group and inpatient LOS was significantly different.

Relationship between Clopidogrel Exposure and LOS, Markers for Life Threatening Bleeding, and Reoperation

	Clopidogrel exposed N = 298	Clopidogrel non-exposed n = 298	p value
Patients Requiring Re-operation (n,%)	19 (6.4)	5 (1.7)	0.004
Patients with Major Bleeding (n,%)1	71 (34.5)	53 (25.6)	0.049
Inpatient LOS (days) - mean, (±SD)	9.7 (± 5.99)	8.6 (± 4.71)	0.016
Re-operation for bleeding complication (n,%)	14 (4.7)	4 (1.3)	0.017
Transfusion received - mean, (±SD)	4.90 (± 7.90)	2.03 (± 3.75)	<0.001
Composite of death/re-infarction/stroke (n,%)	8 (2.7)	5 (1.7)	0.400

[1]Includes patients with fatality due to bleeding OR a post-op decrease in hemoglobin of >5 g/dL OR bleeding/tamponade OR intracranial bleeding

CONCLUSION: Exposure to clopidogrel within 5 days before CABG surgery in ACS patients significantly increases the need for re-operation and other major bleeding outcomes in a broad cross-section of hospitals.
Presented at Presented at the Scientifc Sessions 2007 of the American Heart Association, Orlando, FL, November 4–8, 2007.

8. Once weekly statin therapy effective and well-tolerated in patients with a prior statin intolerance. *James M. Backes, Pharm.D.*, Cheryl A. Gibson, Ph.D., Janelle F. Ruisinger, Pharm.D., Patrick M. Moriarty, M.D.; University of Kansas Lipid, Atherosclerosis, Metabolic and LDL-Apheresis Center, Kansas City, KS.

PURPOSE: Statins possess an excellent safety profile, however approximately 10% of patients discontinue therapy due to intolerance, especially myalgias. We sought to determine changes in lipid profiles [total cholesterol (TC), low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C), triglycerides, TC/HDL and LDL/HDL ratios] and tolerance when a statin (rosuvastatin) is dosed once weekly in patients with a previous statin intolerance.
METHODS: Approximately 1300 medical records in a lipid-specialty clinic were reviewed to identify patients that received rosuvastatin once weekly who previously had experienced a statin intolerance. Documentation of past medical history, demographic data, concomitant lipid-altering agents, lipid profiles immediately before and upon first follow-up with rosuvastatin weekly, was collected. Patients were excluded if other substantial changes were made in their lipid-altering regimen or length of therapy was < four weeks.
RESULTS: Thirty-four patients (22 female/12 male) were identified as having received rosuvastatin once weekly with 27 (79%) tolerating the regimen. Common previous statin intolerances included myalgias (23; 68%) and increased liver function tests (5; 15%). The mean dosage of rosuvastatin was 9.9 ± 4.3 mg once weekly (range 2.5 to 20 mg). For those patients who tolerated the new regimen overall mean changes from baseline to follow-up (mean 3.6 ± 1.5 months) were noted for TC (241 vs 199 mg/dL ±48.9; -17%; p<0.001), LDL-C (166 vs 125 mg/dL ±33.5; -25%; p<0.001), HDL-C (48 vs 51 mg/dL ±11.1; +6.25 %; NS), triglycerides (150 vs 138 mg/dL ±59.7; -8%; NS), TC/HDL (5.3 vs 4.1 ±1.4; -23%; p<0.001) and LDL/HDL (3.7 vs 2.7 ±0.94; -27%; p<0.001).
CONCLUSIONS: Nearly 80% of patients previously intolerant to a statin tolerated the rosuvastatin once weekly regimen. This group experienced significant improvements in TC, LDL-C, TC/HDL and LDL/HDL ratios. The once weekly dosing strategy may be an important option for statin-intolerant patients requiring substantial LDL-C reductions.

9. Use and dosing of bivalirudin after CardioWest™ temporary total artificial heart implantation. *Michael A. Crouch, Pharm.D.*, Vigneshwar Kasirajan, M.D., William D. Cahoon, Pharm.D., Gundars J. Katlaps, M.D., Kyle J. Gunnerson, M.D.; Virginia Commonwealth University, Richmond, VA.

PURPOSE: The CardioWest™ temporary total artificial heart (TAH-t) has emerged as an effective bridge to transplantation for individuals with biventricular failure. After implantation, a multi-drug approach minimizes thromboembolism and hemorrhagic complications, including aspirin, dipyridamole, pentoxifylline, low dose unfractionated heparin (UFH), and warfarin. A concern with UFH is heparin-dependent antibodies, which develop in up to 50% of patients receiving the drug as part of cardiopulmonary bypass. The risk of heparin-induced thrombocytopenia is 1 to 3% if UFH is continued post-operatively. Small investigations demonstrate bivalirudin (bolus 0.75 to 1 mg/kg, then 1.75 to 2.5 mg/kg/hour) is an effective alternative to UFH during coronary artery bypass surgery and/or valve replacement. The goal of this investigation is to evaluate the use and dosing of bivalirudin as an alternative to low-dose UFH after TAH-t implantation.

METHODS: This retrospective case series examines bivalirudin after TAH-t implantation. Treatment was initiated at the discretion of the treating physician and principally adjusted based on thromboelastography. Additional related monitoring included activated partial thromboplastin time, prothrombin time, international normalized ratio, fibrinogen, d-dimer, platelet count, hemoglobin, hematocrit, and platelet aggregation studies. Bivalirudin continued until successful warfarin implementation.
RESULTS: Four patients received bivalirudin in addition to aspirin, dipyridamole, pentoxifylline, and warfarin. Bivalirudin started at 0.005 mg/kg/hr and it maintained normocoagulability, without concomitant warfarin, within the dosage range of 0.01 to 0.02 mg/kg/hr. TAH-t implantation lasted for 41.3 days (range 25–61 days) and bivalirudin continued for 16.8 days (range 7–24 days). All patients successfully transitioned to warfarin.
CONCLUSIONS: Low dose bivalirudin, as an alternative to UFH, maintained normocoagulability after TAH-t implantation. Further investigation is warranted to better define the role of bivalirudin in this situation.

10. Safety and efficacy of nurse-driven heparin dosing protocols. *Todd Miano, Pharm.D.*, Katy Hanzelka, Pharm.D., Regina Schomberg, Pharm.D., Jennifer Noped, Pharm.D.; Wake Forest University Baptist Medical Center, Winston-Salem, NC.

PURPOSE: Our institution uses four nurse-driven heparin protocols. Dosing differs between protocols based upon indication. This study assessed the safety and efficacy of these protocols.
METHODS: Dosing regimens were as follows: Protocol 1: 80unit/kg bolus, 18unit/kg infusion; Protocol 2: 60 unit/kg bolus, 12 unit/kg infusion; Protocol 3:18unit/kg infusion; Protocol 4:12 unit/kg infusion. Heparin dosages, aPTT values, and bleeding episodes were documented. Variables collected to assess influence on protocol success include: age, weight, time between aPTT measurements, and nursing flowsheet documentation rate. Primary outcome was the percentage of patients at goal aPTT within 24hrs.
RESULTS: Data was collected on 150 patients between November 2007 and March 2008. Thirty-two percent of patients were therapeutic within 24 hrs. Median time to goal aPTT was 28.3 hrs. Protocols 1 and 3 were more likely to produce supratherapeutic aPTT values (75% and 60%, respectively) vs. Protocols 2 and 4 (44% and 24%, respectively), p<0.05. Protocol 1 patients > 65 years had a longer time to goal vs. patients < 65 years (42 hrs vs. 2 6hrs, p<0.05) and had more supratherapeutic aPTT values within 24 hrs (65.9% vs. 37.5%, p<0.05). In Protocol 2 there was a non-significant difference in time to goal aPTT between patients > 65 years vs. patients < 65 years (29 hrs vs. 38 hrs, p=NS), and number of supratherapeutic values (26.8% vs. 20.8%, p=NS). Patients therapeutic within 24hrs had higher nursing flowsheet documentation rates vs. non-therapeutic patients (92% vs. 83%, p<0.05). Time to goal was not different for patients <125 kg vs. patients >125 kg (27 hrs vs. 36.5 hrs, p=NS). Heparin was discontinued because of bleeding in 7.3% of patients, and did not differ between protocols.
CONCLUSION: The design of heparin protocols should consider patient age, initial infusion rate, and should employ measures to ensure nursing adherence.

Critical Care

11. Analysis of corticosteroid use in patients with sepsis admitted to an urban academic medical center. *Teresa A. Cavanaugh, Pharm.D.*[1], Lauren M. Gantzer, Pharm.D.[1], Neil E. Ernst, Pharm.D.[2], Eric W. Mueller, Pharm.D.[2]; (1)Winkle College of Pharmacy, University of Cincinnati, Cincinnati, OH; (2)The University Hospital, Cincinnati, OH.

PURPOSE: Controversy persists regarding the accurate identification of relative adrenal insufficiency (RAI) in septic shock patients. Given suspected variability at our institution, this study was performed to assess the processes of care related to the diagnosis of RAI and associated outcomes of management with corticosteroids (CS).
METHODS: Patients with septic shock admitted to The University Hospital between September 1, 2005 and December 31, 2006 were reviewed. Concurrent CS use and total cortisol concentrations were assessed. RAI was defined as either an ACTH-induced cortisol change ≤9 µg/dL from baseline or a random cortisol <25 µg/dL. Evaluation of RAI, and patient outcome between CS and non-CS patients were compared. Patients with preadmission or concomitant disease state CS use were excluded.
RESULTS: One hundred patients were included. Overall mortality was 67%. Patient assessment for RAI included ACTH testing (58%), random cortisol only (27%), or no test (15%). Corticosteroids were administered to 64%, 30%, and 47% of these patients, respectively, for 6.7±5.6 days. CS (n = 53) and non-CS (n = 47) patients were as likely to be tested for RAI (89% vs. 85%; p=0.759); however, CS patients more often underwent ACTH testing (70% v 45%; p=0.019). CS patients were more often diagnosed with RAI (64% v 36%; p=0.01), and had lower ACTH-induced change (8.6±16.3 vs 13.3±8.5 µg/dL; p<0.001) and random (27.0±26.1 v 31.8±15.5 µg/dL; p=0.007) cortisol levels. Overall, the discordance rate between presence or absence of RAI and CS use was 36%. Mortality rates were similar between CS and non-CS RAI (74% v 65%; p=0.744) and non-RAI (72% v 58%; p=0.494) patients.
CONCLUSIONS: Variation in RAI diagnostic methods and subsequent CS use was evident. The utility of ACTH-directed CS to improve patient outcome was not observed. Further study is required to refine outcome-focused strategies for the diagnosis and management of RAI in septic shock patients.

12E. Evaluation of recombinant activated factor VII use in critically ill neurosurgical patients. Lyudmila Garbovsky, Pharm.D., *Gretchen M. Brophy, Pharm.D.*; VCU Medical College of Virginia, Richmond, VA.

PURPOSE: Recombinant activated factor VII (rFVIIa) guidelines for neurosurgical patients were implemented at our institution and the impact on utilization patterns, outcomes and cost were evaluated. We hypothesized that guideline implementation will improve rFVIIa utilization patterns without worsening clinical outcomes.
METHODS: This is a retrospective study of NSICU patients over a 3-year period. Patients with hemophilia were excluded. The pre-guideline group (PRE) includes patients admitted during October 2003–November 2005, and the post-guideline group (POST) includes those admitted December 2005–December 2006. Group characteristics were analyzed using t-tests for continuous data. Categorical data were analyzed with Pearson's chi square test.
RESULTS: Baseline demographics were similar in the PRE (n=54) and POST (n=52) groups, except for age (PRE 63 years vs POST 54 years, p=0.02) and warfarin therapy prior to admit (PRE 54% vs POST 31%, P=0.02). Patients received rFVIIa for traumatic injuries, EDH, SDH, ICH, neurosurgical procedures or bleeding complications. PRE patients received a mean rFVIIa dose of 61 µg/kg as compared to 49 µg/kg in the POST group (p=0.06). Patients were more likely to receive rFVIIa within 4 hours of injury in the POST group (PRE = 11% vs POST 31%; p=0.01). Surgical interventions occurred in 67% of PRE and 60% of POST patients. The incidence of thromboembolic events was 13% in the PRE group and 10% in the POST group (p=0.8). There was no statistical difference in mortality (PRE 24% vs POST 17%, p=0.4). A cost savings of $975 per patient and an estimated annual cost savings of $49,000 (per 50 patients) were achieved after guideline implementation.
CONCLUSION: Implementaion of rFVIIa guidelines for NSICU patients decreased the mean rFVIIa dose per patient by 12 µg/kg and improved utilization patterns, without worsening clinical outcomes. Guideline implementation was also associated with a cost savings of approximately $50,000 annually.
Presented at Presented at the Society of Critical Care Medicine's 37th Critical Care Congress, Honolulu, Hawaii, February 2–6, 2008.

13E. Prospective, randomized comparison of lansoprazole suspension and intermittent intravenous famotidine on gastric pH and acid production in critically ill neurosurgical patients. *Gretchen M. Brophy, Pharm.D.*[1], Marcia L. Brackbill, Pharm.D.[2], Donald F. Brophy, Pharm.D., M.S.[1]; (1)VCU Medical College of Virginia, Richmond, VA; (2)Shenandoah University School of Pharmacy, Winchester, VA

PURPOSE: There is a paucity of studies comparing stress ulcer prophylaxis (SUP) agents in high risk neurosurgical patients. We hypothesize lansoprazole (LAN) and famotidine (FAM) are equally effective in controlling gastric pH and acid secretion in this population.
METHODS: Patient inclusion criteria were baseline gastric pH <4 and a risk factor for stress related mucosal damage (SRMD). Patients were randomized to receive LAN 30 mg suspension (apple juice or 8.4% NaHCO3) via NG/NJ tube daily or FAM 20mg IV q12h. Gastric pH and residual volumes were recorded 5 times daily for 3 days and adverse events were monitored for 7 days after ICU admission.
RESULTS: Between August 1999 and April 2005, 51 ICU patients were randomized to LAN (n = 28) or FAM (n = 23) and received SUP for ≥ 3 days. Baseline demographics were similar. All patients had at least 2 risk factors for SRMD and 75% had a baseline GCS < 9. On day 1, more FAM patients had a gastric pH > 4 at least 80% of the time as compared LAN patients (74% vs 36%, p=0.01, respectively); however, there was no difference on days 2 and 3. Multivariate regression analysis determined that enteral feedings on day 1 predicted a pH > 4 (p=0.01). Gastric residual volumes were < 28 ml in 60–70% of patients in both groups over the study period(p=NS). Heme + aspirates were present in 18-39% of patients (p=NS); one patient receiving FAM met criteria for overt bleeding. The incidence of thrombocytopenia was 17% (FAM) and 4% (LAN)(p=NS).
CONCLUSION: Neurosurgery ICU patients receiving FAM for SUP achieved a gastric pH >4 more often than LAN treated patients, but only on day 1 of the 3 day study period. Both agents were equally effective in reducing gastric acid production. There was no difference in the incidence of acute SRMD and thrombocytopenia.

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14E. Critically ill patients with multiple comorbidities are more likely to receive an erythropoiesis stimulating agent in clinical practice. *Gretchen M. Brophy, Pharm.D.*, Spencer E Harpe, Pharm.D., Ph.D., Michael A Pyles, Ph.D.; VCU Medical College of Virginia, Richmond, VA.

PURPOSE: There are a lack of data on the clinical differences in critically ill patients who received an erythropoiesis stimulating agent (ESA) and those who did not receive an ESA during hospitalization. We hypothesized that critically Ill patients who received an ESA have more comorbidities than those who did not receive an ESA.
METHODS: This is a retrospective database study of adult ICU patients admitted to the ICU for ≥ 3 days. Patients with cancer or who received dialysis were excluded. Administrative discharge data were abstracted from the Solucient® ACTracker® database. A p-value < 0.01 was considered statistically significant.
RESULTS: Between January 2003 and December 2005, 923,043 patients were identified for study inclusion, of which 47,501 patients received an ESA. Patients who received an ESA had the following statically significant differences (p<0.01) as compared to those patients who did not receive an ESA, respectively: severity of illness classified as "catastrophic" (20% vs 12%), mean ICU LOS (14 vs 6 days), mean hospital LOS (21 vs 9 days), RBC transfusion before ICU admission (16% vs 1%), sepsis (24% vs 7 %), GI bleed (6% vs 10%), acute renal failure (36% vs 9%), and mechanical ventilation (37% vs 17%). By study day 30, 9.2% of ESA patients and 2.9% of patients who did not receive an ESA received a RBC transfusion (OR 3.4 [95% CI 3.3, 3.6]).
CONCLUSIONS: Critically ill patients who received an ESA after ICU admission had more comorbidities during hospitalization than those who did not receive an ESA. This study suggests that ESAs are prescribed for severely ill ICU patients in clinical practice.
Presented at Presented at the Society of Critical Care Medicine's 37th Critical Care Congress, Honolulu, Hawaii, February 2–6, 2008.

15E. Effects of nitroprusside on intracranial pressure and correlation with outcomes in patients with hemorrhagic stroke. Jason Trimble, Pharm.D.[1], Spencer E Harpe, Pharm.D., Ph.D.[2], *Gretchen M. Brophy, Pharm.D.*[2]; (1)Sharp Memorial Hospital, San Diego, CA; (2)VCU Medical College of Virginia, Richmond, VA.

PURPOSE: This study evaluates the effects of nitroprusside on intracranial pressure (ICP) in hemorrhagic stroke patients during nitroprusside infusions. This study also describes the outcomes (Glasgow Coma Scale scores and in-hospital mortality rates) of hemorrhagic stroke patients receiving nitroprusside.
METHODS: A retrospective analysis of the effects of nitroprusside on ICP in patients with hemorrhagic stroke was conducted. Data were collected from hemorrhagic stroke patients who received a dose of nitroprusside at the Virginia Commonwealth University Medical Center from January 1st, 2004 to December 31st, 2005. Patients at least 18 years old were eligible for inclusion if they had all of the following: hemorrhagic stroke; nitroprusside (> 1 day) for the management of hypertension; ventriculostomy for ICP monitoring; and an intra-arterial line for MAP monitoring. Parametric techniques were used to compare the effects on ICP between patients with a GCS of ≤ 10 and > 10.
RESULTS: Eleven patients met the inclusion criteria and their medical records were reviewed. An increase in ICP > 50% was observed at least once in 90.9% of the patients receiving nitroprusside in the first 72 hours of therapy, but the mean time the ICP increased > 50% was only 0.4 to 1.6 hours per day. In addition, the increase in ICP > 50% appears to correlate with higher than recommended dosage adjustments (0.8 - 0.9 µg/kg/min vs 0.25 µg/kg/min increments). Elevations in ICP > 50% did not correlate with poor outcomes (GCS ≤ 10 or mortality).
CONCLUSION: In this study, increases in ICP > 50% occurred with dosage adjustments of nitroprusside in a majority of patients; however, these increases were not sustained. ICP changes did not correlate with poor outcomes, as measured by discharge GCS or mortality. When appropriate dosage adjustments were made, clinically significant changes in ICP were minimized in these hemorrhagic stroke patients.
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16E. National survey of acute hypertension management. *Joseph Dasta, M.Sc.*, Jessica Benson, Pharm.D., Anthony Gerlach, Pharm.D.; The Ohio State University, Columbus, OH.

PURPOSE: National practice guidelines do not exist for the overall treatment of acute hypertension (AH) in the critically ill. One of the first steps in AH guideline development is to document the current usage of intravenous (IV) antihypertensives in the pharmacotherapy of AH.
METHODS: An email to participate in this 27-question, web-based survey was sent to 4204 intensivist members of four sections of the Society of Critical Care Medicine. The survey, which requested responses concerning the individual physician's preferences in their ICU, opened February 6, 2007, and closed May 11, 2007. A survey was excluded if it was less than 75% complete, from a pediatric ICU, or was from respondents not in practice.
RESULTS: Two hundred forty three (5.8%) responses were returned; 9 were excluded. The most common practice setting (48.5%) was a mixed-population ICU. Respondents estimated that 4.9 ± 6.8 (mean ± SD) patients were admitted to their ICU per month with hypertensive emergency (HE). Sixty-one (26.6%) respondents reported a guideline exists in their institution for the treatment of HE in acute hemorrhagic stroke (AHS), while only 24 (10.3%) had guidelines for the non-stroke (NS) patient. Systolic blood pressures used to initiate IV antihypertensives were 180.92 ± 21.84 and 167.2 ± 22.2 in NS and AHS patients, respectively. The most common duration of IV therapy was 24–48 hours in both populations. Intermittent IV labetalol (21.3%), nicardipine (19.6%), and sodium nitroprusside (18.7%) were the top three drugs of choice in NS patients, while nicardipine (34.7%), continuous IV labetalol (21.0%), and sodium nitroprusside (16.4%) were selected in AHS patients. Seventy-four respondents (32.3%) have seen a symptomatic patient with cyanide/thiocyanate toxicity receiving sodium nitroprusside.
CONCLUSIONS: Because most institutions do not have HE guidelines in place, the data described herein regarding the pharmacotherapy of AH provides the rationale for developing a national guideline.
Presented at Presented at the 37th Critical Care Congress, Honolulu, HI, February 2–6 2008

17. Recombinant factor VIIa (rFVIIa) protocol for massive traumatic hemorrhage (MTH): Experience at a community-based level one trauma center. *Scott A. Chapman, Pharm.D.*[1], Leslie Becker, R.N.[2], Melissa Thorson, M.S., R.N.[2], Kevin Croston, M.D.[2], Nichole Kulinski, Pharm.D.[3], R. Todd Burkhardt, Pharm.D.[3], Jeffrey G. Chipman, M.D.[2]; (1)North Memorial Medical Center Department of Pharmacy Services and University of Minnesota College of Pharmacy, Minneapolis, MN; (2)North Trauma Institute, Robbinsdale, MN; (3)North Memorial Medical Center Department of Pharmacy Services, Robbinsdale, MN.

BACKGROUND: Metabolic acidosis, hemodilution, and hypothermia in MTH can result in severe coagulopathy. rFVIIa can reduce transfusions, improve coagulation, and assist hemostasis. Protocols for rFVIIa in MTH may conserve rFVIIa utilization costs.
PURPOSE: To evaluate the effectiveness of a protocol for rFVIIa utilization in MTH. To compare blood and blood product (B/BP) use and coagulation parameters before and after rFVIIa.
METHODS: The protocol requires the trauma surgeon to request rFVIIa 90 µg/kg IV for trauma patients (TP) with MTH if hemostasis is not achieved after massive transfusion of B/BP. rFVIIa dose is repeated once if hemostasis is not achieved after the first dose. Two trauma nurses and a critical care pharmacist retrospectively review all trauma-related rFVIIa cases. Coagulation parameters and B/BP before and after rFVIIa are collected. Each case is also reviewed by the multidisciplinary trauma peer review committee. Wilcoxon rank sum was used for comparison of coagulation parameters and B/BP before and after rFVIIa. Data are presented as mean(SD).
RESULTS: From 6/05–6/07, 13 TP received rFVIIa. One TP excluded received rFVIIa for ICH. Eleven of 12 patients included (92%) had MTH. Seventeen rFVIIa doses [6960 (1462) µg/dose, or 87.4 (11.4) µg/kg/dose] were administered (1.4 doses/pt) at a cost of $9071 ($3417)/pt. One patient received a third dose of rFVIIa two days after the initial dose. Coagulation parameters before and after rFVIIa were PT 22.5 (8.6) vs. 12.4 (1.8) sec., (n = 11) p=0.004; INR 2.3 (1.2) vs. 1.1(0.1), (n = 10) p=0.006; and fibrinogen 96 (35) vs. 165(54) mg/dl, (n=8) p=0.008. RBC and FFP units before and after rFVIIa were 21.1 (16.1) vs.10.0 (11.0) p=0.004 and 10.9 (8.3) vs. 7.3 (6.6), p=0.055, respectively. There was no difference in platelet or cryoprecipitate transfusions. Eight (67%) of 12 patients survived.
CONCLUSION: Our protocol and multidisciplinary oversight effectively conserve the use of rFVIIa for TP with MTH. Coagulation parameters were improved and B/BP transfusions decreased after rFVIIa.

18. Comparison of dexmedetomidine versus fentanyl plus midazolam for perioperative sedation in patients undergoing isolated coronary artery bypass graft (CABG) surgery. *Katie E. Ronald, Pharm.D.*[1], Michelle Brenner, Pharm.D., BCPS[2], Radhika Devraj, Ph.D.[1]; (1)Southern Illinois University Edwardsville School of Pharmacy, Edwardsville, IL; (2)St. Joseph's Hospital, Marshfield, WI.

PURPOSE: To evaluate clinical and economic impacts of changing the standard sedation regimen used for isolated CABG surgery from fentanyl plus midazolam to dexmedetomidine.
METHODS: This was a single-center, retrospective study of patients > 18 years old who had isolated CABG surgeries. The control group (n = 106) received fentanyl plus midazolam as the standard sedation regimen between January 1st and March 31st of 2004 while the comparison group (n = 93) received dexmedetomidine as the standard sedation regimen between January 1st and March 31st of 2006.
RESULTS: In the final analysis, 184 of 199 patients were included. Two patients in the control group and 13 patients in the comparison group were excluded. Early extubation (< 6 hours after surgery) was significantly higher

in the dexmedetomidine group (71.2% vs.37.5%, p<0.001) as compared to the control group without significant increases in reintubation rates (p=0.82). Also, a significant decrease was observed in the dexmedetomidine group for initial ventilator hours (6.7 vs.19.6 hrs, p=0.038) and initial intensive care unit (ICU) hours (37.1 vs.65.6 hrs, p=0.010) as compared to the control group, but there were no significant differences for total ventilator hours (p=0.218), total ICU hours (p=0.085) or post-operative length of stay (p=0.582) between the groups. A significant increase in atrial fibrillation (30% vs.14.4%, p=0.010) and cerebral vascular accident (3.8% vs.0%, p=0.046) was observed in the dexmedetomidine group. There were no significant differences between the two groups in total hospital costs (p=0.50) or total pharmacy costs (p=0.524).
CONCLUSIONS: Dexmedetomidine did not provide a significant reduction in the total ventilator or ICU hours, post-operative length of stay, or total hospital and pharmacy costs. This may be attributed to higher rates of atrial fibrillation in the dexmedetomidine group. However, dexmedetomidine did facilitate higher rates of early extubation and decreased initial ventilator and ICU hours without any significant increases in reintubation rates.

19. Vasopressin or norepinephrine effects compared to control on surgical outcomes in septic shock patients. *Joanna L. Stollings, Pharm.D., BCPS*[1], Lance J. Oyen, Pharm.D., BCPS, FCCM[1], Daniel C. Cullinane, MD[2], Mark D. Sawyer, MD[2], Stephen Cha, MS[3]; (1)Hospital Pharmacy Services, Mayo Clinic, Rochester, MN; (2)Department of Surgery, Mayo Clinic, Rochester, MN; (3)Department of Biostatistics, Mayo Clinic, Rochester, MN.

INTRODUCTION: The use of Arginine vasopressin (AVP) as initial therapy in septic shock and its impact on gastrointestinal (GI) perfusion and surgical anastomosis success or complications is unknown.
HYPOTHESIS: The primary objective was to evaluate surgical success and complications in patients receiving AVP, norepinephrine (NE), or no vasopressor (control) within 28 days following GI surgery with resulting septic shock.
METHODS: Retrospective, case control (2:1) of all patients receiving fixed dose AVP compared to titrated NE and a control within 72 hours following GI surgery at a tertiary care academic medical center over 8 consecutive years. Matches were paired by at least 2 of the 3 following criteria: surgical wound classification, surgical type, and age. Included patients were adults (> 18 years old) who have septic shock treated with at least 12 hours of AVP or NE. Exclusion criteria include secondary GI surgery, defined as a complication of prior surgery, and use of a alternative vasopressor.
RESULTS: 26 AVP patients were matched to 26 patients receiving NE and 52 control patients. There was no statistical significant difference in rate of surgical success and complications between patients receiving AVP and NE. APACHE III scores, length of ICU stay, and length of hospital stay were not statistically significant different between the NE and AVP groups. However, there was a statistically significant difference in hospital mortality (75 in the NE group, 45 in the AVP group, p=0.02).
CONCLUSIONS: There appears to be no difference in surgical success or complications between septic shock patients treated with AVP compared to NE. Vasopressin induced perfusion to the GI tract appears no worse than NE.

20. Use of metoprolol continuous infusion for control of heart rate in surgical intensive care unit patients. *Michael D. Kraft, Pharm.D.*, Melissa Pleva, Pharm.D., Cesar Alaniz, Pharm.D., Awori J. Hayanga, M.D., Huy T. Lu, Pharm.D. candidate, Sarah Hudson, Pharm.D. candidate, Lena M. Napolitano, M.D.; University of Michigan Health System, Ann Arbor, MI.

PURPOSE: β-blockers (BB) offer significant protection against cardiac morbidity in surgical patients with cardiac risk. Scant data are available describing the use of metoprolol continuous infusion for the management of tachycardia in the postoperative patient. We set out to evaluate the efficacy and safety of metoprolol continuous infusion (CI).
METHODS: We conducted a retrospective analysis of all surgical intensive care unit patients who have received IV metoprolol as a CI at the University of Michigan Medical Center (UMMC) between January 1, 2005 and April 30, 2007. Data collection included age, sex, APACHE III score, previous use of a beta-blocker, and history of atrial fibrillation or other cardiac arrhythmia. The primary outcome was the percent of time heart rate (HR) was maintained within goal range after goal HR was achieved.
RESULTS: Thirty-one patients (25 males, 6 females) with a mean age of 62.8 +/- 14.9 years were included in the study. The mean duration of infusion was 36.1 +/- 36 hours ranging from 3 to 195 hours. The mean total daily dose was 187.1 +/- 153.1 mg. Goal HR was maintained during the infusion 64.9 +/- 30.6% of time, after the goal HR was achieved. The mean duration of time to achieve goal HR was 8 +/- 7.7 hours. There were 4 episodes of bradycardia which occurred in 2 patients (6.5%), and 34 episodes of hypotension occurred in 13 patients (41.9%).
CONCLUSION: These data suggest a high dose of IV metoprolol may be required to achieve goal heart rate control in some surgical ICU patients. Metoprolol CI may be an alternative for HR control in patients who cannot receive enteral BB therapy or who fail other therapies, such as intermittent IV BB therapy.

Drug Information

21. Evaluation of compatibility references using requests from a drug information center. *Wendy D. Smith, Pharm.D.*[1], Julie P. Karpinski, Pharm.D., BCPS[2], Erin M. Timpe, Pharm.D., BCPS[2], Randy C. Hatton, Pharm.D., FCCP, BCPS[3]; (1)MD Anderson Cancer Center, Houston, TX; (2)Southern Illinois University Edwardsville School of Pharmacy, Edwardsville, IL; (3)Shands at the University of Florida, College of Pharmacy, Gainesville, FL.

PURPOSE: The primary outcome of this study was to assess the scope of coverage of compatibility drug information references by comparing the percentage of drug-drug or drug-fluid pairs that were included in each reference. Multiple compatibility references are commercially available. No comparative analysis has been performed on the currently available references. The goal of this study was to evaluate the scope and depth of coverage of available compatibility references.
METHODS: Drug-drug and drug-fluid pairs were selected by querying a drug information database for questions relating to compatibility. Duplicate pairs, contrast media, and non-drug chemicals were excluded. The primary outcome was whether the pair was included in each of the databases, reported as a percentage. Secondary outcomes are a descriptive summary of the clinical performance for each reference.
The following eight references were included in the analysis: Handbook on Injectable Drugs (print version), King Guide to Parenteral Admixtures (electronic version), Trissel's™ 2 Clinical Pharmaceutics Database, Micromedex® IV INDEX®, Clinical Pharmacology™ IV Compatibility Section, Facts and Comparisons 4.0 IV Chek™, CompoundingToday.com, and the current manufacturer's labeling for each drug.
RESULTS: Ninety-seven unique drug pairs were identified and analyzed. The references containing the highest percentage of pairs were Trissel's™ 2 Clinical Pharmaceutics Database, Micromedex® IV INDEX®, Facts and Comparisons IV-Chek™, and CompoundingToday.com (76% of all pairs included). The remaining databases, King Guide (62%) and Clinical Pharmacology (56%), contained fewer study pairs. The Handbook of Injectable Drugs contained a similar percentage (58%). The manufacturer's labeling performed poorest (13%).
CONCLUSIONS: Several references use the IV compatibility information from Trissel's™ 2 Clinical Pharmaceutics Database as their source; therefore, these references include the same percentage of pairs. These references reported information on the most pairs. Other popular references were able to identify fewer pairs, and manufacturer product labeling rarely contained compatibility information.

22. Assessment of internet resources for warnings against use of red yeast rice dietary supplement following issuance of an FDA consumer warning. *Priti N. Patel, Pharm.D., BCPS*, Lisa Patel, Pharm.D., Candidate; St. John's University, Queens, NY.

PURPOSE: To assess the number of internet websites that warn patients against using red yeast rice dietary supplement following an FDA warning.
METHODS: An internet search engine (www.google.com) was used to search for websites giving information on red yeast rice. The first 40 websites were evaluated to determine if the website contained information on the FDA consumer warning issued in August 2007 against the use of red yeast rice due to the presence of lovastatin in the products. The following information was compiled: name of website and address; type of site (i.e., government, educational facility, general health information website, website selling products); does it mention lovastatin; does it contain information on the FDA warning; does it mention the date of last revision; intended audience for the site (i.e. healthcare professional or patient).
RESULTS: Of the 40 websites evaluated, 4 were government-sponsored sites, 1 came from an educational facility, 20 were general health information sites, and 15 were sites selling products. The government sites had the best information overall, as 3 of the 4 mentioned both lovastatin and the FDA warning. The majority of sites selling products had the poorest quality of information and did not mention either lovastatin (12 of 15; 80%) or the FDA warning (14 of 15; 93%). The one educational facility site mentioned lovastatin but not the FDA warning. Of the 20 general health information sites, 16 mentioned lovastatin (80%) and nine mentioned the FDA warning (45%). Overall, of the 40 websites evaluated, 11 stated their date of revision as August 2007 or after and 9 of those contained information about the FDA warning.
CONCLUSIONS: The results indicated that government-sponsored websites tended to have reliable information. Among the various types of websites, the strongest indicator of overall reliability of information was date of last revision.

Education/Training

23. Evaluation of research training and productivity among junior pharmacy faculty in the US. *Kelly C. Lee, Pharm.D., BCPP*[1], Shareen Y. El-Ibiary, Pharm.D., BCPS[2], Karen S. Hudmon, Dr.P.H., M.S., R.Ph.[3]; (1)University of California, San Diego Skaggs School of Pharmacy and Pharmaceutical Sciences, La Jolla, CA; (2)University of California, San Francisco, School of Pharmacy, San Francisco, CA; (3)Purdue University School of Pharmacy and Pharmaceutical Sciences, Indianapolis, IN.

PURPOSE: To estimate the extent of research training and productivity among junior pharmacy faculty.
METHODS: Junior faculty in Pharmacy Practice or Clinical Pharmacy departments at U.S. pharmacy schools were surveyed to assess the extent of previous or current clinical research training and current research productivity. Sociodemographics, education, training received prior to academic appointment, perceived pressures to conduct research, and confidence in conducting research were assessed. The web-based survey was administered to faculty by the American College of Clinical Pharmacy, with three email reminders for nonresponders.
RESULTS: Respondents (n=349, 36% response rate) averaged 34 years of age, 96% had a Pharm.D. degree, and 70% were female. Over 70% were in non-tenure track positions and for 84%, their current academic appointment was their first. Over 60% completed a pharmacy practice residency and 46%, a specialty residency. In a typical week, 92% reported spending 29% time in clinical service and 38% time in clinical/didactic teaching. Research accounted for 14% of total time; however, it was ranked as most important for promotion and tenure. In addition, 66% reported not having received formal research training at their institution, and 34% reported no informal training. Over 65% surveyed have not received funding as Principal Investigator; average publication rate was 3 peer-reviewed research articles during the career. Most reported that they could meet the teaching and service expectations of their department for promotion and tenure but could not meet research expectations. Potential barriers for productivity were lack of start-up funding, administrative support, and training. Most (89%) felt that they were not adequately compensated for their duties and cited minimal mentorship at their institution. Most felt that their careers were rewarding.
CONCLUSIONS: Based upon those surveyed, most junior pharmacy faculty indicate a lack of research training and mentorship needed to meet the expectations for promotion and tenure.

24. Utilization of alternative teaching methods to facilitate a laboratory course taught to multiple campuses through distance education. *Abir O. Kanaan, Pharm.D.*, Karyn M. Sullivan, B.S. Pharm, MPH, Linda M. Spooner, Pharm.D., BCPS, Matthew A. Silva, Pharm.D., BCPS; Massachusetts College of Pharmacy and Health Sciences, Worcester, MA.

PURPOSE: Clinical Laboratory and Physical Assessment (PA) is a required course offered in the second professional year of the pharmacy curriculum at our institution. The course incorporates hands-on skills recorded on one campus, and broadcast through a distance education system to a satellite campus. The distance education configuration presents challenges for course coordinators: 1. skills are not clearly viewed with typical image compression and video codecs, 2. faculty teaching simultaneously in different classrooms are inconsistent in demonstrating core assessment skills due to various teaching styles. Standardized delivery is ideal for faculty to improve consistency when teaching a laboratory course. We hypothesized that standardized digital recording and simultaneous broadcast would enhance student practical exam scores and facilitate delivery of this course in a distance education environment.
METHODS: Each laboratory session was digitally recorded to clearly demonstrate and capture all techniques on digital video disc (DVD). All students viewed these clips during scheduled 3-hour PA classes to ensure all were exposed to the same instruction and technique. Students were given the opportunity to practice each required skill by pausing the video. Multiple faculty facilitated the lab sessions and assessed student skill mastery before resuming the video. The t-test was used to calculate the differences between practical exam scores before and after the implementation of recording.
RESULTS: The number of students enrolled in the course before and during recording was 118 and 156 respectively. The mean score for the final practical before and during recording was 86.83±16.3 (SD) compared to 95.55±8.96 (SD) (95% CI, $p<0.001$).
CONCLUSIONS: Student practical exam scores increased using the digital recording method as compared to live, multi-instructor delivery. Digital recording and simultaneous DVD playback is an alternative method to live teaching in a laboratory course that ensures consistency and standardization between two campuses utilizing distance education.

25. Evaluation of first-year pharmacy students' attitude toward emergency contraception in two different geographic regions. *Patricia Wigle, Pharm.D.*[1], Shareen Y. El-Ibiary, Pharm.D., BCPS[2], Jeff Guo, Ph.D.[1], Karissa Kim, Pharm.D.[1], Ray Jang, Ph.D.[1]; (1)James L. Winkle College of Pharmacy, University of Cincinnati, Cincinnati, OH; (2)University of California, San Francisco, School of Pharmacy, San Francisco, CA.

PURPOSE: To assess and compare the attitudes of 1st year pharmacy students towards emergency contraception (EC) in two geographically and culturally dissimilar locations.
METHODS: First year pharmacy students at the University of Cincinnati (UC) James L. Winkle and the University of California San Francisco (UCSF) Schools of Pharmacy were surveyed regarding their attitudes towards indications of EC, comfort in providing EC, and knowledge of EC. Surveys were distributed and completed during class. All students had not completed any therapeutics courses. Comfort with filling other ethically challenging medications, perception of EC effectiveness and whether the student would change their perception of appropriateness if the patient was a family member were also evaluated. Pearson and Spearman correlation and χ^2 tests were conducted to assess associations between pairs of study variables.
RESULTS: Ninety-two (100%) UC and 65 (53%) UCSF students elected to participate in this comparison. Politically, UCSF students were more likely to identify themselves as liberal (46.2%), and the majority of UC students considered themselves to be middle of the road (52.2%). Statistically significant differences were noted in beliefs that emergency contraception should be available over-the-counter (33% UC vs. 68% UCSF students; $p<0.0001$), age restrictions for over-the-counter EC sales and appropriate candidates for EC. Consensual unprotected intercourse (53% UC vs. 82% UCSF), patient inability to handle financial responsibility of a child (64% UC vs. 86% UCSF), and delayed initiation of a birth control method (63% UC vs. 88% UCSF) were selected as appropriate reasons for EC use (p value < 0.005).
CONCLUSIONS: Based on our study, several differences in attitudes, knowledge and comfort in filling ethically challenging medications were found in the 2 locations. The results may suggest that culture and location within the U.S. has a bearing on attitudes, knowledge, and comfort in providing emergency contraception.

26. Four-month Retention of 2nd-year Pharmacy Students' Automated External Defibrillator Performance and Confidence. Karen J. Kopacek, R.Ph.[1], *Anna Legreid Dopp, Pharm.D.*[2], Orly Vardeny, Pharm.D.[1], John Dopp, Pharm.D.[1], John Gray, Pharm.D., Candidate[3], J. Jason Sims, Pharm.D.[4]; (1)Pharmacy Practice Division, University of Wisconsin School of Pharmacy, Madison, WI; (2)Extension Services in Pharmacy, University of Wisconsin School of Pharmacy, Madison, WI; (3)University of Wisconsin School of Pharmacy, Madison, WI; (4)Medtronic, Minneapolis, MN.

INTRODUCTION: Nearly 250,000 people die from sudden cardiac arrest (SCA) annually in the United States and up to 80% of events occur in the home environment. Automated external defibrillators (AEDs) are now being placed in the homes of those at highest risk for SCA. Similar to educating on blood glucose and blood pressure monitors, AED counseling provides an opportunity for pharmacists to ensure proper and safe medical device use. We sought to assess pharmacy students' retention of AED use following didactic and practical experience.
METHODS: An initial AED lecture was included as part of a cardiovascular pharmacotherapy course. Evaluators then assessed students' ability to successfully perform CPR and deliver a defibrillation shock within 90 seconds as a single rescuer with a LIFEPAK® 500T AED. Using a Likert scale, students ranked their self-perceived knowledge and skills to successfully deliver an appropriate defibrillation shock. Evaluations were performed at baseline, three weeks and at four months to determine short and long-term retention.
RESULTS: Students' (n=103) mean±SD time to successful shock delivery was significantly lower at three weeks (50 ± 17 seconds) compared with baseline (74 ± 25 seconds) and remained lower when measured four months later (47 ± 18 seconds, $p<0.05$ for both). Students' self-perceived level of knowledge and skills assessments were significantly improved at three weeks compared to baseline ($p<0.05$ for all vs. baseline) and remained high after four months ($p<0.05$ vs. baseline).
CONCLUSIONS: Pharmacy students successfully delivered defibrillation shocks in less than 90 seconds and this ability was retained after four months. Students' self-perceived AED knowledge and skills also remained high over time. As one of the most frequently accessed healthcare providers, pharmacists should be trained on the function and use of AEDs. Future studies are needed to assess education, performance and retention of AED competencies in practicing pharmacists.

27. Student perceptions on usefulness of plagiarism prevention software as an educational tool in a first-year doctor of pharmacy course. *Maria C. Pruchnicki, Pharm.D., BCPS*, Jennifer L. Rodis, Pharm.D., Amy Reusch, Pharm.D. Candidate; The Ohio State University College of Pharmacy, Columbus, OH

PURPOSE: To assess student perceptions of effectiveness of web-based plagiarism prevention software (www.Turnitin.com) to increase awareness and offer formative opportunities for writing improvement, with an emphasis on plagiarism prevention.
METHODS: Instructors for a drug information course required to two first-professional year student cohorts (residential and online) to use Turnitin as part of a drug information assignment. Students were asked to view a training

video, complete user registration, and submit their assignment draft online for analysis. Students received an originality score based on comparison to in-house/internet content, and had opportunity to revise their submission prior to grading. An end-of-term evaluation included questions on perceived usefulness of Turnitin and time required for submission/review of report. Participants were asked to rate agreement with statements identifying possible benefits of the software using a 5-point Likert-type scale.
RESULTS: Survey responses for 81.5% (n = 97) and 87.5% (n = 21) of the residential and online cohorts, respectively, were recorded. In aggregate, 89.8% (n = 106) reported that time spent using Turnitin for the assignment was < 30 minutes; 51.7% (n = 61) reported requiring < 15 minutes. More online students indicated using a 30-minute time frame than on-campus students (14.3% versus 49.1%; p<0.0001). In general, students disagreed or were neutral in reporting that 1) the software helped prepare better written assignment(s) (48.3% and 28.0%, respectively); or 2) after using Turnitin, they had a better understanding of plagiarism and how to prevent it (43.2% and 26.3%, respectively). Overall, only a minority of students agreed that pharmacy students benefit from using plagiarism prevention software (36.7%; n = 43).
CONCLUSION: Based on this survey, first-year professional students report that the Turnitin plagiarism prevention software does not appear to be a useful educational tool when used in the manner described. Benefits from other uses or other plagiarism prevention strategies should be studied in the future.

28. Assessment of third year pharmacy students' attitudes toward cultural competency before and after an educational intervention. *LaTonya R. Menefee, Pharm.D.*, Gagan Jain, B.Pharm, Justin Sherman, Pharm.D., Emily Evans, Pharm.D., Lesa Lawrence, Ph.D.; University of Louisiana Monroe, College of Pharmacy, Monroe, LA.

PURPOSE: The Accreditation Council of Pharmacy Education (ACPE) has adopted as part of its standards that each college or school of pharmacy must ensure that the curriculum addresses patient safety, cultural competence, health literacy, health care disparities, and competencies needed to work as a member of an interprofessional team.1 This study assesses students' attitudes before and after two 1hr lectures on cultural awareness presented as part of a required counseling course.
METHODS: Eighty-nine students were given an adapted version of the Clinical Cultural Competency Questionnaire (CCCQ)2 before the first of two lectures on cultural awareness. The questionnaire gathered information on students' knowledge, comfort level, and attitudes toward cultural issues. After the second lecture, students were again given the CCCQ to evaluate change in attitudes.
RESULTS: Sixty-seven survey pairs were matched and included in the final analysis of students' attitudes. Pre and post changes in students' attitudes were measured using correlated *t*-tests. There was a positive change in students' attitudes in 7 out of 12 items about the importance of factors that contribute to health disparities, items on sociocultural issues in professional and personal interactions, the awareness of students' own racial, ethnic, cultural stereotypes, and the importance of cultural competency training, (p-value <0.05). The scores were from 1 to 5 with 1 being not at all important to 5 being very important. Overall satisfaction with lectures was 4.19 on a 5-point Likert scale. Desire to learn more about the subject after both lectures were completed was 3.79 on a 5-point Likert scale.
CONCLUSION: An educational intervention improved students' attitudes towards sociocultural issues, which may improve their interactions with patients.

29. A pilot project utilizing the clinical patient simulation laboratory to develop student and resident code skills. *Deborah DeEugenio, Pharm.D*, Mirza Perez, Pharm.D., Christina Rose, Pharm.D., Jamila Stanton, Pharm.D., Jason Gallagher, Pharm.D., Anna Wodlinger, Pharm.D.; Temple University School of Pharmacy, Philadelphia, PA.

PURPOSE: To improve pharmacy student and resident skills during a code scenario using the clinical patient simulation laboratory
METHODS: A 50-minute session was developed for use in the patient simulation laboratory. Preparatory reading was assigned and ten minutes were dedicated to orientation to the laboratory and review of a mock patient chart. Participants were divided into groups of three-four and participated in a 30 minute code scenario led by two faculty members acting as a nurse and medicine resident. Participants initiated basic life support, defibrillation, medication selection, preparation and administration and interpreted basic electrocardiograms during the mock code. The session concluded with a brief group discussion. Participants were given anonymous surveys at the conclusion to elicit feedback.
RESULTS: Sixteen students and six pharmacy practice residents participated in the activity. Ninety-four percent of students and 100% of residents found the activity helpful and felt it improved their knowledge and understanding of the logistics in an actual code scenario. Sixty-nine percent of students and 50% of residents felt they were not prepared to participate in a code scenario based on what they learned in pharmacy school. All participants agreed they would like to repeat the activity. Four students suggested this activity would be most appropriate after their related classroom lectures to reinforce concepts. All residents valued this activity because it best simulated a "real-life" scenario.
CONCLUSION: Students and residents felt unprepared to participate in codes and use of the clinical patient simulation laboratory to develop student and resident code skills appeared useful. The faculty should implement additional simulation laboratory scenarios to augment didactic teaching and prepare pharmacy residents.

30. UGA learning outcomes: a survey of APPE preceptor value of outcomes and student achievement of learning outcomes. *Robin L. Southwood, Pharm.D, BCPS*, Lori Duke, Pharm.D; University of Georgia, Athens, GA.

PURPOSE: To assess the relevance that APPE preceptors assign to UGA learning outcomes and preceptor evaluation of student mastery of these outcomes.
METHODS: A nine question electronic survey was emailed to 344 active APPE preceptors. Survey questions included: 1) Practice experience; 2) APPE student numbers; 3) Duration of preceptor activities; 4) Practice site; 5) Alumni status; 6) Faculty status; 7) Value of competency statement to practice site; 8) Student performance of competency at beginning of APPE; 9) Student performance at the end of APPE. A five point Likert scale was used for #7-8.
RESULTS: Surveys were completed by 112 (32%) of APPE preceptors. Sixty-seven of the preceptors had greater than 10 years experience; Fifty-one percent had been a UGA APPE preceptor > 5 years; Fifty-one percent took > 5 APPE students per year; Seventy-one percent provided hospital based APPEs. Professionalism and communication were the most highly valued learning outcomes. Student demonstration of professionalism was rated as 62.4% at the beginning of APPE and 80.7% at the end of APPE. Student communication skills were categorized as very well by 33% of preceptors at the beginning of APPE and by 78.9% at the conclusion of APPE. Comprehending the consequences of substance abuse was rated as not important or less important by 22.7% of preceptors. Eighty-six percent stated that practicing in a legal and ethical manner was very important.
CONCLUSIONS: The data best represents the views of hospital-based pharmacist APPE preceptors. The response rate among retail-based pharmacy APPE preceptors was too small to allow subgroup analysis. The preceptors placed a lower than expected value on awareness of the consequences of substance abuse to their daily practice. Preceptors in all segments felt that students improved performance during their APPE at their practice site. Paid and volunteer faculty expressed similar values of competencies.

Geriatrics

31. Decreased prescribing of high risk medications for older veterans. *Alan J. Zillich, Pharm.D.*[1], Kenneth Shay, D.S.S., M.S.[2], Barbara Hyduke, M.S.A.[3], Thomas A. Emmendorfer, Pharm.D.[4], Alan M. Mellow, M.D., Ph.D.[3], Steven R. Counsell, MD[5], Mark A. Supiano, M.D.[6], Peter A. Woodbridge, M.D., M.B.A.[7], Pamela Reeves, M.D.[3]; (1)Roudebush VA Medical Center, Center for Excellence in Implementing Evidence-Based Practices, Indianapolis, IN; (2)U.S. Department of Veterans Affairs, Office of Geriatric and Extended Care, Ann Arbor, MI; (3)U.S. Department of Veterans Affairs, Veterans Healthcare Network 11, Ann Arbor, MI; (4)U.S. Department of Veterans Affairs, Pharmacy Benefit Management, Battle Creek, MI; (5)Indiana University School of Medicine, Indianapolis, IN; (6)University of Utah School of Medicine, Salt Lake City, UT; (7)Roudebush VA Medical Center, Indianapolis, IN.

PURPOSE: The puporse of this implementation project examines the effectiveness of an intervention to decrease prescribing of high risk (HR) medications.
METHODS: This quality improvement project was a single group, pre/post intervention design within a regional network of eight VA medical centers and 21 VA outpatient clinics. Eligibility included all outpatient veterans > 65 years receiving 1 or more HR medications (amitriptyline, imipramine, doxepin, chlordiazepoxide, and diazepam) and the clinicians who prescribed them. A two-stage intervention was implemented. First, a real-time warning message to prescribers appeared whenever one of the HR drugs was ordered; and second, a personally addressed letter from the Chief Medical Officer asking prescribers to consider discontinuing the HR medication along with a copy of the Beers criteria article, a list of suggested alternatives to HR medications, and a list of older patients, receiving the HR medications, who had upcoming appointments with these prescribers. The primary outcome was the absence of prescribed HR medication for all patients in the cohort during the post-intervention period. A secondary outcome was the absence of prescribed HR medication for each patient within a subgroup of the cohort whose prescribers received the second-stage intervention.
RESULTS: There were 2,753 unique patients in the cohort. More than fifty percent (n = 1,396, 50.7%) of the patients had the HR medications discontinued, resulting in a significant decrease in the number of patients

prescribed HR medication from the pre-intervention period to the post-intervention period (p<0.001). Of the 801 patients in the subgroup whose prescribers received the second-stage intervention, 72.0% (n=577) of patients had HR medications discontinued (p<0.001).
CONCLUSIONS: This multi-method quality improvement intervention significantly decreased prescribing of high risk medications in elderly veterans. Further studies are needed to confirm the findings from this single group intervention.

Hematology/Anticoagulation

32. Inpatient management of supratherapeutic international normalized ratios (INRs): an assessment of adherence to and impact of the American College of Chest Physician (ACCP) guidelines. Elizabeth A. Newton, Pharm.D.[1], *G. Robert DeYoung, Pharm.D., BCPS*[2], Michael J. Jonkman, Pharm.D.[3]; (1)Wake Forest University Baptist Medical Center, Winston-Salem, NC; (2)Advantage Health Physician Network and Saint Mary's Health Care, Grand Rapids, MI; (3)Saint Mary's Health Care, Grand Rapids, MI.

PURPOSE: To assess adherence to the ACCP guidelines for the management of elevated INRs and its impact in hospitalized patients taking warfarin.
METHODS: A random sample of 95 inpatients (January through November 2006) with INRs greater than three was retrospectively analyzed. Adherence to the ACCP guidelines was assessed by comparing any changes in warfarin therapy or vitamin K administration (dose and route) in response to the INR elevations to the course of action recommended by the guidelines. Comparisons of time to return to therapeutic INR (TRT-INR) and length of stay (LOS) between guideline adherent and non-adherent groups were conducted. Outcomes were analyzed to detect differences in adherence based upon level of INR elevation (3.1–4.9; 5.0–8.9; 9.0 and greater) and the presence or absence of bleeding.
RESULTS: Overall, 54% of interventions for elevated INRs were consistent with ACCP guidelines. Adherence was highest in patients with INRs between 3.1 and 4.9 (60%), and lowest in patients with INRs between 5.0 and 8.9 (40%). TRT-INR averaged 1.9 days in the adherent group versus 9.9 days in the non-adherent group (p=0.006). LOS after treatment for elevated INR was longer in the non-adherent group (5.7 days) when compared with the adherent group (3.1 days) (p=0.002). Non-adherent interventions included: warfarin restarted at same dose (30%), vitamin K administration using non-recommended route (27%), administration of vitamin K when not indicated (11%), holding warfarin for longer than recommended (12%), or a combination of non-adherent interventions (20%).
CONCLUSIONS: Multiple opportunities exist to improve the management of elevated INRs in inpatients taking warfarin. This study suggests that improving the management of elevated INRs by following the ACCP guidelines can result in decreases in the TRT-INR and to a decreased LOS.

33. Etiology of elevated INR and effective warfarin dosing in the inpatient setting. *Inna Shalito, Pharm.D.*[1], William Alvarez, Pharm.D., BCPS[2], Paula Biscup-Horn, Pharm.D., BCPS[3], Michael Streiff, M.D.[4]; (1)Holy Redeemer Health System, Philadelphia, PA; (2)Lexicomp, Hudson, OH; (3)West Penn Alleghany Health System, Pittsburgh, PA; (4)Johns Hopkins Hospital, Baltimore, MD.

PURPOSE: To evaluate the common causes of the INR > 5 in the inpatient setting.
METHODS: We performed a retrospective descriptional study of warfarin users at Johns Hopkins hospital comparing patients with elevated INR > 5 compared to patients without an INR > 5. Patients were divided into a case and a control group. Patients were included in the case group if they were on warfarin during hospitalization, had at least one INR > 5 and were older than 18 years. Inclusion criteria for the control group were similar except the patient did not develop INR > 5. Patients were excluded if they were admitted with INR > 3.5 on warfarin or INR > 1.5 not on warfarin, had goal INR ≥ 3.5, or received direct thrombin inhibitors within 7 days. Once the index event, INR > 5 for case group and day of discharge for control, was identified, the patients' medical records were reviewed seven days prior to identify diseases, drugs, and/or dosing strategies that may potentiate the effect of warfarin leading to INR>5.
RESULTS: There were 60 patients enrolled in the study, 30 in case and 30 in control groups. Of the risk factors assessed, end-stage liver disease was the only variable that had a statistically significant effect on the elevated INR (P=0.05). The variables of increased age above 70 (P=0.2) and co-administration of inhibitors of warfarin metabolism (P=0.1) trended towards significance. Changes in INR over a time period can be predictive of development of INR > 5. INR increase over 1 in 24 hours was statistically significant (P<0.001) in predicting development of INR > 5. The ranges of INR change below 1 were not significant.
CONCLUSIONS: The study demonstrated that absolute INR increase by more than 1 in 24 hours may be predictive of developing INR > 5. Higher co-administration of warfarin metabolic inhibitors in the case group may have also contributed INR elevations.

34. Validation of a nomogram for argatroban in heparin-induced thrombocytopenia: A pilot project. *Jonathan E. Hunchuck, B.Sc.Phm., ACPR*, Clarence Chant, B.Sc.Phm., Pharm.D., BCPS; Pharmacy Department, St. Michael's Hospital and Leslie Dan Faculty of Pharmacy, University of Toronto, Toronto, ON, Canada.

PURPOSE: Heparin dosing nomograms have improved anticoagulation management. There are no published nomograms for argatroban anticoagulation in heparin-induced thrombocytopenia (HIT) and available dosing guidelines are incomplete. Our goal was to develop and validate an effective, efficient, and safe nomogram for argatroban dosing.
METHODS: Two nomograms were developed based on published experience, pharmacokinetics, and product monograph information. Each nomogram described: starting dose (regular dose (RD) 2.0 µg/kg/min and modified dose (MD) 0.5 µg/kg/min), therapeutic range (TR) of 1.5–3.0 times baseline activated partial thromboplastin time (aPTT), dosing titrations, and aPTT monitoring frequency. Nomograms were reviewed by pharmacy and hematology staff for appropriateness, clarity, and ease of use. Therapeutic anticoagulation with argatroban (TAA) was defined as 2 consecutive aPTT in TR. Consecutive patients at a tertiary care university-affiliated institution prescribed argatroban for suspected or confirmed HIT were included and had their dosing dictated by nomogram.
RESULTS: Nineteen patients (120 patient-days, mean age 64 +/- 15 years) were enrolled. Six (32%) were patients in the ICU, 4 (21%) had documented or suspected hepatic insufficiency, and 13 (68%) were placed on the MD nomogram. Overall, 78% (222/284) of aPTT were within TR, without report of new thrombotic events. TAA was achieved in most patients (17/19) at a mean of 11.4 +/- 3.2 hours for RD and 18.7 +/- 8.9 hours for MD. Mean time to first therapeutic aPTT was 5.3 +/- 2.1 hours for RD patients and 10.8 +/- 10.7 hours for MD patients, with many reaching TR on the first aPTT (12/19). TAA was easily achieved requiring 2.4 +/- 1.7 aPTT determinations/patient/day and 3.1 +/- 5.2 dose adjustments /patient course. Supratherapeutic aPTT were rare (5/284, 1.8%), without documented bleeding complications.
CONCLUSIONS: This pilot project demonstrated that nomogram-based dosing successfully and safely achieved TAA in a timely manner, while requiring minimal bloodwork and dosage adjustments.

35E. Argatroban dose requirements in intensive care unit patients. Maureen A. Smythe, Pharm.D.[1], Joan C. Mattson, M.D.[2], Michael Kennedy, Pharm.D., Candidate[1], Tatiana Arzumanov, Pharm.D.[3], Marina Arzumanov, Pharm.D., Candidate[1], *John M. Koerber, Pharm.D.*[3]; (1)Wayne State University, Suite 2190, Detroit, MI; (2)Department of Clinical Pathology, William Beaumont Hospital, Royal Oak, MI; (3)William Beaumont Hospital, Royal Oak, MI.

INTRODUCTION: Argatroban is used in the management of heparin-induced thrombocytopenia (HIT) with a recommended starting dose of 2 µg/kg/min (except with hepatic impairment). Although about 15% of ICU patients meet the clinical criteria for suspicion of HIT, argatroban dosing recommendations in this population are lacking. A previous evaluation in our institution found that ICU patients require lower argatroban doses to achieve a therapeutic activated partial thromboplastin time (aPTT). A nomogram for ICU patients was developed with a recommended initial dose of 0.8 µg/kg/min. The objective was to evaluate the outcomes of this nomogram.
METHODS: After institutional review board approval, patient data were retrospectively collected on ICU patients in whom argatroban was begun at 0.8 µg/kg/min. Argatroban use was evaluated during the initial 48–72 hours of infusion (or cessation of argatroban therapy, whichever came first). Argatroban doses and aPTT data were collected during this time period. New thrombotic events were assessed from the time of argatroban initiation through hospital discharge. Bleeding events were assessed from the time of argatroban initiation through 24 hours post-infusion discontinuation.
RESULTS: Twenty-five patients were evaluated. Mean age and creatinine clearance were 68.5±10.8 years and 54.2±29.5 ml/min, respectively. Two patients had hepatic impairment (total bilirubin >1.5mg/dl). The mean duration of argatroban therapy assessed was 46.6±14.6 hours. Outcome data are shown below:

Argatroban Therapy

Measurement	Data
Initial aPTT Result (seconds)	51.1±17.3*
Mean aPTT Ratio	1.9±0.4*
Dose Changes to Reach Therapeutic aPTT (#)	0.6±1.0*
Time to First Therapeutic aPTT (hours)	11.8±9.5*
% therapeutic aPTT ratios	75.2
Thrombotic Event, n(%)	3 (12)
Major Bleeding Event, n(%)	3 (12)

*mean ± standard deviation

CONCLUSIONS: With our ICU argatroban dose titration nomogram approximately 75% of all aPTT values during the study were therapeutic. The overall rate of new thrombosis was consistent with that shown in the argatroban clinical trials. Major bleeding was seen in 12% of patients.
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36E. An evaluation of an argatroban dose titration nomogram. *John M. Koerber, Pharm.D.*[1], Joan C. Mattson, M.D.[2], Michael Kennedy, Pharm.D., Candidate[3], Tatiana Arzumanov, Pharm.D.[1], Marina Arzumanov, Pharm.D., Candidate[3], Maureen A. Smythe, Pharm.D.[3]; (1)William Beaumont Hospital, Royal Oak, MI; (2)Department of Clinical Pathology, William Beaumont Hospital, Royal Oak, MI; (3)Wayne State University, Suite 2190, Detroit, MI.

INTRODUCTION: The approved starting dose for argatroban, a direct thrombin inhibitor used for heparin-induced thrombocytopenia, is 2 µg/kg/min. A previous evaluation of dose requirements in our institution found that patients require lower doses of argatroban to achieve a therapeutic activated partial thromboplastin time (aPTT). An argatroban dose titration nomogram was developed and implemented for non-ICU patients with preserved hepatic function. The recommended starting dose of argatroban with the nomogram is 1.2 µg/kg/min. The objective of this study was to evaluate the outcomes of the nomogram.
METHODS: After institutional review board approval, patient data were retrospectively collected on patients in whom argatroban was begun at a dose of 1.2 µg/kg/min. Argatroban use was evaluated during the initial 48–72 hours of infusion (or cessation of argatroban, whichever came first). Argatroban doses and aPTT data were collected during this time period. New thrombotic events were assessed from the time of argatroban initiation through hospital discharge. Bleeding events were assessed from the time of argatroban initiation through 24 hours post-infusion discontinuation.
RESULTS: Twenty-three patients were evaluated. Mean age and creatinine clearance were 67.3±15.0 years and 69.9±39.3 ml/min, respectively. The mean duration of argatroban therapy assessed was 54.5±10.1 hours. Nearly all patients achieved a therapeutic aPTT. Outcome data are shown below:

Argatroban Therapy

Measurement	Data
Initial aPTT Result (seconds)	53±13.8*
Mean aPTT Ratio	1.93±0.45*
Dose Changes to Reach Therapeutic aPTT (#)	0.1±0.3*
Time to First Therapeutic aPTT (hours)	7.3±6.5*
% therapeutic aPTT ratios	77.3*
Thrombotic Event, n(%)	1 (4.3)
Major Bleeding Event, n(%)	1 (4.3)

*mean ± standard deviation

CONCLUSIONS: With our argatroban dose titration nomogram over 90% of patients achieved a therapeutic aPTT on a dose approximately 40% lower than the recommended initial dose. Effective anticoagulation was supported by a lower rate of thrombotic events than shown in the argatroban clinical trials. Major bleeding was seen in 4.3% of patients.
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37. The incidence of malfunctioning sequential pneumatic compression devices. *Nina Ayrapetova, Pharm.D.*, Henry Cohen, M.S., Pharm.D., FCCM, BCPP, CGP; Kingsbrook Jewish Medical Center, Brooklyn, NY.

PURPOSE: Sequential pneumatic compression devices (SPCD) are indicated for prevention of deep venous thrombosis (DVT). However, recent studies have demonstrated that there was no difference in rates among patients who were on SPCDs and those who did not receive prophylaxis for DVT—possibly due to human error or mechanical malfunction of devices. The study objective was to establish the incidence of SPCD malfunction due to mechanical malfunction and human error at Kingsbrook Jewish Medical Center (KJMC).
METHODS: A prospective observational study of proper utilization and function of SPCDs (AC550 Flowtron® Excel, Huntleigh Healthcare, Eatontown, NJ) in KJMC patients was performed. A minimum of 2 observations at least 4 hours apart were completed by a pharmacist. Compliance for each observation was defined as a SPCD placed correctly on the patient's leg, snugly and without wrinkles; with an output pressure of 40 - 60 mm Hg when the garment is inflated; and functioning properly as indicated by a visual alarm flashing "Fault."
RESULTS: There were 157 individual SPCD observations collected over 2 months (n=60). A mean of 2.6 observations per patient were made (range 2-7). Of 157 observations, only 29.3% (n=46) were compliant. A subgroup analysis revealed that compliance rates were higher in the intensive care unit 38.8% (n=19/49) as compared to internal medicine wards 25% (n=27/108). The causes of non-compliance were found to be mechanical failure 51.7% (n=45), human error 36.8% (n=32) (the device was not turned on), and external causes 11.5% (n=10/87) (electrical outlet malfunction). Due to the high incidence of SPCD mechanical malfunction, the Flowtron® Excel device was replaced by another brand. Device error reports were submitted to MED WATCH.
CONCLUSIONS: The incidence of Flowtron® Excel SPCD malfunction is high occurring in over 70% of observations. Hospital personnel must monitor and document SPCD performance several times daily.

Herbal/Complementary Medicine

38. Effects of policosanol when used in a lipid-specialty clinic. *James M. Backes, Pharm.D.*, Janelle F. Ruisinger, Pharm.D., Cheryl A. Gibson, Ph.D., Patrick M. Moriarty, M.D.; University of Kansas Lipid, Atherosclerosis, Metabolic and LDL-Apheresis Center, Kansas City, KS.

PURPOSE: Policosanol is a popular herbal supplementation used for cholesterol health. Randomized, controlled trials performed primarily in Cuba demonstrated significant reductions in total cholesterol (TC) and low-density lipoprotein cholesterol (LDL-C) by 16 and 24%, respectively, while increasing high-density lipoprotein cholesterol (HDL-C) by 10%. However due to a recent multi-center, randomized, placebo-controlled trial indicating negligible benefit, efficacy of this agent is now controversial. Our objective was to determine changes in lipid profiles (TC, LDL-C, HDL-C, triglycerides, TC/HDL and LDL/HDL ratios) when policosanol was utilized in a lipid-specialty clinic.
METHODS: Medical records of patients receiving policosanol were identified. Documentation of past medical history, demographic data, concomitant lipid-altering agents, and lipid profiles immediately prior to policosanol use and initial follow-up while receiving policosanol, was collected. Patients were excluded if other substantial changes were made in their lipid-altering regimen.
RESULTS: A total of 32 patients (15 male/17 female) met study criteria. Mean patient age was 58.6 ± 10.3 years, six (19%) had coronary artery disease, six (19%) had diabetes mellitus, 19 (60%) had hypertension and 24 (75%) were taking other lipid-altering agents. Mean duration of therapy was 4.1 ± 1.1 months and average daily dose of policosanol was 20mg (range 10-40mg). No statistically significant changes were noted for TC (221.44 vs 221.53 mg/dL ± 30.34; 0.04% increase), LDL-C (140.44 vs 145.19 mg/dL ± 29.015; 3.38% increase), HDL-C (57.53 vs 57.78 mg/dL ± 7.12; 0.43% increase), triglycerides (137.22 vs 124.06 ± 58.93; 9.59% decrease), TC/HDL (3.99 vs 4.07 ± 0.66; 1.90% increase) and LDL/HDL (2.57 vs 2.72 mg/dL ± 0.59; 5.84% increase) from baseline to follow up.
CONCLUSIONS: Policosanol was ineffective at improving any major lipoprotein when used in a lipid-specialty clinic. Our results are consistent with a recent randomized, controlled trial indicating policosanol exhibits minimal effect on lipid values.

HIV/AIDS

39. Post-marketing use of enfuvirtide: tolerability, toxicity, and response in HIV infected US veterans. *Pamela S. Belperio, Pharm.D.*, Larry A. Mole, Pharm D, James Halloran, M.S.N., R.N., I-Chun Linn, Ph.D., Lisa I. Backus, M.D., Ph.D.; VA Palo Alto HCS, Palo Alto, CA.

INTRODUCTION: Enfuvirtide (ENF) safety and efficacy have been evaluated only in controlled trials.
OBJECTIVES: 1) To characterize patients for whom ENF is prescribed, 2) assess ENF's safety, tolerability, and associated clinical outcomes in HIV-infected veterans.
METHODS: A retrospective chart review of all veterans prescribed ENF between 4/03–7/05 was performed. Patient demographics, prescription dates, encounter dates, and CD4 and VL data were extracted from the VA HIV clinical case registry; antiretroviral (ARV) history, resistance results, injection training, tolerance and discontinuation reason were obtained from chart review. Exclusions included receipt of study ENF, or follow-up outside VA.
RESULTS: Of 275 evaluable subjects, 97% were male, 57% Caucasian, 31% African American, 60% had previous OIs, 91% received 2 prior ARV regimens, and 87% had VL>5000 at initiation. Baseline mean CD4 and log VL were 181 and 5.34. 86% of patients started new ARVs with ENF (52% with known active agents). 70% of patients had injection site reactions (11% treatment-limiting). Injection training was documented in 83% of cases; re-training occurred in <4%. New/worsening side effects occurred in 56% of patients: 32% GI, 19% musculoskeletal, 10% respiratory, 4% skin/soft tissue. Hospitalizations occurred in 37% of subjects, 18% of which were respiratory diagnoses. QOL improvements were reported in 42%. CD4 and VL improvements occurred in 71% and 79% of patients; 67% had improvements in both. Mean change in CD4 and log VL from baseline to 6 months was +44 and -1.04; 35% achieved VL<400. At months 1, 3, and 6, 90%, 81%, and 75% of patients remained on ENF. Reasons for discontinuation were 30% toxicity, 27% patient request, 20% suboptimal response/progression, 11% death, and 12% other.
CONCLUSIONS: Nearly three-quarters of patients achieved virologic or immunologic improvement and almost half experience QOL improvements after starting ENF. Despite tolerability issues, many veterans remain on therapy for extended durations.

Infectious Diseases

40. Efficacy and safety of linezolid in methicillin-resistant *Staphylococcus aureus* (MRSA) complicated skin and soft tissue infections (cSSTI): a meta-analysis. *Mark Bounthavong, Pharm.D.*[1], Lisa M. Rubin, Pharm.D.[1], Donald Hsu, Pharm.D.[2], Ryan Quist, Ph.D.[2], Anandi V. Law, Ph.D.[2]; (1)Veterans Affairs San Diego Healthcare System, San Diego, CA; (2)Western University of Health Sciences, College of Pharmacy, Pomona, CA.

PURPOSE: To determine the efficacy and safety of linezolid in methicillin-resistant Staphylococcus aureus (MRSA) complicated skin and soft tissue infections (cSSTI).
DESIGN: Meta-analysis of prospective comparative trials. Heterogeneity testing was performed using Cochran's Q method. Analysis was performed using the random effects model. Three primary outcomes were evaluated: microbiologically evaluable (ME) cure, modified intention-to-tread (MITT) cure, and clinically evaluable (CE) cure. Adverse events measured were: nausea, diarrhea, vomiting, constipation, anemia, and thrombocytopenia.
DATA SOURCE: PubMed/MEDLINE database from January 2000 to June 2007 and Pfizer's clinical trials registry.
RESULTS: Systematic literature search identified five prospective comparative trials of linezolid (N=400) and its comparators (N=405) for the treatment of MRSA cSSTI. Patients receiving linezolid experienced a higher cure rate compared to its comparators in ME cure (odds ratio [OR] 2.13, 95% confidence interval [95% CI] 1.20–3.76, p=0.009), MITT cure (OR 1.12, 95% CI 0.53–2.38, p=0.774) and CE cure (OR 1.63, 95% CI 1.01–2.64, p=0.044). No differences in adverse events were seen between linezolid and its comparators for: nausea (OR 1.54, 95% CI 0.88–2.70, p=0.135), diarrhea (OR 2.22, 95% CI 0.84–5.85, p=0.107), vomiting (OR 1.53, 95% CI 0.87–2.71, p=0.14), constipation (OR 0.55, 95% CI 0.24–1.24, p=0.146), and anemia (OR 1.34, 95% CI 0.64–2.81, p=0.432). One study reported seven patients with thrombocytopenia, but none of the patients had their treatment discontinued.
CONCLUSION: Linezolid was associated with higher cure rates versus its comparators in terms of ME and CE cure. MITT cure did not show statistically significant differences in cure rates between linezolid and its comparators. There was no difference in adverse events between linezolid and its comparators; however, thrombocytopenia was reported in seven patients receiving linezolid. Overall, linezolid was both efficacious and safe in eradicating MRSA in cSSTI which also resulted in symptomatic (CE) cure.

41E. Association between the cell wall integrity pathway and chitin content in the attenuation of caspofungin activity in *Candida glabrata*. *Jason M. Cota, Pharm.D., M.S.*[1], Jodi L. Grabinski, Pharm.D., M.S.[1], P. David Rogers, Pharm.D., Ph.D.[2], Thomas D. Edlind, Ph.D.[3], Nathan P. Wiederhold, Pharm.D.[1]; (1)The University of Texas at Austin College of Pharmacy and The University of Texas Health Science Center at San Antonio, San Antonio, TX; (2)University of Tennessee, Memphis, TN; (3)Drexel University, Philadelphia, PA.

PURPOSE: Attenuation of caspofungin activity at elevated concentrations is associated with up-regulation of the cell wall integrity (CWI) pathway and increased chitin in *Candida albicans*. We examined the response of the CWI pathway and chitin to caspofungin exposure in *Candida glabrata* (CG).
METHODS: The XTT colorimetric assay was used to assess viability in CG 200989 (WT) and the CG 200989 ¢slt2 strain following caspofungin exposure (0–32 µg/mL). For gene expression and chitin quantification, yeast were exposed to caspofungin at 0, 0.125, 1 and 16 µg/mL. RNA was extracted, reverse transcribed to cDNA and relative gene expression was determined in triplicate by real-time PCR using primers and probes specific for DNA encoding SLT2 (a MAP kinase of the CWI), CHS3 (chitin synthase III) and SKT5 (chitin synthase III activator). Chitin was quantified in triplicate using a colorimetric assay.
RESULTS: Maximum reduction in CG WT viability was observed at caspofungin 1 µg/mL (84% viability reduction vs. control). Caspofungin activity was attenuated at concentrations of 4-32 µg/mL. This attenuation was absent in CG ¢slt2. Increased expression of SLT2 (4-fold), CHS3 (2-fold), and SKT5 (3.5-fold) was observed following caspofungin exposure in CG WT. In the CG ¢slt2 strain, SKT5 expression was elevated (> 3.5 fold) following caspofungin exposure, while CHS3 expression did not increase. Similarly, chitin content in CG ¢slt2 did not increase following caspofungin challenge. In contrast, a 3- to 4.5-fold increase in chitin was observed in CG WT at all caspofungin concentrations.
CONCLUSIONS: The attenuation of caspofungin activity observed in CG WT at elevated caspofungin concentrations was absent in CG ¢slt2. Furthermore, no increases in chitin content or CHS3 expression were observed in CG ¢slt2 in contrast to CG WT. This suggests a link between the CWI pathway, increased chitin content and the attenuation of caspofungin activity at higher concentrations in CG.
Presented at 47th Annual Interscience Conference on Antimicrobial Agents and Chemotherapy (ICAAC), Chicoago, IL, September 17–20, 2007

42. Time between blood culture collection and positive result reported for *Candida* species. *Julianna M. Fernandez, Pharm., D.*[1], David E. Nix, Pharm.D.[2], Brian L. Erstad, Pharm.D.[3], Wanda Petty, B.S.[4]; (1)University of Arizona College of Pharmacy and University Medical Center, Houston, TX; (2)University of Arizona College of Pharmacy, Tucson, AZ; (3)University Medical Center, University of Arizona, Tucson, AZ; (4)University Medical Center, Tucson, AZ.

BACKGROUND: Candidemia and delay to appropriate therapy contributes to increased morbidity and mortality. Current literature addresses the delay between blood culture collection and final identification, however fails to delineate differences among species. The purpose of this study was quantify the time to yeast detection and identification relative to blood culture collection and determine whether differences exist among species.
METHODS: In this retrospective study, all cases of *Candida* isolation over two years were reviewed. The time-delays between blood culture and detection of *Candida* growth were quantified as well as the additional time required for final species identification. Initiation of antifungal therapy was assessed in relation to culture collection, detection of yeast, and final identification. The appropriateness of therapy at each time point was also analyzed.
RESULTS: The majority of *Candida* infections were caused by either *C. albicans* (n = 43) or *C. glabrata* (n = 28). Results (mean ± SD) are provided below and all were significant (p<0.001)

Candida Infections

Parameter	*C. albicans*	*C. glabrata*
Time to yeast detection (h)	35.3 ± 18.2	79.5 ± 22.1
Time to final identification (h)	85.8 ± 30.87	151.4 ± 44.42
Time to appropriate therapy (h)	43.3 ± 27.6	97.7 ± 37.5

Results of other species were similar to that of *C. albicans*.
CONCLUSIONS: The time-delay between time of blood culture collection and yeast detection as well as final identification was significantly longer for *C. glabrata* isolates when compared to *C. albicans*. As a result, mean time to appropriate antifungal therapy was significantly longer in patients with *C. glabrata* isolates.

43. A surveillance study to determine the prevalence of community-acquired methicillin-resistant *Staphylococcus aureus* (CA-MRSA) in Northeastern Pennsylvania (NEPA). KarenBeth H. Bohan, Pharm.D., BCPS[1], Sheila K. Kang, Pharm.D.[1], *Kenneth A. Pidcock, Ph.D.*[1], Gary R. Decker, M.D.[2], Daniel Kosinski, B.S.[3]; (1)Wilkes University, Wilkes-Barre, PA; (2)Wyoming Valley Healthcare System, Wilkes-Barre, PA; (3)Mercy Health Partners, Scranton, PA.

PURPOSE: Infections caused by CA-MRSA have become increasingly common over the past five years. Recent reports indicate that CA-MRSA strains have been infiltrating the healthcare setting and can be responsible for nosocomial MRSA infections. Several CA-MRSA infections in NEPA have resulted in severe and fatal outcomes. Measuring the prevalence of this pathogen could improve patient outcomes by earlier recognition of the potential for CA-MRSA and the provision of appropriate empiric antimicrobial therapy, as well as provide evidence to emphasize the need for proper prevention and control.
METHODS: From June 2007 to August 2007, consecutive positive MRSA specimens were collected from two hospital systems in NEPA. The isolates were analyzed to identify inducible-clindamycin resistance (ICR) by D-test, Panton-Valentine Leukocidin (PVL) and SCCmec sequences by PCR, and SmaI profile by PFGE.
RESULTS: Of the 74 MRSA specimens analyzed, 39 (52.7%) were HA-MRSA (USA100, SCCmec-II) and 35 (47.3%) were CA-MRSA (USA300, SCCmec-IVa) with an average patient age of 74 and 39, respectively. PVL sequences were present in all but one (97.1%) of CA-MRSA and in 2 (5.1%) of HA-MRSA. Thirteen (32.5%) of the 40 isolates from patients residing in healthcare facilities (HC) were CA-MRSA. Most (84.6%) of the CA-MRSA from HC were from infected tissue or wound (TW) specimens. Twenty-two (64.7%) of the 34 isolates from outpatients (O) were CA-MRSA. All (100%) of the CA-MRSA from O isolates were from TW specimens. ICR was not present in any of the CA-MRSA but 2 (5.7%) specimens were resistant to clindamycin. ICR was present in 18 (46.2%) of HA-MRSA and the rest were resistant.
CONCLUSIONS: CA-MRSA is prevalent in NEPA in outpatients as well as in healthcare settings. The presence of a tissue or wound infection increases the likelihood of CA-MRSA. In our hospitals, clindamycin remains effective for CA-MRSA but not HA-MRSA.

44. Pharmacodynamic target attainment rates for 9 antibiotics against *Escherichia coli*, *Klebsiella* spp., and *Pseudomonas aeruginosa* isolates in USA hospitals. *Jared L. Crandon, Pharm.D.*[1], Joseph L. Kuti, Pharm.D.[1], Ronald N. Jones, M.D.[2], David P. Nicolau, Pharm.D., FCCP[1]; (1)Center for Anti-Infective Research and Development, Hartford Hospital, Hartford, CT; (2)JMI Laboratories, North Liberty, IA.

PURPOSE: We determined phamacodynamic target attainment rates for 9 antibiotics against selected Gram-negative bacilli and compared these results with the 2004 OPTAMA assessment.
METHODS: A 5,000-patient Monte Carlo simulation utilizing data from

population pharmacokinetic studies was employed to estimate the pharmacokinetic profiles for standard and/or prolonged infusion (PI) dosing regimens of cefepime, ceftazidime, ceftriaxone, ciprofloxacin, ertapenem, imipenem, levofloxacin, meropenem, and piperacillin-tazobactam. MIC data were obtained from 15 USA hospitals participating in the 2006 MYSTIC study for 640 *E. coli*, 618 *Klebsiella* spp., and 606 *P. aeruginosa* isolates. Cumulative fraction of response (CFR) was calculated using bactericidal phamacodynamic targets for each antibiotic and compared with results from the 2004 OPTAMA study.
RESULTS: Against *E. coli*, all regimens had a CFR >92% except for the fluoroquinolones (range: 69.4–72%), reduced 6% from 2004. The presence of *Klebsiella* spp. producing carbapenemases (KPC) with associated multi-drug resistance resulted in a ≥7% drop in CFR of standard dosing regimens relative to 2004. enem achieved CFRs of 97% and 95.8%. Excluding 3 KPC-harboring hospitals resulted in CFR increases to > 98% for carbapenems and cefepime and > 90% for all other agents tested. Against *P. aeruginosa*, the fluoroquinolones had the lowest CFR (55.8–63.9%) followed by imipenem (74.6–80.4%). The most predictable activity was seen with cefepime 2 g q12h or higher (> 90%), ceftazidime 2 g q8h (97.9%), and meropenem 1–2 g q8h (86.7–92.6%). Utilization of PI for piperacillin-tazobactam and meropenem increased CFRs by 6% and 4%, respectively, over standard infusions. Substantial decreases in CFR, compared with 2004, were observed only for imipenem (5.9–12.8%).
CONCLUSIONS: Relative to 2004, an increase in resistance was noted amongst Gram-negative bacilli to common antibiotics resulting in disproportionate decreases in pharmacodynamic target attainment. The use of PI for β-lactams may help overcome these decreases.

45. Surveillance of gram-negative isolates the intensive care unit: an eleven year study to identify trends in minimum inhibitory concentration. *Monica V. Golik, Pharm.D.*, Kenneth R Lawrence, Pharm.D., David Snydman, M.D.; Tufts-New England Medical Center, Boston, MA.

PURPOSE: The prevalence of antimicrobial resistance in Gram-negative bacteria has been well documented. However, longitudinal studies measuring changes in the MIC_{50} and MIC_{90} for these organisms from ICU patients are not well documented. Knowledge of such trends is critical and may assist prescribers in selecting appropriate empiric antimicrobial therapy.
METHODS: From 1996 to 2005 we collected 100 consecutive, non-duplicate Gram-negative aerobic isolates from patients bedded in adult ICUs. Organisms were determined to the species level and susceptibility tests were performed using guidelines from the Clinical and Laboratory Standards Institute (CLSI) using customized microdilution panels. We combined organisms into 2-year intervals and analyzed the trends in MIC_{50} and MIC_{90} for *Klebsiella* spp, *E. coli*, and *Pseudomonas* spp. against imipenem, cefepime, ciprofloxacin, piperacillin-tazobactam and tobramycin.
RESULTS: A total of 1012 isolates were collected, of which 684 (68%) were *Enterobacteriaceae*. *Klebsiella* spp, *E. coli* and *Pseudomonas* spp accounted for 261 (26%), 174 (17%) and 169 (17%), respectively. Against *E. coli*, MIC_{50} and MIC_{90} values for imipenem, cefepime and tobramycin remained within 1 dilution during the study period. The MIC_{90} values for ciprofloxacin increased from 1 µg/ml in 2002–3 to 8 µg/ml in 2004–5. For *Klebsiella* spp, all MIC_{50}s, with the exception of imipenem, have increased at least 3-fold since 1996–7. The MIC_{50}s against *Pseudomonas* spp have consistently increased for all agents, especially imipenem and cefepime. Since 2000–01, the MIC_{50} for these agents has at least doubled.
CONCLUSIONS: Longitudinal monitoring of antimicrobial MIC data can provide more detailed information than monitoring antimicrobial susceptibility information alone.

Nephrology

46. Urodilatin and acute ischemic renal failure. *Maxwell Weinmann, M.B.B.S.*, Edward Kelly, M.D., Nader Najafian, M.D.; Brigham and Women's Hospital, Boston, MA.

INTRODUCTION: The endogenous renal natriuretic peptide, urodilatin, acts as a potent local natriuretic, diuretic and vasodilator. Its paracrine origins also implicate it in renal homeostasis. The authors sought to evaluate this possibility in an animal model of acute ischemic renal failure.
METHODS: Twenty-four euvolemic Sprague-Dawley rats were anesthetized and underwent unilateral nephrectomy. The renal vessels of the remaining kidney were occluded for 60 minutes, followed by reperfusion. The incision was closed and anesthesia was reversed. Sampling (serum and urine) occured pre-anesthesia, baseline (anesthesia induction), 0.5,1.0, 2.0, 6.0, 12.0, 24.0 and 48.0 hours post ischemia. Renal venous Na+, K+, Urea, Lactate Creatinine, Angiotensin I and II, and Endothelin I were assayed. Urine was simultaneously sampled for Urodilatin, Na+, K+, and Creatinine.
RESULTS: All vasoactive peptides demonstrated postclamping increases by approximately 200%, following a transient decline; including urinary Urodilatin (2,500 ng/ml 48 hours vs 956 ng/ml baseline). Elevations in Urea and Creatinine were late in comparison (6–12 hours) and then trended downwards. Serum lactate levels were bimodal post clamping; an immediate post clamp peak (300% increase), rapid decline and then a slow continual rise. Urinary Na+ remained low post clamping; < 10 mmol/l.
CONCLUSION: The persistent elevations in vasoactive peptides accompanied by elevated renal vein lactate suggests ongoing attempted stabilization of renal perfusion through activation of renal homeostatic mechanisms. The associated presence of high levels of urinary Urodilatin in the face of low urinary Na+ suggests a potential vasoregulatory role of Urodilatin, rather than purely as a regulator of Na+ homeostasis as has been suggested previously. It's relatively early appearance may facilitate it's use as both a biomarker of renal stress and identify those patients who might respond to exogenous natriuretic peptides in this situation. More study is warranted to determine this.

47. Short and long term impact of pharmacist's counseling on hemodialysis patients' drug knowledge, compliance and adherence to prescribed regimen: pre-post intervention study. *Oussayma Moukhachen, Pharm.D., BCPS*[1], Mounir Atchan, Pharm.D.[2], Lucy Ashdjian, Pharm.D.[3], Lama Daouk, Pharm.D.[3], Wael Abi Ghanem, Pharm.D.[4]; (1)Massachusetts College of Pharmacy, Boston, MA; (2)American University of Beirut Medical Center, beirut, Lebanon; (3)Lebanese American University, byblos, Lebanon; (4)St George Hospital, Ashrafieh, Lebanon.

PURPOSE: To assess the potential short and long-term impact of pharmacy counseling and interventions on hemodialysis patients' drug knowledge, and adherence to prescribed regimen.
METHODS: This was a single-center, pre/post intervention, unblinded study. During Phase I (Pre, April 2006), on all 60 hemodilaysis patients, pharmacists collected data on patient drug knowledge, compliance and adherence to prescribed medication regimen. The intervention consisted of patient education and counseling, in addition to providing written memory aid chart along with medication chart reconciliation. A month later, in Phase II, data was collected and compared to Phase I. The same was done at 1 year (Phase III).
RESULTS: Two patients were lost in Phase II and five in Phase III. Overall, drug knowledge was assessed as appropriate in 66% of patients in Phase I and it increased to 85% in Phase II and back to 65% in Phase III. Knowledge of bone metabolism medications was the lowest in Phase I at 57% compared to 66% and 77% with anemia and cardiac medications. Knowledge of bone, anemia, and cardiac medications improved in Phase II to 73%, 89% and 93% respectively and in Phase III the values became 49%, 68%, and 77%. Regarding overall compliance with all medications in the pre-Phase, 7% were fully compliant, and 85% were 60–100% compliant. In Phase II, overall compliance with all medications improved as 25% patients became fully compliant and 75% patients between 60-90% compliant. In Phase III, 49% patients became fully compliant and 25% between 60-90% compliant. Similarly, compliance with bone metabolism, anemia, and cardiac medications improved to 64%, 79% and 74% respectively in Phase II then to 75%, 90.5%, and 92% in Phase III.
CONCLUSION: Overall, pharmacists interventions had a positive impact suggesting the service need to be provided on a continuous basis.

Neurology

48. Total valproic acid concentrations from oral enteric-coated divalproex sodium are predictable within epilepsy patients from day-to-day at the same time of day. *Ronald C. Reed, Pharm.D.*[1], Ivan Osorio, M.D.[2], R. Edward Hogan, M.D.[3]; (1)Abbott Laboratories Global Pharmaceutical Research & Development, Abbott Park, IL; (2)Comprehensive Epilepsy Center, University of Kansas Medical Center, Kansas City, MO; (3)Director, Adult Epilepsy Section, Dept. of Neurology, Washington University in St. Louis, St. Louis, MO.

PURPOSE: Inter-subject variability in drug pharmacokinetics is well recognized. However, certain drugs exhibit large intra-subject kinetic variation, e.g., clindamycin, warfarin, ethosuximide (Wagner, J Pharmacokinet Biopharm 1973), theophylline (Rogers, J Peds 1985) and phenytoin (Birnbaum, Neurology 2003). Intrasubject variability ("fickleness") has consequences, both clinically (in terms of therapeutic drug monitoring) and industrially (sample size calculation in bioequivalence studies). Another antiepileptic drug, divalproex sodium, frequently requires monitoring plasma valproic acid (VPA) levels for optimal patient care in refractory epilepsy. Questions have risen regarding the degree of predictability of VPA levels in the same patient.
METHODS: After written informed consent, we studied the degree of intra-patient variability in total plasma VPA concentrations in medically stable patients with epilepsy (complex partial with secondary generalized seizures) hospitalized for 7 days in a GCRC. Patients (n = 4 thus far) took their regularly scheduled doses of conventional enteric-coated, delayed-release divalproex, q6 hourly (8 AM-2 PM-8 PM-2 AM). Frequent blood samples were obtained over the dosing intervals, days #3 to #7. Similar conditions were maintained for each patient day-to-day (activity, daily diet times & content,

posture & fluid intake with divalproex administration). Samples were analyzed for VPA in batch via Emit assay (%CV < 8.5% at 65 mg/L).
RESULTS: The average %CV over 5 days for total trough VPA, 8 AM-2 PM-8 PM-2 AM, was 9.2%, 10.4%, 16.4% & 23.2%, respectively. VPA C_{max} was lower and Tmax more variable at night vs. day. One patient had %CV as high as 37% at one evening time point across 5 days, without clinical consequences. Diurnal variation (differences in C_{min}, C_{max}) in total VPA was observed when comparing 8a & 8p.
CONCLUSONS: Total plasma VPA trough concentrations from conventional divalproex are reproducible (not fickle) at 8a from day-to-day over a short time period. Greater variability in trough VPA (%CV) occurred at later times in the day, from day-to-day.

49. Evaluation of high-dose atorvastatin for prevention of vasospasm in aneurysmal subarachnoid hemorrhage. *Joseph V. Ybarra, Pharm.D.*[1], Thuy D. Nguyen, Pharm.D.[1], Miguel Salazar, Ph.D., Pharm.D.[1], Kevin W. Garey, Pharm.D., M.S.[2], Hesham Morsi, M.D.[3], Elissa F. Wible, M.D.[3], George A. Lopez, Ph.D., M.D.[3]; (1)St. Luke's Episcopal Hospital, Houston, TX; (2)University of Houston College of Pharmacy, Houston, TX; (3)Baylor College of Medicine, Houston, TX.

PURPOSE: To investigate the pharmacotherapeutic and pharmacoeconomic impact of atorvastatin 80 mg daily as prophylaxis therapy for vasospasms secondary to aneurysmal subarachnoid hemorrhage (SAH).
METHODS: This is a retrospective cohort study on 26 patients admitted with aneurysmal SAH between July 2006 and July 2007. Patient data was stratified into two groups: traditional medical management, or traditional medical management plus atorvastatin 80 mg daily given within 72 hours of admission and continued for at least 21 days or until discharge. Pharmacotherapeutic outcomes were measured by vasospasm confirmation via cerebral angiography and neurological outcomes at discharge. Pharmacoeconomic outcomes were measured by duration of intensive care unit (ICU) day stay correlated with a fixed cost per day.
RESULTS: The patient population was equally distributed between the treatment and the control groups. There was no significant difference in the frequency of vasospasms between the treatment and the control groups (61.5% vs. 38.5%, p=0.24). However, the severity of vasospasms tended to be milder in the treatment group compared to the control group. There was no significant difference in average cost of care in the treatment group compared to the control group ($17,900 vs. $14,500, p=0.24). Furthermore, average length of stay in the ICU did not differ significantly between the two groups (13.8 days for the treatment group vs. 11 days for the control group, p=0.24).
CONCLUSION: In this study, atorvastatin 80 mg daily seems to offer no significant pharmacotherapeutic or pharmacoeconomic benefit over traditional therapy. However, there was a trend towards milder vasospasms in the atorvastatin group. A larger study is needed to validate our findings.

Oncology

50. Evaluation of the modification of diet in renal disease (MDRD) and Cockcroft-Gault (C-G) formulas in the Calvert equation for carboplatin dosing. *Brandon Bookstaver, Pharm.D.*[1], LeAnn Norris, Pharm.D.[1], Richard Schulz, Ph.D.[1], Whitney Jones, Pharm.D., Candidate[2]; (1)South Carolina College of Pharmacy - USC Campus, Columbia, SC; (2)University of South Carolina College of Pharmacy, Columbia, SC.

PURPOSE: Traditionally, the original C-G ($C\text{-}G_o$) formula has been used for renal function estimation in the Calvert equation for carboplatin dosing. The primary objective of this study is to determine whether differences exist in estimations of renal function and carboplatin dosing between the $C\text{-}G_o$, modified C-G ($C\text{-}G_m$), and 6-variable MDRD formulas in a non-small cell lung cancer (NSCLC) population.
METHODS: This was a retrospective study conducted in an adult population of NSCLC patients at a Veterans Administration Hospital. Patients with a documented clinic visit who had received at least one dose of carboplatin for NSCLC from January 2002 to December 2006 were screened for study inclusion. Patients were not duplicated in the study. Patient data were entered into the $C\text{-}G_o$, $C\text{-}G_m$, and 6-variable MDRD formulas in order to determine estimations of renal function for each study subject. These estimations were then applied to the Calvert equation to calculate carboplatin doses. The primary endpoints were the differences in renal function estimates and carboplatin dose calculations between the formulas. Paired t-tests were used to assess differences between means.
RESULTS: A total of 128 patients were included in study analysis. This was a predominant Caucasian (62%), male (98%) population, with a mean age of 63 years. The difference in mean renal clearance (mL/min) between the $C\text{-}G_o$ vs. MDRD formulas (85.18 vs. 80.45, p=0.028) and the $C\text{-}G_o$ vs. $C\text{-}G_m$ formulas (85.18 vs. 79.36, p<0.001) was statistically significant. No significant differences were detected when comparing calculated carboplatin doses.
CONCLUSIONS: Differences exist between the $C\text{-}G_o$, $C\text{-}G_m$, and 6-variable MDRD formulas in estimating renal function in this NSCLC population. Application of individual formulas could potentially result in clinically significant carboplatin dosing modifications in select patients. A prospective, controlled study would aid in determining the optimal formula for renal function estimations in carboplatin dosing.

Pain Management/Analgesia

51. Evaluating the impact of a pharmacist/physician intervention program on patient satisfaction of pain management practices compared with usual care treatment in hospitalized general medicine patients. *Mark A. Douglass, Pharm.D.*[1], Gail M. Burniske, Pharm.D., BCPS[2], Gail Wilkes, R.N.C., M.S., A.O.C.N.[3], Daniel P. Alford, M.D., M.P.H.[3], Jeffrey L. Greenwald, MD[3]; (1)Northeastern University Department of Pharmacy Practice/Boston Medical Center, Boston, MA; (2)Boston Medical Center, Dept of Pharmacy, Boston, MA; (3)Boston Medical Center, Boston, MA.

PURPOSE: Pain management practices at our medical center have been less than optimal, despite the implementation of institutional pain management guidelines. We sought to assess pain management intensity and satisfaction scores between patients who received treatment by medical house officers who participated in a pharmacist/physician co-lead educational program compared to patients who received usual care treatment.
METHODS: Prior to their four week acute care medicine rotation, physicians treating patients in the intervention study group participated in a one hour problem-based interactive pain management forum, developed and implemented by clinical pharmacists and physician pain management specialists. Patients in the control group were treated by physicians who had not undergone the educational activity. Prior to hospital discharge, patients in both study groups were surveyed and pain management intensity (0–10 numerical rating scale) and satisfaction (1, very poor to 5, very good) were compared.
RESULTS: Twenty nine patients in the intervention study group and 24 patients in the standard care group completed the pain management satisfaction survey. Mean pain intensity scores improved significantly from hospital admission to discharge in both active (8.62 to 4.45, p=0.0001) and control groups (8.67 to 4.67, p=0.0001), but not between groups (p=0.77). Additionally, no significant difference was noted between the groups with respect to satisfaction scores (4.07 to 3.92, p=0.56).
CONCLUSION: Patients at our institution reported significant improvements in their pain intensity scores throughout hospitalization. A smaller than expected sample size may have contributed to a non-significant difference between study group pain intensity and satisfaction scores. Pharmacist/physician collaborative efforts to improve institutional pain management practices are ongoing.

52E. Efficacy and safety of extended-release tramadol for osteoarthritis pain in the elderly. Jim Xiang, Ph.D., Jean Farrell, RN, BS, Donna M. Jordan, BSN, John LoCoco, MBA, Gary J. Vorsanger, Ph.D., M.D., *K. Lynn McClure, Pharm.D., CGP, BCPS*; Ortho-McNeil Janssen Scientific Affairs, LLC, Raritan, NJ.

PURPOSE: To evaluate the efficacy and safety of once-daily extended-release (ER) tramadol for the treatment of osteoarthritis pain in an elderly population by post hoc analysis.
METHODS: A total of 556 patients ≥ 65 years were included in this analysis, which pooled data from two 12-week, double-blind, placebo-controlled, randomized, parallel-group studies evaluating the efficacy and safety of once-daily tramadol ER (100, 200, 300, and 400 mg for Study A and 100, 200, and 300 mg for Study B) in patients (20–80 years) with moderate to severe pain from radiographically-confirmed osteoarthritis of the knee or hip. Arthritis pain intensity was assessed using a 100-mm (0=no pain, 100=extreme pain) visual analog scale (VAS). Joint pain and related symptoms were evaluated using the Western Ontario and McMaster Universities (WOMAC) Osteoarthritis Index. Pain-related sleep disturbances (PRSD) were evaluated using the Chronic Pain Sleep Inventory.
RESULTS: WOMAC Osteoarthritis Index subscale scores for pain, joint stiffness, and physical function, WOMAC Osteoarthritis Index composite score, and index and non-index joint pain intensity VAS scores improved significantly in the tramadol ER 300-mg group compared with placebo (all $P \leq 0.035$). A significant decrease in awakening by pain at night and trouble falling asleep due to pain (100-, 200-, 300-mg groups); a significant decrease in awakening by pain in the morning (200- and 300-mg groups); and significantly better sleep quality (300-mg group; $P<0.05$ all parameters vs placebo) were observed. The most common adverse events in both studies were constipation, dizziness, nausea, headache, and somnolence.
CONCLUSION: In this post hoc analysis, tramadol ER reduced pain and related symptoms including PRSD in elderly patients. The results of this analysis provide additional support for the use of tramadol ER in appropriate elderly patients with moderate to moderately severe chronic osteoarthritis pain.
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Pediatrics

53. Prophylactic ketoconazole shampoo for tinea capitis in a high-risk pediatric population. *Brandon Bookstaver, Pharm.D.*[1], Adrian Carlson, Pharm.D., Candidate[2], Shauna Winters, Pharm.D.[3], Richard Schulz, Ph.D.[1], Holly Watson, Pharm.D.[1]; (1)South Carolina College of Pharmacy - USC Campus, Columbia, SC; (2)University of South Carolina College of Pharmacy, Columbia, SC; (3)University of Tennessee Medical Center, Knoxville, TN.

PURPOSE: The efficacy of topical agents such as selenium sulfide and ketoconazole as prophylactic agents for tinea capitis has not been reported. The purpose of this study is to examine outcomes following implementation of a twice-weekly 2% ketoconazole shampoo prevention protocol in patients at a Medically Fragile Children's Program (MFCP).
METHODS: This was a retrospective study conducted at the MFCP with Palmetto Health Richland. The ketoconazole prevention protocol was initiated in April 2006 on selected patients. Data including patient demographics, wheelchair status, complexity of care, tinea capitis infections, and prophylaxis status were collected over 12 month pre- and 12 month post-protocol implementation periods. The primary outcome was the impact of prophylaxis on documented tinea infections between the 12 month pre- and 12 month post-protocol periods. Secondary outcomes included evaluation of risk factors for acquiring tinea infections and facility cost analysis. Analysis of variance was used to assess the impact of prophylaxis on subsequent infection.
RESULTS: Ninety-seven patients were included in the study and 78% were African-American with a mean age of 8.06 years (range, 1–21). Forty-five patients (46%) were selected to the ketoconazole protocol arm. The use of prophylaxis was not associated with a reduction in tinea infections (p=0.192). Of evaluated factors, infections during the 12-month pre-protocol period was significantly associated with increased risk of subsequent infections post protocol implementation (p=0.003). Infections in months 1–6 prior to protocol initiation was more predictive than infections 7–12 months prior to protocol initiation. Monthly ketoconazole protocol costs were estimated at $1,249.
CONCLUSIONS: Prophylaxis with twice-weekly 2% ketoconazole did not result in a reduction of tinea capitis infections. The strongest predictor of tinea infections was a documented infection during the 6 months prior to protocol initiation. Discontinuation of this ketoconazole prophylaxis protocol should provide significant cost savings to the program.

Pharmacoeconomics/Outcomes

54. Primary atrial fibrillation: Inpatient resource use associated with choice of initial acute conversion therapy. Michael Belz, MD[1], *James Spalding, Pharm.D.*[2], Alex Exuzides, Ph.D.[3], Sara Adams, M.P.H.[3], Chris Colby, Ph.D.[3]; (1)Group Health Cooperative, Seattle, WA; (2)Astellas Pharma US, Inc., Deerfield, IL; (3)ICON Clinical Research, San Francisco, CA.

PURPOSE: To assess whether adjusted inpatient costs and length of stay (LOS) for atrial fibrillation (AF) patients were associated with the choice of initial acute conversion therapy.
METHODS: We extracted 2004–2005 discharges from Premier Perspective™, the largest hospital service-level database in the US, with a primary AF diagnosis and evidence of initial treatment with either electric conversion (EC) or with an IV anti-arrhythmic agent (AA). AAs included amiodarone, ibutilide and procainamide. Inpatient costs and LOS were adjusted for comorbidities, demographic and hospital-specific factors. We computed adjusted average costs and LOS among patients initially receiving EC or AAs.
RESULTS: An estimated total of 74,072 principal AF discharges were initially treated with EC or IV AAs in the US during 2004 and 2005. Adjusted average costs were $5,667 for patients initially treated with EC, $6,409 for amiodarone, $4,489 for ibutilide and $3,873 for procainamide. Adjusted average LOS was 4.5 days for patients initially treated with EC, 5.2 for amiodarone, 3.8 for ibutilide and 4.0 for procainamide. The adjusted average cost and LOS for amiodarone was significantly higher than all other treatments (P<0.0001). When amiodarone was excluded from the AA group, adjusted average costs decreased to $3,962 compared to EC (P<0.0001) and adjusted average LOS decreased to 3.7 days, also lower than EC (P<0.0001). Significant clinical factors in these comparisons included anticoagulant treatment, use of cardiac rate regulators, the presence of comorbidities and use of secondary AF therapy.
CONCLUSIONS: There are significant inpatient cost and LOS differences among AF patients, depending on their initial therapy. Patients initially treated with amiodarone had the highest adjusted average costs and LOS among all evaluated therapies. Further research is warranted to assess whether other factors, such as time to conversion and adverse events, affect average cost and LOS among these patients.

55. Economic burden associated with dose-titration at initiation to managed care in patients with non-psychotic major depressive disorder. Fabian Camacho, M.S., M.A.[1], Vijay Joish, Ph.D.[2], David Sheehan, M.D., M.B.A.[3], *Rajesh Balkrishnan, Ph.D.*[4]; (1)Pennsylvania State University College of Medicine, Hershey, PA; (2)sanofi aventis, Bridgewater, NJ; (3)University of Southern Florida, Tampa, FL; (4)The Ohio State University College of Pharmacy, Columbus, OH.

PURPOSE: Although serotonin reuptake inhibitors (SSRIs) are considered cost effective medications to treat major depressive disorders (MDDs), they are associated with significant dosage adjustments at treatment initiation. This study examined whether dosage titration in SSRIs was associated with significantly different resource utilization and costs in patients with MDDs enrolled in a managed care plan.
METHODS: A nationally representative cohort of individuals with MDD was identified in the Pharmetrics database between the years 2004 and 2006. We used titration algorithms to identify 838 patients starting new SSRI therapy whose dosages were adjusted within 56 days of starting the therapy: sertraline (n=196), fluoxetine (n=209), escitalopram (n=186), paroxetine (n=147), and citalopram (n=100). Propensity scores were developed to adjust for selection bias and identify a 1:1 matched cohort of control subjects who were not dose titrated during the same period. We compared mean therapeutic days, health care service utilization and costs between patients who were dose titrated and the matched cohort.
RESULTS: Overall, within the first 56 days of new treatment initiation, the dose-titrated cohort had a 39% decrease in number of therapeutic days (38 vs. 53), 49% increase in depression-related outpatient visits (1.91 vs 1.28), and 24% increase in all-cause related outpatient visits (4.82 vs. 3.88), leading to significant increase in direct medical and pharmacy costs compared to a matched cohort that did not experience dose-titration (all p<0.01). These findings differed across individual SSRIs, with the most significant economic burden of dose titration associated with sertraline.
CONCLUSIONS: MDD patients that are dose-titrated with SSRIs consume more medical and pharmacy resources and have greater days on sub-therapeutic dose compared to a matched group. Future research needs to determine whether there is a similar association when titration occurs during therapeutic switches and over a longer period of time.

56. Primary atrial fibrillation: Adverse event-attributable inpatient costs by choice of treatment. Michael Belz, MD[1], *James Spalding, Pharm.D.*[2], Alex Exuzides, Ph.D.[3], Sara Adams, M.P.H.[3], Chris Colby, Ph.D.[3]; (1)Group Health Cooperative, Seattle, WA; (2)Astellas Pharma US, Inc., Deerfield, IL; (3)ICON Clinical Research, San Francisco, CA.

PURPOSE: To assess the incremental inpatient costs attributable to treatment-related adverse events (AEs) among atrial fibrillation (AF) patients undergoing acute conversion therapy.
METHODS: We extracted 2004–2005 inpatient discharges with a primary AF diagnosis and evidence of treatment with either electric conversion (EC) or with an IV anti-arrhythmic agent (AA) from Premier Perspective™, the largest hospital service-level database in the US. AAs included amiodarone, ibutilide and procainamide. We estimated the total inpatient costs attributable to AEs (identified by ICD9 codes) for patients receiving EC or AAs at any time during their inpatient stay. Models were adjusted for demographic factors, hospital-specific factors and comorbidities.
RESULTS: Out of 100,058 principal AF discharges treated with EC or IV AAs, an estimated 27% had a treatment-related AE. Among patients who had an AE, 22% had hypotension and 37% experienced dysrhythmia. Adjusted inpatient costs for discharges with an AE were significantly higher compared to discharges without an AE (P<0.0001). AEs among patients receiving an AA at any time during the inpatient stay had the highest impact, contributing an average of $2,702 in additional adjusted costs. Hypotension and dysrhythmia AEs among patients receiving AA treatment were associated with an additional $1,232 and $1,054 in adjusted costs (P<0.0001), respectively. Among patients receiving EC treatment, hypotension AEs were not associated with a significant increase in costs (P=0.21), while EC patients with dysrhythmia AEs had an average incremental increase of $1,655 (P<0.0001).
CONCLUSIONS: Incremental costs attributable to AEs among AF patients are substantial and vary by type of acute conversion treatment received during an inpatient stay. For AAs, both dysrhythmia and hypotension AEs contributed significant incremental costs, while for EC, only dysrhythmia AEs increased costs significantly. Further research is warranted to assess the effectiveness of these therapies versus the resultant costs of potential AEs.

57. Inpatient resource use associated with the treatment of secondary atrial fibrillation. Michael Belz, MD[1], *James Spalding, Pharm.D.*[2], Alex Exuzides, Ph.D.[3], Sara Adams, MPH[3], Chris Colby, Ph.D.[3]; (1)Group Health Cooperative, Seattle, WA; (2)Astellas Pharma US, Inc., Deerfield, IL; (3)ICON Clinical Research, San Francisco, CA.

PURPOSE: We estimated incremental inpatient costs and length of stay (LOS) attributable to secondary atrial fibrillation (AF) in patients with and without cardiac predisposing factors to document the economic burden of this disease.
METHODS: We extracted 2004–2005 discharges from Premier

Perspective™, the largest hospital database in the US, with a secondary AF diagnosis and matched controls that had neither a primary nor a secondary AF diagnosis. We matched on patient age, discharge date, facility type and primary diagnosis category. We used regression models to estimate the incremental inpatient costs and LOS due to secondary AF. We adjusted for comorbidities, demographic and hospital-specific factors. We repeated this analysis for patients without cardiac predisposing factors (i.e. mitral valve disease, heart failure, non-AF cardiac operation, chest pain and congestive artery disease).
RESULTS: The estimated 5.4 million secondary AF discharges in the US during 2004 and 2005 had an adjusted average inpatient cost of $12,292. This cost was $3,532 more than the adjusted average inpatient cost for controls without AF (P<0.0001). Patients with secondary AF had an adjusted average LOS of 7.8 days or 1.9 additional days compared to controls without AF (P<0.0001). The estimated 1.4 million secondary AF discharges without cardiac predisposing factors had an adjusted average inpatient cost of $8,956, an increase of $1,908 compared to controls without AF or cardiac predisposing factors (P<0.0001). Secondary AF patients without cardiac predisposing factors had an adjusted average LOS of 6.2 days or one additional day compared to controls (P<0.0001).
CONCLUSIONS: Inpatient costs and LOS were significantly higher for patients with a secondary AF discharge diagnosis when compared to controls that did not have an AF diagnosis. These differences, although still significant, were less pronounced among patients without cardiac predisposing factors. Further research is warranted to investigate how secondary AF is most cost-effectively treated.

58. Indirect costs associated with patients treated for insomnia: an employer perspective. *Sameer R. Ghate, B.Pharm, M.S.P.H.*[1], Justin F. Doan, M.P.H.[2], Richard E. Nelson, Ph.D.[1], Jill Van Den Bos, M.A.[3], Diana Brixner, Ph.D., R.Ph.[1]; (1)Pharmacotherapy Outcomes Research Center, University of Utah, Salt Lake City, UT; (2)Takeda Global Research and Development Center, Deerfield, IL; (3)Milliman, Denver, CO.

PURPOSE: To assess the indirect costs associated with treated versus untreated insomnia in employees aged 18-65 years.
METHODS: Employee health records were obtained from the Thomson Medstat Marketscan database (Jan 2004 to Dec 2005). Employees with at least 2 prescriptions for an individual insomnia medication (benzodiazepine [temazepam], nonbenzodiazepine [zaleplon, zolpidem, eszopiclone], or sedating antidepressant [trazodone at doses < 150 mg]) and no prescription for an insomnia medication within 1.5 months prior to the initial prescription, over a 6-month time period were eligible for inclusion in the study. Using this study sample, productivity claims were obtained from the Thomson Medstat Health & Productivity Management database for the same time period. Total annual indirect costs (absenteeism and short-term disability) were calculated on a per-person basis using productivity claims coupled with industry average salary, and compared to estimates for a similar population of employees with untreated insomnia (Ozminkowski et al, Sleep 2007).
RESULTS: The mean age of employees ranged from 45 to 47 years for the different drug treatment groups. Six-month costs associated with absenteeism were lower for all treatment groups ($964 nonbenzodiazepines, $1,174 benzodiazepines, $1,547 sedating antidepressant) compared with costs for untreated insomnia patients ($3,042). Costs associated with short-term disability were also lower for all treatment groups ($207 nonbenzodiazepines, $236 benzodiazepines, $208 sedating antidepressant) compared with untreated insomnia patients ($310). The total estimated annual indirect costs of insomnia in employees treated for insomnia were $2,341 (nonbenzodiazepines), $2,819 (benzodiazepines), and $3,509 (sedating antidepressant) compared to $6,704 for employees with untreated insomnia.
CONCLUSIONS: In the current analysis, pharmacologic treatment of insomnia was associated with cost savings for employers. These results suggest that it may be more cost effective to treat employees with insomnia and incur the initial costs of medication rather than forgo treatment and incur greater indirect costs later.

59. Clinical and economic outcomes in hepatitis C patients treated with peginterferon alfa-2a or peginterferon alfa-2b plus ribavirin. *Diana Brixner, Ph.D., RPh*[1], Teng-Chiao Chu, Ph.D.[2], Tarek I. Hassanein, MD[3]; (1)Pharmacotherapy Outcomes Research Center, Suite #208, Salt Lake City, UT; (2)Roche Laboratories, Nutley, NJ; (3)University of California, San Diego, San Diego, CA.

INTRODUCTION AND AIMS: The introduction of pegylated interferons (PegIFNs) has improved treatment for chronic hepatitis C (CHC) by reducing dosing frequency and improving sustained virologic response (SVR) rates. A recent report from the VA Health System comparing PegIFNs suggested that only PegIFNα-2a was a positive predictor of achieving SVR. The characteristics of each pegylated conjugate, however, can alter its effectiveness over time, and this may have an impact on treatment persistence. This analysis compared therapy persistence and healthcare costs in patients treated with PegIFNα-2a/ribavirin or PegIFNα-2b/ribavirin.
METHODS: A retrospective database analysis used eligibility and pharmacy and medical claims data from a large US health plan for patients treated for CHC with PegIFNα-2a/ribavirin or PegIFNα-2b/ribavirin from January 2002 through June 2006. Major outcome variables included treatment persistence and annualized overall and CHC-attributable healthcare costs. The propensity scoring technique was used to establish comparable cohorts for comparison of study outcomes.
RESULTS: A total of 1,876 patients met the inclusion/exclusion criteria for PegIFNα-2a/ribavirin and 2,474 patients met the inclusion/exclusion criteria for PegIFNα-2b/ribavirin treatment, yielding 1,783 matched pairs after propensity score matching. Compared with patients receiving PegIFNα-2a/ribavirin, patients receiving PegIFNα-2b/ribavirin were significantly less likely to be persistent with therapy at week 48 (OR=0.82; 95% CI, 0.70–0.96, P=0.013). During the first 6 months of follow-up, mean all cause ($20,746 vs $21,529, P=0.0368) and HCV-attributable ($16,680 vs $17,862, P<0.0001) costs were significantly lower for PegINFα-2a/ribavirin than for PegIFNα-2b/ribavirin. On an annualized basis, mean all cause ($72,442 vs $85,081, P=0.0060) and HCV-attributable ($48,935 vs. $54,884, P=0.0167) costs over the entire follow-up period were significantly lower for PegIFNα-2a/ribavirin than for PegIFNα-2b/ribavirin.
CONCLUSION: Compared with PegIFNα-2b/ribavirin, PegIFNα-2a/ribavirin treatment was associated with higher persistence with therapy and lower overall and HCV-attributable healthcare costs.

60E. Five-year investigation of pharmacoepidemiology among patients with community-acquired (CAP), healthcare-associated (HCAP), hospital-acquired (HAP), and ventilator-associated pneumonia (VAP). Jennifer Soun, Pharm.D., Candidate[1], *Christine U. Oramasionwu, Pharm.D., M.Sc., Candidate*[1], Marcos I. Restrepo, M.D., M.Sc.[2], Eric M. Mortensen, M.D., MSc[2], Andres D. Ruiz, Pharm.D. Candidate[3], Jessica L. Jiminez, B.S.N., Candidate[4], Patricia Castellanos-Mateus, M.D.[5], Jennifer Seltzer, Pharm.D.[6], Robert L. Talbert, Pharm.D., FCCP, BCPS[3], Christopher R. Frei, Pharm.D., M.Sc., BCPS[7]; (1)The University of Texas at Austin and The University of Texas Health Science Center at San Antonio, San Antonio, TX; (2)Univ. TX Health Sci. Ctr., Vet. Evidence-Based Res. Dissemination and Implementation Ctr., and South TX Vet. Health Care System, San Antonio, TX; (3)The University of Texas at Austin College of Pharmacy and The University of Texas Health Science Center at San Antonio, San Antonio, TX; (4)The University of Texas at Austin, Austin, TX; (5)University of Texas Health Science Center at San Antonio, VERDICT, and South Texas Veterans Healthcare System, Austin, TX; (6)The University of Texas at Austin, The University of Texas Health Science Center at San Antonios, and University Health System, San Antonio, TX; (7)The University of Texas at Austin and The University of Texas Health Science Center at San Antonio, San Antonio, TX, San Antonio, TX.

PURPOSE: Guidelines emphasize appropriate empiric antibiotic selection in the management of pneumonia; nevertheless, health-systems have been slow to adopt these recommendations. Our aim was to determine guideline-adherence rates among CAP, HCAP, HAP, and VAP patients at our institution.
METHODS: Data were retrospectively collected from the medical charts for patients admitted to the intensive care unit at University Health System from Jan 2002–Dec 2006. All patients had clinically-confirmed pneumonia. Baseline demographics, co-morbidities, presenting signs and symptoms, antibiotics, complications, and health outcomes were collected. CAP, HCAP, HAP, and VAP patients were divided into 2 sub-groups based on the receipt of guideline-adherent antibiotic therapy. Yearly adherence rates were assessed for trend using regression models. Two sensitivity analyses were performed: 1) CAP and HCAP patients who received an antipseudomonal beta-lactam (APBL) were added to the CAP and HCAP guideline-adherent sub-groups and 2) HCAP patients treated with CAP-recommended antibiotics were included in the HCAP guideline-adherent sub-group.
RESULTS: The 193 patients had the following pneumonia types (n): CAP (46), HCAP (68), HAP (48), and VAP (31). Guideline adherence rates were as follows (collective 5-year rate, minimum annual rate—maximum annual rate): CAP (30%, 20–50%), HCAP (25%, 6–36%), HAP (40%, 17–86%), and VAP (32%, 13–100%). Adherence rates were poor in all years for CAP and HCAP—partially due to the widespread use of APBL. When patients who received an APBL were added to the guideline-concordant groups, the modified 5-year adherence rates were: CAP (47%) and HCAP (41%). In addition, acceptance of CAP-recommended antibiotics for HCAP patients resulted in an adjusted HCAP adherence rate of 51%. Annual adherence rates increased significantly as the years progressed from 2002 to 2006 for HAP (p=0.04) and HCAP (p=0.03).
CONCLUSION: The proportion of CAP and HCAP patients who receive guideline-adherent antibiotics at our institution remains low despite evidence for improved health outcomes.
Presented at 42nd American Society of Health-System Pharmacists Midyear Clinical Meeting, Las Vegas, Dec 2-6, 2007.

61. Amiodarone side effects and monitoring: temporal trends, adherence, and clinical outcomes. *Robyn M. Kondrack, Pharm.D., MBA*[1], Stephanie R. Maciejewski, Pharm.D.[2], W. Michael Kutayli, MD[1], Karen S. Rovang, MD[1], Nazih N. Kadri, MD[1], Tom T. Hee, MD[1], Daniel E. Hilleman, Pharm.D.[1]; (1)Cardiac Center of Creighton University Medical Center, Omaha, NE; (2)The Cardiac Center of Creighton University Medical Center, Omaha, NE.

BACKGROUND: Amiodarone is an effective antiarrhythmic agent with a substantial risk of toxicity. Monitoring is recommended with the following minimum: 2 clinic visits per year including thyroid function tests (TFTs) and liver function tests (LFTs), annual eye exam (AEE) and chest x-ray (CXR).
PURPOSE: The objective of this study was to evaluate adherence to the minimum monitoring standards for amiodarone in two cohorts of patients (one treated between 1988–1992 and the other 2000–2004). Adherence to monitoring was correlated with adverse drug reactions and outcome of therapy.
METHODS: Consecutive patients initiated on amiodarone during 1988-1992 and 2000–2004 were followed prospectively. Only patients remaining on amiodarone for ≥ 12 mos were included. Patients with a minimum of 2 clinic visits having TFTs and LFTs, AEE and CXR were considered to be adherent to monitoring. Outcomes were categorized as (1) discontinued for lack of efficacy (DC-LOE); (2) discontinued due to SE (DC-SE); (3) continued with SE (C-SE); and (4) continued without SE (C-NoSE).
RESULTS: 577 patients initiated on amiodarone during 1988-1992 and 553 during 2000–2004 were included. Mean follow-up was 22 months. Outcomes for all 1130 patients include: DC-LOE 18%; DC-AE 38%; C-NoAE 22%; and C-AE 22%. The proportion of patients compliant with follow-up was significantly greater in 1988–1992 (67%) compared to 2000–2004 (55%; p<0.05). Patients with the outcome of DC-AE were significantly more likely to be non-compliant with follow-up in both time periods (p<0.05). The most common types of side effects in the DC-AE groups were pulmonary, hyperthyroidism, neurologic (tremor), and hepatic.
CONCLUSION: Patients compliant with follow-up are less likely to discontinue amiodarone due to side effects than non-compliant patients. It is hypothesized that compliant patients have side effects that can be managed clinically which reduces the severity of side effects and reduces the number requiring drug discontinuation.

Pharmacoepidemiology

62E. Use of statin therapy in U.S. diabetics. Mandy Lea, DO[1], *Larry Segars, Pharm.D., DrPH, FCCP, BCPS*[2]; (1)Des Peres Hospital, Saint Louis, MO; (2)Kansas City University of Medicine & Biosciences, College of Medicine, Kansas City, MO.

PURPOSE: To assess the use of statins in U.S. diabetics.
METHODS: We utilized the 2002–2004 NAMCS and NHAMCS. Ambulatory visits associated with diabetes were identified using ICD-9-CM codes. Statin therapy was captured using trade/generic name codes. The study population consisted of patients with a diabetes diagnosis. The dependent variable was use of a statin with independent variables including region of country, age group, gender, ethnicity, race, physician specialty and medical degree, form of payment and study year.
RESULTS: A total of 3,304,044,978 visits, with 152,990,291 associated with a diabetes diagnosis, occurred from 2002–2004. Statin therapy was associated with only 21.1% of the diabetic population and only 14.1% of diabetics without hyperlipidemia. Diabetic males were 1.38 times more likely to be on a statin (OR=1.38; 95% CI 1.09, 1.73; p=0.007). Compared to 2002, diabetics treated in 2003 were 1.51 times more likely, and patients treated in 2004 were 1.48 times more likely, to be on statin therapy (2003: OR=1.51; 95% CI 1.02, 2.24; p=0.040; 2004: OR=1.48; 95% CI 1.03, 2.15; p=0.036). Compared to patients aged 45-64 years, diabetics aged 1-24 were 90% less likely (OR=0.10; 95% CI 0.01, 0.84; p=0.034), those aged 25–44 years were 52% less likely (OR=0.48; 95% CI 0.31, 0.74; p=0.001), and those aged 65–74 years were 1.38 times more likely (OR=1.38; 95% CI 1.01, 1.90; p=0.043) to be on a statin. There was no difference between patients aged 75 years or older (OR=1.12; 95% CI 0.78, 1.61; p=0.535). Diabetics with hyperlipidemia were over 5 times more likely to be prescribed a statin compared to diabetics without this diagnosis (OR=5.15; 95% CI 3.47, 7.65; p<0.001). Finally, no differences were demonstrated with physician specialty or medical degree, region of the country, race, ethnicity, or form of payment.
CONCLUSION: From 2002–2004, U.S. physicians under prescribed statins in their diabetic patients.
Presented at 2007 Annual Meeting of the American College of Osteopathic Internists.

63. Use of statistical process control methods to identify adverse event trends associated with methadone as preferred long-acting narcotic analgesic. *Vaughn L. Culbertson, Pharm.D.*, Christopher T. Owens, Pharm.D.; Idaho State University College of Pharmacy, Pocatello, ID.

PURPOSE: The study objectives were to evaluate statistical process control (SPC) methods as a potential claims database surveillance technique to determine if any adverse respiratory events may have resulted from addition of methadone to a state Medicaid preferred drug list (PDL).
METHODS: Medicaid claims data were reviewed from 2000 through 2006 to identify patients taking methadone (n=8,816). Cases of possible methadone poisoning were identified using the following ICD-9 codes: methadone = 965.02, opioid poisoning = 965.00 and 965.09, and diagnosis codes/hospitalizations related to respiratory failure = 518.81–518.84 and 799.01–799.02) for patients with one or more fills. Statistical process control (SPC) charts were constructed using SPC XL® software (Six Sigma, Colorado Springs, CO). A u chart representing the total number of patients receiving methadone and the proportion of those patients with a respiratory event code within 30 days of a prescription fill were plotted for each quarter. The u chart plots control limits defined as three ó (i.e., standard deviations) above and below the process mean and standard SPC run test rules were used to identify significant changes over time. A visual inspection of patient claims for the 14 patients with associated events during 2004 confirmed the likely association with methadone.
RESULTS: The proportion of methadone treated patients with a respiratory failure code nearly doubled (0.45% to 0.81%, p<0.05) during the second quarter of 2004 which temporally coincides with addition of methadone to the PDL. A second change in mean rate (decrease to 0.42%, p<0.05) was observed after January 2006 when elderly Medicaid recipients > 65-years-old were moved to Medicare Part D. A u chart with combined endpoints of a respiratory failure or methadone poisoning code did not show any significant trends.
CONCLUSION: SPC methods successfully identified changing adverse event trends associated with addition of methadone to a Medicaid PDL.

64. Long-term drug utilization trends in acute uncomplicated cystitis. *Brooke Pugmire, Pharm.D.*, Rex W. Force, Pharm.D., Christopher T. Owens, Pharm.D.; Departments of Family Medicine and Pharmacy Practice, Idaho State University, Pocatello, ID.

PURPOSE: Current guidelines recommend 3 days of trimethoprim-sulfamethoxazole (TMP-SMX) as first-line treatment for acute uncomplicated cystitis (AUC). Alternatives, including fluoroquinolones and nitrofurantoin, are recommended when community resistance rates exceed 20%. Literature suggests a lack of adherence to guidelines and that fluoroquinolone use is increasing. We examined fourteen years of Medicaid data to describe trends in AUC drug utilization.
METHODS: Paid medical and pharmacy claims were analyzed from 1994 through September 2007 to identify cases of acute cystitis. Complicated urinary tract infections were excluded. Office visits for AUC were identified and linked to an oral antibiotic claim within seven days. The percentage of cases treated annually with each antibiotic was determined and treatment duration (< 3, 3, 4–7, >7 days) for each regimen was established. Time trends for drug choice and treatment duration were plotted.
RESULTS: A total of 18,965 (yearly average: 1,354) cases of AUC were analyzed over the study period. The percent of office visits without a linked oral antibiotic was 28.2% on average. TMP-SMX utilization peaked at 39.8% of cases in 1997 and steadily decreased to 18.0% in 2007. Fluoroquinolone utilization increased from 7.1% in 1994 to a high of 24.9% in 2005. Nitrofurantoin utilization remained relatively consistent. In the last two years, over 80% of cases treated with TMP-SMX or a fluoroquinolone were for four or more days.
CONCLUSIONS: Since 1994, despite current recommendations, TMP-SMX utilization in the treatment of AUC has declined while use of fluoroquinolones has increased. A substantial number of office visits for AUC were not linked to oral antibiotic therapy, a possible limitation of retrospective data analyses. In many cases, treatment duration with TMP-SMX and fluoroquinolones appears to have been excessive.

65. Use of geographic information systems to evaluate medication selection, resistance patterns, and treatment failures in acute uncomplicated cystitis. *Rex W. Force, Pharm.D.*, Brooke Pugmire, Pharm.D., Christopher T. Owens, Pharm.D.; Departments of Family Medicine and Pharmacy Practice, Idaho State University, Pocatello, ID.

PURPOSE: Geographic information systems (GIS) allow for the mapping of health data in order to visualize trends as it relates to geography. E. coli resistance rates are used for medication selection decisions in acute uncomplicated cystitis (AUC). However, these resistance rates and medication selection may vary geographically. Additionally, it is unclear whether medication selection, resistance patterns, and treatment failure are linked. We examined the relationship between these three variables via mapping with GIS software across the counties in our state.
METHODS: Paid medical and pharmacy Medicaid claims were analyzed from October 2005 through September 2007 to identify cases of AUC. Complicated urinary tract infections (UTI) were excluded. Office visits for AUC were identified and linked to an oral antibiotic claim within seven days. Cases were grouped by initial antibiotic prescribed and mapped by county. Apparent treatment failures were defined as a subsequent UTI diagnosis with a

hospitalization and/or emergency department visit within 14 days, or a claim for a different antibiotic within 14 days. For trimethoprim-sulfamethoxazole (TMP-SMX)-treated cases, failure rates were mapped with the most recent E. coli susceptibility profiles from hospitals in each county.
RESULTS: A total of 3,824 cases of AUC were analyzed over the study period. Among treated cases, 36.3%, 30.2%, and 22.5% were with TMP-SMX, fluoroquinolone, and nitrofurantoin, respectively. Among all cases treated initially with TMP-SMX, 12.8% had an apparent treatment failure. Apparent failure rates for initial fluoroquinolone and nitrofurantoin users were 14.1% and 12.7%, respectively. By county, *E. coli* resistance to TMP-SMX ranged from 9–38%, while apparent failure rates ranged from 1.8–18.8%.
CONCLUSIONS: Medication use, apparent treatment failures, and *E. coli* resistance varied geographically. Geographic visualization of medication selection, resistance patterns, and treatment failures may allow for novel interventional strategies.

Pharmacokinetics/Pharmacodynamics/Drug Metabolism/Drug Delivery

66. Computer-simulated pharmacokinetic feasibility and timing for transition from intravenous to oral nicardipine. *Shuang Bai, Ph.D.*[1], Dennis Fisher, M.D.[2], Denise Rhoney, Pharm.D.[3]; (1)PDL BioPharma, Inc., Redwood City, CA; (2)"P Less Than" Company, San Francisco, CA; (3)Wayne State University, Detroit, MI.

OBJECTIVE: Evaluate the feasibility and timing of first dose of oral nicardipine (NIC; immediate-release [IR] or sustained-release [SR]) using computer modeling and simulation, to minimize clinical risks of supra- or subclinical NIC blood levels during transition from intravenous (IV) to oral formulation.
METHODOLOGY: Concentration-time data were obtained from 71 healthy subjects in 3 crossover studies comparing bioavailability of SR (30, 45, and 60 mg bid) and IR (20, 30, 40 mg tid) formulations. A population pharmacokinetic (PK) analysis was conducted using NONMEM® software. Five compartments were built in the final model: 2 depots (C1 and C2), central (C3), fast (C4), and slow (C5) distribution compartments. SR component of SR-NIC into C1 was slowly released into C2 with a first-order rate constant, while IR-NIC and IR component of SR-NIC were released directly into C2. Drug in C2 was then absorbed into C3 following a first-order absorption rate constant. Simulation, using typical values estimated from the final PK model, involved 840 scenarios at different IV (3 to 15 mg/h for 4 to 72 hours), SR or IR doses with different time intervals (± 2 hours) between termination of IV infusion and initiation of oral administration. Results were compiled and plots generated using S-PLUS®.
RESULTS AND CONCLUSION: Predicted peak/trough levels for IR-NIC 30 and 40 mg tid were comparable to results in original PK study reports and were 53/12 and 93/21 ng/mL, respectively. Values for SR-NIC, 45 and 60 mg bid, were 28/7 and 49/11 ng/mL, respectively. Oral NIC adminstered 30 min before termination of all IV-NIC doses provides the smoothest transition to steady-state blood levels. This simulation shows the feasibility of using the NONMEM model as a foundation for future transition studies.
Funded by PDL BioPharma, Inc.

67. No drug-drug interaction between brimonidine and timolol in systemic circulation after ocular co-administration. Dale Yu, Ph.D.[1], *Yilong Zhang, Ph.D.*[1], Ajit Suri, Ph.D.[2], Janet K. Cheetham, Pharm.D.[2], Diane Tang-Liu, Ph.D.[1]; (1)Clinical Pharmacology Department, Allergan, Irvine, CA; (2)Allergan, Irvine, CA

PURPOSE: This study was to evaluate potential drug-drug interaction between brimonidine and timolol in systemic circulation after ocular co-administration.
METHODS: Eighteen healthy subjects were assigned to treatment groups and received twice-daily administration of 0.2% brimonidine tartrate / 0.5% timolol fixed combination ophthalmic solution (Combo), Alphagan® (0.2% brimonidine tartrate) alone, or 0.5% Timoptic® (0.5% timolol) alone for seven days during three separate dosing periods using a crossover design. Serial blood samples were collected for the determination of plasma brimonidine and timolol concentrations by a validated GC/MS and LC-MS/MS method with a lower limit of quantitation of 5 pg/mL, respectively. Plasma pharmacokinetic parameters of brimonidine and timolol were analyzed using standard non-compartmental techniques.
RESULTS: Pharmacokinetic parameters of brimonidine and timolol are summarized in the following table (mean ± SD, N=16):

Pharmacokinetic parameters of brimonidine and timolol

PK Parameters	Brimonidine Alphagan® alone	Combo treatment	Timolol Timoptic® alone	Combo treatment
T_{max} (hr)	1.30 ± 0.59	1.28 ± 0.46	1.40 ± 0.66	2.42 ± 1.17
C_{max} (pg/mL)	34.7 ± 22.6	32.7 ± 15.0	507 ± 269	406 ± 216
AUC_{0-12} (pg.hr/mL)	141 ± 106	128 ± 61	2910 ± 1230	2920 ± 1680
$t_{1/2}$ (hr)				

Brimonidine was rapidly absorbed and eliminated following ocular administration. There was no significant difference on the C_{max} and AUC_{0-12} values of brimonidine between Combo treatment and Alphagan® alone (p-value of 0.329 for C_{max} and 0.327 for AUC_{0-12}). Similarly, timolol was also rapidly absorbed and eliminated following ocular administration. There was no significant difference in the C_{max} and AUC_{0-12} values of timolol between Combo treatment and Timoptic® alone (p-value of 0.088 for C_{max} and 0.662 for AUC_{0-12}).
CONCLUSION: No drug-drug interaction in systemic circulation between brimonidine and timolol was observed after ocular co-administration to healthy subjects.

68. Non-compartmental single dose pharmacokinetics, bioavailability and bioequivalence of two novel non-immediate release oral tranexamic acid products in fed and fasting healthy adult females. *Keith A. Moore, Pharm.D.*, James L. Young, Ph.D., Ralph A. Heasley, Ph.D., Stephen E. Boesing, M.S.; Xanodyne Pharmaceuticals, Inc, Newport, KY.

PURPOSE: To compare the pharmacokinetics (PK), safety and tolerability of single oral doses of two novel tranexamic acid (TA) tablet products in healthy adult females during fasting and non-fasting conditions under development for a menorrhagia indication.
METHODS: Study 1 randomized 28 adult female volunteers to a single-dose, 4-way crossover comparative PK, bioavailability and bioequivalence study. A fasting single 1.3 g dose of the novel modified-release (MR) and novel delayed-release (DR) TA tablet were compared to a 1.3 g oral dose of an immediate-release (IR) tablet and 1g IV TA dose. Study 2 randomized 28 adult female volunteers to a single-dose, 4-way crossover comparative bioavailability study comparing the two novel TA products under fasting and fed conditions. Both studies obtained serial blood samples over 36 hours separated by a washout period of 7 days. TA plasma concentrations were analyzed by GC/MS with PK parameters derived using standard approaches.
RESULTS: Twenty-six subjects completed Study 1. TA plasma concentrations post IV best fit a 3-compartmental model with absolute bioavailability of 46.0%, 44.9% and 32.4% for the IR, MR and DR product, respectively. Ratios of C_{max} and AUC_{∞} for the MR vs. IR product were 92.4% (90% CI 84.0–101.6) and 95.1% (90% CI 87.4–103.5), respectively. C_{max} and AUC_{∞} ratios for the DR vs. IR product were significantly below the 90% CI acceptance range (80–125%). Twenty-six subjects completed Study 2. Ratios of C_{max} and AUC_{∞} for the MR product under fed vs. fasting conditions were 106.8% (90% CI 97.2–117.3) and 115.4% (90% CI 106.5–124.9), respectively; DR did not pass the 90% CI range. Adverse events were low across all treatments. Gastrointestinal adverse events were observed with the IR and DR products.
CONCLUSIONS: The absolute bioavailability, comparable bioequivalence to the immediate-release product, lack of food effect and gastrointestinal tolerability of the modified-release TA product was demonstrated in females.

69. Steady-state and compartmental pharmacokinetic analysis of two novel non-immediate release oral tranexamic acid products in healthy adult females. *Keith A. Moore, Pharm.D.*, James L. Young, Ph.D., Ralph A. Heasley, Ph.D., Stephen E. Boesing, MS; Xanodyne Pharmaceuticals, Inc, Newport, KY.

PURPOSE: To assess the pharmacokinetics (PK), safety and tolerability of multiple oral doses of two novel tranexamic acid (TA) tablet products in healthy adult females. The objective was to confirm the preferred product to advance into late phase clinical development for a menorrhagia indication.
METHODS: Two groups of 20 adult female volunteers were randomized in a parallel fashion. A single 1.3 g dose of either the novel modified-release (MR) or delayed-release (DR) TA tablet was administered with serial blood samples obtained over 36 hours. Multiple doses followed with the same product administered every 8 hours with serial blood samples obtained at day 5 over the last dosing interval. TA plasma concentrations were analyzed by GC/MS with PK parameters derived using non-compartmental and compartmental approaches.
RESULTS: Nineteen and 20 subjects were included in the pharmacokinetic and safety analyses for the MR and DR products, respectively. Steady-state mean C_{min}, C_{max} and AUC_{Δ} for the MR product were 5.2 µg/mL, 15.8 µg/mL and 74.8 µg h/mL, respectively, which approximate the desired therapeutic range of 5-15 µg/mL required to produce an 80% inhibition of plasmin activity. Steady-state C_{max} and AUC_{Δ} for the DR product were significantly lower with greater variability compared to the MR product. Ratios of AUCΔ /AUCinf for the MR and DR products were 97.3% (90% CI 86.5–109.5) and 107.7% (90% CI 89.2–130.1), respectively. Absorption kinetics determined by a standard two stage (STS) approach was best described by a mixed-order absorption rate constant for both products. A 3-compartment PK model best fit the population analysis. Adverse events were low for both products. The MR product demonstrated the best gastrointestinal tolerability.
CONCULSIONS: The modified-release TA product was well tolerated, demonstrated time-independent pharmacokinetics (AUC_{Δ} /AUC_{inf} 90% CI within 80–125% acceptance criteria) and produced acceptable peak and total systemic exposure after multiple dose administration in females.

70E. Effects of mometasone furoate on upper and lower airway inflammation in allergen-challenged Brown Norway rats. John C. Anthes, Ph.D.[1], Robbie L. McLeod, Ph.D.[1], Richard W. Chapman, Ph.D.[1], Yanlin Jia, Ph.D.[1], Jonathon E. Phillips, Ph.D.[1], *James D. Tislow, Pharm.D.*[2]; (1)Neurobiology, Schering-Plough Research Institute, Kenilworth, NJ; (2)Schering-Plough Corporation, Kenilworth, NJ.

PURPOSE: To assess inhibitory effects of mometasone furoate (MF) on allergen-provoked upper and lower airway inflammation, we evaluated inflammatory cell infiltration and reductions in forced vital capacity (FVC) and peak expiratory flow (PEF) in allergen-challenged Brown Norway rats.
METHODS: Four experiments were performed on ovalbumin (OVA)-sensitized rats: Group 1) intranasal (i.n.) MF or vehicle given for 3 consecutive days, last treatment dose given 2 hours before i.n. OVA (1%) challenge on last day; Group 2) and Group 3) intratracheal (i.t.) MF or vehicle given 5 hours before aerosolized OVA (1%) challenge; Group 4) nose-only inhalation of dry powder MF, given 5 hours before aerosolized OVA (1%) challenge. In Groups 1 and 2, nasal lavage (NL) and bronchoalveolar lavage (BAL) samples were collected 24 hours after OVA challenge. In Groups 3 and 4, FVC and PEF were assessed 24 hours after OVA challenge.
RESULTS: Intranasal MF (0.01–10 ng/ml) reduced number of total inflammatory cells in the NL induced by OVA challenge, with significant effects seen at all doses. Intratracheal MF (0.01–0.3 mg/kg, i.t.) significantly attenuated number of total BAL inflammatory cells. MF (0.1–1 mg/kg, i.t.) also inhibited reductions in FVC and PEF induced by the OVA challenge. MF attenuated reductions in FVC (32%, 45%, and 92% inhibition) and PEF (50%, 59%, and 100% inhibition) when given by nose-only inhalation (estimated pulmonary deposition of MF, 1.4, 4.1, and 13.3 µg/kg, respectively).
CONCLUSION: In these animal models of upper and lower airway inflammation, MF significantly attenuated cellular lung inflammation and normalized lung function following allergen provocation. This study provides insight into the anti-inflammatory properties of the corticosteroid mometasone furoate.
Presented at To be presented at the meeting of the American Academy of Allergy, Asthma & Immunology, Philadelphia, PA, March 14–18, 2008.

71. A Mayo clinic collaboration: stability studies involving hormone compounded sterile preparations. *Christine M. Formea, Pharm.D.*, William T. Weiss, R.Ph., Maureen Bigelow, R.N., Sreekumara Nair, M.D., Ph.D.; Mayo Clinic Rochester, MB G-722, Rochester, MN.

PURPOSE: This study evaluated the stability of four hormone sterile compounded sterile preparations over five days in order to better utilize limited endocrine research and pharmacy resources.
METHODS: Four hormone compounded sterile preparations were evaluated for stability in December 2006 and February 2007. The change in regular insulin, growth hormone, glucagon, and somatostatin concentrations in 0.9% normal saline were measured over five days by the Mayo Clinic St. Marys Hospital Immunochemical Core Lab, Rochester, Minnesota, and Inter Science Institute [Inglewood, CA].
RESULTS: Regular insulin, growth hormone, glucagon, and somatostatin concentrations in 0.9% normal saline were measured over five days. Regular insulin concentrations did not significantly change (p value=0.4159, range 145.3–153.0 uIU/mL, mean 146.2, SD 4.4). Growth hormone concentrations did not significantly change (p value=0.4336, range 1.11–0.84 uIU/mL, mean 0.98, SD 0.1). Glucagon concentrations did not significantly change (p value =0.4159, range 16.5–12.75 uIU/mL, mean 14.2, SD 1.4). Somatostatin concentrations did not significantly change (p value=0.3679, range 1.077–1.438, mean 1.301, SD 0.196).
CONCLUSION: Standard concentrations of insulin, growth hormone, glucagon, and somatostatin used in research protocols did not demonstrate significant concentration changes over five days, thus permitting an extension of the stability window for four hormone compounded sterile preparations resulting in more efficient use of research resources.

Psychiatry

72. Is ADHD increasing among U.S. adults?: trends in diagnosis and pharmacotherapy treatment, 1995–2004. *David A. Sclar, B.Pharm., Ph.D.*, Linda M. Robison, M.S.P.H., Tracy L. Skaer, B.Pharm., Pharm.D.; Washington State University, Pullman, WA.

OBJECTIVE: To evaluate whether the trend in adults seeking medical care for the treatment of attention deficit/hyperactivity disorder (ADHD) reflects the upward pattern seen among children.
METHODS: Data from the U.S. National Ambulatory Medical Care Survey (NAMCS) were utilized for this analysis. The NAMCS is an ongoing annual survey of a representative sample of U.S. office-based physician practices. The number and rate of office-based physician visits resulting in a diagnosis of ADHD (International Classification of Diseases, 9th Revision, Clinical Modification code 314.00 or 314.01) among patients aged 20 years or older, were discerned for the years 1995 through 2004. Trend analysis was conducted using five time intervals: 1995–96; 1997–98; 1999–00; 2001–02; 2003-04.
RESULTS: Over the time-frame, national estimates of the number of annualized office-based physician visits documenting a diagnosis of ADHD among adults increased 4.7-fold; from 582,728 in 1995–96, to 2,738,285 in 2003-04 ($p<0.05$). Adjusted for population growth, the rate per year of office visits per 1,000 U.S. population aged 20+ years old resulting in a diagnosis of ADHD more than quadrupled; increasing from 3.1 per 1,000 in 1995–96, to 13.0 in 2003–04. The majority of office visits documented a prescription for stimulant pharmacotherapy or atomoxetine (available since late 2002), increasing from 61.7% in 1995–96, to 77.8% in 2003–04.
CONCLUSIONS: As with children, the rate of adults seeking medical care for ADHD has increased significantly. By 2003–04, adults accounted for more than 1 in 4 (28.8%) office visits resulting in a diagnosis of ADHD.

Pulmonary

73. Benefits and risks of adding an inhaled corticosteroid to a long-acting beta-2-agonist in patients with chronic obstructive pulmonary disease. *Diana M. Sobieraj, Pharm.D.*[1], C. Michael White, Pharm.D., FCCP, FCP[2], Craig I. Coleman, Pharm.D.[2]; (1)University of Connecticut, Meriden, CT; (2)University of Connecticut, Hartford, CT.

PURPOSE: In severe or very severe chronic obstructive pulmonary disease (COPD), the use of long-acting bronchodilators together with inhaled corticosteroids (ICS) remains standard of care according to the Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines. Several clinical trials have evaluated the benefits and risks associated with combination therapy in terms of exacerbations, mortality, and quality-of-life. We sought to meta-analyze these studies to better elucidate the benefits and risks associated with adjunctive ICS therapy in COPD patients with severe or very severe disease.
METHODS: A systematic literature search was conducted through September 2007. Three efficacy endpoints [exacerbations, mortality, and change in St. George Respiratory Questionnaire score (SGRQ)] and two safety endpoints [pneumonia and oral candidiasis] were evaluated. A random-effects model was utilized. Statistical heterogeneity was addressed using the Q statistic and visual inspection of funnel plots and Egger's weighted regression statistics were used to assess for publication bias.
RESULTS: A total of eight studies satisfied our inclusion criteria (totaling 12,340 subjects). Duration of study follow-up ranged from 24 to 156 weeks. Exacerbations (rate ratio, 0.80; 95% CI 0.71 to 0.90) and SGRQ score (weighted mean difference, -1.97 points; 95% CI -2.58 to -1.36) were reduced with adjuvant ICS therapy but mortality was not significantly affected (relative risk, 0.91; 95% CI 0.76 to 1.08). Both pneumonia (relative risk, 1.57; 95% CI 1.16 to 2.13) and oral candidiasis (relative risk, 4.06; 95% CI 2.36 to 6.99) were increased with adjuvant ICS therapy. Our analysis' conclusions were not altered upon subgroup or sensitivity analyses evaluating salmeterol or formoterol with adjuvant ICS therapy separately, removal of one study mandating tiotropium use, or when using a fixed-effects model.
CONCLUSION: Adjunctive inhaled corticosteroid therapy can reduce exacerbation rates but increases adverse effects. Clinicians need to assess whether the benefits of therapy will be worth the risks and additional cost.

74E. Mometasone furoate nasal spray exhibits 24-hour duration of effect in seasonal allergic rhinitis subjects in an environmental exposure chamber model. Piyush Patel, M.D.[1], Deepen Patel, M.D.[1], Gokul Gopalan, M.D.[2], *James D. Tislow, Pharm.D.*[2], Xin Yu, Ph.D.[2], Santosh Varghese, M.D.[2]; (1)Allied Research International Inc., Mississauga, ON, Canada; (2)Schering-Plough Corporation, Kenilworth, NJ

PURPOSE: Environmental exposure chamber (EEC) is a controlled environment for inducing allergen responses similar to those occurring outdoors on peak pollen days. This study measured duration of action of mometasone furoate nasal spray (MFNS) following initial and maintenance (7-day) dosing after ragweed exposure in EEC.
METHODS: As part of a double-blind, placebo-controlled, parallel-group study, 310 subjects with seasonal allergic rhinitis (SAR) received 1 dose of MFNS 200 µg or placebo on Day 1. A subset of 155 subjects were randomized to maintenance dose of MFNS QD (n=78) or placebo (n=77) (Days 2–7). On Day 1, after priming visits, subjects with minimal threshold total nasal symptom score (TNSS) ≥ 6/12 (composite of individual symptom scores for congestion, rhinorrhea, itching, and sneezing, rated on 0–3 point scale [0=none; 3=severe]) in conjunction with congestion score ≥2, entered EEC and were exposed to ragweed. After 1.5 hours, subjects with minimal threshold score were randomized to receive initial dosing at 2 hours, and remained in EEC for 6 hours post-dosing (n=310). Duration of action was measured in the subset of 155 subjects who continued MFNS dosing at home for 6 days, returning to EEC for a second 4-hour ragweed exposure on Day 8 (22-26 hours after last dose). Instantaneous TNSS was assessed on Days 1 and 8.
RESULTS: On Day 8, the MFNS group demonstrated statistically significantly

greater improvements versus placebo: mean instantaneous TNSS was 7.21 vs 8.41, respectively, after 2 hours in EEC (p=0.02) (24 hours after last dose) and 7.50 vs 8.62, respectively, after 4 hours (p=0.03) (26 hours post last dose). Numerically greater reductions in TNSS were observed with MFNS versus placebo on Day 1. Most treatment-emergent adverse events (MFNS=15, 9.7%; placebo=16, 10.3%) were mild/moderate.
CONCLUSION: MFNS produced statistically significant improvements in TNSS in subjects with SAR that were sustained over 24 hours.
Presented at To be presented at the meeting of the American Academy of Allergy, Asthma & Immunology, Philadelphia, PA, March 14-18, 2008.

75E. Mometasone furoate nasal spray increases time to recurrence of nasal polyps following functional endoscopy sinus surgery. Pär Stjärne, M.D., Ph.D.[1], Petter Olsson, M.D.[2], *Phillip Treadwell, Pharm.D.*[3]; (1)Karolinska University Hospital, Huddinge, Stockholm, Sweden; (2)Schering-Plough AB, Stockholm, Sweden; (3)Tallahassee Memorial HealthCare, Tallahassee, FL.

PURPOSE: Assess the safety and efficacy of mometasone furoate nasal spray (MFNS) 200 µg QD in preventing nasal polyp recurrence and symptom worsening after functional endoscopy sinus surgery (FESS).
METHODS: In this phase 3, randomized, placebo-controlled, double-blind, multicenter study, subjects who had undergone FESS for nasal polyposis began treatment with MFNS 200 µg QD or placebo nasal spray about 2 weeks after surgery. Response was assessed endoscopically at Weeks 4, 8, 16, and 24. Primary efficacy variable was time to recurrence, defined as score increase of at least 1 on a 0- to 6-point polyp scale. Data analyses were conducted on intention-to-treat (ITT) and per-protocol (PP) populations.
RESULTS: In the ITT analysis (n=159), median time to recurrence was 125 days in the placebo group. In the MFNS group, time to recurrence could not be defined as the recurrence rate was < 0.5 (p=0.0499). Median time to recurrence in the PP analysis (n = 104) was 173 days in the MFNS group and 61 days in the placebo group (p=0.0074). Worsening rate in diagram polyp score was larger with placebo. Forty-four subjects in the MFNS group and 48 in the placebo group reported adverse events (AEs); most were considered mild. The only serious AE (bleeding) was considered related to surgery. The most common AE considered related to study drug was epistaxis.
CONCLUSION: MFNS 200 µg QD was significantly superior to placebo in prolonging time to recurrence of nasal polyps in subjects who had undergone FESS and may prolong time to next surgery. MFNS 200 µg QD was well tolerated.
Presented at Presented at the Congreso Latinamericano de Rinologia y Cirugia Plastica Facial, Cuzco, Peru, November 7–10, 2007.

76E. Concomitant therapy with mometasone furoate nasal spray and antibiotic improves symptoms and quality of life in acute rhinosinusitis patients. François Lavigne, M.D.[1], *Krishna Patel, Pharm.D.*[2]; (1)Institut ORL de Montréal, Montréal, QC, Canada; (2)Schering-Plough Corporation, Kenilworth, NJ.

PURPOSE: Concomitant treatment of acute rhinosinusitis (ARS) with the intranasal corticosteroid mometasone furoate nasal spray (MFNS) and an antibiotic has been found to be significantly more effective than antibiotic alone. This study sought to determine the efficacy of MFNS for the symptoms and QoL of people with ARS when used with an oral antibiotic with/without decongestant.
METHODS: A total of 362 Canadian physicians recruited 2,800 adults with ARS. Subjects received MFNS 200 µg BID for 14 days plus oral antibiotic and oral/topical decongestant if needed. At baseline and treatment Days 7 and 14, subjects completed questionnaires rating 7 ARS symptoms (congestion, nasal discharge, headache, facial pain, cough, toothache, and other, ear pain, pharyngitis, fever) and their impact on 4 aspects of QoL (daily activities, work/studies, sleep, overall QoL) using a 4-point scale (0=not troubled/no interference, 3=severe).
RESULTS: Questionnaire was completed by 1839 subjects. ARS symptom scores decreased significantly with incremental improvement from baseline to Day 7 and to Day 14: congestion (2.47 to 1.44 to 0.69), nasal discharge (2.09 to 1.15 to 0.48), headache (2.18 to 1.16 to 0.53), facial pain (2.08 to 1.07 to 0.42), cough (1.59 to 1.02 to 0.54), toothache (0.91 to 0.43 to 0.15; p<0.0001 for all), and other (1.89 to 1.75 to 1.46; p=0.007). QoL ratings improved significantly over the same period: daily activities (2.14 to 1.22 to 0.54), work/studies (2.18 to 1.18 to 0.50), sleep (2.24 to 1.22 to 0.54), overall QoL (2.42 to 1.35 to 0.73; p<0.0001 for all). At Day 14, only 237 subjects required a decongestant; use of decongestants did not reduce symptoms or improve QoL.
CONCLUSIONS: Treatment with MFNS plus antibiotic was highly effective in improving symptoms and QoL of subjects with ARS. This result was not modified by use of topical/oral decongestants.
Presented at Presented at the Annual Meeting of the American College of Allergy, Asthma & Immunology, Dallas, TX, November 8–14, 2007.

77E. Mometasone furoate nasal spray is effective in the treatment of adenoidal hypertrophy and snoring in pediatric subjects with allergic rhinitis. Talal Nsouli, M.D.[1], *Krishna Patel, Pharm.D.*[2]; (1)Georgetown University School of Medicine, Burke and Watergate Allergy and Asthma Research Centers, Washington, DC; (2)Schering-Plough Corporation, Kenilworth, NJ.

PURPOSE: Allergic airway inflammation occurs not only in mucosa of the shock target organ, but also in corresponding lymphatic tissue. The adenoidal gland is the closest lymphoid tissue to nasal mucosa. Allergic rhinitis (AR) is a risk factor for adenoidal hypertrophy (AH), which results in significant morbidity including nasal obstruction, mouth breathing, and snoring.
OBJECTIVE: To assess efficacy of mometasone furoate nasal spray (MFNS) in reducing adenoidal gland size and degree of snoring in pediatric subjects with AR.
METHODS: Twenty-four subjects with AH and history of chronic nasal obstruction and snoring received MFNS 100 µg QD for 8 weeks. Group A comprised 16 subjects (age range, 5-10 years) with clinical history of AR and positive skin prick test; control subjects in Group B (n=8; age range, 5-8 years) had no history of AR and negative skin prick test. Subjects with hypertrophic tonsils were excluded. Efficacy variables, assessed at Weeks 0 (baseline) and 8, were change in size of adenoidal gland and change in degree of snoring. Adenoidal gland size was evaluated by means of flexible fiber-optic rhinoscopy, graded as a percentage according to degree of obliteration of choanae. Degree of snoring was assessed with three-point snoring symptom scale: 0=absent, 1=intermittent, 2=continuous.
RESULTS: At Week 8, subjects in Group A reported significant improvement in snoring. Mean average score decreased from 2 at Week 0 to 0.4 at Week 8 (-80%) compared with Group B (mean average score decreased from 1.9 to 1.8, -5.4%). Mean average adenoidal tissue size grade significantly decreased in Group A from 74.4 to 11.6 (-84%) during the study period; corresponding reduction for Group B was from 76.3 to 72.5 (-5%).
CONCLUSION: Once daily MFNS 100 µg is beneficial in treatment of AH and snoring and may reduce the need for surgical intervention in pediatric patients with AR.
Presented at Presented at the Annual Meeting of the American College of Allergy, Asthma & Immunology, Dallas, TX, November 8–14, 2007.

Smoking Cessation

78E. Tobacco cessation: adherence to treatment with varenicline and associated abstinence outcomes. *Theodore C. Lee, M.D.*[1], J. Taylor Hays, M.D.[2], Martina Flammer, M.D.[1], Simon Davies, Ph.D.[1]; (1)Pfizer Inc., New York, NY; (2)Mayo Clinic, Rochester, MN.

PURPOSE: Smoking cessation is critical for prevention of heart disease. Adherence to a medication treatment schedule is key to optimizing smoking cessation outcomes.
METHODS: Treatment adherence and abstinence outcomes were analyzed, using pooled data from two randomized, controlled, US trials of 1 mg twice daily varenicline and a multicenter, Asian trial using the same dose. All Randomized (RAND) and Completer Subjects (COMP; i.e., subset of RAND subjects who took ≥1 dose of medication for ≥80% of the 12-week treatment period) were analyzed for efficacy outcomes. The primary efficacy endpoint was carbon monoxide-confirmed continuous abstinence rate (CAR) from Weeks 9–12 in varenicline-treated subjects versus placebo for both populations.
RESULTS:

Continuous abstinence rates for all randomized and completer subjects

	CAR Weeks 9–12					
	RAND			COMP		
Studies	Varenicline n/N (%)	Placebo n/N (%)	OR (95% CI)	Varenicline n/N (%)	Placebo n/N (%)	OR (95% CI)
Pooled US data	306/696 (44.0)	121/685 (17.7)	3.66 (2.86-4.68)*	287/483 (59.4)	111/411 (27.0)	4.15 (3.11-5.55)*
Asian data	75/126 (59.5)	40/124 (32.3)	3.22 (1.89-5.47)*	71/116 (61.2)	40/120 (33.3)	3.37 (1.94-5.84)*

*All P<0.0001 vs placebo.
CAR, continuous abstinence rate; CI, confidence interval; COMP, completer subjects; OR, odds ratio; RAND, all randomized subjects

A trend was found toward improved CARs and ORs in COMP versus RAND subjects in the US trials, but similar trends were not present in the Asian trial. However, overall treatment adherence in the Asian trial was very high (varenicline: 92.1%; placebo: 96.8%) versus the US trials (varenicline: 69.4%; placebo: 60.0%), resulting in a higher percentage of subjects achieving COMP status.
CONCLUSIONS: Smoking abstinence is improved with varenicline versus placebo. Moreover, greater adherence to a prescribed 12-week course of varenicline may improve abstinence outcomes and thus, tobacco cessation intervention with varenicline should include a discussion of adherence to optimize outcomes.

Presented at To be presented at the American Cardiology Congress 2008, Chicago, IL, March 29–April 1, 2008.

79E. Delayed quitting and long-term outcomes for smokers taking varenicline, bupropion and placebo. *Theodore C. Lee, M.D.*[1], David Gonzales, Ph.D.[2], Douglas E. Jorenby, Ph.D.[3], Thomas H. Brandon, Ph.D.[4], Carmen Arteaga, Ph.D.[1]; (1)Pfizer Inc., New York, NY; (2)Smoking Cessation Center, Oregon Health Sciences University,, Portland, OR; (3)School of Medicine and Public Health Medicine, Madison, WI; (4)H. Lee Moffitt Cancer Center & Research Institute, Tampa, FL.

PURPOSE: We evaluated the relationship between quitting patterns and long term outcomes of smokers on therapies approved for smoking cessation.
METHOD: Smoker quitting patterns from 2 identically-designed, randomized studies were analyzed from target quit date (TQD) through 12 weeks of treatment with varenicline (VAR) 1mg BID (n=696), bupropion-SR (BUP) 150mg BID (n=671), or placebo ([PBO] [n=685]), in combination with brief (≤ 10 minutes) cessation counseling. The primary endpoint was the continuous abstinence rate (CAR) for Weeks 9 to 12, confirmed by carbon monoxide levels of ≤ 10 ppm. Subjects abstinent during this period were classified as immediate quitters (ImQs; abstinent at all visits) or delayed quitters (DQs: smoking at ≥ 1visits for Weeks 2 to 8). Analyses evaluated lapses and recovery of DQs during treatment, and long term abstinence for ImQs and DQs for 40 weeks of post drug follow-up.
RESULTS: Delayed quitting occurred at each week up to Week 9 regardless of treatment with increases greater for VAR vs BUP or PBO. 24.0% of VAR subjects were ImQs vs 18.0 % for BUP (P=0.0072) and 10.2% for PBO (P<0.0001). DQs were 20.0% for VAR vs 11.6% for BUP (P<0.0001) and 7.5% for PBO (P=0.0092). The rate of decline in CAR from Week 12 to 52 was similar across treatments and quitting patterns. ImQs were more likely than DQs in each treatment to maintain abstinence for Weeks 9 to 52 (p=0.001).
CONCLUSIONS: These data illustrate the importance of maintaining smokers in active treatment for at least 9 weeks, regardless of lapses or failures to quit early in treatment, and regardless of therapy. The more robust effects of varenicline on immediate and delayed quitting during treatment resulted in a superior long-term abstinence rate.
Presented at To be presented at the 14th meeting of the Society for Nicotine and Tobacco Research, Portland, OR, February 27–March 1, 2008.

CLINICAL PHARMACY FORUM
Ambulatory Care

80. Assessment of prescriber perceptions of the use of thiazide diuretics. *Betsy W. Blake, Pharm.D.*, Richard M. Schulz, Ph.D., Jessica N. Taylor, Pharm.D. Candidate; South Carolina College of Pharmacy, University of South Carolina Campus, Columbia, SC.

PURPOSE: The Seventh Report of the Joint National Committee on the Prevention, Detection, Evaluation, and Treatment of High Blood Pressure recommends the use of thiazide diuretics as first-line therapy for uncomplicated hypertension. Despite evidence of cardiovascular protection, utilization of this drug class remains low wihtin the Veterans Administration (VA). This study aims to identify and assess reasons providers at our institution refrain from prescribing thiazide diuretics.
METHODS: Fourteen Dorn VAMC prescribers participated in a focus group to discuss factors related to prescribing thiazides. A questionnaire was developed from the focus group discussion and distributed to VA prescribers.
RESULTS: The focus group identified hyperglycemia, gout, urinary frequency, hypokalemia sulfa allergies, impotence, elderly patients, and hypercholesterolemia as factors that could prohibit thiazide prescribing. Thirty questionnaires (64%) were returned from three VA sites. The medical conditions in which a majority of respondents would not prescribe thiazides, and the respective percentages, are as follows: gout (93.3%), urinary incontinence (56.7%), sulfa allergies (53.3%), and hypokalemia (50%). Specific reasons within gout were inducing a gout attack (53.3%) and increasing uric acid levels (43.3%). A specific reason within sulfa allergies was the possibility of cross-sensitivity with other sulfa agents (40%). Prescriber response was not influenced by academic degree, with the exception of sulfa allergies. In such patients, 78.6% of physicians would not prescribe thiazides, whereas only 33.3% of non-physicians would not prescribe them (p=0.013).
CONCLUSIONS: This study identified medical conditions and reasons prescribers have avoided use of thiazide diuretics. Additionally, discrepancies in prescribing patterns by academic degree were also identified. Educational programs are currently being implemented to provide evidence for use of thiazide diuretics in the identified medical conditions that will subsequently maximize utilization.

81. Medication therapy management experience: from pharmacist contracting to patient care. *Jeanette L. Altavela, Pharm.D., BCPS*[1], Thomas A. Sorrento, R.Ph.[1], Mona Chitre, Pharm.D.[2]; (1)Greater Rochester Independent Practice Association, Rochester, NY; (2)Excellus BlueCross BlueShield, Rochester, NY.

OBJECTIVE: To describe our initial experience contracting with and providing medication therapy management (MTM) services for a large insurance company and to report intermediate outcomes.
METHODS: Captured the timeline and details of contracting MTM services. The insurance company initiated contact with the patients, provided 4 months of pharmacy claims data, each patients medication list and contact information. The pharmacist contacted patients once by phone and provided written recommendations to the patients and their primary care physician regarding medication therapy. Pharmacists documented all recommendations and estimated the potential financial impact of them. To determine 6 month financial outcomes based on pharmacy claims data only.
RESULTS: With assistance of finance and legal expertise, it took 4 months to render a signed contract to provide MTM services. Forty-five patients received MTM services in the first 2 months. Determined by the clinical pharmacists, there were 200 recommendations made to optimize medication therapy for these 45 patients, with an estimate of potential savings of over $35,000 (cost avoidance), over $10,000 savings on medication costs as well as $6,600 in out of pocket savings for patients over the 12 months following MTM. Insurance company driven outcomes based on actual pharmacy claims assessed 90 days after MTM provided, revealed 0.17 savings for every dollar spent on clinical pharmacist consultant fees. These same outcomes determined at 6 months after MTM are pending.
CONCLUSION: As there is no recognized MTM service standard, each health plan and consultant vendor uses individual health plan specific criteria to formulate a contract. Contracting MTM services can be time consuming and may require the expertise of many. Enhancing patient data to include medical claims, lab values, prescription information is always desirable to provide a more complete consult. Opportunity exists to improve outcome measures by focusing on appropriate time frames, measurement goals and quality indicators.

82. Development of a pharmacist-managed telephone based tobacco cessation clinic for veterans. *Khanh L. Nguyen, Pharm.D.*, Jessica Harris, Pharm.D., Seung-bin Lee, Pharm.D., Stacey Nguyen, Pharm.D., Tim C. Chen, Pharm.D.; Veterans Affairs, San Diego, CA.

PURPOSE: Establishing a pharmacist-run telephone based tobacco cessation program at the Department of Veterans Affairs San Diego Healthcare System (VASDHS).
INTRODUCTION: The VASDHS promotes tobacco cessation for all veterans. Many patients were started on cessation medications by their providers, but follow-up care was limited. To improve care and follow VA directive to make tobacco cessation more accessible to veterans, pharmacists at the VASDHS set out to initiate a tobacco cessation clinic.
METHODS: A protocol developed by physicians and pharmacists was approved by hospital policy to initiate a pharmacist-run tobacco cessation clinic. Pharmacists were given prescribing privileges. Tobacco Cessation Guidelines were used as the foundation for the clinic. Enrollment to the clinic was initiated by any provider or patients who wanted to enroll in the clinic. An educational pamphlet was designed to educate patients on tobacco cessation medications and cessation services. After enrollment, tobacco cessation pharmacists would make initial call and provide follow-up care for the entire quit attempt.
RESULT: The clinic was developed and successfully initiated in 2005. Since initiation, over 3000 patients have been enrolled with an average of 60 telephone calls per week. On average, there are 20 new patients each week. There are three pharmacists assigned to the clinic with total of approximately 12 hours weekly. Due to the workload, patients are required to be proactive and call the clinic to initiate the enrollment and for follow up.
CONCLUSION: The pharmacist run telephone-based tobacco cessation clinic met an unfulfilled need at the VASDHS. The clinic continues to enroll a large number of patients each week and is planning to expand the program. Despite some limitations, the clinic was successfully implemented and met the VA directive to make smoking cessation more accessible to the veterans.

83E. Ten years of experience with a community based approach to improving diabetes care. Jessica Eveleth, Pharm.D.[1], James D. Hoehns, Pharm.D.[2], John E. Sutherland, M.D.[3], Patricia A. Heth, R.N., CDE[4], Chitra Reddy, M.D.[5], Katherine Renner, Pharm.D.[1], *Kristi Kavanaugh, Pharm.D.*[3]; (1)University of Iowa College of Pharmacy, Iowa City, IA; (2)University of Iowa College of Pharmacy/Northeast Iowa Family Practice Center, Waterloo, IA; (3)Northeast Iowa Medical Education Foundation, Waterloo, IA; (4)Allen Memorial Hospital, Waterloo, IA; (5)Cedar Valley Medical Specialists, Waterloo, IA.

PURPOSE: The Cedar Valley Community Diabetes Task Force was initiated in 1998 to enhance the application of practice guidelines, and to improve the care of diabetic patients in the Waterloo, Iowa area.
METHODS: A community based quality improvement program was implemented. Interventions during the ten years have been ongoing and multimodal in nature. Examples of interventions include: improved provider education, standardized community-wide diabetes flowsheets, and

standardized eye care provider reporting to the primary provider. Every participating system submits at least 50 randomly selected diabetic patient flowsheets for evaluation annually. In 1998, 100 chart audits were completed from two participating clinics/systems in Waterloo. By 2003, five health clinics/systems were involved. In 2003 and 2007 there were 255 and 297 chart audits, respectively.
RESULTS: Diabetic process and outcome results were compared from 1998, 2002, and 2007. Implementation of the usage of the flowsheet (54, 78, and 91%) improved during this time period (P<0.001). The percent of patients with HbA1c obtained within the past year was 70, 98, and 97% (P<0.001) and the frequency of HbA1c levels <8% was 54, 76, and 83% (P<0.001). The HbA1c value of <8% was used because that was the recommended goal in 1998. The percentage of patients with SBP <130 mm Hg was 36, 53, and 54% (P=0.002). Documentation of an eye exam (27, 38, and 55%, P<0.001), foot exam (62, 62, and 77%, P=0.003), microalbumin level (24, 59, and 76%, P<0.001), and lipid profile (57, 77, and 90%, P<0.001) all improved during this 10 year period. The frequency of total cholesterol levels < 200 mg/dL (40, 58, and 76%) showed similar improvement (P<0.001).
CONCLUSIONS: Diabetes care has improved significantly in our community over the past ten years. The diabetes quality improvement program has been a successful, collaborative intervention to facilitate and document this improved patient care.
Presented at the 42nd ASHP Midyear Clinical Meeting, Las Vegas, NV, December 2–6, 2007.

Cardiovascular

84. Effectiveness and safety of low-dose and high-dose aspirin therapy in patients post-percutaneous coronary intervention with drug-eluting stents. *Megan N. Au, Pharm.D.*[1], Ramin Ebrahimi, M.D.[1], Cynthia Jackevicius, B.Sc.Phm., M.Sc., Pharm.D.[2]; (1)Veterans Affairs Greater Los Angeles Healthcare System, Los Angeles, CA; (2)Western University of Health Sciences/Veterans Affairs Greater Los Angeles Healthcare System, Pomona, CA.

PURPOSE: Current American Heart Association/American College of Cardiology (ACC/AHA) guidelines recommend administration of aspirin (ASA) 325 mg for at least 1 month post-bare-metal stent (BMS) and 3-6 months post drug-eluting-stent (DES) placement. To date no studies have evaluated the safety and efficacy of low-dose (LD) 81 mg versus high-dose (HD) 325 mg of aspirin therapy initiated immediately post-percutaneous coronary intervention (PCI) with DES. The purpose of this study was to evaluate effectiveness and safety of LD versus HD aspirin therapy in patients post-PCI with DES.
METHODS: A retrospective chart review was conducted in patients who received either a sirolimus or paclitaxel stent and on thienopyridine therapy between April 2003 and April 2006 at a tertiary medical center. The primary endpoint was the rate of a composite of major adverse cardiovascular events (MACE) including cardiovascular death, myocardial infarction (MI), stroke, and recurrent ischemia. A secondary endpoint was the incidence bleeding.
RESULTS: Of the 448 patients evaluated, 264 patients receiving LD and 66 patients receiving HD aspirin post-PCI met criteria for analysis. The incidence of MACE at 12 months was 1.9% with LD versus 3.0% with HD aspirin (p=0.63). Analysis of patients with 24 months follow-up available found an incidence of MACE of 5.2% versus 9.0% with LD versus HD aspirin, respectively. (p=0.42). Bleeding occurred in 4.2% versus 4.5% in patients using LD versus HD aspirin (p=0.98)respectively.
CONCLUSION: Based on our analysis, we found no difference between LD and HD aspirin therapy initiated immediately post-PCI with DES. However, due to the small sample size of this study, larger prospective clinical trials are needed to further investigate the validity of these results.

85. A pilot evaluation of adult cardiac resuscitation documentation utilizing a novel tool. *Kerry E. Francis, Pharm.D.*, Patricia P. Fulco, Pharm.D., BCPS; Virginia Commonwealth University, P.O. Box 980042, Richmond, VA.

PURPOSE: Only 17% of hospitalized patients with cardiac arrest survive to hospital discharge. The Utstein guidelines were developed to improve return of spontaneous circulation during a cardiac resuscitation event (CRE). Four gold standard criteria are proposed: 1) initiation of cardiopulmonary resuscitation (CPR) within one minute of an event; 2) defibrillation within three minutes; 3) intubation within five minutes; and 4) administration of a vasopressor within five minutes. Documentation of CREs is vital for patient care and protocol review.
Virginia Commonwealth University Medical Center (VCUMC) manages cardiac resuscitation via a multidisciplinary team. The pharmacist provides drug information, prepares medications, and documents events for the medical record. Utilizing a personal digital assistant (PDA) for CRE documentation may improve efficiency, accuracy and time synchronization issues. The primary objective of this study was to analyze the differences between manual and PDA code documentation.
METHODS: During this four-month, observational, quality improvement study, one of the investigators responded to adult codes originated by the hospital's central paging system, Monday through Friday between 08:00–16:00. One investigator documented the events using the novel PDA program that allowed synchronized documentation of resuscitation events. Following data collection, descriptive statistics were used to compare the two documentation methods.
RESULTS: Fifty-three codes were initiated by the hospital's central paging system. Adult events were excluded for the following: 34 events occurred outside of the specified time parameters, four codes had one of the primary investigators as the initial responder, and miscellaneous reasons accounted for the remainder. Three adult cardiac resuscitation events were analyzed. Time synchronization, documentation of medications and cardiac rhythms favored the novel documentation tool.
CONCLUSIONS: Based on this small pilot study, the documentation of cardiac resuscitation events may be more efficient and provide a more complete record with use of a PDA documentation tool.

Clinical Administration

86. Utilization of clinical pharmacy services to improve compliance with surgical care quality measures. *Rachel A. Strub, Pharm.D.*, Mary G Manning, Pharm.D., BCPS, Cynthia Anneski, M.D., Kellie Steingrabe, R.N.; Banner Baywood Medical Center, Mesa, AZ.

PURPOSE: To describe the contribution of clinical pharmacy services within a multidisciplinary group of healthcare providers focused on improving patient care and clinical outcomes in surgery patients. In an effort to reduce mortality and morbidity in the surgical population, the Surgical Care Improvement Project (SCIP) was implemented as part of a national quality partnership of organizations. SCIP establishes a list of quality measures to decrease the risk for surgical complications related to infection, post-operative arrhythmias, and venous thromboembolism. ASHP has also focused on improving surgical care in the 2015 Initiative. Goal 4.4 requires pharmacy to participate in surgical antibiotic prophylaxis. Original abstraction data from Banner Baywood Medical Center for the first quarter of 2006 showed poor compliance with these quality measures. In October of 2006 a multidisciplinary team of surgery department leaders, quality management representatives, infection control, and clinical pharmacy was established to improve compliance and patient care. Clinical pharmacists provided drug information and SCIP policy education to a variety of multidisciplinary committees, worked with individual surgeons to change practices that were considered non-complaint, and updated preprinted order forms for all consenting physicians to comply with SCIP measures. Pharmacy utilized the P&T committee to approve therapeutic substitutions, provided inventory management to for approved antibiotics, and dispensed the first post-operative antibiotic dose in the post-anesthesia care unit to be transported with the patient to the surgical floor. Compliance data for the SCIP measures from the third quarter of 2007 reflected improvement across all measures. SCIP Inf-1 increased from 58% to 95%, SCIP Inf-2 increased from 83% to 95%, SCIP-Inf-3 increased from 65% to 79%.

87. Emergency department pharmacy program: a medication reconciliation success. *Lori M. Amborn, B.S., Pharm., D.*[1], Miki L. Finnin, B.S., Pharm.D.[2]; (1)Regions Hospital, St. Paul, MN; (2)University of Minnesota College of Pharmacy, Duluth, Duluth, MN.

In January 2006, The Joint Commission began requiring all member institutions to comply with the Patient Safety Goal regarding reconciliation of medications across the continuum of care. The medication reconciliation process contains several steps as outlined by The Joint Commission. Although this process appears simple in theory, many hospitals have found it to be an operational challenge. Concerns include: who provides the service, how can consistency be maintained throughout the organization, what is the information reliability, and what are the organizational costs? Our institution addressed these issues and arrived at the final conclusion that the gathering of a complete medication list was paramount in making the project a success.
In January of 2006, Regions Hospital, a 427-bed level one trauma center in St. Paul, Minnesota, instituted an Emergency Department (ED) Pharmacy program as an initial component of the hospital's medication reconciliation process. This program is staffed daily from 0800–0000 by one pharmacist and one pharmacy technician on each of the two shifts. The role of the pharmacy staff is to obtain complete medication histories from all patients (or their family members) who are being admitted to the hospital, and to document this information in the electronic health record.
Since the implementation of the program, the number of ED patients interviewed has increased dramatically. Currently, over 76% of the total number of patients admitted through the ED between the hours of 8:00 AM and 12 midnight are interviewed, with the average interview lasting ten minutes. Patients not interviewed are most commonly transferred to the floor prior to pharmacy contact. Of the patients interviewed, approximately 50% require pharmacy intervention. These interventions are subdivided into several categories with automatic substitution and formulary notifications

being the most prominent. The success of the program has positively impacted patient safety and hospital policy adherence.

Community Pharmacy Practice

88. Identification of patients in need of medication therapy management services and finding of drug related problems. *Deanne L. Hall, Pharm.D., CDE*, Karen Pater, Pharm.D., BCPS, CDE, Yaramus Maria, Pharm.D., Saenz Rafael, Pharm.D., St. Denis Janet, BSPharm, Weber Robert, BSPharm, MS; University of Pittsburgh, Pittsburgh, PA.

PURPOSE: To evaluate if screening criteria to identify patients for medication therapy management correlate to finding a population in need as determined by identification of drug related problems.
METHODS: Patients were identified through criteria developed in accordance with Medicare Part D recommendations for Medication Therapy Management; > 65 years old, > 5 chronic medications, > 3 chronic disease states, presence of diabetes, adverse drug reaction and preventive care. Upon prescription intake the pharmacist would ascertain through interview and review the patient's profile if the patient met one or more of these criteria. Once a patient was identified, they were contacted to schedule a comprehensive medication therapy management visit with the pharmacist. After each patient visit, the pharmacist documented identified drug related problems, need for education and recommendations.
RESULTS: Three-hundred and twenty-nine patients were identified as being in need of medication therapy management; 20% > 65 years old, 66% > 5 or more meds, 43% diabetes, 53% > 3 chronic disease states, 17% preventive care and 6% adverse drug reaction. Ninety-two patient encounters resulted in 121 identified drug related problems; 41 non-compliance, 26 needed additional drug therapy, 22 adverse drug reactions, 13 needs different drug product, 11 dose to low, 5 unnecessary drug therapy, 3 dose too high and 80 opportunities for patient or physician education. Pharmacists provided 79 recommendations for change in medication therapy, resolved 5 adverse drug reactions and referred 1 patient to the emergency room.
CONCLUSION: Developed screening criteria resulted in the identification of 1.3 drug related problems per patient visit. Eighty-seven percent of patients were found to be in need of drug related education. This process supports that screening patients at the point of dispensing results in identifying patients in need of medication therapy management.

89. Development of a pharmacist provided immunization service in a diverse university setting. *Deanne L. Hall, Pharm.D., CDE*, Benjamin Anderson, Pharm.D., Robert J Weber, MS; University of Pittsburgh, Pittsburgh, PA.

PURPOSE: To develop a direct patient care service in which pharmacists provide influenza vaccinations in a variety of settings at the University of Pittsburgh, a large university with an associated medical center, to differing populations. In addition, the development of a mechanism of payment for each group will be individualized.
METHODS: Three target groups were identified; University of Pittsburgh employees, University of Pittsburgh Medical Center employees and non-employees. Pharmacist provided immunization services were arranged in various settings to allow for maximal access to vaccinations. The settings included dedicated time at the university hospital-based outpatient pharmacy, health fairs, vaccination clinics at identified buildings on campus and going to selected offices within the university and medical center. Payment mechanisms were developed to limit the out-of-pocket cost to the patient, while obtaining appropriate reimbursement for service.
RESULTS: Preliminary results show that 420 people have been immunized to date. Seventy-seven were health system employees, 139 were university employees and 204 were non-employees. Three hundred and twenty-seven were immunized at a pre-arranged vaccination clinic, 41 at their work-place, 29 at a health fair, and 23 at the pharmacy. Financial data will be assessed at the completion of the influenza vaccination season.
CONCLUSION: Pharmacists are able to provide immunizations in many settings through a large university health system setting to reach the various patient populations in addition to receiving payment for service.

90. The need of implementing cognitive services in a Puerto Rico's chain drug store. *Rolando L. Torres-Colon, Pharm.D*[1], Frances Ortiz-Giuliani, MBA, Pharm.D[1], Leanne Lai, Ph.D.[2]; (1)Nova Southeastern University, Ponce, PR; (2)Nova Southeastern University, Fort Lauderdale, FL.

PURPOSE: The purpose is to determine the needs to develop a community pharmacy clinic in a chain drug store in Puerto Rico.
METHODS: A random retrospective screening DUR was performed to identify which patient may need cognitive services due to their medication profile. Clinical guidelines were used to asses' appropriateness of therapy. Data was classified as chronic or acute conditions and patients that met the criteria agreed to participate. Patients' profiles < 21 years old were excluded. Encounter will be performed face to face by appointment; also walk-in patients would receive the services at no charge for an introductory period of 6 months.
RESULTS: Asthma, Diabetes, Hypertension and HIV diseases required the most pharmacists' intervention. The needs for services were presented to Pharmacy District Supervisor. Negotiations have been made and an agreement was signed. A complete office space separated from the pharmacy and equipped with monitoring machines and specific computer program were installed for cognitive services implementation. More specific data will be offered after clinic full achievement.
CONCLUSION: Several studies demonstrated the value of pharmacist's cognitive services in the community setting. However, little is known about these services in chain drug stores since there are always barriers to provide such services; particularly in high volume chain stores. This is the first time that a community pharmacy clinic is offered in a chain drug store, but also in Puerto Rico. Protocol and measuring instrument have been developed for interpretation and feasibility of this type of services and possible implementation at other chain drug store.

91. Retrospective analysis of alternative medical practices in a sub-rural West African university community. *Sharon I. Omoruyi, B., Pharm, MSc*[1], Chris O. Imafidon, BSc, Ph.D., FRSH[2], Mary O. Ologe, B., Pharm, M.Sc[3]; (1)Obafemi Awolowo University, Ile Ife, Nigeria; (2)University of East London, London E16 2RD, United Kingdom; (3)University of Ilorin, Ilorin, Nigeria.

Alternative Medical Practices (AMP) are therapeutic practices, though prevalent and openly accepted in Africa are not currently considered integral part of conventional allopathic medical practice. Alternative medicines often do not follow conventional biomedical or scientific explanations, but are based on belief systems not derived from modern science. There are reasonable argument that Alternative or Traditional Medical practices have no scientific bases, no apparent diagnoses, no clinical trials, no dosage and no standardized method of preparation, however, these medicines have been found to be effective over the centuries for treatment of a wide range of illnesses.
This study reviewed 12 cases of patients who claimed that they were treated and cured by AMP after they tried without success conventional medications for their various ailments.
The most interesting case is that of a 4-year-old infant female patient with Chronic Inflammation of the ears. After applying conventional medication of Antibiotic and Anti-inflammatory drugs to the ears without any relief, this patient consulted an Alternative Medical Practitioner who recommended a simple treatment plan. The practitioner told the patient to pick up 3 giant ants (Soldier ants) from the bush and put all the ants in a jar with about 4 Fl Oz of water and let it sit overnight. The following day, the patient was told to apply drops from the jar into the inflamed ears. The patient received complete relief for the ears just after 3 days application. This study sought to examine the Pharmacological / medicinal content of this simple medication. The results are shocking, interesting and baffling, underscoring the need for more detailed randomized, double-blind investigation, and if the safety and efficacy can be established, develop a program for inclusion of Traditional Medical practice in Worldwide Healthcare delivery.

Critical Care

92E. Failure to use a sedation order form results in increased ventilator days and intensive care unit length of stay. *Stephen W. Nissen, Pharm.D., BCPS*[1], Erin J. Iselin, Pharm.D.[1], Keith M. Olsen, Pharm.D.[2], Evan B. Wearne, Pharm.D., Candidate[3]; (1)The Nebraska Medical Center, Omaha, NE; (2)University of Nebraska Medical Center, Omaha, NE; (3)Univeristy of Nebraska Medical Center, Omaha, NE.

PURPOSE: Our institution implemented a sedation protocol with an order form in 2003. The frequency of use of the order form and its impact on outcomes in our adult intensive care population was evaluated.
METHODS: Patients who received mechanical ventilation(MV) and continuous infusion (CI) sedation with propofol or midazolam were selected over a three month period. The patients sedated with the use of the order form were compared to a group managed without the form.
RESULTS: A total of 118 patients were evaluated. Of these patients, 44 (37.4%) used the sedation form. Those patients whose sedation was initiated by using the order form had more frequent sedation score assessment (2.1 vs. 3.1 hrs; $p<0.05$), less time between sedation vacations (30.1 vs. 41.0 hrs; $p<0.05$), and duration of sedation (2.6 vs. 3.0 days; $p<0.05$). The duration of MV was shorter in the order form group (4.7 vs. 5.1 days; $p>0.05$), ICU LOS was less (7.5 vs. 7.8 days; $p>0.05$) and ICU LOS was less after sedation ended (4 vs. 4.6 days; $P=0.045$). Of note, ICU LOS was shorter in those patients who received a daily sedation vacation versus those who did not (6.6 vs. 8.3 days; $p<0.05$), and length of MV was shorter in those patients who received a daily sedation vacation versus those who did not (3.5 verses 5.8 days; $p<0.05$).
CONCLUSIONS: The management of continuous infusion sedation in MV patients was improved by the use of a standard order form versus not using a form. The use of an order form reduced the length of sedation use, the

duration of MV, as well as the ICU LOS after discontinuation of sedation.
Presented at Presented at Society of Critical Care Medicine 37th Critical Care Congress, Honolulu, HI, Feb 2–6, 2008.

Drug Information

93. Evaluation of an erythropoiesis-stimulating agent therapeutic interchange program within a health system. *Amy T. Sekel, Pharm.D.*[1], Mandy C. Leonard, Pharm.D., BCPS[1], Radhika Nair, Ph.D.[2], Joanie Cook, Pharm.D.[3], Rasheen C. Jackson, Pharm.D.[4], Rachael M. Lerman, Pharm.D.[5], Nicholas A. Link, Pharm.D.[6], Chris Lowe, Pharm.D.[1], Jason Milner, Pharm.D.[7], John Remchick, R.Ph.[8], Frank S. Rigelsky, Pharm.D., BCPS[6]; (1)Cleveland Clinic, Cleveland, OH; (2)Abbott Laboratories, Roundrock, TX; (3)Mount Carmel West Hospital, Columbus, OH; (4)Euclid Hospital, Euclid, OH; (5)Huron Hospital, East Cleveland, OH; (6)Hillcrest Hospital, Mayfield Heights, OH; (7)South Pointe Hospital, Warrensville Heights, OH; (8)Lakewood Hospital, Lakewood, OH.

PURPOSE: To assess: 1) adherence to therapeutic interchange (TI) program for erythropoiesis-stimulating agents (ESAs) within Cleveland Clinic Health System (CCHS) including academic and community hospitals, 2) appropriate conversion of epoetin (EPO) to darbepoetin (DARB) based on TI criteria, 3) outcomes including hemoglobin and transfusions, and 4) iron studies.
METHODS: Records of inpatients (n = 172) and outpatients (n = 107) from 7/10 CCHS hospitals who received EPO or DARB were reviewed between 5/2006–5/2007. Demographic data, ESA, dose, route, frequency, and indication were collected along with naïve or non-naïve ESA status, hemoglobin, iron studies, and concomitant therapies.
RESULTS: For inpatients, the most common indication, dose, route, and frequency for ESA was chronic kidney disease (n = 125), 100 µg, subcutaneous, and QW, respectively; 57% were ESA naïve. For outpatients, the most common indication, dose, route, and frequency for ESA was chemotherapy-induced anemia (n = 65), 200 µg, subcutaneous, and Q2W, respectively; 71% were ESA naïve. Overall, 86% of patients met TI criteria for conversion from EPO to DARB. Dose and frequency were converted appropriately in 84%. Inpatients received a mean of 1.97±1.72 doses during a mean length of stay of 13.78 ±9.18 days. Outpatients received a mean of 7.61±6.25 doses during a mean of 23.9±18.42 weeks of therapy. Target hemoglobin (≥ 12g/dl or ≥ 2g/dl above baseline) occurred in 34% of patients. During ESA treatment, 71 inpatients and 16 outpatients received transfusions. The majority of patients did not have iron studies performed at baseline (72%) or after baseline (68.1%).
CONCLUSION: CCHS pharmacists are appropriately adhering to the ESA TI, with opportunity for improvement in dosing and frequency conversion as the program continues. Co-morbid conditions and unknown iron status may have contributed to the lower than expected efficacy. Education for providers is planned. These data will be used to assess the impact of the new CMS reimbursement for ESAs.

Education/Training

94. Performing a drug use evaluation as part of a clinical pharmacy practice course. *Anna M. Wodlinger Jackson, Pharm.D.*, Jason C Gallagher, Pharm.D.; Temple University School of Pharmacy, Philadelphia, PA.

PURPOSE: The purpose of this project was to determine the feasibility of conducting a drug use evaluation (DUE) as part of a clinical pharmacy practice course.
METHODS: Students in the Advanced Clinical Practice Track at Temple University School of Pharmacy were enrolled in an elective course titled Advanced Clinical Practice II. As part of the course requirements, students completed a DUE under the guidance of a preceptor. Drugs to be evaluated were chosen based on the needs of the pharmacy department at Temple University Hospital (TUH). Students were divided into groups of 3 or 4 and assigned a preceptor who had experience with the drug being evaluated. Students identified the issues and subsequently developed data collection forms which were then presented to the class for comment. Data collection occurred during class time in the computer lab using scanned electronic medical records from TUH. Data analysis was then performed and students both presented their data to the class and submitted a written summary. Classroom training was provided for each step in the process of completing the DUE.
RESULTS: Twenty-eight students have completed the course in its first two years. DUEs were completed for pantoprazole IV, vancomycin, ondansetron IV, levalbuterol, aminoglycosides, IVIG, unfractionated heparin, vitamin K, and phenytoin. Eight of the nine groups of students chose to present their results at a national pharmacy meeting. Results were also shared with TUH pharmacy administration and presented to pertinent hospital committees.
CONCLUSION: It is feasible to complete DUEs within a didactic course that are valuable to a hospital.

95. Experience with a standardized patient counseling activity. *Mirza Perez, Pharm.D., BCPS*, Deborah DeEugenio, Pharm.D, Jason Gallagher, Pharm.D; Temple University School of Pharmacy, Philadelphia, PA.

PURPOSE: To assess student-patient interactions and counseling skills using standardized patient (SP) scenarios.
METHODS: Two ambulatory counseling scenarios were developed by a clinical pharmacist for third professional year pharmacy students. The two main drugs for counseling were warfarin and insulin lispro. The standardized patients had no medical background. They were provided with a detailed medical history anticipating different questions from the students and were trained to behave in a pleasant and cooperative way but with concern about their medical problems. Students were evaluated based on accuracy of the information provided and their counseling technique. Appropriate technique included use of appropriate terminology, use of open-ended questions, appropriate nonverbal behavior, empathy and other criteria. The encounter was recorded on video and the videotape was evaluated by faculty members and the participating student.
RESULTS: Sixteen students participated. The most common problems encountered were: incomplete patient assessment (13/16), incomplete explanation of drug indication (12/16), excessive use of medical terminology (11/16), and lack of empathy (8/16). Most students were not able to assess the patient appropriately because they did not ask enough questions. All of the students assessed the activity as helpful and as better than counseling activities performed in the classroom with peers. Two students did not feel prepared to counsel the patient and four students felt uncomfortable by being video-taped. Fifteen of the students would like to repeat this activity and all of them felt like they were counseling a real patient.
CONCLUSION: The use of standardized patients to evaluate counseling skills was successful. The students and faculty were able to assess strengths and areas of improvement to a greater degree than in the standard classroom setting.

Emergency Medicine

96. Evaluating the impact of new pharmacy services within the emergency department at the Veterans Affairs Boston Healthcare System. *Lindsey A. Farrell, Pharm.D.*, Shawn Saunders, Pharm.D.; VA Boston Healthcare System, West Roxbury, MA.

PURPOSE: The pharmacy department within the Veterans Affairs (VA) Boston Healthcare System has recently allocated a decentralized pharmacy service to the emergency room (ER) at the West Roxbury campus. This initiative was implemented in response to the standards placed by the Joint Commission and Institute for Healthcare Improvement (IHI) to decrease medication discrepancies and increase safe utilization of such medications. The emergency room pharmacy service is new to the Boston VA. A retrospective evaluation was conducted after the implementation to document the benefit of pharmacy services in this patient care area.
METHODS: The evaluation of this implementation was achieved through a multiple point staff questionnaire administered to nurses and physicians in the ER. The questionnaire consisted of validated survey questions with Likert scale responses. In addition, the pharmaceutical interventions made were combined and collected for the complete evaluation of this new service. No patient specific data was used during this evaluation.
RESULTS: The survey results showed an overwhelming 85% of ER employees thought the technical and clinical skills provided by the pharmacist was an imperative component to ER services. Results demonstrated that 69% of employees stated reconciliation completed prior to admission was beneficial during the admission process. In addition, 77% stated the pharmacist optimized patient care and proved to be an essential component to the ER service.
CONCLUSIONS: The trial of emergency pharmacy at the Boston VA has proved to be beneficial to both staff and patients in the ER. Services provided were documented to be a vital component to emergency medicine. The trial was a successful addition to the multitude of pharmacy services provided throughout the Boston VA.

Family Medicine

97E. Diabetes self management education program in a family medicine residency program. *Lori L. Dickerson, Pharm.D., FCCP, BCPS*, Sarah Shrader, Pharm.D., BCPS, Andrea Wessell, Pharm.D., BCPS, Kelly Ragucci, Pharm.D., FCCP, BCPS, Gibson Maria, M.D., Ph.D.; Medical University of South Carolina, Charleston, SC.

Diabetes care accounts for many visits to primary care providers, and pharmacists are often members of the care teams in this setting. Diabetes self-management education (DSME) programs have been shown to improve glycemic control and can be implemented in a family medicine residency program as a model of collaborative and quality care. In the Medical University of South Carolina Department of Family Medicine, more than 200 patients have participated in our American Diabetes Association-recognized

DSME program. All patients with type 1 or type 2 diabetes, regardless of glycemic control, are invited to participate in the program. After obtaining informed consent, patients have an intake assessment, participate in an educational curriculum, attend shared medical visits and diabetes support group meetings. Data is collected on quality process and outcome measures (hemoglobin A1C [HbA1c], low-density lipoprotein [LDL] cholesterol, blood pressure [BP], urine microalbumin, retinal exam, foot exam, pneumococcal vaccinations and tobacco cessation counseling) and behavioral outcomes (7 day assessment scale, psychosocial distress scale, depression screening, and patient satisfaction) at baseline and every 3 to 6 months thereafter. At baseline, the mean age is 50.9 +/- 12.4 years, is 51% African American and 49% Caucasian. HbA1c values have decreased from 9.0 +/- 2.2% to 7.0 +/- 1.3% (p< 0.0001) and the proportion of patients with HbA1c values less than 7% has increased from 20.3% to 56.3% (p<0.0001). The mean LDL value has decreased from 120 +/- 39.8 mg/dL to 104 +/-37.8 mg/dL (p<0.0001), and proportion of patients with BP control (< 130/80 mmHg) has improved from 16.2% to 55.9% (p<0.0001). Patients have shown improvements self-reported diet, exercise and foot care practices (p<0.05) and a reduction in the level of diabetes-related distress. Collaborative DSME programs in family medicine are an effective tool for improving diabetes care.
Presented at Society of Teachers of Family Medicine, Chicago, IL, April 2007.

98E. A statewide competency-based pharmacotherapy curriculum for family medicine residents in South Carolina. *Lori L. Dickerson, Pharm.D., FCCP, BCPS*[1], Adrienne Ables, Pharm.D.[2], Sandra Counts, Pharm.D., BCPS[3], Kelly Jones, Pharm.D., BCPS[4], Sharm Steadman, Pharm.D., BCPS, CDE[5]; (1)Medical University of South Carolina, Charleston, SC; (2)Spartanburg Regional Health System Center for Family Medicine, Spartanburg, SC; (3)Anderson Family Practice Center, Anderson, SC; (4)McLeod Family Medicine Center, Florence, SC; (5)USC Department of Family and Preventive Medicine, Columbia, SC.

In 2001, pharmacists in the family medicine residency programs in South Carolina collaborated to develop an on-line pharmacotherapy resource to accompany their current and rotations for family medicine residents. This curriculum was identified as a tool to evaluate the Accreditation Council for Graduate Medical Education medical knowledge core competency. Through initial funding (2001) and renewed support (2006) from the South Carolina Area Health Education Consortium, this curriculum has grown to include 46 modules and more than 400 enrolled residents and faculty. Each module contains suggested reading materials and a multiple choice quiz, and is housed in Web-CT. Topic areas were determined based on the American Board of Family Medicine in-training examination and American Academy of Family Physicians core curriculum. Pharmacists were assigned topic areas, identified reading materials and developed multiple choice questions with detailed feedback, which were peer reviewed by the group and by physician colleagues. Each residency program (N=5) assigns modules to fit their individual curriculum (ie. based on rotation, year of training, in-training examination performance, etc) and responses are tracked on scheduled basis. Although first used as an optional educational tool, completion of the assigned modules is now a requirement for promotion and graduation in each participating residency program. In addition, residents evaluate the curriculum annually. All questions (N=469) are reviewed annually during a faculty development retreat and updated based on learner response statistics and changes in clinical evidence. For example, in 2007, 27% of questions were revised in this process. Scores on individual modules range from 51% to 95%, with a mean of 80% correct. In 2007, the residency programs expanded the curriculum to include modules on evaluation and diagnosis. After testing and implementation of these modules, the question databank and reading materials will be merged into one curriculum for a more global evaluation of medical knowledge.
Presented at ACCP Spring Meeting, Savannah, GA, April 2002 (this poster presented the initial development of curriculum without outcome data) Society of Teachers of Family Medicine Annual Meeting, Chicago, IL, April 2007. Association of Family Medicine Residency.

99. Evaluation of a pharmacotherapy clinic's impact on lipid management in diabetic patients. *Dana G. Carroll, Pharm.D.*[1], John Higginbotham, Ph.D., M.P.H.[2], Douglas N. Carroll, Pharm.D.[1]; (1)Auburn University Harrison School of Pharmacy, Tuscaloosa, AL; (2)Rural Health Institute for Clinical and Translational Science, The University of Alabama, Tuscaloosa, AL.

PURPOSE: A pharmacist managed pharmacotherapy referral clinic (PC) was established in the Fall of 2001 at the University of Oklahoma (OU) -Tulsa Family Medicine Clinic. The goal of this study was to assess the impact of the PC on managing diabetic patients' lipids according to American Diabetes Association standards.
METHODS: This study was approved by the OU Health Science Center IRB and was conducted from January 2002 to December 2004 by retrospective chart review. Inclusion criteria included: OU–Tulsa Family Medicine referred patients to the PC, > 18 years of age, type 2 diabetes, and a minimum of 2 visits to the PC during the study period.
RESULTS: One hundred twelve patients met inclusion criteria. Eighty-five percent of patients in this study had at least one documented treatment compliance issue and 42% had multiple issues. The most common reason given for noncompliance with treatment plans was financial limitations (68.5% of patients).
In 2002, 34.2% of patients were below goal LDL levels (less than 100 mg/dL). In 2003, the percentage meeting goal increased to 49.3% and to 58.5% in 2004. The mean LDL levels decreased over time from 110 mg/dL in 2002 to 98 mg/dL in 2004. Triglycerides also decreased from a median of 227 mg/dL in 2002 to 181 mg/dL in 2004. Median was used for TG due to significant outliers. The HDL levels remained unchanged throughout the study period with a mean of 44 mg/dL. No variables were identified that significantly impacted the achievement of goal LDL levels. However, this may be due to the small sample size.
CONCLUSIONS: The number of diabetic patients seen in the PC achieving goal LDL levels increased over the three year study period. Mean LDL and TG levels decreased over the study period while HDL remained unchanged.

Hematology/Anticoagulation

100E. Clinical and economic benefits of an anticoagulation management service for cardiac surgery inpatients. *Kenneth M. Shermock, Pharm.D.*, Paula Biscup-Horn, Pharm.D., Michael Streiff, M.D., Todd Nesbit, Pharm.D., Timothy Ulbrich, Pharm.D. candidate; The Johns Hopkins Hospital, Baltimore, MD.

Management of anticoagulation in hospitalized patients with multiple medications and co-morbid conditions can be challenging, particularly after major surgery. Previous studies have demonstrated the value of specialized anticoagulation management services, especially in the outpatient setting. The purpose of our retrospective study was to determine the clinical and economic benefits of an inpatient anticoagulation management service (AMS) in post-operative cardiac surgery patients. Using administrative and clinical databases, we assessed the impact of specialized anticoagulation management in consecutive cardiac surgery patients hospitalized before (1/1/2003–5/30/05) and after (6/1/05–12/31/05) provision of a specialized AMS. Outcome measures were the number of INR values > 5, the number of clinically significant episodes of bleeding or thromboembolism (venous thromboembolism or cerebrovascular accident), the post-surgical length of stay (LOS) and the total attributable costs of hospitalization and re-operation for bleeding. Comparisons between the study groups were conducted using a χ^2 or Fisher's exact test for categorical measures and a student's *t*-test or Wilcoxon rank sum test for continuous outcome measures. Analyses were performed using STATA, version 9.0 (Stata Corp., College Station, TX).
Eight hundred twenty seven patients were admitted during the study period, 674 patients before and 153 patients after institution of the AMS. AMS care was associated with a decrease in the percent of patients with INR values > 5 (13% versus 7%, p=0.036) and a trend toward fewer bleeding episodes requiring a return visit to the operating room (8 versus 0, p>0.05). No difference in post-operative thromboembolic events (8% versus 11%, p>0.05) was noted. Post-operative LOS declined from 13.9 days to 11.6 days after initiation of the AMS (p=0.015). The annual attributable cost savings of AMS care was estimated to be $280,000. Our study demonstrates that a specialized inpatient AMS is associated with improved clinical and economic outcomes for cardiac surgery patients.
Presented at Presented at the 9th National Conference on Anticoagulation Therapy, Chicago, IL, May 3–5, 2007.

101. Results of implementation of a pharmacist-managed direct thrombin inhibitor protocol. *Jason A. Hoffman, Pharm.D.*[1], Amanda C. Schutt, Pharm.D.[2], Linda R. Young, Pharm.D.[1]; (1)Carilion Roanoke Memorial Hospital, Roanoke, VA; (2)Medical University of South Carolina, John's Island, SC.

PURPOSE: Direct thrombin inhibitors (DTIs) used for the treatment of heparin-induced thrombocytopenia (HIT) present problems due to limited management experience and confusion on proper drug selection, dosing, and monitoring. We sought to evaluate the implementation of a pharmacist-managed DTI protocol in patients being treated for known or suspected HIT.
METHODS: A protocol was approved by the P&T Committee and implemented in October 2006. Adult patients receiving argatroban, lepirudin, or bivalirudin between April 2006 and April 2007 were retrospectively reviewed. Patient's creatinine clearance and liver function tests, goal activated partial thromboplastin time (aPTT), frequency of aPTT measurements, and orders for dosage adjustments were documented.
RESULTS: Forty six patients were included (argatroban, n = 43; lepirudin n=3). Pharmacist-managed patients on argatroban (n = 22) resulted in more appropriate starting dose based on hepatic function (100% vs. 86%), more clearly defined aPTT goals (96% vs. 52%), a greater number of initial aPTT measurements within four hours of drug initiation (96% vs. 76%) and more appropriate orders for monitoring subsequent aPTT values (91% vs. 14%). No patients on lepirudin were managed by a pharmacist and none had clearly defined aPTT goals. Two of three patients on lepirudin had appropriate

starting doses based on their renal function.
CONCLUSIONS: A pharmacist-managed DTI protocol resulted in more appropriately written orders for monitoring DTIs. In 2008, the Joint Commission will require a reduction in the likelihood of harm associated with anticoagulation therapy as one of its National Patient Safety Goals. This study demonstrated that a pharmacist-managed DTI protocol has the potential to improve the quality of patient care for known or suspected HIT.

Infectious Diseases

102. Revision of a treatment algorithm for community-associated methicillin-resistant *Staphylococcus aureus* (CA-MRSA) skin infections. *Marisel Segarra-Newnham, Pharm.D., M.P.H., FCCP, BCPS*; Veterans Affairs Medical Center, West Palm Beach, FL.

BACKGROUND: After an increase in the number of patients presenting to our emergency room (ER) with CA-MRSA skin infections, a treatment algorithm was developed in 2004. A revision of the original algorithm was done in 2007 due to CA-MRSA epidemiology changes.
OBJECTIVE: To describe changes in CA-MRSA epidemiology that warranted a treatment algorithm change.
METHODS: Patients presenting to the ER with CA-MRSA skin infections within the last year were reviewed applying the original algorithm that included an MRSA risk assessment, emphasized ER presentation and did not include recommendations on incision and drainage (I&D).
RESULTS: More than 90% of 40 patients presented to the ER in the first eight months; however, an increasing number of cases were presenting to primary care clinics, particularly with recurrent episodes and treatment for CA-MRSA was sub-optimal in this setting. In addition, around 25% of CA-MRSA cases were not considered high risk based on the algorithm risk assessment. When the algorithm was implemented, the risk assessment classified only 5% of CA-MRSA cases as low risk. New data suggested that for small abscesses, I&D was sufficient. Therefore, a new algorithm that provided for treatment in all ambulatory settings, encouraged I&D for small abscesses and facilitated empiric treatment for CA-MRSA in all cases of suspected Staphylococcal infection, regardless of perceived risk, was developed. Initial feedback from providers has been positive. A one-year post implementation review is planned.
CONCLUSIONS: CA-MRSA infections are increasingly common in all ambulatory settings. A treatment algorithm that initially facilitated the care of these patients in the ER only needed to be revised after changes in the epidemiology of this disease were observed. The new algorithm provides for empiric treatment for MRSA in all cases of suspected Staphylococcal skin infection regardless of perceived risk or setting. The new algorithm has been well received.

103. Implementation and evaluation of a community acquired pneumonia pathway in hospitalized patients. *Kathryn A. Taylor, Pharm.D.*, Dustin Dickerson, Pharm.D., Stephen T. Hanson, Pharm.D, Jason Hiett, Pharm.D., Judy Harrer, Ph.D.; VA Medical Center, Cincinnati, OH.

PURPOSE: Community acquired pneumonia (CAP) is the leading cause of death from infectious disease in the United States, however appropriate and timely therapy can greatly reduce complications. The implementation of clinical pathways to prompt the practitioner through proper work-up and therapy have been shown to increase compliance with guidelines, reduce length of stay, and improve patient outcomes. The objective of this research was to evaluate the effectiveness of a treatment pathway for CAP at the Cincinnati VA medical center. The purpose of the order set was to help guide therapy and expedite the first dose of antibiotic for early administration in the emergency department (ED).
METHODS: In February 2005, a CAP treatment pathway was developed in the computerized patient record system (CPRS) based on the 2003 guidelines of the Infectious Disease Society of America. Pre and post-implementation were compared for mean time to first dose of an antibiotic and percent of patients receiving the initial dose within 4 hours of presentation to the hospital ED.
RESULTS: Significant improvements were seen in mean time from presentation to first dose of antibiotic (417 min pre-protocol, vs. 173 min post-protocol, $p \leq 0.001$) and percent of patients receiving the first dose of antibiotic within 4 hours of presentation to the hospital (32% pre-protocol vs. 71% post-protocol, $p<0.001$). Results continued to improve and in fiscal year 2007, 94% of patients with CAP received their first dose of antibiotic within 4 hours of presentation to the ED.
CONCLUSIONS: Development and implementation of computerized order set significantly improved timing of first dose of antibiotic in patients with a diagnosis of community acquired pneumonia.

International Health

104. Development and implementation of a barcoding system to determine critical re-order medication levels in an international outpatient pharmacy. *Matthew J. Brown, Pharm.D., candidate*[1], Kathryn Clark, Pharm.D.[1], Patricia V. Klein, M.P.H., Pharm.D. candidate[1], Patricia R. Wigle, Pharm.D., BCPS[1], Jennifer P. Askew, B.S., Pharm.D.[2]; (1)University of Cincinnati, 304 Wherry Hall, Cincinnati, OH; (2)New Hanover Regional Medical Center & Coastal AHEC, Wilmington, NC.

PURPOSE: In the United States, medication barcoding is traditionally used for medication safety purposes. This project was designed to develop and implement a medication barcoding system in an outpatient pharmacy in Honduras to determine critical re-order levels. This process would minimize medication shortages and the impact these shortages would have on patient continuity of care.
METHODS: A Microsoft Access database was created to contain medication-related information. The medication-related information included a sample field clinic list which could automatically deduct items taken into the field, an add/delete function to maintain inventory as medications were brought into, or dispensed from, the pharmacy and an easily accessible list of medications approaching critical threshold levels. A full inventory of the pharmacy was performed and these medications were entered into the database. Barcodes for the most commonly dispensed medications were generated and the barcoding device was connected to the clinic pharmacy computer. The staff was trained on the appropriate use of the database and the need to upload it regularly to a protected internet site, which is viewable by support staff in the U.S. This process was completed in 7 days.
RESULTS: An interdisciplinary team of pharmacists, physicians, and a nurse were trained on the appropriate use of the barcoding system. New medication categories have been added for database ease of use and the database has been uploaded to the internet without difficulty. Medications at threshold levels have been re-ordered and will arrive with the next medical brigade to the pharmacy.
CONCLUSION: A successful barcoding system for medication re-order was developed and implemented in an outpatient pharmacy in Honduras. This system allows for changes in prescribing habits, as well as the prompt re-order of medications, as medication threshold levels are approached.

Managed Care

105. Pharmacy involvement in a nurse-run diabetes case management program: multidisciplinary collaboration in managing a high risk diabetes population of a national managed care health plan. *Brenda M. Parker, Pharm.D.*, James D. Nash, Pharm.D.; Humana Inc, Louisville, KY.

PURPOSE: Diabetes has reached epidemic proportions nearing seven percent of the United States population; complications associated with this condition are serious and life-threatening, often leading to increased healthcare utilization. Humana understands the reduction of complications and improvement in quality of life for its members through effective diabetes management. With this focus, nurse and pharmacy case management has been dedicated to manage high risk members with diabetes via telephonic consultations. The overall primary outcome is adherence to current American Diabetes Association Standards of Care outcomes. Secondary outcomes include hospitalizations and emergency room / urgent care utilization.
METHODS: Members enrolled in Humana's Senior Case Management program with a Medicare Risk Adjusted (MRA) score of 2.5 or above and ICD-9 codes indicating a diagnosis of diabetes are eligible for diabetes case management. Members are routed to pharmacy case management at the discretion of the nurse case manager, with suggested triggers including hypertension and cholesterol management, blood glucose testing, diabetes medication selection / review, cardiovascular disease and risk factors, tobacco use, acute care issues and medication adherence. The nurse and pharmacist document goals and interventions in the diabetes care plan.
RESULTS: Results pending include number of patients referred for pharmacy case management as well as number of patients who participated in a consultation, interventions addressed during the consultation and available outcomes of those interventions / consultation.
CONCLUSION: Humana has implemented an internal diabetes case management model using an interdisciplinary approach to improve member health and reduce member and health care costs as a result of improved diabetes management. The model could guide open and closed managed care plans in managing high risk diabetes patients.

Medication Safety

106. Medication discrepancies between outpatient and admission medications at a veterans affairs hospital: a pilot study. *Angela M. Correia, Pharm.D.*, Anand B. Kartha, M.D.; VA Boston Healthcare System - West Roxbury Campus, West Roxbury, MA.

PURPOSE: To avoid medication discrepancies, the Joint Commission mandates medication reconciliation upon hospital admission. The Veterans Affairs Healthcare System (VA) is the largest healthcare system in the United States; however the nature of medication discrepancies upon admission in the

VA is unknown. This study characterizes the frequency and nature of medication discrepancies between the patient's home regimen and admission orders in the VA.
METHODS: This study was approved by the Institutional Review Board. Patients admitted to medicine and surgical floors of our 150 bed, urban, academic veterans hospital are eligible. Clinical pharmacists obtain a comprehensive medication history within 24 hours of admission incorporating patient/caregiver interview, medication lists and vials, Electronic Medical Record (EMR) review and contacting outpatient providers; a medication reconciliation note is then entered in the EMR. Patients without this note were excluded. Discrepancies are classified as Unintentional (true errors) or Intentional (intended therapeutic changes) based on confirmation with the ordering provider. Unintentional discrepancies are characterized for frequency and type: omission (deletion of drug used before admission), commission (addition of drug not used before admission), dose, interval and other.
RESULTS: Among 139 patients, 39 patients were excluded from the study leaving 100 subjects for analysis. The total number of unintentional and intentional discrepancies for all 100 patients was 938. Sixty-two subjects (62%) had 112 unintentional discrepancies (Mean 1.8 unintentional discrepancies per patient). Twenty-six subjects (42%) had two or more unintentional discrepancies and 7 (11%) had 4 or more unintentional discrepancies. Types of unintentional discrepancies included 76 omission (67%), 24 dose (21%), 8 interval (7%) and 4 commission (4%).
CONCLUSION: Medication discrepancies are common upon admission at a VA hospital. They are often unintentional and errors of omission are most common. Future analyses will determine reasons for these discrepancies and clinical impact.

107. Impact of safety interventions on inpatient colchicine use. *Terry L. Seaton, Pharm.D.*[1], Nicholas J. Herrmann, (student)[1], Richard M. Reichley, R.Ph.[2], Thomas C. Bailey, M.D.[3]; (1)St. Louis College of Pharmacy, St. Louis, MO; (2)BJC HealthCare, St. Louis, MO; (3)BJC HealthCare and Washington University School of Medicine, St. Louis, MO.

PURPOSE: This study evaluated the appropriateness of colchicine use and its associated toxicity in hospitalized patients before and after implementation of a series of safety interventions.
METHODS: Using a retrospective observational study design, we compared two cohorts of inpatients for whom colchicine was ordered at a large tertiary care teaching hospital. To achieve a power of 80%, each group of 75 patients consisted all who were prescribed intravenous colchicine plus a randomly selected sample who were prescribed oral colchicine during the first six months of either 2004 (pre-implementation) or 2005 (post-implementation). The safety interventions consisted of 1) a policy restricting intravenous colchicine to the rheumatology service; 2) monitoring recommendations printed on the medication administration record; and 3) a set of dosing rules to promote safe colchicine use. We used explicit criteria to determine both the appropriateness of prescribing and the development of toxicity. Using a standardized form, we collected data either automatically, by querying a large clinical database, or manually, by viewing electronic health records. We used Chi square, students *t*-tests, and Pearson correlations for statistical analysis.
RESULTS: Patient characteristics did not differ between groups. Colchicine orders were deemed "appropriate" more often in the post-implementation period than in the pre-implementation period (67% vs. 47%, P=0.021). Colchicine toxicity was found more commonly in the pre-implementation group than the post-implementation group (28% vs. 8%, P=0.003) and less often when colchicine was used appropriately (2% vs. 38%, P<0.001). Toxicity frequency in both groups was directly proportional to the number of doses per treatment course (P=0.005).
CONCLUSIONS: These data suggest that interventions aimed at improving colchicine safety can increase the appropriateness of prescribing and decrease the frequency of colchicine toxicity in a hospital setting. Further measures are needed, however, to ensure that colchicine is appropriately used and toxicity is minimized in all patients.

Nephrology

108. Evaluation of clinical pharmacy service on dosage adjustment in patients with renal impairment. *Chui Ping Lee, Pharm.D*[1], Isaac YF Cheng, master, of, clinical, pharmacy[2], Samuel CK Li, Master of Clinical Pharmacy[2]; (1)School of Pharmacy, The Chinese University of Hong Kong, Hong Kong; (2)Pharmact Department, Tuen Mun Hospital, Hong Kong.

PURPOSE: Pharmacists are generally trained to make renal dosage adjustment based on tertiary literature. However, it is uncertain whether the recommended dosages would apply to most clinical cases and their acceptance by physicians. This study examined the percentage of renal dosage adjustment recommendations made by a clinical pharmacist service out of all potentially inappropriate prescriptions identified and the acceptance of these recommendations.
METHODS: A list of 40 targeted drugs in the hospital formulary that require renal dosage adjustment were identified through tertiary reference review. Patients admitted to two general medical wards between October 1st 2006 and January 31st 2007, with creatinine clearance <50% as assessed by Crockcroft-Gault equation, and prescribed with at least one of the 40 targeted drugs were included. A detailed protocol to evaluate patients' renal function and clinical data was developed to assist formation of final dosage recommendation.
RESULTS: A total of 538 drug orders prescribed for 489 patients that met the inclusion criteria were reviewed by the clinical pharmacists. Interventions were made for 129 out of the 539 prescriptions (24%) and 75 (58.1% of 539) interventions were accepted by physicians. For the remaining 409 drug orders, no pharmacist interventions were made because of change or discontinuation of drug order before intervention, substantial change in estimated renal function, or severe clinical signs and symptoms that rendered the higher than recommended dosage possibly acceptable.
CONCLUSION: A relatively low percentage of potentially inappropriate orders were successfully intervened by clinical pharmacists in the current study. Consideration of individual patient factors and shortcomings of using estimation equation for renal dosage adjustments need to be considered when renal dosage adjustments are made clinically. References on renal dosage adjustments with clinical considerations taken into account are urgently needed to improve the quality and efficiency of renal dosage adjustment services provided by pharmacists.

Pediatrics

109. Daptomycin pharmacokinetics in a pediatric patient with methicillin-resistant Staphylococcus aureus endocarditis. Kim W. Benner, Pharm.D.[1], *Mary W. Worthington, Pharm.D.*[1], Leslie Hayes, M.D.[2], Pamela J. Sims, Pharm.D., Ph.D.[1], Heather Searcy, Pharm.D. candidate[1], Michele Bryant, Pharm.D. candidate[1], David Kimberlin, M.D.[3]; (1)Samford University McWhorter School of Pharmacy, Birmingham, AL; (2)University of Alabama at Birmingham, Division of Pediatric Critical Care, Birmingham, AL; (3)University of Alabama at Birmingham, Division of Pediatric Infectious Disease, Birmingham, AL.

PURPOSE: Daptomycin is a cyclic lipopeptide antibiotic with microbiologic activity against gram-positive organisms including methicillin-resistant Staphylococcus aureus (MRSA). Due to limited information on daptomycin use in pediatric patients, we report a case of daptomycin use and pharmacokinetic analysis in a 17 month old patient with history of corrective heart surgery and subsequent MRSA endocarditis.
CASE REPORT: Daptomycin therapy was initiated in a 17-month-old male with endocarditis after the patient's blood cultures remained positive for MRSA despite prolonged treatment with a combination of vancomycin, tobramycin, rifampin, and linezolid. Daptomycin 4 mg/kg was given as a one hour intravenous infusion every 24 hours; vancomycin and linezolid were discontinued. On day 7 of daptomycin therapy, blood samples were drawn immediately prior to administration of a dose, and 30 minutes, 2 hours, 5 hours, and 8 hours after the end of the infusion. These samples were analyzed utilizing a validated HPLC method at an outside institution; following receipt of the values, pharmacokinetic parameters were calculated using a noncompartmental model and the statistical moment theory. Measured concentrations ranged from 21.41 µg/ml drawn 30 minutes after the end of the infusion to 1.96 µg/ml drawn just before the dose. The calculated area under the curve (AUC_{0-24}) was 155.7 mg-hr/L and Cl was 0.225 L/hr (28.1 ml/hr/kg). The calculated mean residence time (MRT) was 6.6 hr and the Vss was 0.19L/kg. Blood cultures drawn on days 2 through 6 of daptomycin therapy were reported as no growth. Daptomycin was continued for a 42-day course of therapy, and all further cultures remained negative.
DISCUSSION: MRSA in our patient was successfully treated with daptomycin. Certain pharmacokinetic parameters determined for this pediatric patient substantially differ from reported adult values (AUC(0-24)494 mg-hr/L,Cl 8.3 ml/kg/hr) indicating the need for further pharmacokinetic studies in the pediatric population.

Pharmacoeconomics/Outcomes

110E. Consolidating research-pharmacy services at the VA-New York Harbor Healthcare System with an implementation of a fee schedule. *Simona Peker, R.Ph., B.S., M.S./M.L.S., M.S.A., Pharm.D.*, David Hoffman, R.Ph., Ph.D, Joseph Aprile, R.Ph., M.S.; New York Harbor Healthcare System, New York, NY.

PURPOSE: To consolidate the research-pharmacies at the VA-New York Harbor Healthcare System and to provide all pharmacy research-related services from one centralized location of one of the three campuses that make up the Harbor, without compromising patient safety and quality of care to the veterans. The goal was also to implement a fee-schedule to cover research-related overhead expenses.
METHODS: A meeting was held with the principal investigators and study

coordinators to discuss the proposal. The research pharmacy at the Manhattan campus became the central location for all research studies at the Harbor VA and was redesigned to create additional storage space. The investigational drugs were mailed to the patients by Federal Express using next-day delivery service. Medications requiring pick-up by the Brooklyn patients, were hand-delivered to Brooklyn by the Manhattan-campus pharmacy technician.
Once the research-pharmacy services were centralized and the same standards were established for all three campuses, a fee schedule was established to reimburse the research pharmacy for its overhead expenses. The proposed reimbursement schedule was as follows: $600.00/protocol for start-up fees, $360.00/protocol for closing fees, $276.00/patient/year for dispensing fees and $120.00/patient/year for maintenance fees.
RESULTS: Consolidation of services resulted in an estimated total cost-savings of $154,000. For a typical study of 15 patients the reimbursement fee added up to $6,900.00/year. For 10 studies closing in one year the cost totaled $69,000.00. The campuses now operate under the same standards. The planning of new studies and the administration of active studies has been simplified. The research-pharmacy reimbursement program began to generate revenue to cover research-pharmacy overhead expenses and buy necessary equipment. The consolidation also cleared up valuable space in the Pharmacy department.
CONCLUSIONS: Consolidating the research-pharmacies, centralizing the pharmacy-related research-services and establishing a fee schedule resulted in significant cost savings, improved efficiency and generated revenue for the pharmacy department.
Presented at the Clinical Executive Board meeting at the Manhattan campus of the VA-New York Harbor Healthcare System in June 8, 2006.

112. Effect of pharmacy-based intervention on appropriate use of proton-pump inhibitors in an inpatient rehabilitation facility. *McKenzie C. Ferguson, Pharm.D.*, Abigail Woodland, Pharm.D., BCPS, Brad Stemler, Pharm.D.; SSM St. Mary's Health Center, St. Louis, MO.

Studies have shown an association between Clostridium difficile-associated diarrhea (CDAD) and acid suppressive therapy with proton-pump inhibitors (PPIs). The objective of this prospective study was to evaluate the appropriate use or misuse of proton-pump inhibitors (PPIs) based on practice guidelines and to determine if proper use will affect improper prescribing of PPIs and the associated financial impact of a pharmacy-based intervention. Potential adverse effects of continued or discontinued PPI therapy were also evaluated. The study population included inpatients admitted to a rehabilitation unit within the hospital, including a 25-bed neurological rehabilitation unit. All patients prescribed a PPI at any time during their hospital stay were evaluated. Medical charts were reviewed for each patient prescribed a PPI. Pharmacist interventions were recommended directly to the physician in the form of a note placed on the outside of the medical chart. Primary outcomes to be evaluated were the appropriate use of PPIs based on practice guidelines, efficacy of pharmacy intervention and related financial savings. Secondary outcomes included evaluation of adverse events during inpatient stay.
Results showed that physician prescribing patterns shifted after study implementation. Fewer patients were admitted and continued on PPI therapy throughout the hospital stay. Pharmacy medication costs decreased as a result. No adverse events were reported in relation to patients whom were successfully switched to an alternate agent or those without continued stress ulcer prophylaxis.
Pharmacy-based interventions with the use of PPIs made a considerable impact on the number of patients that were continued on acid suppressive therapy, including upon discharge. The data collected from this study may be used for future implementation onto general medicine floors within the hospital.

Pharmacoepidemiology

113. Pharmacy preparation for a medical mission trip. *Melody Ryan, Pharm.D.*[1], Jami Bailey, Pharm.D.[2]; (1)University of Kentucky College of Pharmacy, Lexington, KY; (2)Veterans Affairs Medical Center, Lexington, KY.

INTRODUCTION: Pharmacists frequently participate in medical mission trips to underserved countries. On these trips, the pharmacist may need to set up a pharmacy, give initial doses, and provide counseling under unusual circumstances such as in a very small, non-private space, outdoors, or in another language. Additionally, the pharmacist is often asked to procure medications for the trip through donations or with a very limited budget. Appropriate planning helps assure that resources are used wisely and that the clinic flows smoothly.
OBJECTIVE: Describe procedures that facilitate provision of pharmacy services in the context of a medical mission trip.
DESCRIPTION: Areas for planning include types and quantities of medications, legal procedures, logistics for dispensing and counseling, non-medication supplies to enhance medication use, and reference materials. For example, an appropriate amount of antiparasitic medications in a dosing form that can be used by the population to be treated must be obtained, dosing information for the specific medication is needed, and purified water and sanitary drinking cups should be provided for one-time dosing in the pharmacy.
If previous medical missions have gone to the same or similar areas and some data is available, more specific planning can take place. The pharmacist can anticipate the most common medical conditions and select corresponding medications. If information about the population is known, appropriate dosage forms to meet patient age needs (e.g., liquid formulations for use in pediatrics) can be ordered. These considerations and a list of useful materials will be presented. Medication documentation methods to assist in data analysis and future medical mission planning will also be provided.
CONCLUSION: Preplanning for effective pharmacy services can be accomplished prior to departing for a medical mission. These methods can conserve valuable resources and assist in the provision of pharmacy services in an effective and efficient manner.

Women's Health

114. Patient experience with emergency contraception. *Jill H. Cwik, Pharm.D.*, Mitzi Wasik, Pharm.D., BCPS, Louise Parent-Stevens, Pharm.D., BCPS, Kristen Goliak, Pharm.D., Jennifer Hardman, Pharm.D., BCPS; University of Illinois at Chicago, Chicago, IL.

PURPOSE: Unintended pregnancy in the US continues to rise at an alarming rate such that increasing awareness and understanding of emergency contraception (EC) may help to decrease the number of unplanned pregnancies.
METHODS: Three groups of participants were enrolled in the study: (1) women who received an EC prescription for immediate use; (2) women who obtained an advance provision prescription for EC; and (3) women who present to purchase EC over-the-counter. Subjects ≥18 years of age and currently not smoking at the time of enrollment were recruited. A follow-up telephone survey was initiated within 3 to 4 weeks for subjects who receive EC for immediate use and within 3 to 6 months for those who received an advance provision prescription.
RESULTS: Sixteen immediate use patients and 8 patients given advance provision prescriptions were recruited. Average time to presentation for a prescription was 17.8 hours. Thirteen of 24 patients who were contacted for phone follow-up; one advance provision and 12 immediate use patients.
Patients in the immediate use group were asked to recall information in the leaflet with 3 questions which included the mechanism of action of levonorgestrel, how long after intercourse can one take levonorgestrel and the proper administration of levonorgestrel. Five of the 12 patients in the immediate use group could not remember the mechanism of action. Eight of the 12 patients recalled that they could take levonorgestrel up to 72 hours following unprotected intercourse. Three of the 12 patients could recall that they can take levonorgestrel up to 120 hours following unprotected intercourse. Ten of the 12 patients could recall that they were told to take 2 pills simultaneously.
CONCLUSION: This study demonstrated the importance of pharmacists counseling patients regarding the proper use as many could not recall the duration after intercourse that they could use levonorgestrel.

115. Adherence to osteoporosis and anticoagulation treatment guidelines in acute hip fracture patients. *Jessica L. Purcell, Pharm.D., MPH*[1], James D. Hoehns, Pharm.D.[2], Kristi Kavanaugh, Pharm.D.[1]; (1)Northeast Iowa Medical Education Foundation, Waterloo, IA; (2)University of Iowa College of Pharmacy/Northeast Iowa Family Practice Center, Waterloo, IA.

PURPOSE: Guidelines recommend short-term anticoagulation as well as osteoporosis treatment in patients who have suffered an acute hip fracture. This study documented anticoagulation and osteoporosis drug therapy administered to acute hip fracture patients in order to 1) compared prescribed drug therapy to established medical guidelines and 2) evaluate potential areas for quality improvement.
METHODS: Medical charts of all patients admitted to one community hospital for hip fracture from January 2004 to December 2006 were reviewed. Patients were included if they were > 65 years of age, had an acute hip fracture and underwent surgical repair. Data collected included demographics, medications, past medical history, length of surgery, time to anticoagulation.
RESULTS: Females comprised 74% of cases. Frequency of being prescribed osteoporosis drug therapy did not increase significantly during hospitalization (14.2% vs. 11% at discharge and admission, respectively). Fewer patients were discharged receiving calcium supplementation than upon admission (22.5 vs. 27.2%). Whereas, vitamin D containing multivitamin use increased significantly at discharge as compared to admission (37% vs. 27.5%, $P<0.001$). The majority of patients (88.3%) received no pharmacologic anticoagulation pre-operatively while 88.2% of patients received anticoagulation postoperatively. The mean duration of anticoagulation postoperatively was 9.1 days which began a mean of 24 hours post-operatively. Surgery was performed within 24 hours and 48 hours of admission in 54% and 85% of patients, respectively. Of the 15.3% of patients

hospitalized more than 48 hours before surgery, 70% received no anticoagulation preoperatively. Patients who received preoperative anticoagulation had a longer delay from admission until surgery compared to those who did not receive preoperative anticoagulation (59.4 vs. 27.8 hours, p<0.001).
CONCLUSION: Osteoporosis drug therapy is very seldom started acutely after a hip fracture and remains greatly undertreated in this high-risk population. Most patients receive appropriate anticoagulation; however greater emphasis on correct timing and duration of anticoagulation is needed.

116. Highlight on: the women's health PRN. Jacintha S. Cauffield, Pharm.D., BCPS[1], *Patricia Wigle, Pharm.D.*[2], Jennifer McIntosh, Pharm.D.[3], Shareen Y. El-Ibiary, Pharm.D., BCPS[4], David L. Lourwood, Pharm.D., BCPS, FCCP[5], Laura Hansen, Pharm.D.[6]; (1)Southwest Washington Medical Center, Vancouver, WA; (2)University of Cincinnati, 304 Wherry Hall, Cincinnati, OH; (3)Northeastern University-Bouve College of Health Sc, 203 Mugar Life Science Bldg, Boston, MA; (4)University of California, San Francisco, School of Pharmacy, San Francisco, CA; (5)Poplar Bluff Reginal Med Ctr, Poplar Bluff, MO; (6)University of Colorado Health Sciences Center, Denver, CO.

PURPOSE: To increase the awareness and highlight the accomplishments of the Women's Health PRN.
METHODS: Pending.
RESULTS: The Women's Health PRN consists of 150 members whose interests range from pregnancy and prenatal care to the aging issues of osteoporosis and heart disease to gender-related pharmacokinetics. Its purpose is to provide ACCP members with an interest in Women's Health a smaller community for exchange of practice ideas and opportunity for collaborative research. Several members list clerkships and/or post-graduate experiences that emphasize women's health at the ACCP website. The history, purposes, demographics, and future direction of PRN will be discussed. Past, present, and future PRN activities will be highlighted with an emphasis on accomplishments. Recent accomplishments include: the development of a women's health curriculum for pharmacy schools through a partnership with AACP; and an ACCP White Paper on Research in Women and Special Populations. Four of 26 of projects awarded support from the Frontier Fund address issues related to women's health. The roles of the various PRN officers (Chair, Chair-Elect, Secretary-Treasurer, Public Policy Liaison, and Immediate Past-Chair) will be outlined. Activities of the various committees (Programming, Communications, Research and Scholarship, Nominations and Membership) will be presented. An example of the PRN newsletter will be available. Future goals of the PRN will also be presented. Among these is the development of two textbooks, one of which will cover Women's Health Issues, and the other which will emphasize the treatment of chronic medical conditions during pregnancy.
CONCLUSIONS: Women's Health is a broad field encompassing multiple dimensions of health across the life span, and the Women's Health PRN seeks to address multiple aspects of women's health. It is a dynamic, accomplished group of diverse members who enjoy collaborating with one another as well as specialists from other disciplines. We welcome new members.

RESIDENTS AND FELLOWS RESEARCH IN PROGRESS

ADR/Drug Interactions

117. The frequency of clopidogrel plus CYP3A4 inhibitors and substrates in residents of a long-term care facility. *Maricelle O. Monteagudo, Pharm.D.*, Catherine A. Millares, Pharm.D., CGP, Bishoy Luka, Pharm.D., Henry Cohen, M.S., Pharm.D., FCCM, BCPP, CGP; Kingsbrook Jewish Medical Center, Brooklyn, NY.

OVERVIEW: Clopidogrel is an adenosine diphosphate receptor antagonist prodrug. Upon ingestion clopidogrel is absorbed systemically and converted into an active moiety by hepatic CYP450 3A4 enzymes. Clopidogrel and statins are standard therapy in the management of atherosclerotic disease and are 3A4 substrates. Statins may inhibit the metabolism of clopidogrel and thus prevent it's conversion to its active metabolite via competitive antagonism, plausibly yielding clopidogrel inactive. Furthermore, 3A4 inhibitors such as erythromycin and troleandomycin have been shown to inhibit clopidogrel metabolism, thus blocking its antiplatelet effects. Ostensibly, similar interactions may occur with other 3A4 substrates and inhibitors (azole antifungals, amiodarone, calcium channel blockers, fluoxetine and indinavir).
PURPOSE: We hypothesize that there may be a high incidence of clopidogrel use with other 3A4 substrates and inhibitors. This study was conducted to assess the frequency of clopidogrel coadministration with 3A4 substrate and inhibitor medications.
METHOD: An electronic report was used to include all residents at the Rutland Nursing Home who were receiving clopidogrel between October 1 and October 31, 2007. The medication profiles for all identified residents were screened for possible substrates and inhibitors of the 3A4 enzyme system. The Flockhart's Cytochrome P450 Drug-Interaction Table was used to identify and stratify 3A4 inhibitors and classify them as, weak, moderate, or strong inhibitors. An analysis was performed to assess the frequency of clopidogrel use with 3A4 inhibitors vs. non-3A4 inhibiting agents.
RESULTS: Pending
CONCLUSION: Pending

Adult Medicine

118. Evaluation of continuation of stress-ulcer prophylaxis at hospital discharge. *William R. Judd, Pharm.D.*, P. Shane Winstead, Pharm.D., George A. Davis, Pharm.D., BCPS, Timothy M. Clifford, Pharm.D., BCPS, Tracy E. Macaulay, Pharm.D., BCPS; University of Kentucky HealthCare, Lexington, KY.

PURPOSE: The use of stress ulcer prophylaxis (SUP) for the prevention of stress-related mucosal disease is a common practice in hospitalized patients. However, only a subset of patients are at an increased risk of clinically important bleeding. The primary objectives are to determine the percentage of hospitalized patients who receive SUP during their admission and at hospital discharge without an approved indication. Secondary objectives are to determine the cost impact of inappropriate prescribing and to evaluate if transition of care medication reconciliation from ICU to floor facilitates discontinuation of inappropriate drug therapy.
METHODS: We conducted a retrospective chart review of ~10% of adult cardiology, family medicine, and internal medicine patients who received pantoprazole, famotidine, or sucralfate from July 2006–June 2007. Appropriateness of SUP therapy was evaluated based on its compliance with the American Society of Health-System Pharmacists (ASHP) therapeutic guidelines for stress-ulcer prophylaxis. A cost analysis will be performed to assess financial impact using AWP and number of units dispensed. Medication reconciliation forms will be reviewed to assess their impact on continuation of drug therapy.
RESULTS: Interim analysis of 12,928 admissions revealed that 71% of hospitalized patients received pantoprazole, famotidine, or sucralfate. A total of 463 patients were randomly selected based on predetermined inclusion and exclusion criteria. Of the initial 34 patients reviewed, 74% received SUP. Only 7.4% of these patients met criteria established by ASHP, and 19% of patients who received SUP were discharged home on the medication without an approved indication.
CONCLUSIONS: Preliminary data indicate that SUP is being over-utilized by practitioners when the risk of stress-related mucosal bleeding is low. Use of SUP for patients who do not meet guideline-based criteria may contribute to increased healthcare expenditures. Further analysis will reveal if medication reconciliation facilitates the assessment and discontinuation of inappropriate drug therapy.

Ambulatory Care

119. Appropriate utilization of add-on ezetimibe lipid-lowering therapy at the Veterans Affairs San Diego Healthcare System. *Lisa M. Rubin, Pharm.D.*, Mark Bounthavong, Pharm.D.; Veterans Affairs San Diego Healthcare System, San Diego, CA.

PURPOSE: To assess outpatient response in achieving LDL-C goals with ezetimibe when added to concurrent statin therapy at the Veterans Affairs San Diego Healthcare System (VASDHS).
BACKGROUND: There is currently a gap between evidence-based guideline recommendations and achievement of LDL-C goals with statin monotherapy. Combination statin and ezetimibe therapy is an option for reaching LDL-C goals set forth by NCEP/ATP III. Access to ezetimibe at the VASDHS is restricted to non-formulary approval through a clinical pharmacy specialist. However, the VASDHS currently has no systematic process to evaluate whether patients approved for ezetimibe respond to this medication and achieve target LDL-C goal.
METHODS: Retrospective review of electronic medical records of outpatients approved for ezetimibe between January 1st, 2005 and August 31st, 2007. Primary outcome was to determine whether patients identified as non-responders to ezetimibe had their medication regimen subsequently modified. Secondary outcomes intended to determine if associations existed between patient covariates and response to ezetimibe. Statistical analysis was performed using χ^2 (or Fischer's exact) on categorical data and the student *t*-test (or Mann-Whitney U) on continuous data where appropriate. Matched data was analyzed using the paired *t*-test (or Wilcoxon signed-rank) where appropriate.
RESULTS: Preliminary descriptive statistics showed no significant difference at baseline between responders and non-responders, while interestingly, the

only covariate significantly different post-intervention was serum triglycerides. Paired pre-post comparisons showed statistically significant differences in LDL-C and total cholesterol in responders but no difference in any covariates in non-responders.
CONCLUSIONS: This research is ongoing and under review with this facility's Institutional Review Board. Final statistical analyses, conclusions, and clinical recommendations are pending. Anticipated date of completion is February 2008.

Cardiovascular

120. Impact of the timing of initial activated partial thromboplastin time on duration to achievement of therapeutic anticoagulation with intravenous unfractionated heparin. *Joseph R. Rinka, Pharm., D.*, Toby C. Trujillo, Pharm., D.; Boston Medical Center, Boston, MA.

PURPOSE: Intravenous unfractionated heparin (UFH) has been a foundation in antithrombotic therapy for over 50 years. It has proven effectiveness for a variety of indications. However, the utility of UFH is complicated by its unreliable pharmacokinetic profile, associated adverse events, and reliance on the non-standardized activated partial thromboplastin time (aPTT) for estimation of therapeutic efficacy. Failure to achieve a therapeutic aPTT early in the treatment may be associated with worse outcomes. The objective of this analysis is to study the impact of timing of the initial aPTT on the time to therapeutic anticoagulation with UFH.
METHODS: This study is a retrospective analysis of patients with an order for a weight-based UFH infusion protocol. Patients will be categorized according to the timing of the first aPTT after initiation of therapy (<6 hours, 6-7 hours, >7 hours). The primary outcome will be the duration of time to reach stable therapeutic anticoagulation, as defined by the institution specific therapeutic aPTT range. Secondary outcomes include mean time of the initial aPTT drawn, mean first aPTT value, the number of dosage adjustments needed to achieve therapeutic anticoagulation, as well as the percentage of aPTTs within the therapeutic range. ANOVA and χ^2 analysis will be used to evaluate differences between the groups as appropriate. A sample size of 40 patients in each group will have an 80% power to detect a difference of 12 hours in time to therapeutic anticoagulation with a significance level of 0.05.
RESULTS: Interim results (n=34) demonstrate that patients with an initial aPTT drawn < 6 hours, 6–7 hours, and > 7 hours after initiation achieved stable therapeutic anticoagulation at 36.1, 13.8, and 38.4 hours, respectively (p=0.035).
CONCLUSION: Full results for all defined outcomes will be presented. Current interim results indicate a need to improve UFH monitoring practices within our institution.

121. Pinacidil Reduces Interventricular Heterogeneities and Arrhythmia Inducibility During Loss of Inward Rectifier Potassium Channel Function. *Przemyslaw Radwanski, Pharm.D.*, Rengasayee Veeraraghavan, B.Tech., Mark Munger, Pharm.D., Steven Poelzing, Ph.D.; University of Utah, Salt Lake City, UT.

INTRODUCTION: Heart failure and Andersen-Tawil syndrome Type 1 (ATS1), linked to abnormalities of the inward-rectifier potassium current (IK1), are associated with ventricular arrhythmias. It was previously demonstrated that interventricular IK1 heterogeneities underlie QT prolongation and increased arrhythmia induction rates secondary to increased right ventricular (RV) action potential duration (APD) sensitivity to partial IK1 blockade and hypokalemia. We hypothesized that increasing outward potassium current with pinacidil, an ATP-sensitive potassium channel opener, will globally decrease APD, mitigate QT prolongation and attenuate the incidence of arrhythmias.
METHODS: BaCl2 (10ÌM) was perfused to reduce IK1 in Langendorff perfused isolated guinea pig whole-heart preparations and extracellular potassium concentration was maintained at 2mM [K+]o (baseline). APD from RV and left ventricle (LV) were quantified by ratiometric-optical voltage (di-4-ANEPPS, n = 6) mapping during RV pacing (S1) without or with pinacidil (5, 15 and 30ÌM).
RESULTS: At 400ms basic cycle length (BCL), pinacidil (15ÌM) significantly decreased RV base (RVB), RV apex (RVA) and LV apex (LVA) APD from baseline by 15.7±3.5%, 16.3±3.6% and 11.6±3.6% respectively (p<0.05), but did not significantly change APD in LV base (LVB). Importantly, APD dispersion between RVB and LVA (regions demonstrating greatest dispersion at baseline) decreased from 7.4±0.4 to 2.6±0.2% (p<0.001). Moreover, 15ÌM pinacidil significantly shortened QT interval by 45.8±16.9ms (p<0.05) compared to baseline. At baseline, interventricular repolarization heterogeneities were insufficient to precipitate arrhythmias during premature stimulation (S1-S2); however, 50% (n=8) of animals exhibited spontaneous and/or rapid pacing induced arrhythmias. Notably, pinacidil abolished all spontaneous arrhythmias and decreased the incidence of rapid pacing induced arrhythmias to 6.3% (n=1).
CONCLUSION: These data suggest that increased dispersion of APD secondary to reduced IK1 function serves as a substrate for arrhythmogenesis. Therefore, amelioration of potassium handling deficit in diseases resulting in loss of IK1 function such as heart failure and ATS1 results in mitigation of pro-arrhythmic APD dispersion.

122. Rabbit antithymocyte globulin dosing and complications in heart transplant induction and rejection. *John P. Lindsley, Pharm.D.*, Kerry Pickworth, Pharm.D., Danielle Blais, Pharm.D.; The Ohio State University Medical Center, Columbus, OH

PURPOSE: ATG is the primary agent at our institution for the treatment of heart transplant rejection and induction. Conventional dosing of ATG is 1.5mg/kg for six days and 0.75 mg/kg for 4 days. Another method of ATG dosing is based on CD3 counts, however, limited data exists in heart transplant recipients. The objective of this study is to determine the CD3 count response to ATG, total ATG dosing, cost, long-term complications, and the dosing scheme of other immunosuppressive agents.
METHODS: A retrospective chart review is being conducted in patients treated with ATG for induction or rejection of heart transplant between July 1, 2003 and June 30, 2007. Data collected includes demographics, ATG dose, concurrent immunosuppression, laboratory findings, readmissions, and cost.
RESULTS: During the time period, 60 transplants were performed and six patients were treated with ATG for rejection and nine for induction. At this time, data is available for the six patients suffering rejection (33% humoral rejection and 66% cellular rejection). The average initial dose of ATG was 1.1 mg/kg with an average reduction in CD3 count of 794 cells/mm^3 was found after the first ATG dose. Patients received a mean total dose of 183 mg based on CD3 counts versus a potential dose of 808 mg if a conventional strategy was utilized, p=0.0029. This resulted in a total decrease in cost of $41,679. Two patients expired and two of the remaining four were readmitted for reasons possibly related to ATG, pancytopenia and recurrent infections. All patients received IV steroids, 66% continued their calcineurin inhibitor and 83% continued their mycophenolate mofetil.
CONCLUSIONS: Thus far, the total dose of ATG was reduced using CD3 count monitoring resulting in a decrease in overall drug cost. Long-term complications of ATG are still being evaluated.

123. Impact of nicotine replacement therapy on postoperative mortality following coronary artery bypass graft surgery. *Christopher A. Paciullo, Pharm.D.*, Marintha R. Short, Pharm.D., Heath R. Jennings, Pharm.D.; Saint Joseph HealthCare, Lexington, KY.

PURPOSE: Nicotine replacement therapy (NRT) has recently been associated with mortality in medical intensive care unit patients. NRT is frequently utilized in cardio-thoracic (CT) surgery populations, however, no safety data exist for use in this population. The primary outcome of this evaluation was the impact of NRT on in-hospital mortality following coronary artery bypass graft (CABG) surgery.
METHODS: This retrospective cohort study evaluated patients undergoing CABG between August 2004 and August 2007. Patients were consecutively screened and identified using electronic medical records and were stratified into three groups by smoking status and NRT usage—smokers who received NRT, smokers who received no NRT, and nonsmokers. Block randomization was used for patient selection and patients were matched by APACHE II score.
RESULTS: A total of 2057 patients undergoing CABG were evaluated and 35.8% (n = 736) underwent cardiopulmonary bypass. Of the total population, 27.3% (n = 823) were smokers and NRT was subsequently administered to 12.8% (n = 107, NRT group). Mortality was non-significantly higher in the NRT group versus the non-NRT smoker group (n = 716), 3.3% versus 1%, respectively (p=0.083). Smokers not receiving NRT were not at increased risk of death compared to non-smokers (HR 0.92, 95% CI 0.42–2.04). APACHE II scores were similar between NRT and non-NRT groups, 25.6±5.3 versus 26.4±4.8, respectively (p=0.4). A non-significant increase in mortality was noted for NRT use following either on-pump CABG (HR 2.51, 95% CI 0.25–25.1) or off-pump CABG (HR 4.72, 95% CI 0.65–34.5).
CONCLUSIONS: These results demonstrate a non-significant increase in mortality as a result of NRT administration. Heterogeneity within groups and low patient deaths impact these findings and contribute to wide confidence intervals. Additional evaluation in large patient cohorts with prospective controls is warranted to further assess trends in mortality with NRT use following CABG.

124. Ischemic and hemorrhagic outcomes following percutaneous coronary intervention with antithrombotic therapy plus glycoprotein IIb/IIIa inhibition—enoxaparin versus bivalirudin. *Terri J. Suffoletta, Pharm.D.*, Heath R. Jennings, Pharm.D., BCPS; Saint Joseph HealthCare, Lexington, KY.

PURPOSE: ACC/AHA guidelines for management of patients experiencing unstable angina (UA) or non-ST elevation myocardial infarction (NSTEMI) include recommendations for the use of antiplatelet and antithrombotic therapy in combination with percutaneous coronary intervention (PCI). This study evaluated two pharmacologic regimens used adjunctively with PCI in this patient population. Treatment groups consisted of glycoprotein IIb/IIIa inhibitor (GP IIb/IIIa) in combination with either enoxaparin (ENOX) or bivalirudin (BIV). The purpose of this evaluation was comparison of ischemic and hemorrhagic outcomes following PCI with these therapies.
METHODS: This retrospective cohort evaluation reviewed the medical

records of 9230 patients undergoing PCI secondary to UA or NSTEMI from January 1, 2001 to July 31, 2005. The primary endpoint was the triple composite of death, MI, and urgent revascularization within 30 days. The secondary endpoint included major bleeding according to TIMI criteria.
RESULTS: A total of 4091 patients received ENOX plus GP IIb/IIIa (n=2479) or BIV plus GP IIb/IIIa (n=1612). Use of ENOX versus BIV resulted in a significantly lower rate of the primary endpoint (3.0% versus 8.8%, respectively; p<0.001; relative risk [RR], 0.56; 95% confidence interval [CI], 0.74–0.42). Increased major bleeding was observed in the ENOX group compared to the BIV group (16.1% and 1.7%, respectively; p<0.001; RR, 1.65; 95% CI, 2.43 to 1.12). Overall, ENOX was associated with an increased rate of any event as evidenced by the quadruple composite of death, MI, urgent revascularization, and TIMI major bleeding (18.4% versus 10.4%; p<0.001; RR, 1.25; 95% CI, 1.5 to 1.03).
CONCLUSIONS: These results illustrate significantly decreased ischemic events when a GP IIb/IIIa is combined with ENOX versus BIV adjunctively during PCI. These benefits may be counterbalanced by a significant increase in major bleeding with ENOX versus BIV.

Clinical Administration

125. Assessment of erythropoeisis stimulating agent (ESA) use and the impact of pharmacist intervention on inappropriate prescribing. *Lauren Czosnowski, Pharm.D.*[1], Joanna Q. Hudson, Pharm.D.[2], Bob L. Lobo, Pharm.D.[1], Jennifer Robertson, Pharm.D.[1], Carli Nesheiwat, Pharm.D.[3]; (1)Methodist Healthcare University Hospital, Memphis, TN; (2)University of Tennessee, Memphis, TN; (3)Methodist University Hospital, Memphis, TN.

PURPOSE: The FDA has recently added new safety warnings regarding the use of erythropoeisis stimulating agents (ESA). For this reason, we developed and implemented a program consisting of an ESA dispensing form that must be completed by the pharmacist prior to dispensing the first ESA dose. The form consists of a checklist of appropriate indications and contraindications, and requires the pharmacist to contact the prescriber for inappropriate orders. In addition, we implemented a computerized clinical rule that notifies the pharmacist electronically whenever the hemoglobin value exceeds 12 g/dl during ESA therapy.
METHODS: All ESA dispensing forms will be collected from October, 2007 through March, 2008 and reviewed for correct indication, contraindications, pharmacist interventions and ESA order discontinuations or dosage modifications. ESA utilization prior to October, 2007 will be compared to utilization during the intervention. Cost savings as a result of the program will be calculated.
RESULTS: In the first four weeks there were 67 new ESA orders and three clinical rule notifications. The most common indications for ESA were end-stage renal disease, followed by chronic kidney disease and cancer. Use of the ESA dispensing form led to two interventions (for a normal hemoglobin and a contraindication). In addition, the clinical rule led to three interventions for elevated hemoglobin. Thus, 7% of ESA orders required an intervention (5/70). Assuming that each intervention averted two doses from being dispensed, the program reduced ESA utilization by 10 doses.
CONCLUSIONS: A program consisting of routine evaluation of each ESA order by a pharmacist using a standardized dispensing form and the implementation of a computerized clinical rule reduced ESA doses dispensed in the first month of implementation. Data will be collected for at least five additional months.

Critical Care

126. Evaluation of bleeding events in patients receiving recombinant human activated protein C dosed on actual body weight. *Rachel C. Stratman, Pharm.D.*, Aaron M. Cook, Pharm.D., Kenneth E. Record, Pharm.D., P. Shane Winstead, Pharm.D.; UK HealthCare, Lexington, KY.

PURPOSE: The approval of recombinant human activated protein C (rhAPC) for the treatment of severe sepsis was based on the PROWESS study. In this trial, rhAPC was evaluated at a dose of 24 µg/kg/hr based on actual body weight (ABW), excluding patients exceeding 135 kg. Data in patients >135 kg is limited to a single pharmacokinetic trial that concluded dosing should be based on ABW. The current study objective is to evaluate bleeding complications as the dose of rhAPC increases with weight.
METHODS: We conducted a retrospective analysis of adult patients with severe sepsis treated with rhAPC from August 2001–August 2007. Bleeding complications will be assessed through evidence of intracranial hemorrhage, serious bleeding events, life-threatening bleeding, and utilization of packed red blood cells (PRBC) during the 96-hour infusion and until death or hospital discharge. The primary endpoint will be analyzed by logistic regression. Overall transfusion requirements, mortality, and factors that predispose to increased risk of bleeding such as recent surgery and concomitant medications will be determined.
RESULTS: Interim analysis of 124 patients, of which 48% were female and 9% were >135 kg, yielded an average age of 52 years and average weight of 87.9 kg. The in-hospital mortality rate was 40%. Transfusion of PRBC during hospital admission were required in 46% of patients overall and in 27% of those >135kg.
CONCLUSION: Preliminary results indicate that bleeding events associated with rhAPC are not more prevalent in patients >135 kg. The final results of this trial will report bleeding complications as the dose of rhAPC increases with ABW and describe factors associated with bleeding.

127. Continuous bispectral index monitoring in medical ICU patients. *Michelle L. Horan, Pharm.D.*[1], Sara Brouse, Pharm.D., BCPS[2], W. Douglas Pitcher, MD[3]; (1)Texas Tech University Health Sciences Center, VA Medical Center, Dallas, TX; (2)Texas Tech University Health Sciences Center, VA Medical Center, 4500 South Lancaster Rd, Dallas, TX; (3)Dept of Internal Medicine, UTSW Medical Center, Dallas, TX.

PURPOSE: Prior ICU studies of objective monitoring of sedation status with the Bispectral Index (BIS) are limited by short-term, intermittent assessments and use of older equipment.
METHODS: A prospective clinical trial was conducted in medical ICU patients randomized to receive midazolam or lorazepam continuous infusions or scheduled lorazepam intermittent boluses. Nurses titrated sedatives by predefined protocol to achieve a goal SAS score of 3-4. Patients were monitored continuously with the BIS system (Aspect A-2000, Newton, MA) for 48 hours following intubation. Descriptive statistics evaluated demographics, hourly mean, minimum, and maximum BIS scores. Potential for correlation with BIS scores and SAS scores or benzodiazepine dose were assessed by Spearman rank correlation analysis.
RESULTS: Twenty-five patients were included. Baseline characteristics were similar amongst patients. The median (interquartile range) midazolam infusion dose was 3.8 mg/hr (2.5, 5.6) with mean BIS score 63 +/- 14.5, lorazepam infusion dose was 3.2 mg/hr (2.8, 5.2) with mean BIS score 63 +/- 13.6, and lorazepam intermittent bolus dose was 0.9 (0.72, 1.05) with mean BIS score of 60 +/- 13.2. No significant correlation was found between BIS and SAS scores in midazolam (r=0.03; p=0.753) or lorazepam infusion groups (r=0.095; p=0.257) and only weak correlation with lorazepam intermittent bolus (r=0.249; p=0.024). A weak negative correlation existed between midazolam dose and BIS score (r=-0.20; p=0.031).
CONCLUSIONS: Studies assessing correlation between BIS and subjective sedation scales have produced variable results in different ICU patient populations. In this study, continuous BIS monitoring did not consistently correlate with benzodiazepine dose or SAS score in general medical ICU patients. Further study is needed to determine the most appropriate long-term use of BIS monitoring.

128. Effect of subcutaneous administration of insulin glargine on insulin infusion requirements in critically ill burn patients. *Alyson W. Gibson, Pharm.D.*[1], Jeffrey S. Guy, M.D.[2], Sloan B. Fleming, Pharm.D.[1], Cathy M. Oleis, D.Ph.[1]; (1)Vanderbilt University Medical Center, Nashville, TN; (2)Vanderbilt Regional Burn Center, Nashville, TN.

PURPOSE: Managing hyperglycemia in the intensive care unit (ICU) setting is of great importance, as research has demonstrated a significant reduction in morbidity and mortality with the maintenance of normoglycemia via intensive insulin therapy in critically ill patients. The Vanderbilt University Medical Center Burn ICU has taken a nontraditional approach to managing hyperglycemia, utilizing subcutaneous insulin glargine in addition to insulin infusions and sliding-scale insulin. This practice is not widely accepted, as subcutaneous administration is believed to produce a depot in burn patients and result in erratic absorption. The purpose of this study is to determine the effectiveness of subcutaneous administration of insulin glargine in decreasing intravenous (IV) insulin requirements and further quantify the mathematical relationship between insulin glargine and IV insulin.
METHODS: This study is a retrospective analysis of adult burn patients (age ≥ 18) admitted to the Burn ICU at Vanderbilt University Medical Center from June 2005 to June 2007. Patients who received both insulin glargine and an insulin infusion were included. Patient demographics, total body surface area (TBSA) burn, insulin type and requirements, glucose measures, concurrent nutrition, and specified co-morbidities were collected. The primary objective is to determine the time spent within target glucose range (80–110mg/dL) for patients while on IV insulin only, sub-Q glargine only, and combination therapy. Secondary endpoints include the number of hypo- (< 70mg/dL) and hyperglycemic (> 200mg/dL) events on each insulin therapy and the correlation between total daily IV insulin received to amount of sub-Q glargine required on transition.
RESULTS: Data collection ongoing. Results to be presented.

Drug Information

129. Impact of a meta-analysis indicating potential safety risks of rosiglitazone on physician prescribing decisions. *Christopher S. Wisniewski, Pharm.D.*, Shelby L. Corman, Pharm.D., BCPS; University of Pittsburgh

Medical Center, Pittsburgh, PA.

PURPOSE: A recently published meta-analysis indicated an increased risk of cardiovascular events in patients taking rosiglitazone versus comparator agents. The objective of this study is to determine whether this publication changed rosiglitazone prescribing, and the factors that influenced physicians' prescribing decisions.
METHODS: A retrospective review of prescriptions dispensed at a hospital-based outpatient pharmacy will be conducted. The number of rosiglitazone prescriptions will be expressed as a proportion of the total number of oral antidiabetic prescriptions dispensed, and will be compared, using McNemar's test, for six-month periods before and after study publication. Additionally, a survey has been distributed to physicians practicing at the associated hospital to assess their awareness of, and reactions to, the meta-analysis. Questions ask respondents to rate their familiarity with the findings, describe the impact of the findings on their prescribing practice, and identify additional factors that have influenced their decision. The responses will be analyzed using descriptive statistics.
RESULTS: In a preliminary evaluation of 68 survey responses, most physicians consider themselves either very familiar (31%) or somewhat familiar (62%) with this issue. Eighty percent of these physicians indicated that this information affected their prescribing. Of those respondents, 50% indicated that they completely stopped writing new rosiglitazone prescriptions and 50% specified that they stopped prescribing rosiglitazone only in certain patient populations. In patients previously prescribed rosiglitazone, 75% of physicians stopped the medication in specific populations, while 14% stopped rosiglitazone in all patients and 11% did not discontinue the drug. The majority of respondents rated the influence of the meta-analysis, recommendations from physician leadership, and other published information as 4 out of 5, with 5 meaning very influential on their decision.
CONCLUSION: Full results of this study will be used to determine how well new information permeates the medical community, and identify effective methods of influencing prescribing practice.

Education/Training

130. Student perception of wiki in an elective course. *Sean M. Mirk, Pharm.D.*, Jill S. Burkiewicz, Pharm.D., BCPS, Kathy E. Fit, Pharm.D., BCPS; Midwestern University Chicago College of Pharmacy, Downers Grove, IL.

PURPOSE: This study surveyed third professional year pharmacy students enrolled in a pharmacy elective course in order to (1) describe student experiences and overall satisfaction with using wiki and (2) evaluate whether level of involvement in a wiki is associated with student performance or satisfaction. Faculty experience with using wiki was also assessed.
METHODS: A pre- and post-survey was used to evaluate previous experiences and satisfaction with wiki use as a voluntary option for participation points. Level of student involvement will be compared to student reported course performance and wiki satisfaction. Faculty feedback and experiences both in the classroom and with using wiki will be gathered.
RESULTS: Based on responses from the pre-survey 50% (14/28) of the students have used a wiki; none reported collaborating or participating in a wiki prior to the course. Of those who have used a wiki, 79% (11/14) have a very positive or positive attitude toward wikis, 86% (12/14) find wikis very useful or useful and 100% (14/14) said they use wikis to search for information. Information from the post-survey and faculty feedback is pending.
CONCLUSION: Students who are aware of wikis have a favorable attitude towards them. Wikis may provide a tool to actively involve students and to foster the idea of student-directed learning.

131. Student consumerism and educational attitudes: a comparison of a 4-year public institution versus a 3-year private institution. *Korey Kennelty, Pharm.D., Candidate*, Aaron Katz, Pharm.D. Candidate, Dawn Knudsen, Pharm.D., Mary Gurney, Ph.D., R.Ph.; Midwestern University College of Pharmacy—Glendale, Glendale, AZ.

PURPOSE: The purpose of this study is to determine and compare the level of consumerism and educational attitudes between pharmacy students at a 4-year public institution and a 3-year private institution. A potential consequence of competitive admissions standards, an arduous curriculum, differences in tuition and years of tuition paid, is an increase in the consumeristic expectations of pharmacy students.
METHODS: Students at a 3-year private institution ("Private") were recruited after attendance of a required class during October 2007. Inclusion criteria included students in the first or the last year of the pharmacy program. Second year students were excluded because they were off campus at this time. Comparison data is from a 4-year public institution ("Public") that had previously used the same survey. A 19-item survey was given to students. Four questions were used to obtain demographics. Fifteen of the questions were designed to assess student attitudes regarding their education. The students were asked to rate their responses from "strongly disagree" to "strongly agree" on a 5-point Likert scale using a ParSCORE scantron card. The "Private" results were compared to the "Public" results. Pearson correlations, Student *t*-tests and χ^2 tests were applied to the data as determined to be appropriate.
RESULTS: 288 "Public" and 163 "Private" students provided complete data from the survey. Preliminary results show: For the 14 items given students at both institutions, trends in the mean were identified. For 11 of the 14 items, pharmacy students attending the "Public" institution had higher means than students attending the "Private" institution. Final results will be completed by February 2008.
CONCLUSIONS: This information may be helpful in understanding the degree of students' consumerist and educational attitudes and applying that knowledge to teaching activities in and out of the classroom.

132. Comparing the impact of interventions made by doctor of pharmacy students to those of pharmacy residents. *Evangelia Davanos, Pharm.D.*[1], Tamara Goldberg, Pharm.D.[2], Robert DiGregorio, Pharm.D.[1], Boris Nogid, Pharm.D.[1], Evangelina Berrios-Colon, Pharm.D.[1]; (1)The Brooklyn Hospital Center, Brooklyn, NY; (2)Arnold and Marie Scwartz College of Pharmacy, Long Island University, Brooklyn, NY.

OBJECTIVE: ???
PURPOSE: Pharmacy schools introduce students to patient care activities early on in their curriculum,however it is during their 6th year experiential clerkships that students have the ability to make significant impacts on patient outcomes and contribute to cost savings. Pharmacy residency programs are designed to prepare pharmacists to become competent and confident practitioners of direct patient care. To date there is no direct comparison of interventions made by Pharm.D. students to those of pharmacy residents. The purpose of this study is to compare the impact of interventions made by Pharm.D. students to those interventions made by pharmacy residents.
METHODS: All interventions made by pharmacy students at The Brooklyn Hospital Center between September 1, 2006 and August 31, 2007 were retrospectively analyzed and the interventions made by pharmacy residents at TBHC between September 1, 2007 and August 31, 2008 will be prospectively evaluated. The interventions will be evaluated for type and level of impact, acceptance rates, and frequency. Acceptance rates for interventions will be recorded as followed, partially followed or not followed at all. All the interventions will be included regardless if they were patient- related or not. Data will be statistically analyzed using Chi squared test. We hypothesize that the pharmacy residents will show a higher level of impact due to their extensive training.
RESULTS: Preliminary data analysis has shown that on average, Pharm.D. students completed 18 interventions per month compared to 29 interventions per month performed by pharmacy residents. Acceptance rates for interventions were 89.5% in the Pharm.D. student group and 93% in the resident group. The percentage of interventions which were "not followed" in the Pharm.D. student and resident group respectively was 8.95% versus 4%. Slightly higher rates for interventions which were "partially followed" were seen in the resident group (3%) compared to (1.5%) in the student group.

Endocrinology

133. The rate of primary prevention for osteoporosis in long-term glucocorticoid use: A retrospective chart analysis. *Kate E. Schemmel, Pharm.D.*, Jill Burkiewicz, Pharm.D., BCPS, Carrie Sincak, Pharm.D., BCPS; Midwestern University Chicago College of Pharmacy, Downers Grove, IL.

PURPOSE: This study is designed to assess the rate at which bisphosphonates are prescribed for osteoporosis prophylaxis and treatment in patients receiving concurrent long-term glucocorticoid therapy. There is significant literature published demonstrating that there is a decreased risk for osteoporosis if bisphosphonates are prescribed as primary prevention in the long-term glucocorticoid therapy population. Despite these published benefits, gaps remain in physician prescribing patterns for these agents. Secondarily, this study hopes to investigate which predictors positively and negatively influence the rate of primary prevention prescribing.
METHODS: Electronic medical records of 250 randomly-selected patients receiving long-term glucocorticoid therapy at a prednisone-equivalent dose of 5 mg or more with treatment duration of at least 3 months at 1 academic center in the United States will be reviewed. The rates of bisphosphonate use as primary osteoporosis prevention will be assessed. Patient's medical history, indications for steroid use, dose of steroid, length of steroid treatment, prescribed bisphosphonate agent, and pertinent lab values will be documented. Glucocorticoid dose ≥ 7.5 mg/day, specialty care, postmenopausal status and history of GERD/PUD, will be collected and assessed as possible predictors of bisphosphonate use or non-use.
RESULTS: Nine hundred patients have been identified as meeting the inclusion criteria. Electronic medical records for 250 randomly selected patients will be reviewed. Data collection and analysis is currently underway.
CONCLUSIONS: This study will determine the rate of primary osteoporosis prevention prescribing in long-term glucocorticoid patients. Identified

predictors of bisphosphonate use may be potential barriers to use. As such, this study hopes to discover a potential role for pharmacists to alleviate these barriers and ensure that all long-term glucocorticoid therapy patients receive appropriate bisphosphonate prophylaxis.

Health Services Research

134. Implementing observer methodology to determine the impact of bar-code medication administration and infusion pump technologies on medication administration errors. *Pieter J. Helmons, Pharm.D*, Lindsay N. Wargel, Pharm.D., Charles E. Daniels, Ph.D.; UCSD Medical Center, department of Pharmacy, San Diego, CA.

PURPOSE: Administration errors are the most dangerous type of medication errors, as they are abundant and unlikely to be intercepted. Bar-code medication administration (BCMA) and intelligent infusion pump technologies ("smart-pumps") complement each other in decreasing medication administration errors. The additive effects of sequential implementation of these technologies on medication administration errors are unknown. The goals of this study are to implement observer methodology to determine medication administration errors and the additive effects of BCMA and smart-pump technologies on the incidence of these errors.
METHODS: This study is conducted on two medical-surgical units and two Intensive Care Units (ICU). A validated observation methodology is used to determine the medication administration error rates. After training the observers and assuring adequate interrater reliability, observations are conducted before and after implementation of each technology. Medication errors are determined by matching the observed medication administered to the patients with the scheduled medication in the electronic medication record.
RESULTS: The results of the pre bar-coding observations on the two medical surgical units are described here. Pre bar-coding observations on the ICU's are scheduled in November 2007 and post bar-coding observations on both units are finalized by March 2008. Observations pre and post smart-pump implementation are scheduled in May and September 2008.We observed 888 medication administrations (509 and 379 medication administrations on each medical surgical ward). We found an average pre bar-coding error rate of 10.4% (7.7% if time errors are excluded). Omissions (37% of all errors), drug unavailable (34%) and time errors (26%) were the most prevalent errors.
CONCLUSION: We successfully implemented the observer methodology in our hospital. On the medical-surgical units, we found error rates that are in line with other studies using similar methodology. We expect that bar-coding implementation will decrease the errors of omission and time errors identified by this methodology.

135. Increasing employee influenza vaccination rates utilizing immunization certified pharmacists. *Jamie L. Glore, Pharm.D.*, Kerri S. Parks, Pharm.D., David Kuhl, Pharm.D., Marilyn Lee, Pharm.D., BCPS; Regional Medical Center at Memphis, Memphis, TN.

PURPOSE: Documentation of employee influenza vaccination status is now required to comply with state law and recommended to improve patient safety by the Centers for Medicare and Medicaid Services (CMS). Our institution's employee vaccination rate in 2006 was 20%. The purpose of this study is to demonstrate the effect of utilizing immunization certified pharmacists in collaboration with nurses as part of an interdisciplinary focused influenza vaccination initiative to increase employee influenza vaccination rates.
METHODS: This is a prospective, single center study conducted in a tertiary care teaching hospital from October 1 to November 30, 2007. During the month of September 2007, there was an organized educational initiative to educate employees about the influenza vaccination and dispel common surrounding myths. Beginning in October, all employees were required to fill out a hospital approved form which screened for contraindications, allowed for documentation of annual vaccination, and provided the employee the option to decline as well as include rational for declination. Decentralized, vaccination certified pharmacists and nurses with mobile vaccination carts were available to assist with screening and vaccination of employees (healthcare professionals and non-professional staff). Vaccination rates were compared to historic employee vaccination rates from 2006 using chi square analysis. Additionally, reasons for declination were evaluated.
RESULTS: As of November 14, 2007, 1297 of 3041 (42.7%) employees have been vaccinated ($p<0.001$ vs. 2006), and 550 (18%) employees have declined vaccination. The most common reasons for declination were "I have been sick from the flu shot in the past" (n=107, 19%) and "don't need it" (n=53, 9%).
CONCLUSION: Immunization certified pharmacists involved in an employee vaccination program improved compliance with patient safety recommendations and state law. Innovative immunization initiatives incorporating pharmacists should be incorporated into health-systems' employee vaccination programs.

Hematology/Anticoagulation

136. Timing to reversal of INR with vitamin K at an urban teaching hospital. *Kristin A. Tuiskula, Pharm.D.*[1], Karyn M. Sullivan, RPh, MPH[2], Matthew A. Silva, Pharm.D., BCPS[2], Michael J. Ditoro, Pharm.D.[1], Linda M. Spooner, Pharm.D., BCPS[2], Abir O. Kanaan, Pharm.D.[2]; (1)St. Vincent Hospital, Worcester, MA; (2)Massachusetts College of Pharmacy and Health Sciences, Worcester, MA.

PURPOSE: Vitamin K (vitK) dose and route of administration prescribing practices for supratherapeutic INR varies among physicians. To standardize our practice and optimize patient care, we propose a study evaluating the relationship between vitK dose, route of administration, and reversal time.
METHODS: A retrospective chart review of patients presenting with supratherapeutic INR and receiving vitK starting January 2007 is in progress. The following data will be evaluated: INR upon presentation, goal INR for indication (< 1.6 for surgery, 2.5–3.5 for prosthetic heart valve, and 2–3 for all other indications), vitK dose and route, and administration of blood products. A cross comparison was conducted using two-sided p values and T-test analysis.
PRELIMINARY RESULTS: Twenty-five patients were evaluated; preliminary results are as follows: 1. Goal < 1.6: 10mg orally achieved reversal in 19.7 hrs compared to 35.3 hrs with 5 mg subcutaneously (SC) ($p=0.0355$). The mean initial INR (MIINR) in the oral group was 3.3 compared to 5.4 in the SC group ($p=0.4765$), 2. Goal 2–3: 10 mg orally achieved reversal in 26.1 hrs compared to 43.5 hrs with 10 mg SC group ($p=0.0371$). The MIINR in the oral group was 5.35 compared to 6.6 in the SC group ($p=0.7177$), 3. Goal 2.5–3.5: 5 mg SC achieved reversal in 20 hrs and the MIINR was 5.3. There was no difference in reversal time with 10 mg oral for INR goal of < 1.6 vs. INR goal of 2–3 ($p=0.3444$). A difference was observed in the reversal time with 5 mg SC for INR goal of 2.5–3.5 vs. INR goal of < 1.6 ($p=0.0397$). More blood products were administered in SC groups compared to oral groups (11 vs. 6 patients).
CONCLUSION: Preliminary results suggest that vitK oral administration may be more effective in reversing supratherapeutic INR compared to the subcutaneous route. More patients need to be included to have a definitive recommendation.

137. A pilot study to compare activated partial thromboplastin time to anti-factor Xa levels. *Linda H. Ghobrial, Pharm.D.*, Katie Greenlee, Pharm.D., BCPS, Jeffrey Ketz, Pharm.D., BCPS, Michael Militello, Pharm.D., BCPS, Kandice Marchant, M.D., Ph.D.; Cleveland Clinic, Cleveland, OH.

PURPOSE: Activated partial thromboplastin time (aPTT) is the standard assay for measurement of unfractionated heparin (UFH) anticoagulation. Therapeutic aPTT levels for heparin are derived from correlation of aPTT to anti-factor Xa (anti-Xa) assays. The full-dose weight-based nomogram at our institution consists of 80 units/kg bolus and 18 units/kg/hr infusion. The institution-specific therapeutic aPTT range for the nomogram is 56–78 seconds, which correlates to an anti-Xa level of 0.3–0.7 units/ml. Laboratory performed correlation (r) of therapeutic aPTT to anti-Xa is 0.778 for the current aPTT reagent. The correlation and concordance of aPTT and anti-Xa results in a subset of patients receiving full-dose heparin were investigated, as part of a recent evaluation of the heparin nomogram.
METHODS: Anti-Xa assays were performed on 40 frozen aPTT samples in 12 patients on the full-dose weight-based heparin nomogram to determine the correlation and rate of concordance of aPTT and anti-Xa values.
RESULTS: The Pearson's correlation coefficient (r) was 0.747 for aPTT and anti-Xa values. Of the 40 samples, 26 (65%) showed concordance, defined as aPTT and anti-Xa results both therapeutic or both non-therapeutic. There were 14/40 (35%) samples which were discordant.
CONCLUSION: The Pearson's correlation coefficient of aPTT and anti-Xa in patients evaluated on the heparin nomogram was similar to the correlation reported by the laboratory during derivation of the aPTT therapeutic range. There is a high rate of discordance of aPTT and anti-Xa results of individual blood samples. Discordance of aPTT and anti-Xa results indicates that heparin dosing may not be optimal when aPTT is used for heparin monitoring. Results are being used to guide a larger study of the effectiveness of the heparin nomogram and the use of anti-factor Xa assay for heparin monitoring.

HIV/AIDS

138. Health disparities among HIV patients in the 2005 National Ambulatory Medical Care Survey (NAMCS): a critical analysis of prescribing patterns in the United States. *Christine U. Oramasionwu, Pharm.D., M.Sc., Candidate*, Christopher R. Frei, Pharm.D., M.Sc., BCPS; The University of Texas at Austin and The University of Texas Health Science Center at San Antonio, San Antonio, TX.

PURPOSE: The administration of antiretroviral therapy (ART) is associated with improved patient outcomes for HIV patients. Nevertheless, many patients fail to receive appropriate ART; therefore, this study aimed to

identify patient factors associated with failure to receive guideline-concordant ART.
METHODS: Data were extracted from the 2005 NAMCS. HIV patients were defined as those that received at least one antiretroviral during their ambulatory care visit. Data included patient age, gender, race, ethnicity, geographic region, insurance status, and medications. Antiretroviral medications were evaluated for appropriateness according to antiretroviral guidelines from the Department of Health and Human Services. Appropriate and inappropriate groups were compared using the Chi-square or Fisher's Exact test.
RESULTS: Antiretroviral therapy was mentioned in 34 of 25,665 visits. These patients had a mean (±SD) age of 49±11 years, 71% were male, 62% were white, 56% had Medicaid/SCHIP, and 47% were located in the Western United States. Only 71% received appropriate therapy: two nucleoside reverse transcriptase inhibitors (NRTIs) + one non-nucleoside reverse transcriptase inhibitor (NNRTI) (38%), two NRTIs + two protease inhibitors (PIs) (25%), or three NRTIs + two PIs (17%). Common inappropriate regimens included: NRTI (50%), PI (20%), and NNRTI (20%) monotherapy. Patients ≥50 years of age were less likely to receive appropriate therapy (25% vs. 80%, p=0.003), whereas patients with Medicaid/SCHIP were more likely to receive appropriate therapy (66% vs. 30%, p=0.048). Comparisons of appropriate ART use among females vs. males (21% vs. 50%, p=0.1) and whites vs. non-whites (54% vs. 80%, p=0.2); failed to achieve statistical significance however, the post-hoc power for these statistics were only 21% and 33%, respectively.
CONCLUSION: One-third of HIV patients in the 2005 NAMCS received suboptimal antiretroviral therapy. Older patients and those without Medicaid/SCHIP were less likely to receive guideline-endorsed therapies.

Infectious Diseases

139. Compliance with Healthy People 2010 Initiatives on the use of vancomycin in a medical intensive care unit. *Hung M. Le, Pharm.D.*, Linda W. Kam, Pharm.D., BCPS; James A. Haley Veterans' Hospital, Tampa, FL.

BACKGROUND: Healthy People 2010 initiative recognizes the importance of reducing vancomycin use among intensive care unit patients due to significant increase in the prevalence of bacterial resistance to vancomycin. The target is to achieve a 20 percent reduction from the baseline of vancomycin use. The objective of the study is to determine the amount of intravenous vancomycin used in the medical intensive care unit (MICU) at the James A. Haley Veterans Hospital and assess compliance with the target set by Healthy People 2010.
STUDY METHODS: This study will be submitted to the Institutional Review Board for approval. This is a retrospective chart review study. The primary outcome is to determine average vancomycin doses per 1,000 patient-days used in the MICU at the James A. Haley Veterans' Hospital in compliance with the Healthy People 2010. The secondary outcomes are to compare 2004 national benchmark of vancomycin use in MICU, to assess compliance with CDC guidelines in regards to indication and duration of therapy; to measure incidence of intravenous vancomycin for empiric versus definitive therapy defined by documented microbiological culture positivity; to evaluate culture
RESULTS: methicillin-resistant *Staphylococcus aureus*, methicillin-sensitive *Staphylococcus aureus*, methicillin-resistant *Staphylococcus epidermidis*, vancomycin-resistant enterococci. The study setting is the 15-bed MICU at the James A. Haley Veterans Hospital. All MICU patients received intravenous vancomycin therapy during the study period of October 1, 2007 and March 31, 2008 will be included in the study. A list of MICU patients who received vancomycin will be identified each day through the pharmacy computer database. A chart review using the computerized patient record system (CPRS) will be initiated to gather pertinent patient information. Data will be collected including dose and duration of vancomycin therapy, indication for vancomycin, culture and sensitivities.

140. Evaluation and clinical impact of concomitant administration of polyvalent cations with oral fluoroquinolones. *Michael A. DeCoske, Pharm.D.*, Nicole M. Bohm, Pharm.D.; Medical University of South Carolina, Charleston, SC.

PURPOSE: The in vitro interaction between fluoroquinolones (FQ) and concomitant polyvalent cations (PVC) resulting in decreased FQ bioavailability has been extensively characterized. However, there is a paucity of information regarding its clinical significance or the extent of inappropriate scheduling. The goal of this study is to characterize scheduling errors and identify resultant treatment failures.
METHODS: A retrospective review of adult patients who were prescribed oral FQ for at least 2 days between January 1 and August 31, 2007 was performed. Appropriateness of PVC scheduling was assessed based on recommendations by the manufacturers and common clinical practice. Changes in individual pathogen susceptibility and alterations in antibacterial regimens likely attributable to clinical failure were analyzed. Additional analysis is pending; results will be presented.
RESULTS: A preliminary analysis of the first 41 patients concurrently receiving FQ and PVC reveals that 100% were scheduled inappropriately according to the recommendations by the manufacturers. Of 48 PVC doses concurrently administered, 38% were scheduled for administration at least 2 hours apart from the FQ as suggested by our hospital but did not meet recommendations by the manufacturers, while the remaining 62% were scheduled within 2 hours of FQ administration.
Twelve patients were deemed a clinical failure due to alterations in antibiotic regimen, which included switching from oral to intravenous FQ while medications continued to be given orally (6%) or changing to a different antibiotic in the absence of new microbiologic data (17%). One isolate of Escherichia Coli that had previously demonstrated sensitivity became resistant. Overall, 25% of patients met criteria for treatment failure.
CONCLUSIONS: Concomitant administration of FQ and PVC appears to be associated with treatment failure. Healthcare practitioners must maintain vigilance to avoid inappropriate scheduling, which occurred commonly in this study, to prevent potentially significant drug interactions.

141. Impact of a pharmacist-managed standing orders program on pneumococcal vaccination rates of hospitalized patients. *Kerri S. Parks, Pharm.D.*, Jamie Glore, Pharm.D., David Kuhl, Pharm.D., Marilyn Lee, Pharm.D.; Regional Medical Center at Memphis, Memphis, TN.

PURPOSE: Pneumococcal vaccination improves outcomes in at risk populations. Accordingly, the 2008 Centers for Medicare and Medicaid Services (CMS) Core Measures require hospitals to provide documentation of vaccine administration to patients who meet criteria established by the Centers for Disease Control (CDC). This study evaluates the impact of a pharmacist-managed standing orders program on pneumococcal vaccination rates among hospitalized adults.
METHODS: This is a prospective, single center study conducted in a tertiary care teaching hospital from October 15, 2007 to January 15, 2008. All patients 50 years of age or older receiving antibiotics were screened. A standing order form with screening criteria and administration recommendations was used to determine vaccination status and to provide documentation for the medical record. Vaccination history was obtained from each patient's chart, previous discharge summaries, and through patient interviews. Patients meeting CDC criteria were vaccinated. Pneumovax® was ordered by the pharmacist using the standing orders form and administered by either the nurse or pharmacist. Vaccination rates for the project were compared to a retrospective group of 95 patients admitted from September 24 through October 12, 2007.
RESULTS: A total of 102 patients were screened in the intervention period through November 2, 2007. The number of patients receiving prior vaccination or not meeting criteria for vaccination were not different between the baseline 51 (53.7%) and intervention 61 (59.8%) groups (p=0.4). Patients not vaccinated, but meeting criteria for immunization, decreased from 29 (30.5%) to 10 (9.8%), p<0.001. Vaccination rates increased from 15.8% (n=15) to 30.4% (n=31), p=0.016.
CONCLUSION: A proactive approach to patient pneumococcal vaccination dramatically decreases missed vaccination opportunities and increases compliance with CMS measures. Pharmacists should be integrated into health system immunization initiatives.

142. Evaluation of antimicrobial selection for healthcare-associated pneumonia before and after the implementation of a guideline-supported emergency department protocol. *Lisa Keller, Pharm.D.*[1], Douglas Slain, Pharm.D., BCPS[2], Michael Sweet, Pharm.D.[3], Scott Kincaid, Pharm.D.[4]; (1)West Virginia University Hospitals/West Virginia University School of Pharmacy, Morgantown, WV; (2)West Virginia University School of Pharmacy, Morgantown, WV; (3)West Virginia University Hospitals, Morgantown, WV; (4)South University School of Pharmacy, Savannah, GA.

PURPOSE: Healthcare-associated pneumonia (HCAP), which includes patients admitted from nursing homes and long-term care facilities, is a relatively new entity now included with the hospital-acquired (HAP) and ventilator-associated pneumonia (VAP) guidelines. The 2005 American Thoracic Society (ATS) and The Infectious Diseases Society of America (IDSA) guidelines for the management of HAP, HCAP and VAP state that these conditions should be treated initially with broad-spectrum antimicrobials targeting multidrug-resistant pathogens. Following the guideline publication, our institution employed a guideline-based emergency department (ED) protocol for HCAP treatment. The objectives of this study are to evaluate antimicrobial selection before and after the ED protocol implementation and determine the rate of compliance to this protocol and the national guidelines.
METHODS: A retrospective analysis was performed of patients admitted to the ED from a nursing home, long-term care facility, or a local inpatient rehabilitation center that received antimicrobials for pneumonia. Age, sex, admission source (facility), length of stay, patient expiration, initial antibiotic selection, culture site and positive culture results were documented.
RESULTS: Sixty-five patients were included in this study. The average age was 72 years. Fifty-one patients were admitted prior to and 14 patients were admitted following protocol implementation. Compliance rate increased from 6% to 79% following ED-protocol implementation. Of the overall non-compliant regimens, 6% did not have methicillin-resistant *Staphylococcus*

aureus coverage, 6% did not have combination therapy for targeted gram-negative organisms, and 66% received neither. More data will be presented on the post-ED protocol population at a later date.
CONCLUSIONS: The percentage of patients receiving ATS/IDSA-recommended HCAP treatment increased following implementation of the emergency department protocol.

143. Ertapenem as empiric substitution for ampicillin/sulbactam in complicated intra-abdominal infections. *Lisa Rene, Pharm.D.*[1], Debra Goff, Pharm.D., FCCP[2], Jay M. Mirtallo, M.S., RPh, BCNSP, FASHP[2], Julie Mangino, M.D.[3]; (1)The Ohio State University Medical Center, 410 West 10th Avenue, Columbus, OH; (2)The Ohio State University Medical Center, Columbus, OH; (3)*The Ohio State University Medical Center, Columbus, OH.

PURPOSE: Complicated intra-abdominal infections (cIAI) are most frequently caused by *Escherichia coli*. The 2006 hospital-wide antibiogram reported *E. coli* susceptibility to ampicillin/sulbactam (A/S), ertapenem, and piperacillin/tazobactam (P/T) as 52%, 100%, and 92%, respectively. This is a retrospective review of empiric use of A/S, ertapenem, and P/T for postoperative cIAI during a 3-month period. The proportion of patients without risk factors for *Pseudomonas aeruginosa* who received P/T is also reported.
METHODS: In May 2007, ertapenem became the recommended agent by the Antibiotic Subcommittee for non-ICU patients with postoperative cIAI. Staff was notified through the Pharmacy and Therapeutics bulletin. When A/S was prescribed, a pharmacist was to contact the physician for an ertapenem switch. If P/T was prescribed, the case was reviewed for *P. aeruginosa* risk, and physician was contacted. Patients were identified through daily reports of A/S, ertapenem, and P/T use by the general surgical service. Data collected included patient demographics, operative procedure, antibiotic indication, days of postoperative antibiotics, and microbiology results (including *Clostridium difficile*) until discontinuation of antibiotics or hospital discharge. Appropriateness and timing of preoperative antibiotic prophylaxis were reviewed. Study results will be used to identify additional education and interventions.
RESULTS: Results for 60/110 patients are reported. Thirty-five patients met inclusion criteria. Prescribing of A/S, ertapenem, and P/T was 14%, 23%, and 63%, respectively. In 46% of cases, guidelines for appropriate antibiotic selection were followed. P/T was used in 46% of patients without *P. aeruginosa* risk. Pharmacist interventions were poorly documented and infrequent.
CONCLUSIONS: Compliance with the guideline was poor. In the antibiotic resistance era, patients without *P. aeruginosa* risk factors should not receive P/T. Additional, formal re-education of physicians with consistent pharmacist interventions is necessary. The complete analysis of 110 patients including 65 cIAI patients will be presented at the 2008 ACCP Spring Practice and Research Forum.

144. Analysis of vancomycin minimum inhibitory concentrations, plasma levels, and treatment outcomes for methicillin-resistant *Staphylococcus aureus* bloodstream infections. *Natalie Boyd, Pharm.D., M.S.*[1], Jon D. Herrington, Pharm.D.[2], Robert Fader, Ph.D.[2]; (1)University of Texas at Austin College of Pharmacy, Temple, TX; (2)Scott & White Memorial Hospital, Temple, TX.

PURPOSE: Clinical failures with vancomycin treatment for methicillin-resistant *Staphylococcus aureus* (MRSA) infections are increasing, despite reported susceptibilities. This study will investigate the relationship between in vitro MIC data and vancomycin efficacy against MRSA bloodstream infections and evaluate outcomes in relation to pharmacokinetic monitoring and dosage adjustment of vancomycin.
METHODS: Patients hospitalized at Scott & White > 18 years and with positive MRSA blood cultures will be included in the study. Patients with presumed or confirmed central nervous system infections will be excluded. MICs will be determined via epsilometer test strips (E-test). Vancomycin serum levels will be monitored and pharmacokinetics will be calculated. Outcomes will be assessed as either clinical success, defined as resolution of fever, leukocytosis, and local signs of infection or failure, defined as lack of improvement, worsening of signs and symptoms of infection, requiring a different antibiotic, or relapse. Outcomes will be correlated with response rate of vancomycin for MRSA bloodstream infections with MICs of < 1 µg/ml, 1–1.5 µg/ml, and > 1.5 µg/ml.
RESULTS: Preliminary data shows that during a 12 month period, 135 bloodstream isolates were positive for *S. aureus* and 56% (76/135) of these isolates were MRSA. Vancomycin MICs were measured for 43 of the 76 MRSA isolates. The percent of isolates with MICs of 2, 1.5, 1, and < 1 µg/ml were 16%, 19%, 39%, and 26%, respectively.
CONCLUSION: The pilot data suggest that the median vancomycin MIC for MRSA bloodstream isolates is 1 µg/ml. Studies are currently ongoing to delineate the relationship between vancomycin MICs and response rates for MRSA bloodstream infections.

Nephrology

145. Home medication regimen changes over time in daily nocturnal home hemodialysis patients. *Katie E. Pallotta, Pharm.D.*[1], Darren W. Grabe, Pharm.D.[1], Harold J. Manley, Pharm.D., BCPS[2], Shari Meola, R.N.[3], Christopher D. Hoy, M.D.[3], George R. Bailie, Pharm.D., Ph.D., MSc[1]; (1)Albany College of Pharmacy, Albany, NY; (2)VillageHealth Disease Management, Glenmont, NY; (3)Hortense and Louis Rubin Dialysis Center, Inc., Clifton Park, NY.

PURPOSE: Simplification of medication regimens may improve medication adherence, which is poor in end stage kidney disease patients. Daily nocturnal home hemodialysis (DNHD) has proven benefits, however its effect on medication burden is unknown. We examined medication regimen changes in patients who changed from another form of kidney replacement to DNHD.
METHODS: A retrospective analysis of 41 DNHD patients over a 2-year period was conducted. Demographic and medication regimen information was collected at baseline (prior to DNHD training), on day 1 of DNHD (following training), and at 3, 6, 12, 18, and 24 months of DNHD. Medication regimen changes, including number of medications, daily pill burden (PB), and number of total administration times per day were determined at each time point for each patient. Home medications used to treat anemia, renal osteodystrophy (ROD), and cardiovascular (CV) disease were analyzed for number of medications and PB.
RESULTS: The mean age at the start of DNHD therapy was 53.5 ± 11.3 years. Thirty-two percent of patients were female and 86% Caucasian. Patients were prescribed 10.4 ± 4.4 home medications at baseline and 12.6 ± 4.8 at study end (p=0.067). Number of home anemia medications significantly increased (p<0.001), number of ROD medications decreased (p=0.027), and number of CV medications did not change significantly (p=0.087). Total PB did not change significantly over 24 months (p=0.884), nor did anemia PB (0.876). ROD and CV PB decreased (p=0.015 and p=0.039, respectively). Number of medication administration times per day decreased from 5.0 ± 1.5 at baseline to 3.8 ± 1.5 at 24 months on DNHD (p=0.003).
CONCLUSIONS: Medication burden changes over time in end stage kidney disease patients after changing to DNHD. Although total number of medications did not change significantly by 24 months, other changes in the regimen occurred.

146. Comparison of phosphate binder exposure and all-cause mortality among veterans on hemodialysis. *Abril S. Atherton, Pharm.D.*[1], Ravindra Pathak, Pharm.D., Ph.D., M.B.A.[2]; (1)University of Utah Pharmacotherapy Outcomes Research Center, Salt Lake City, UT; (2)Salt Lake City Veterans Affairs Medical Center, Salt Lake City, UT.

INTRODUCTION: The incidence and prevalence of stage-5 chronic kidney disease (end stage renal disease) in the US is estimated to be 107,000 and 485,000, respectively. Management of hyperphosphatemia is difficult in these patients and is the leading cause of morbidity and mortality. Calcium acetate, sevelamer and lanthanum carbonate are the three FDA approved dietary phosphate-binders. The aim of this study is to assess the all-cause mortality and clinical effectiveness of these medications in veterans with end-stage renal disease (ESRD) undergoing hemodialysis.
METHODS: Retrospective data will be obtained from 2005–2007 using the VA information Systems and Technology Architecture (VISTA) system. Patients with ESRD will be identified using ICD 9 codes (585.5 and 585.6), hemodialysis procedural codes(V56.31)and the code for hemodialysis (39.95). ESRD patients not undergoing hemodialysis, those receiving chemotherapy or those requiring more than one oral phosphate binder will be excluded. Patient exposure days to phosphate binders and all cause mortality will be assessed using ANOVA (null hypothesis will be rejected if the study finds a statistically significant difference in mortality among the three dietary phosphate binders) and evaluated using Kaplan Meier survival curves and Cox regression analysis. Secondary outcomes, including serum chemistries and hospitalizations will be compared using ANOVA among the 3 different phosphate binders.
RESULTS: 184 veterans with ESRD and receiving hemodialysis were identified. Utilization days of sevelamer, calcium acetate and lanthanum carbonate were 4290, 691 and 290, respectively. Data is currently being analyzed to assess all cause mortality and comparative effectiveness of these dietary phosphate binders.
CONCLUSION: Details will be presented at the meeting. However, a preliminary analysis indicates that lanthanum was very poorly tolerated by the veterans. It also had the highest discontinuation rates, and its effectiveness in lowering serum phosphate appeared to be inferior to the other dietary phosphate binders.

Oncology

147. Evaluation of oxaliplatin versus irinotecan based first-line chemotherapy for advanced colorectal cancer. *Rebecca L. Owens, Pharm.D.*[1],

Rebecca Boudreaux, Pharm.D.[1], Trevor McKibbin, Pharm.D., M.Sc., BCPS[2], Jim Koeller, M.S.[1]; (1)University of Texas at Austin and University of Texas Health Science Center San Antonio, San Antonio, TX; (2)University of Tennessee Health Science Center, Memphis, TN.

PURPOSE: Both irinotecan- and oxaliplatin-based regimens are utilized in the treatment of metastatic colorectal cancer (MCRC). However, survival outcome may be influenced by the initial regimen. The purpose of this study is to evaluate survival rates for MCRC patients treated with either irinotecan- or oxaliplatin-based regimens in community oncology practice.
METHODS: A national, multi-centered, retrospective chart review was performed at 10 community oncology settings throughout the United States. Data were collected on baseline demographics, initial performance status, initial regimen, cycles of first-line regimen, toxicities, and survival. To control for confounding, characteristics significantly different between groups ($p \leq 0.05$) in univariate regression were introduced into a multivariate regression model. The model evaluated survival between patients treated with irinotecan or oxaliplatin regimens while adjusting for potential confounders identified (performance status and number of cycles received).
RESULTS: This analysis included 367 patients treated with irinotecan- (n=110) or oxaliplatin-based (n=257) initial regimens. Survival rates were similar between patients on irinotecan- (n=59, 54%) versus oxaliplatin-based regimens on univariate analysis (n=143, 56%, p=0.70). Performance status and cycles received of the first-line regimen were significantly different between the groups. Patients in the oxaliplatin group had a lower initial performance status compared to irinotecan ($p<0.03$). Patients on irinotecan regimens received fewer cycles of therapy than did patients on oxaliplatin regimens (median 5 versus 7, $p<0.004$). In a multivariate model controlling for performance status and cycles received, survival rates between the groups remained similar (p=0.73). The number of cycles of the first-line regimen received was the only factor that was independently predictive of survival in the multivariate model.
CONCLUSION: This retrospective review of patients with MCRC suggests that there is no difference in survival between patients who initially receive oxaliplatin versus irinotecan based regimens.

148. A retrospective analysis of the impact of weight loss on overall survival in advanced colorectal cancer patients initially treated with oxaliplatin- or irinotecan-based regimens in community oncology practice. *Rebecca D. Boudreaux, Pharm.D.*[1], Rebecca L. Owens, Pharm.D.[1], Trevor McKibbin, Pharm.D., M.S., BCPS[2], Jim Koeller, M.S.[3]; (1)University of Texas at Austin and University of Texas Health Science Center at San Antonio, San Antonio, TX; (2)University of Tennessee Health Science Center, Memphis, TN; (3)University of Texas at Austin and University of Texas Health Science Center San Antonio, San Antonio, TX.

PURPOSE: Both oxaliplatin- and irinotecan-based chemotherapy regimens are acceptable therapy for metastatic colorectal cancer (MCRC). However, these regimens have significant toxicity differences. Weight loss and performance status (PS) are indicators of functional status and are related to the toxicity seen with these regimens. We investigated the association between overall survival and both performance status and percent weight loss after initial therapy with oxaliplatin- or irinotecan-based regimens.
METHODS: A national, multi-centered retrospective chart review of MCRC patients treated after January 2003 was conducted at 10 community oncology settings throughout the US (CA, FL, MA, ME, MT, NV, NY, OH, TX). Data were collected on baseline demographics, performance status, medications, toxicity-related events, and mortality. A multi-variate regression model was constructed with mortality as the dependent variable and performance status as a confounder.
RESULTS: 372 patients received initial treatment with oxaliplatin (N=262) or irinotecan (N = 110) based therapies. There was no significant difference in weight loss (> 5% from baseline) during initial therapy between oxaliplatin and irinotecan regimens (26% vs 21%, respectively; p=0.3). Survival rates at last follow-up were 55% for oxaliplatin therapy and 53% for irinotecan therapy (p=0.7). Baseline characteristics of age, gender, and body mass index at treatment initiation were similar for both groups on univariate analysis ($p>0.05$ for all comparisons). Performance status was significantly worse at baseline for patients treated with irinotecan therapy compared to oxaliplatin therapy (p=0.045). However, there was no difference in overall survival associated with weight loss > 5% between treatment groups when evaluated by multi-variate regression with performance status as a potential confounder (p=0.9).
CONCLUSION: Weight loss greater than 5% from baseline during initial treatment was not statistically different among MCRC patients treated with oxaliplatin- or irinotecan-based regimens and was not associated with a decrease in overall survival when adjusted for performance status.

Pain Management/Analgesia

149. Efficacy of continuous peripheral nerve blockade in the management of total knee arthroplasty pain. Does preoperative education improve patient outcomes related to pain control?. *Molly E. Adams, Pharm.D.*[1], Tudy Hodgman, Pharm.D., BCPS, FCCM[1], Jill Moscato, R.N., APN[2], Alanna Ackerson, RN, APN[2]; (1)Midwestern University Chicago College of Pharmacy, Downers Grove, IL; (2)Northwest Community Hospital, Arlington Heights, IL.

PURPOSE: Narcotics work well as analgesics after total knee arthroplasty (TKA), but are associated with many adverse effects. Our purpose is to evaluate if continuous peripheral nerve blockade with ropivicaine and education during and after TKA decreases narcotic use and decreases side effects associated with narcotic analgesia.
METHODS: A chart review was conducted of TKA patients at Northwest Community Hospital. Patients were included if they had a unilateral TKA during the months of June to September 2007. Patients were separated into three groups: no continuous nerve block; continuous nerve block with or without preoperative pain pump and medication education. Standardized education was initiated in August 2007. Data collected included: amount of narcotic equivalents used (PACU and 48h postop), highest pain score in PACU, LOS in PACU and hospital, use of anti-emetics (PACU and 48h postop), and adverse events noted.
RESULTS: Data has been collected on 45 patients (5 no block; 26 block without education; 14 block with education). These preliminary results show an average PACU highest pain score of 5 (0–10) (3.8 no block, 2.92 block without, 3.82 with education). PACU LOS for most patients was > 90 minutes. Five patients required the use of anti-emetic in the PACU (1 no block; 4 block without education) and 14 required an anti-emetic on the floor (2 no block, 8 block without, 4 with education). The most common adverse event was breakthrough pain. Average LOS for the hospital is 3.5 days (3 no block, 3.77 block without, 3.36 with education). Further analysis is pending.
CONCLUSION: Our preliminary results suggest that average high pain score is lower for the groups receiving continuous nerve block. Treatment with continuous nerve block does not appear to affect PACU or hospital LOS. Anti-emetic use is slightly lower for the groups with continuous nerve blocks.

Pediatrics

151. Evaluation of medication dosing in overweight children. *Jamie L. Miller, Pharm.D.*, Peter N. Johnson, Pharm.D., Donald Harrison, Ph.D., Tracy M. Hagemann, Pharm.D.; University of Oklahoma College of Pharmacy, Oklahoma City, OK.

PURPOSE: The incidence of overweight children in the U.S. has significantly increased over the last three decades. Baseline data for the number of overweight children admitted to institutional settings has not been established. Weight-based dosing in pediatric patients (mg/kg/dose or mg/kg/day) is the most common empiric strategy for dosing medications in children. In overweight children, this dosing strategy could result in under/over dosing leading to a lack of efficacy or toxicity from medications. The objective of this study is to document the number of overweight pediatric patients to 1.) determine the percentage of patients admitted to our institution with a BMI > 85th percentile and 2.) identify the number of occurrences of over/under dosing of analgesics and antimicrobials.
METHODS: This is a retrospective, pilot study of patients 5–12 years of age with a BMI > 85th percentile admitted between January 1–June 30, 2007. Data collection includes baseline demographics and the dosing regimen of analgesics and antimicrobials for patients with a BMI > 85th percentile. A potential under-dose is defined as: (1) < 90% of the minimum recommended pediatric dose (mg/kg/day) and below the minimum adult recommended dose (mg/day); (2) doses/day less than recommended according patient age. A potential overdose is defined as: (1) > 110% of the maximum recommended pediatric dose; (2) dose exceeding maximum recommended adult dose. χ^2 analyses will be performed to assess potential association between BMI percentile and presence of over/under dosing. Data will be analyzed using SPSS for Windows (v14.0) with the priori level of significance set at $p<0.05$.
RESULTS: Preliminary data analysis indicates that 37% (312/843) of pediatric patients admitted to our institution during this timeframe have a BMI > 85th percentile.
CONCLUSIONS: Data analysis in progress. Final results to be presented.

152. Retrospective review of current antiemetic approach in pediatric cancer patients receiving inpatient chemotherapy. *Madeline O. Willen, Pharm.D.*, Jennifer Grant, Pharm.D., Stephanie Fuhrman, Pharm.D., Sarah Sobotik, Pharm.D., Brian Yarberry, Pharm.D.; Kosair Children's Hospital, Louisville, KY.

PURPOSE: The American Society of Clinical Oncologist (ASCO) current antiemetic guidelines suggest 5-HT3 serotonin-receptor antagonist with, or without, a corticosteroid for the prevention of chemotherapy-induced nausea and vomiting (CINV). The objective of this study is to retrospectively evaluate the effectiveness of antiemetic approaches used for pediatric oncology patients at Kosair Children's Hospital to prevent and treat CINV.
METHODS: Prior to commencement, this study will be submitted to the Institutional Review Board for approval. Kosair Children's Hospital electronic

medical record system will be used to identify patients who, since March 1, 2007 to August 31, 2007, received antiemetics to prevent CINV. Patient not receiving chemotherapy, those receiving oral chemotherapy, or those treated on an outpatient basis will be excluded. The following data will be collected: date and time of chemotherapy, dose of chemotherapy, emetogenic risk potential for chemotherapy, date and time of antiemetic therapy, dose and route of antiemetic therapy, number of vomiting episodes, number of as-needed antiemetics required, patient age, sex, allergies, type of cancer, and length of hospital stay. All the data will be recorded without patient identifiers and maintained confidentially.

Pharmacoeconomics/Outcomes

153. Evaluation of cost-effectiveness of erythropoiesis stimulating agents in a university-affiliated military treatment facility. *Dean Kang, Pharm.D.*, Amy M. Lugo, Pharm.D., BCPS; National Naval Medical Center, Bethesda, MD.

BACKGROUND: The financial burden of erythropoiesis stimulating agents (ESAs) is a major budgetary concern for most pharmacy departments, and exemplifies one therapeutic class of agents which has shown medical benefit but has encountered scrutiny for its cost. In the retail setting, patients would be expected to pay over $2000 a month for this therapy alone. Drug costs for these agents exceed 1.4 million dollars at National Naval Medical Center (NNMC) annually. In addition to fiscal concerns, the Food and Drug Administration (FDA) required a black box warning in March 2007, alerting providers to the risk of increased mortality, cardiovascular and thromboembolic events, and tumor progression.
PURPOSE: The primary objective of this study is to determine cost-effectiveness of ESAs at NNMC. Secondary objectives include evaluating adherence to national standards of care and preventing drug-related adverse events.
METHODS: Data collection includes patient demographics and co-morbidities, laboratory data (change in hemoglobin, renal function, iron studies), indications for use, dose and frequency, adverse drug events, and medication costs. Financial and laboratory data over a one-year course will be reviewed with patient chart information to assess appropriateness.
RESULTS: Between 12 December 2006 and 12 December 2007, 250 prescriptions were written for ESAs in the inpatient setting and an additional 1,140 prescriptions for ESAs were dispensed or refilled in the outpatient setting. Calculated average cost per dose for darbepoetin alfa (Aranesp®) and epoetin alfa (Procrit®, Epogen®) were $696.66 and $187.78, respectively. Complete results are pending additional chart review and anticipated completion of project will be March 2008.
CONCLUSIONS: By evaluating the indications for use, side effect profile, costs, and clinical effects, our goal is to improve prescribing behaviors and implement a protocol that supports national standards. A prescribing protocol will ensure medication appropriateness and promote fiscal responsibility.

154. Comparison of pharmacist-mediated versus physician-directed interventions initiated by clinical pharmacists reviewing Utah Medicaid patients' medication profiles. *Abril S. Atherton, Pharm.D.*, Joanne LaFleur, Pharm.D., MSPH, Gary Oderda, Pharm.D., MPH; University of Utah Pharmacotherapy Outcomes Research Center, Salt Lake City, UT.

PURPOSE: Drug-related problems (DRPs) are assessed by clinical pharmacists reviewing the drug regimens of Utah Medicaid patients and mailed interventions are generated to address identified problems. The purpose of this analysis was to compare the change in DRPs 90 days after the intervention letter for patients whose review letters were sent directly to the physician versus those that were sent care of the clinical pharmacist. We hypothesized that pharmacist-mediated letters were more likely to be associated with a decrease in the number of DRPs compared to physician-directed letters.
METHODS: Patients for whom review letters were sent between January-December 2006 to clinicians care-of pharmacists or directly to prescribers in University of Utah clinics were identified. Baseline characteristics were compared using Student's *t*-test for continuous variables and χ^2 for categorical variables. The odds of having a decrease in DRPs was compared between groups using logistic regression, adjusting for patient-specific characteristics such as initial number of drug-related problems and initial number of pharmacies.
RESULTS: A total of 440 patients in University clinics were reviewed in 2006 including 187 whose letters were sent to pharmacists and 253 directly to a physician. The mean number of DRPs identified at baseline was 3.39, 3.21 for pharmacist-mediated and 3.52 for physician-only practice models (p=0.076). The mean decrease in DRPs was 48% (47% for pharmacist-mediated and 52% for physician-directed, p=NS). Adjusted odds ratio comparing the decrease in DRPs between the pharmacist-mediated and physician-directed model will be reported.
CONCLUSION: All patients had nearly a 50% reduction in number of DRPs 90 days after intervention letters were mailed, regardless whether intervention letters were mailed to the physician or a clinical pharmacist. Additional results will be reported.

Pharmacoepidemiology

155. Antidepressant use in preganancy: Analysis of 13 years of claims data. *Rebecca Holt, Pharm.D.*, Rex W. Force, Pharm.D., Brooke A. Pugmire, Pharm.D., Christopher T. Owens, Pharm.D.; Idaho State University Drug Utilization Review Progam and Department of Family Medicine, Pocatello, ID.

PURPOSE: Pharmacologic treatment beginning in, or continuing through, pregnancy is a controversial topic. To date, the FDA has not approved specific antidepressant therapy for use in pregnancy. The goal of this study was to examine Medicaid claims data to characterize antidepressant utilization among pregnant women in a state Medicaid population.
METHODS: This retrospective, observational study reviewed Medicaid claims among pregnant women between January 1, 1995 and October 20, 2007. The prescription claims database was queried to identify pregnancies associated with one or more claims for antidepressant medication. The data were analyzed to identify the most widely prescribed antidepressants. Prescription claims were screened monthly during pregnancy by agent and class to evaluate if antidepressant treatment was continued, substituted, or discontinued. Antidepressant prescription trends were evaluated yearly as well as by first, second, and third trimesters.
RESULTS: Preliminary results indicate of the 108,862 pregnancies 8,030 (7.4 %) were exposed to an antidepressant. Pregnancies exposed to selective serotonin reuptake inhibitors were 4.6%. Pregnancies exposed to bupropion, SNRIs, TCAs, and trazodone were 1.0%, 0.5%, 0.3%, and 0.3% respectively. The number of pregnancies exposed to antidepressants steadily increased from 2.2% in 1995 to a high of 11.0% in 2004. Overall, 2.2% of pregnancies were linked with an antidepressant drug in the first trimester, 3.3% in the second trimester, and 4.1% in the third trimester.
CONCLUSIONS: These data indicate SSRIs as the most prescribed antidepressants during pregnancy and the use of antidepressants have been increasing since 1995. Complete analysis of the data will be available at the time of presentation.

156. Use of ACE-inhibitors, angiotensin II receptor blockers, and statins in women of childbearing potential. *Christine D. Lee, Pharm.D.*, Rex W. Force, Pharm.D., Brooke A. Pugmire, Pharm.D., Christopher T. Owens, Pharm.D.; Idaho State University, Pocatello, ID.

PURPOSE: The epidemics of metabolic syndrome and type 2 diabetes combined with adherence to treatment guidelines has led to increased prescribing of ACEI, ARB, and statins. The fact that younger patients are receiving these medications and that they are pregnancy category D and X raises concerns in women of childbearing potential. To characterize this problem, we analyzed longitudinal paid pharmacy and medical claims in this at-risk population.
METHODS: In this research in progress, women aged 14–45 were identified from January 1, 1994 to October 2007. The at-risk women who received one or more prescriptions for an ACEI, ARB, or statin were identified and time-trend analyses were performed. Additionally, all pregnancies over the study period were identified by ICD-9 delivery codes. Pharmacy claims for the drugs of interest during the 280 days prior to delivery were quantified. An analysis of indications for drug use and the presence of concurrent pharmacologic contraception in the at-risk population will be performed and available at the time of presentation.
RESULTS: Of 27,753 at-risk women in 1994, 259 (0.93%) had at least one claim for an ACEI, ARB or statin. At-risk women peaked in 2005 when 1460 of 43,759 (3.34%) had one or more claims, but declined slightly over the past two years. There were 116,276 pregnancies during the study period, 93 of which were linked with one or more claims for an ACEI, ARB, or statin. The rate of pregnancies exposed in 1994 was 0.027% (2 women) and in 2007 was 0.15% (11 women).
CONCLUSION: The use of ACEIs, ARBs, and statins in women of childbearing potential has increased 3-fold from 1994 to 2007. Additionally, increased use of these medications appears to be occurring concurrently with pregnancy. Additional data will be available at the time of presentation.

Pharmacokinetics/Pharmacodynamics/Drug Metabolism/Drug Delivery

157. Influence of Lopinavir/ritonavir on Gemfibrozil pharmacokinetics in healthy volunteers. *Kristin H. S. Busse, Pharm.D.*, Elizabeth Formentini, RNC, MSN, FNP-C, Cheryl Chairez, RN, BSN, Raul M. Alfaro, MS, Joseph A. Kovacs, M.D., Colleen Hadigan, M.D., Scott R. Penzak, Pharm.D.; National Institutes of Health, Bethesda, MD.

PURPOSE: HIV protease inhibitor (PI)-treated patients have increased TC,

LDL, and TG compared to PI-treatment naïve individuals. As PIs continue to be first-line HIV therapy, cardiovascular complications are being realized. Coronary heart disease and pancreatitis are independently associated with hypertriglyceridemia relative to ARV therapy. Despite treatment with fibric acid derivatives (i.e., gemfibrozil), TGs typically remain elevated in HIV-infected subjects; this may be due to enhanced metabolism of fibric acids via uridine 5'-diphosphate-glucuronosyl transferase enzymes (UGT) induction by ritonavir. A drug interaction of this nature could lead to reduced exposure of the fibric acid derivative and poor TG control. The purpose of this study was to determine the influence of lopinavir/ritonavir (LPV/r) on gemfibrozil pharmacokinetics in healthy volunteers.
METHODS: This was an open-label, crossover study conducted in 15 healthy volunteers. In Phase I, 15 subjects received a single dose of gemfibrozil 600mg followed by serial blood collection over 24 hours to determine gemfibrozil plasma concentrations. Following 2 weeks of LPV/r administration (400/100 mg twice daily), subjects received a second dose of gemfibrozil with repeat blood sampling (Phase II). Gemfibrozil pharmacokinetic parameters were determined using non-compartmental methods and compared between Phases I and II.
RESULTS: All fifteen subjects (8 males) have completed the study. Average age and weight of the participants were 36.6 years (±10) and 77.8 kg (±18.4), respectively. Baseline lipid measurements (mean ±SD) were within normal ranges at baseline: TC 176.6 mg/dL (±28.7), LDL 110 mg/dL (±21.2), TG 77.1 mg/dL (±34.7). After 14.5 days LPV/r administration, TC, LDL, and TG concentrations were significantly elevated above baseline measurements ($p<0.01$); however, lipid levels were not elevated to the point of placing subjects at risk for adverse clinical events (i.e., pancreatitis). Study medications were well-tolerated by all subjects.
CONCLUSIONS: Plasma samples are undergoing HPLC/MS analysis for determination of pharmacokinetic parameters. Complete analysis of data will be presented.

Transplant/Immunology

158. Retrospective evaluation of the drug interaction between low-dose fluconazole and tacrolimus in renal transplant. *Crystal M. Truax, Pharm.D.*, Keri L. Roberts, Pharm.D., Sabrina T. Lee, Pharm.D., Jacke L. Corbett, M.S., FNP-c, Lonnie D. Smith, Pharm.D., Fuad S. Shihab, M.D.; University Health Care, Salt Lake City, UT.

PURPOSE: Elevated blood concentrations of tacrolimus have been documented with concurrent treatment doses of fluconazole. The purpose of this study is to determine if there is a clinically significant drug interaction between oral low-dose fluconazole (50 mg/day) and tacrolimus and to evaluate this regimen's efficacy in primary renal transplant patients.
METHODS: All adult recipients from January 2005 to December 2006 have been reviewed. Patients who received maintenance immunosuppression with tacrolimus, mycophenolate mofetil and a rapid seven day steroid withdrawal, in addition to 30 days of fluconazole prophylaxis, are eligible for inclusion. Patients are excluded if another interacting medication was used or if tacrolimus doses and troughs were unavailable. Two tacrolimus troughs are then compared, one while on fluconazole and another at least seven days after fluconazole discontinuation.
RESULTS: Of the patients screened, 54 are eligible for this study. Demographics: male 61% (33/54), deceased donor 24% (26/54), living related 37% (20/54) and living unrelated 15% (8/54). After fluconazole discontinuation, the average tacrolimus trough decreased by 15%, but the average tacrolimus dose also decreased by 6%. On average, serum creatinine decreased 19%. In 31 patients with a stable dose both on and off fluconazole, the average tacrolimus trough decreased. There was one documented oral thrush infection. Additional patients are being evaluated for inclusion to reach 80% power.
CONCLUSION: Preliminary data suggests that although low-dose fluconazole appears to be an effective antifungal prophylactic agent, there may be a drug interaction with tacrolimus. Interpretation of this data is limited by intrapatient variability of tacrolimus troughs and change in tacrolimus dose. Additional patients are currently being evaluated for inclusion.

	On fluconazole (mean±SD)	Off fluconazole (mean±SD)	p-value
Tacrolimus trough (ng/mL)	12.61±3.5	10.96±3.7	p=0.016
Tacrolimus trough (with stable dose, ng/mL)*	12.22±2.6	10.86±3.9	p>0.05
Tacrolimus dose (mg/kg/day)	0.1±0.047	0.09±0.047	p=0.014
Serum creatinine (mg/dL)	1.59±0.5	1.32±0.4	p<0.001

STUDENT SUBMISSIONS

ADR/Drug Interactions

159. Adverse effects of dapsone when used as pneumocystis carinii pneumonia prophylaxis in pediatric oncology patients. *Zhiyu Chen, B.S.*[1], Edmund V. Capparelli, Pharm.D.[2], Deborah Schiff, MD[3]; (1)Skaggs School of Pharmacy and Pharmaceutical Sciences, University of California, San Diego,, La Jolla, CA; (2)School of Medicine, University of California, San Diego,, San Diego, CA; (3)Hematology/Oncology , Rady Children's Hospital-San Diego, San Diego, CA.

PURPOSE: Dapsone (DDS)-associated adverse effects (AE) include hemolysis and methemoglobinemia. DDS metabolism involves N-hydroxylation to toxic DDS-NHY and acetylation to nontoxic MADDS. Our study's purpose was 2-fold: 1) to determine the frequency of hemolysis and methemoglobinemia in pediatric oncology patients on DDS for PCP prophylaxis, and 2) to develop an assay to measure DDS and its metabolites for using in a prospective study of DDS-associated toxicity in pediatric oncology patients.
METHODS: We performed a retrospective study of pediatric oncology patients with DDS-related AE treated at RCHSD from 3/2006 to 3/2007. Patients with DDS-associated AE were identified by treating physicians and their medical records were screened. To help identify patients at risk for DDS-associated AE, we also attempted to develop a novel assay to simultaneously measure DDS, DDS-NHY and MADDS in human plasma using HPLC method.
RESULTS: From 3/2006 to 3/2007, 7 patients (ages 4–13 yrs) experienced a DDS-associated AE. Mean duration of DDS therapy prior to AE was 12.6 months. For 4 patients, AE involved hemolysis and methemoglobinemia; 2 patients, methemoglobinemia only; and 1 pt, hemolysis only. MetHb level for patients with methemoglobinemia was 6.5+ 2.0%. Two patients had cyanosis. Six had decreased O2-saturation by pulse oxygen.
The highly unstable DDS-NHY in plasma at room temperature was the major challenge for assay development. Deproteination was optimized with 100% methanol. The addition of 10 ul of 200 mg/ml ascorbic solution into every 1ml of plasma stabilized DDS-NHY. The degradation was reduced from 30.7% to 5.1% over 48 hours. The resulting assay range was 0.097 ug/ml–5ug/ml for all three compounds.
CONCLUSIONS: DDS-associated AE occur commonly. We recommend close monitoring of pediatric oncology patients on DDS PCP prophylaxis for signs/symptoms of hemolysis and methemoglobinemia. We plan to perform a prospective study to determine the incidence of AE in patients and correlate AE with DDS-metabolite levels.

Ambulatory Care

160. Evaluating the stability of chronic anticoagulation when switching vitamin K formulations. *Elim Ijo, Pharm.D., candidate*; Wingate University School of Pharmacy, Wingate, NC.

PURPOSE: Low-dose vitamin K supplementation has been used to decrease variability of international normalized ratios (INR) in patients on warfarin therapy. Patients followed in our anticoagulation clinic were discontinuing use of ADEK (vitamin K 150 µg) supplement. Our purpose is to determine the effect of changing vitamin K formulations on the INR in patients taking warfarin.
METHODS: This prospective study evaluated ten patients (four men, six women), ages 48–88 years old, on warfarin therapy and supplemental low-dose vitamin K. Inclusion criteria were as follows: stable anticoagulation with individualized warfarin dosing, low-dose vitamin K with ADEK, and reasonably consistent lifestyle (e.g., diet, medication compliance). Patients were switched from a full tablet of ADEK to either two Viactiv® chewable tablets (40 µg vitamin K/tablet) or one GNC vitamin K tablets (100 µg vitamin K/tablet). INR measurements were taken using a point-of-care testing device. Total weekly warfarin and vitamin K doses, time in range and number of INR values in the therapeutic range were compared three months before and after changing vitamin K formulation.
RESULTS: To date six participants have completed three months follow-up with the remaining four pending completion. Although successfully changing to a lower daily vitamin K dose required minimal change in the weekly warfarin dose (+ 0.4 %, range -6.6% to 9%), the daily vitamin K dose was carefully titrated to a lower range of 25–100 µg to maintain INR stability. The average daily vitamin K dose before was 150 µg compared to 71 µg afterwards.
CONCLUSION: Our preliminary data suggests that when changing ADEK to another formulation of vitamin K supplement the INR should be closely monitored. In most cases a supplement with lower vitamin K content may be adequate to maintain INR stability. Final data collection will be completed by February 2008.

161. Impact of collection methods on lipid results obtained using the Cholestech LDX Portable Lipid Analyzer. *Cory Holland, Pharm.D., Candidate*[1], Kristal L. Williams, Pharm.D.[2]; (1)Butler University College of Pharmacy and Health Sciences, 1520 N. Senate Ave, Indianapolis, IN;

(2)Butler University College of Pharmacy and Health Sciences / IU Methodist Family Practice Center, Indianapolis, IN.

INTRODUCTION: The Cholestech L•D•X system is a self-calibrating desktop point-of-care lipoprotein analyzer that measures TC, TG, HDL and LDL cholesterol concentrations. Currently the Cholestech L•D•X is not recommended for diagnostic and treatment purposes secondary to not consistently achieving the NCEP standards for acceptable total measurement error of TC, HDL, and TG. To date, no clinical trials have investigated factors that could have potentially generated the conflicting results and inaccuracies.
OBJECTIVES: This comparative prospective study is designed to (1) determine the variability between the Cholestech L•D•X portable lipid analyzer and the standard laboratory processing of lipoproteins (2) to assess if blood sample collection technique, the type of blood collected (capillary or venous) or demographic parameters contribute to differences observed between the Cholestech L•D•X analyzer and standard laboratory processing.
METHODS: Consenting, English speaking adults (> 18 years of age) who either receive their primary health care at the Indiana University•Methodist Family Practice Center or individuals responding to the study announcement distributed within faith-based and academic institutions, who can provide adequate blood samples will be included in the study. Following an 8-hour fast, each participant will provide two fingerstick (capillary) samples and one venipuncture (venous) sample. Two different sterilization and handwashing techniques will be used when obtaining the fingerstick samples. Two samples will be processed using the venipuncture sample. One venipuncture sample will be processed via the standard laboratory process and the other will be processed using the Cholestech L•D•X analyzer. Three of the four samples will be processed using the Cholestech L•D•X analyzer. A total of four samples will be compared and analyzed. Results will be analyzed using appropriate statistical equations.
RESULTS: Pending. Data collection and analysis will be complete February 2008.

162. Quality of oral anticoagulation in a pharmacy-managed anticoagulation clinic. *Samantha R. Barfield, Pharm.D., Candidate, 2008*; University of Florida, Gainesville, FL

Quality of oral anticoagulation in a pharmacy-managed anticoagulation clinic
INTRODUCTION: Management of anticoagulation therapy in patients taking warfarin necessitates frequent INR monitoring and evaluation of extraneous factors. Monitoring the INR within target therapeutic range is an important determinant of therapeutic effectiveness and overall quality control. Pharmacy-managed anticoagulant clinics have been shown to be beneficial in improving access to anticoagulation and increasing quality of control compared to traditional care.
PURPOSE: The aim of this study is to determine overall quality of oral anticoagulation control by calculating time in therapeutic range (TTR). TTR will be compared to historic controls from published literature as a benchmark for overall quality of care.
METHODS: A retrospective chart review identified 32 patients, of which 55% were males. 58.82% were Caucasian and 29.4% were African American patients previously or currently managed on warfarin at Shands pharmacotherapy clinic for a minimum of 6 months with a target therapeutic INR between (2.0–3.0) from October 2006 through August 2007.
RESULTS: TTR in patient-days was determined for (2.0–3.0) target therapeutic INR range, (1.8–3.2) expanded therapeutic INR range, and (1.5–3.5) high-risk INR range; 60.39%, 73.95%, and 87.31%, respectively. The percentage of INR checks in range: 56.17%, 71.81%, and 88.27%, respectively. The percentage of INR values ≥ 5 was 1.44% and INR values ≤ 2, was 28.4%, respectively.
CONCLUSIONS: Patients managed at Shands pharmacotherapy clinic spent 60.39% or approximately (2/3) of the time controlled in the (2.0–3.0) targeted therapeutic INR range.
Expected Completion: February 15th, 2008.

Cardiovascular

163. Outcomes of patients requiring dual or triple antithrombotic therapy: Clopidogrel and warfarin with or without aspirin. Gladys H. Mitani, Pharm., D.[1], *Dwight Song, BS, Pharm., D., Candidate*[1], May Mak, Pharm.D.[1], Enrique Ostrzega, M.D.[2], Sandra Yoo, Pharm., D.[1]; (1)USC School of Pharmacy, Los Angeles, CA; (2)USC School of Medicine, Los Angeles, CA.

PURPOSE: To examine the incidence of bleeding rates, stent reocclusion and cardiovascular events (CV) for patients on dual antithrombotic therapy (DT) with clopidogrel plus warfarin and triple therapy (TT) with clopidogrel, aspirin plus warfarin who received close anticoagulation monitoring by the Outpatient Anticoagulation Clinic (OAC) at the LAC+USC Medical Center.
METHODS: 23 Post-PCI/stent patients (pts) and 1 pt with a PTCA discharged from the LAC+USC Cardiology Ward were retrospectively followed from December 10, 2001 to October 12, 2007. Inclusion requirements for this study include pts who were followed up at the OAC; who received DT or TT for > 1 month.
RESULTS: Twenty-two out of 24 pts were on TT and 2 were on DT. The primary end points were bleeding defined by the Thrombolysis In Myocardial Infarction scale (TIMI) and stent reocclusion. There were a total of 26 bleeding events in 11 pts in the TT group; 23 were minimal, 3 were minor and none were major. Forty percent were associated with underlying causes. One pt on DT experienced 1 minor episode of bleeding; another had 5 minimal episodes. Gum bleeding was the most common (36%), followed by rectal bleeding or occult positive stools (24%). Most bleeding events resolved spontaneously and only 4 events required minor interruptions in therapy. Fifty-eight percent of the bleeding events were associated with an INR within range (INR: 1.95–3.1), 35% were below (INR <1.95) and 7% were above (INR>3.1). During the study period, none of the pts in either group experienced stent reocclusion, second CV event, or death from complications.
CONCLUSION: TT patients who were carefully managed by an anticoagulation clinic did not appear to experience levels of adverse bleeding episodes that would warrant discouraging the use of this regimen when indicated. Further studies are needed to further evaluate the risk/benefit of TT.

164. Interferon gamma and IL-10 gene polymorphisms and immune responses to influenza vaccine in patients with heart failure. *Jonathan C. Badger, B.S., Pharmacy, Student*[1], Michelle A. Detry, Ph.D.[2], John JM Moran, B.S.[1], Nancy K. Sweitzer, M.D.[3], Mary S. Hayney, Pharm.D., M.P.H[1], Orly Vardeny, Pharm.D.[1]; (1)University of Wisconsin School of Pharmacy, Madison, WI; (2)University of Wisconsin, Madison, WI; (3)Division of Cardiovascular Medicine, Dept of Medicine, University of Wisconsin, Madison, WI.

PURPOSE: Heart failure (HF) patients (pts) are at high risk for influenza illness and mount less vigorous immune responses to influenza vaccine. Vaccine-induced T cell responses through production of the cytokines interferon gamma (IFNγ) and IL-10, are necessary for protection from influenza illness. We hypothesized that genetic variants in the IFNγ and IL-10 genes affecting their production are associated with influenza vaccine immune responses.
METHODS: We studied 32 HF pts optimized on guideline based therapy and 19 healthy controls (HC). Participants received the inactivated influenza vaccine intramuscularly, and underwent phlebotomy before and 2–4 weeks after vaccination. Cytokine production were measured in cultured peripheral blood mononuclear cells (PBMCs) using ELISA. IFNγ and IL-10 genotypes were determined by PCR, and linear regression models were created to explore associations between genotypes and IFNÁ and IL-10 concentrations.
RESULTS: There were no statistically significant differences between HF and HC in IFNγ production from influenza vaccination (table, p=NS). HF pts had higher levels of IL-10 compared to HC (p=0.001). IFNγ genotype was not associated with IFNγ concentrations. Associations with the IL-10 variant will be presented.
CONCLUSIONS: In this exploratory study, IFNγ genotype was not associated with vaccine-mediated cytokine production. Further investigation of genetic associations with vaccine response is warranted in a larger sample.

	HC (N=19)	HF (N=32)
Age, yrs	47 ± 10[a]	58 ± 13
Sex (M / F)	11 / 8	24 / 8
IFNγ genotype: T/T, T/A, A/A	1, 13, 4	8, 15, 6
IL-10 genotype: GCC, ACC, ATA	6, 7, 5	6, 12, 10
IFNg production, pg/mL		
Pre-Vaccination	57.2 ± 68.4	18.8 ± 19.3
Post-Vaccination	113.2 ± 53.4	84.2 ± 44.5
IL-10 production, pg/mL		
Pre-Vaccination	10.5 ± 13.9	6.8 ± 6.8
Post-Vaccination	19.2 ± 23.5	22.4 ± 8.7[b]

[a] Data are mean ± SD
[b] Percent change difference p=0.001

165. Incidence of adverse cardiac events among patients on a QT-prolonging drug with concomitant cardiac risk factors: results from the MATRIX study. *Kyle J. Ellis, .*[1], Naomi V. Dahl, Pharm.D.[2]; (1)Wilkes University, Wilkes-Barre, PA; (2)Watson Laboratories, Morristown, NJ.

PURPOSE: Drugs that prolong the QT interval have been associated with an increased risk of adverse cardiac outcomes. The Multicenter Assessment of Transdermal Therapy in Overactive Bladder with Oxybutynin (MATRIX) study assessed safety and effectiveness of transdermal oxybutynin treatment (OXY-TDS) for overactive bladder (OAB). We conducted a post-hoc analysis to examine whether concomitant use of QT-prolonging drugs affected the incidence of cardiac adverse events among study participants.
METHODS: This was a multicenter, open-label, prospective study in community-dwelling adults with OAB. All participants were treated with OXY-TDS 3.9 mg/day (2 patches/week) for ≤6 months. The incidence of cardiac adverse events was compared between patients taking QT-prolonging drugs vs those not taking them by means of a Fisher's exact test.
RESULTS: Among 2878 participants (mean age 62.5±14.8), 50 (1.7 %) took a

drug known to cause QT-prolongation during the study. These patients (39 female) also had numerous other cardiac risk factors: history of cardiac disease 29 (58%), a hypertension 36 (72%), diabetes 9 (18%), obesity 23 (46%). Overall, 25 (0.9%) participants experienced any cardiac event during the study. The incidence of cardiac events was significantly greater (P=0.001) among participants taking QT-prolonging drugs at the time of the event (4 participants, 8%; sotalol, amiodarone, methadone) than among others patients (21, 0.7%).
CONCLUSIONS: QT-prolonging drugs appear to increase the risk of cardiac adverse events 10-fold over a 6-month period. Further analyses will be conducted to control for other factors which may contribute to the risk.

Community Pharmacy Practice

166. Leveling the playing field for basic health care: A study evaluating resources available for non-English speaking Hispanic patients in retail pharmacy settings in Indianapolis. *Eberenna Egwu, Pharm.D., Candidate*[1], Kristal L. Williams, Pharm.D.[2], Tynesha Dodd, High School Student[3]; (1)Butler University College of Pharmacy and Health Sciences, Indianapolis, IN; (2)Butler University College of Pharmacy and Health Sciences / IU Methodist Family Practice Center, Indianapolis, IN; (3)Crispus Attucks Medical Magnet High School, Indianapolis, IN.

BACKGROUND: The elimination of health disparities is a major key goal of Healthy People 2010. Currently, significant disparities between white and minorities continue to exist. As the U.S. Hispanic population increases, it is imperative that health care systems and providers adequately respond to the needs of the community, the individual, and various cultures. Pharmacists, the most accessible health care providers, are positioned to positively impact individuals through providing essential medication counseling and assisting patients achieve the best use of medications. For the growing non-English speaking Hispanic population it will be necessary to provide such information in Spanish. There are very few studies evaluating pharmacy-related services available to non–English speaking patients.
OBJECTIVES: The objectives of this multi-centered, biphasic study are to evaluate available resources at retail pharmacies for the non-English speaking Hispanic population; to survey Hispanic residents regarding their pharmacy experiences and perceptions, and to determine ways to potentially decrease medication errors among Hispanics.
METHODS: This study will be conducted utilizing multiple survey tools (phase 1) and a secret shopper (phase 2). Two surveys will be distributed as apart of this study. The first survey will be distributed via facsimile to pharmacy managers and pharmacists of major retail pharmacies. Pharmacist and pharmacy managers will be asked to complete a 14-item survey on available resources for the Hispanic individual. The second survey will be randomly administered to adult, non-English speaking Hispanic patients of the various study sites at their physician appointments. The 10-item patient survey will focus on the patient's experiences at the pharmacy and the desirable characteristics at their community pharmacies. Hispanic patients obtaining valid prescriptions will be randomly asked to participate in phase two. Volunteering patients will be instructed on the study-designated criteria for evaluating the medication counseling experience and resources available.
RESULTS: To be presented.

Critical Care

167. Treatment of recurrent *Stenotrophomonas maltophilia* ventilator-associated pneumonia with IV doxycycline and aerosolized colistin: a case report. *Elizabeth L. Underwood, Pharm.D., candidate*, G. Christopher Wood, Pharm.D., Martin A. Croce, M.D., Bradley A. Boucher, Pharm.D., Joseph M. Swanson, Pharm.D., Timothy C. Fabian, M.D.; University of Tennessee Health Science Center, Memphis, TN.

PURPOSE: *Stenotrophomonas maltophilia* is an emerging cause of ventilator-associated pneumonia (VAP) in some centers and is associated with a high mortality rate. High dose trimethoprim/sulfamethoxazole (TMP/SMX) is considered to be the drug of choice; however, there are virtually no clinical data for other drugs. This case of recurrent *S. maltophilia* VAP was treated with IV doxycycline plus aerosolized colistin after TMP/SMX had failed. This is the first such report.
METHODS: Retrospective case report.
RESULTS: A 28-year-old male was admitted to the Presley Regional Trauma Center with a severe head injury (Glasgow Coma Scale score 7) and was mechanically ventilated. On hospital day 17, a bronchoscopic bronchoalveolar lavage (BAL) culture performed in response to signs and symptoms of pneumonia showed VAP caused by *S. maltophilia* (> 30,000,000 cfu/mL). The isolate was sensitive to TMP/SMX and was treated with TMP/SMX 4 mg/kg (based on TMP) IV Q6h for seven days. Follow-up BALs on days 23 and 28 showed the *S. maltophilia* was eradicated. However, the patient developed a recurrent episode of *S. maltophilia* VAP (> 30,000,000 cfu/mL) on day 34 that was again treated with TMP/SMX 4 mg/kg (TMP) IV Q6h. A follow-up BAL on day 42 showed persistent *S. maltophilia* (500,000 cfu/mL), and signs and symptoms had not resolved satisfactorily. Additional disk diffusion testing showed the isolate was sensitive to doxycycline and colistin. The TMP/SMX was stopped. Treatment was started with doxycycline IV 100 mg Q12h and aerosolized colistin 150 mg Q12h on day 48 and continued for 14 days. No follow-up BAL was performed because the patient was extubated. The patient subsequently had complete resolution of symptoms on day 54 and was later discharged.
CONCLUSION: The positive clinical response suggests that IV doxycycline plus aerosolized colistin is a potential treatment option for patients who fail or cannot tolerate high dose TMP/SMX.

Education/Training

168. Disease and medicine management programme for patients with Chronic Obstructive Pulmonary Disease (COPD). *Maher Al-Abed, Ph.D., Student*[1], James McElnay, BSc Ph.D. FPSNI FRPharmS FACCP[2], Joseph C. Kidney, Respiratory, Consultant[3], Bronagh McCourt, BSc. Clinical Pharmacist[4]; (1)School of Pharmacy,Queen's University of Belfast (QUB), Belfast, United Kingdom; (2)Queen's University of Belfast (QUB), Belfast, United Kingdom; (3)Department of Respiratory Medicine, Mater Hospital, N.Ireland, Belfast, United Kingdom; (4)Mater Hospital, N.Ireland, Belfast, United Kingdom.

PURPOSE: The aim of this study is to examine the impact of a pharmacy led disease and medicine management programme on clinical and humanistic outcomes in patients with COPD.
PATIENTS AND SETTING: 173 patients (mean age 67; 54% females) who had moderate to severe COPD, were recruited from the outpatient clinic at the Mater Hospital. 86 patients were randomly assigned to the intervention group and 87 patients to the usual care group.
INTERVENTION: The programme was delivered by well trained clinical pharmacists. It included patient education on disease state and medications (including inhaler technique), discussion on simple home exercises, breathing and relaxation techniques. Patients were given printed information booklets and a customised action plan for acute exacerbations (including advice to GPs to provide a prescription for an antibiotic and an oral corticosteroid to be initiated promptly by patients for exacerbations). Patients were followed up at three months by telephone and at six months during a scheduled visit.
OUTCOMES MEASUREMENTS: Hospital admissions, emergency department (ED) visits and health related quality of life.
RESULTS: At the six month follow up patients in the intervention group had a significant reduction in both hospital admissions [34 (43%) vs 15 (19%); p=0.01; OR = 0.43, CI 0.21–0.86] and emergency department visits [43 (53%) vs 21 (25%); p<0.01; OR=0.53, CI 0.31–0.90].
Using the disease specific St George Respiratory Questionnaire (SGRQ), differences reached statistical significance at the 5% level on the symptom scores (-7.9; p=0.01), impact scores (-7.6 p=0.02) and total scores (-5.6; p=0.05). However, the physical activity subscale did not reach the clinically relevant improvement of 4 points.
CONCLUSION: The clinical pharmacy led self-management plan significantly reduced hospital admissions and improved the quality of life of COPD patients. Physical activity was resistant to the intervention at the six month measurement point.

169. Academic dishonesty among pharmacy students: does technology have a role?. *Meghan E. Morgan, BS, BA*[1], Heather P. Whitley, Pharm.D., BCPS, CDE[2]; (1)Auburn University Harrison School of Pharmacy, Tuscaloosa, AL; (2)Auburn University, Harrison School of Pharmacy, Tuscaloosa, AL

BACKGROUND: Academic dishonesty is a concern among universities and colleges across the country. Schools of pharmacy are no exception; however, few studies have determined the pervasiveness of academic dishonesty in this population of professional students. Academic dishonesty while in school may lead to unprepared pharmacists or unethical behavior in future practice. If academic dishonesty becomes a problem in our schools of pharmacy, the future of the profession may be in jeopardy. Additionally, in this age of ever expanding technology, students have new opportunities for academic dishonesty.
PURPOSE: This study will evaluate the use of technology for academic dishonesty and prevalence among doctor of pharmacy candidates.
METHODS: A link to a brief online survey, posted at www.surveymonkey.com, will be e-mailed to all pharmacy students attending Auburn University, Samford University, Mercer University, or University of Mississippi following IRB approval. The survey questions will address academic dishonesty committed or witnessed while enrolled in pharmacy school. The questions will evaluate the prevalence of academic dishonesty as well as the use of technology for this purpose.
RESULTS & CONCLUSION: pending.

170. What practice area do pharmacy graduates prefer, retail or academia. *Michelle Piercy, Pharm.D, candidate*, Fungisai Mugwagwa, Pharm.D..,

candidate, Yvette Collins, Pharm.D.., candidate, Abbigail Williams, Pharm.D.., candidate; Hampton University, Hampton, VA.

PURPOSE: The profession of pharmacy practice has evolved greatly over the recent years. Many opportunities are available for pharmacists such as working in retail, clinical settings or teaching at pharmacy schools. This study was conducted to determine if factors such as scheduling, benefits and financial earnings, location and the ability to advance have influenced pharmacists to choose retail over academia.
METHODS: The researchers conducted surveys targeted towards retail pharmacists in Virginia and pharmacy practice professors teaching at Hampton University, Virginia Commonwealth University, Shenendoah University and the University of Appalachia. The website www.SurveyMonkey.com was used to access the survey. Participants were asked if financial earnings, job satisfaction, geography, job advancement and gender influenced them to choose academia or retail pharmacy as their first career choice after graduating pharmacy school.
RESULTS: All of the pharmacists in academia completed a residency, whereas the average number of retail pharmacists who completed a residency was only 21 %. The factors affecting career choices in academia was consistent with an average between 60 to 70 % and these factors included job advancement, diversity and job title. An average of 89 % of retail pharmacists agreed that the salary was the greatest factor influencing their decisions of working in retail. Pharmacists in both academia and retail agreed that they were adding value to their institution.
CONCLUSIONS: Pharmacy graduates preferred retail pharmacy compared to academia pharmacy based on certain factors.

Endocrinology

171. Retrospective study evaluating impact of race and gender on HbA1c following pioglitazone therapy. *Ligy T. John, Pharm.D.Candidate*[1], Jacqueline Milton-Brown, Pharm.D.[2], Lincy S. Lal, Pharm.D., Ph.D[3]; (1)Texas Southern University, College of Pharmacy and Health Sciences, Houston, TX; (2)Harris County Hospital District (HCHD) Drug Information Center, Houston, TX; (3)UT MD Anderson Cancer Center, Houston, TX.

OBJECTIVE: Following a drug utilization review at a county hospital district, it was found that majority of patient population were Hispanic and females. This study was carried out to determine gender and racial specific response to pioglitazone therapy.
METHODS: This is a retrospective analysis of patients prescribed pioglitazone over a period of 6 months. Patient specific information ascertained from reviewing patient medical records included: demographics, pre and post HbA1c, FBG, LFT, lipid profiles, and adverse events. Descriptive statistics, unpaired t-test and chi-square for nominal data were used to determine the impact of race and gender on laboratory outcomes.
RESULTS: A total of 199 patients were included in the final analysis, this group consisted of 72 (36.2%) males, and 127 (63.8%) females. Among them, 105 (52.8%) were Hispanics and 94 (47.2%) were Non-Hispanics. There was no significant age difference between these groups. The results showed that 16 subjects achieved A1c < 7% after therapy vs. 3 prior to therapy (P=0.004). Of the 16 subjects, eleven (8.66 %) women reached the treatment goal of < 7.0 mg/dL HbA1c, while only five (6.94 %) men reached the goal, p=0.005 (women) vs. p=0.441 (men). There is a significant difference in the number of study Hispanic patients who attained treatment goal of A1c < 7 % (0 pre vs. 7 post therapy, p=0.0141) compared to Non-Hispanics (3 pre vs. 9 post therapy, p=0.1330). Other treatment monitoring parameters, such as LFT, lipid profile, and FBG, and change in A1c values, there were no significant difference between male vs. female or Hispanic vs. non-Hispanic groups.
CONCLUSIONS: After pioglitazone therapy, significantly higher number of women and Hispanics achieved A1c values < 7%. Roll of concurrent therapy or compliance rate in achieving the goals was not taken into consideration. Further studies are needed to determine gender or racial specific outcome responses to piglitazone.

172. Diabetes risk, perceptions of risk, and physical activity patterns in an active older adult community. Mark A. Parmenter, MS, Pharm.D., Candidate, *Gina C. Guzzetta, Pharm.D., Candidate*, Erin Raney, Pharm.D., BCPS; Midwestern University, Glendale, AZ.

PURPOSE: Older adults are at increased risk for developing Type 2 diabetes (DM). Little data is available regarding whether perceived risk for DM influences risk reduction behaviors. The purpose of this study was to: 1) assess whether older adults with access to healthcare and health education accurately perceive DM risk, 2) determine the relationship between perception of DM risk and physical activity, and 3) provide an educational intervention to help decrease DM risk.
METHODS: Residents of an active older adult community in the Phoenix metropolitan area without DM were eligible. Measurements included the American Diabetes Association (ADA) Risk Test, the Risk Perception Survey – Developing Diabetes, and the Stanford Brief Activity Survey, as well as physical measurements of body mass index, blood pressure, and fasting plasma glucose. A live program on diabetes risk reduction was offered to all participants.
RESULTS: Sixty adults (age=66±8 years) were classified as moderate risk (MR; n = 22) or high risk (HR; n = 38) for developing DM. There was no significant difference in risk perception scores between the MR (1.96 ± 0.25) and HR (2.12±0.34) groups (p=0.07). There was a negative correlation between risk perception and physical activity (r = -0.35, p=0.006). Perception of "personal control" was positively correlated with physical activity levels (r = 0.28, p=0.03). Approximately 40 participants attended the live program.
CONCLUSION: As evidenced by a lack of difference between risk perception of MR and HR participants, older adults in this study setting were not able to accurately perceive their personal diabetes risk. Perception of higher DM risk was associated with lower physical activity levels, but perception of control over developing diabetes was associated with higher physical activity levels. These data suggest that risk reduction efforts should emphasize personal empowerment in order to maximize risk-reducing behaviors.

HIV/AIDS

173. Lopinavir/ritonavir (LPV/RTV) pharmacokinetics (PK) in human immunodeficiency virus (HIV)-infected cytochrome P450 (CYP) 3A5 expressors versus non-expressors. *Alyssa M. Walker, B.S.*, Christina L. Aquilante, Pharm.D., Peter L. Anderson, Pharm.D., Charles J. Foster, B.S., Jennifer J. Kiser, Pharm.D.; University of Colorado Denver School of Pharmacy, Denver, CO

PURPOSE: Polymorphisms exist in the CYP3A5 gene resulting in decreased protein expression and metabolism of CYP3A5 substrates. LPV and RTV are CYP3A5 substrates; however, few studies have evaluated concentrations based on CYP3A5 genotype. We sought to determine if LPV and RTV PK differed between genetically-determined CYP3A5 expressors versus non-expressors.
METHODS: HIV+ adults receiving LPV/RTV capsules 400/100mg twice daily plus tenofovir disoproxil fumarate (TDF) and ≥1 nucleoside reverse transcriptase inhibitor for ≥ 4 weeks underwent an intensive PK study following a standardized meal. PK parameters were determined by non-compartmental analysis. Subjects were genotyped for the CYP3A5*3, *6, and *7 polymorphisms by PCR-pyrosequencing. Subjects who were *3, *6, or *7 homozygotes were classified as non-expressors; heterozygotes or wild-type homozygotes were classified as expressors. Log-transformed PK parameters were compared between expressors versus non-expressors (t-tests).
RESULTS: Thirteen subjects (4 male/9 female, 3 black/10 non-black, 3 expressors/10 non-expressors) completed the study. Results are shown as mean (±SD).

LPV	CL/F (mL/hr)	AUC (ng*hr/mL)	C_{max} (ng/mL)	C_{min} (ng/mL)
Non-expressors	73.4 (33.7)	71923 (21334)	7714 (2407)	4052 (1594)
Expressors	174.9 (47.2)	45729 (21510)	5915 (1653)	2100 (1865)
p-value	0.002	0.07	0.3	0.04

LPV CL/F was faster and C_{min} was lower in CYP3A5 expressors versus non-expressors. Additionally, in the setting of TDF, LPV concentrations were decreased in all subjects compared to historical data [mean (±SD) LPV AUC = 92600 (36700) ng*hr/mL and C_{min} = 5500 (2700) ng/mL)]. No statistically significant differences in RTV PK were found.
CONCLUSION: This study revealed faster LPV CL/F and lower Cmin in CYP3A5 expressors versus non-expressors. LPV concentrations were also significantly lower in these subjects on TDF compared to historical values, particularly in the CYP3A5 expressors. Future research is necessary to determine if certain patients receiving LPV/RTV plus TDF who are CYP3A5 expressors may be at risk for virologic failure.

Infectious Diseases

174. In vitro activity of trimethoprim vs. various antimicrobial agents against clinical isolates of MRSA from colonized patients. *Elyn Choa Tan, Pharm.D., Candidate*; Mercer University, Atlanta, GA.

BACKGROUND. Eradication of methicillin-resistant *Staphylococcus aureus* (MRSA) carriage via trimethoprim oral therapy may be a feasible decolonization option that can reduce the risk of MRSA infection and prevent transmission of the organism to other patients. This study compared the in vitro activity of trimethoprim vs. various antimicrobial agents against clinical isolates obtained from patients colonized with MRSA.
METHODS. Broth microdilution MIC susceptibility testing and time-kill methods were used to test the activities of vancomycin, clindamycin, rifampin, trimethoprim, and trimethoprim-sulfamethoxazole against clinical isolates of MRSA obtained from colonized patients who accessed services through Piedmont Hospital in Atlanta, Georgia from December 2006–July 2007. Susceptibility profiles of a total of 82 clinical isolates were obtained and time-kill studies were performed on three selected isolates at two times their

respective MIC. ATCC 29213 was utilized as a control strain.
RESULTS. The MIC_{50} of vancomycin, clindamycin, rifampin, trimethoprim and trimethoprim/sulfamethoxazole were 1, 0.125, 0.0156, 4, 0125/2/375 µg/ml, respectively. Vancomycin inhibited all isolates at MICs of 0.25 to 2 µg/ml. Among the 82 isolates, resistance to clindamycin, rifampin, trimethoprim, and trimethoprim/sulfamethoxazole were 30.49%, 10.98%, 34.15%, and 32.93% respectively. Time-kill analyses of three selected isolates showed significantly greater killing activity when comparing trimethoprim vs clindamycin or rifampin at all time intervals. No difference in kill was noted between trimethoprim and vancomycin at 4, 8 and 24 h. Trimethoprim demonstrated greater kill at 4 h vs trimethoprim/sulfamethoxazole. No difference in kill was noted between trimethoprim and trimethoprim/sulfamethoxazole at 8 and 24 h.
CONCLUSIONS. Trimethoprim showed comparable susceptibility profiles to trimethoprim/sulfamethoxazole. Time kill analyses revealed that trimethoprim exhibited better killing activity vs clindamycin or rifampin. It exhibited similar killing activity when compared to vancomycin or trimethoprim/sulfmethoxazole. Trimethoprim may provide an alternative option for decolonization therapy of methicillin-resistant *Staphylococcus aureus*.

175. The relationship between vancomycin susceptibility in *Staphylococcus aureus* and resistance to other antibiotics. *Steven Chen, B.S.*[1], Scott Johns, Pharm.D.[2], Janice Kaping, M.S.[2], Pamela Moise, Pharm.D.[2]; (1)University of California at San Diego, School of Pharmacy, La Jolla, CA; (2)Veteran Affairs Healthcare System, San Diego, CA.

Our goal is to attempt to identify if susceptibility trends exist among current active anti-microbial agents commonly used against methicillin-resistant *Staphylococcus aureus* (MRSA) in the VA hospital. E-test is used to measure the minimum inhibitory concentration values (MIC's) for vancomycin, tigecycline, linezolid, daptomycin, co-trimoxazole, and minocycline using 30 MRSA isolates collected from 30 unique patients at the VA San Diego Healthcare System. MIC values were compared using Spearman rank correlational analysis. We also investigated the relationship between Vitek II and E-test MIC values of MRSA. Spearman correlation analysis was employed to analyze the data. We found a significant correlation only between MIC values of vancomycin and those of minocycline ($r = 0.81$, $p<0.0001$). This correlation is difficult to explain since vancomycin inhibits bacterial cell wall synthesis, while minocycline inhibits bacterial protein synthesis without affecting cell wall synthesis. No other statistically signifant relationship was found to correlate with the MIC values of vancomycin: linezolid ($r = 0.28$, $p=0.1310$); co-trimoxazole ($r = 0.12$, $p=0.5286$); tigecycline ($r = 0.28$, $p=0.1310$); daptomycin ($r = 0.08$, $p=0.6456$). Of the 27 isolates tested for the comparison between Vitek II and E-test, only nine show 100% agreement, 12 show 33% disagreement, and six show 50% disagreement. Vancomycin E-test MIC values were typically higher than Vitek II MIC values. In conclusion, the reliability of Vitek II to assess the variability in MIC values of MRSA to vancomycin necessitates further evaluation.

176. Antimicrobial consumption as a potential driver of microbial resistance in a surgical intensive care unit at an academic medical center. *Hien N. Nguyen, Pharm.D. Candidate*, Charles James, Pharm.D., BCPS; University of California, San Diego Skaggs School of Pharmacy and Pharmaceutical Sciences, La Jolla, CA.

OBJECTIVE: To examine the use of antimicrobials (abx) in a surgical intensive care unit (SICU) comparing two different utilization methodologies Define Daily Dose (DDD) and Days of Therapy (DOT). To compare these usage tools to microbial resistance rates over time.
BACKGROUND: Excessive antimicrobial use is a key driver of microbial resistance development in the hospital settings that can lead to negative patient outcomes and increased healthcare cost.
METHOD: This retrospective investigation obtained abx usage data from pharmacy database and abx sensitivity patterns obtained from micro lab data from January 1, 2003 to December 31, 2006. Data were collected: IV abx received, patient identifier, dose, frequency, and start and end dates, census data which determined DDD and DOT. Susceptibility patterns included *P. aeruginosa*, *Acinetobacter* spp, *E. coli*, *K. pneumoniae*, *E. cloacea*, and *S. aureus* (both MSSA and MRSA). Abx classes examined: β-lactams (pip/tazo (p/t), ampicillin, cefazolin (cef), ceftriaxone (cft), ceftazidime (ctd)), carbapenems (meropenem (M) and imipenem (I)), aminoglycoside (genta (G), tobra and amik (A)), fluoroquinolones (cipro (C) and moxi), and vancomycin (V).
RESULT: Abx agent trended against organism resistance rates over time. Agents and organisms examined: cef, V, G to *S. aureus*; p/t, C to *P. aeruginosa*; cft to *E. coli*, *K. pneumoniae*; I, M, amik to *E. cloacae*; ctd, I, M, amik to *Acinetobacter* spp. Linear regression analysis performed for each combination above for both DDD and DOT. The only statistically significant correlation found was for cft to *E. coli* (DDD p=0.1; DOT p=0.01).
CONCLUSION: SICU abx consumption, as determined by DDD and DOT, matched to commonly isolated organism resistance rates over time did not correlate as a driver of resistance for the majority of SICU organisms' encounter.

177. Utilization of culture and susceptibility testing in patients with candidemia at UNC hospitals. *Bridgette L. Therriault, B.S.*[1], Todd A. Correll, Pharm.D., BCPS[2], Ralph H. Raasch, Pharm.D., FCCP, BCPS[2]; (1)University of North Carolina School of Pharmacy, Chapel Hill, NC; (2)University of North Carolina Hospitals, 101 Manning Drive, Chapel Hill, NC.

PURPOSE: Because data-driven interpretive breakpoints for fluconazole, itraconazole and flucytosine rely on methodological consistency and delivered dose, and clinically meaningful data is lacking for amphotericin B, extended-spectrum triazoles and echinocandins, routine antifungal susceptibility testing is not recommended as a standard of care for *Candida* infections by the Infectious Diseases Society of America. The objectives of this study are to retrospectively investigate if culture and susceptibility (C/S) data obtained for patients with candidemia at UNC Hospitals is utilized appropriately to de-escalate therapy and to collect patient outcomes of that chosen therapy.
METHODS: Approval for this study has been obtained from the Institutional Review Board; all information has been maintained confidentially. Patients were identified from positive *Candida* bloodstream infections from July 1, 2006 to June 30, 2007 utilizing the microbiology laboratory database at UNC Hospitals. Patient outcomes collected include evidence of dissemination, length of hospitalization and survival of hospital admission. Data analysis will be complete by March 2008.
RESULTS: C/S data was obtained for twenty-six of the seventy-three *Candida* bloodstream isolates identified. C/S data was not obtained for forty-six isolates and two isolates were excluded due to outpatient status. Outcomes were evaluated in three groups: (1) appropriate use of C/S data to guide therapy (2) disregard or untimely availability of C/S data, and (3) C/S not obtained. Frequency of disseminated disease within each group was 23%, 54% and 15%, respectively; the median length of hospitalization was 25, 27 and 29 days, respectively; and the percentage of patients surviving hospital admission was 77%, 85% and 61%, respectively.
CONCLUSIONS: Appropriate utilization of C/S data to guide therapy appears to reduce the length of hospitalization and improve survival rates in patients with candidemia. Further analysis is necessary to determine the statistical, clinical and economic significance of these findings.

178. Therapeutic impact of statin therapy in patients with chronic hepatitis C. *Brandon Bookstaver, Pharm.D.*[1], LeAnn Norris, Pharm.D.[1], Rebecca L. Tombleson, Pharm.D. Candidate[2], Linsey Hocker, Pharm.D.[3]; (1)South Carolina College of Pharmacy - USC Campus, Columbia, SC; (2)University of South Carolina College of Pharmacy, Columbia, SC; (3)Wake Forest University Baptist Medical Center, Winston-Salem, NC.

PURPOSE: Optimal therapy for the treatment of HCV includes pegylated interferon plus ribavirin which is shown to produce a sustained virologic response that only approaches 55% in addition to an undesirable side effect profile. In vitro studies have demonstrated the inhibition of HMG-CoA reductase and thus, depletion of mevalonate-derived geranylgeranylated proteins, leads to a disruption of HCV RNA replication. Initial studies have demonstrated the beneficial effects of lovastatin on HCV RNA replication. While published package inserts include chronic liver disease as a relative contraindication to statin use, several studies have demonstrated an acceptable rate of hepatotoxicity in patients with HCV on concurrent statin therapy. The objective of this study is to evaluate the safety of statin therapy and impact on viral load in patients with chronic HCV in order to determine if a favorable risk-benefit profile exists.
METHODS: This study was conducted in a population of HCV positive patients at a Veterans Administration Hospital. Patients with a diagnosis of HCV were screened through a computerized record system. The following data were collected on each study subject: severity of disease, viral load, time of contraction, liver function tests, lipid profile, HCV related hospitalizations, treatment of HCV, length of HCV treatment, reasons for cessation in HCV treatment, and use of statin therapy. Data collected on patients with HCV currently receiving statins will be compared to those HCV positive patients not receiving statin therapy. The primary outcome of safety will be evaluated by determining if significant elevations of liver function tests, occurred secondary to statin therapy. Data will be analyzed to determine if significant reductions in viral load occurred on statin therapy of if the receipt of statins correlated with an increase in sustained virologic response. Appropriate statistical analysis will be applied to the data set.

Managed Care

179. STEP I – A baseline assessment of pharmacologic concerns identified by clinical pharmacists in workers' compensation. *Elizabeth J. Kuschner, R.Ph., Pharm.D. Candidate*[1], Tron Emptage, R.Ph., M.S.[1], Mona Nasif, B.S., Pharm.D. Candidate[2], Renee F. Robinson, Pharm.D., M.P.H.[1]; (1)Progressive Medical Inc, Westerville, OH; (2)Ohio State University, Columbus, OH.

PURPOSE: Pharmacists play an important role in improving clinical outcomes and reducing costs. STEP I - Identify therapeutic classes of most concern in this population in order to develop "real-time alerts" for adjustors

and nurse case managers for early detection of drug related problems (STEP II).
METHODS: Comprehensive drug utilization reviews (n = 284) conducted by the clinical pharmacy staff over the past calendar year (n = 7 pharmacists) were reviewed, patient information was removed and data was entered into an electronic spreadsheet for analysis.
RESULTS: Opportunities for clinical interventions were identified that could impact both patient safety and clinical outcomes. Eight percent of injured workers were seen by multiple physicians within the same specialty practice. Approximately 13% of injured workers received overlapping drug therapies. Opioids (22%), sedative hypnotics (14%), anticonvulsants (13%), muscle relaxants (13%), and antidepressants such as tricyclic antidepressants (8%), serotonin and norepinephrine reuptake inhibitors (11%), and selective serotonin reuptake inhibitors (9%) constituted a majority of these duplications in therapy. Narcotic analgesics (24%) and antidepressants (34%) were the two classes most often involved in the drug-drug interactions.
Inappropriate use of muscle relaxants (11%) and NSAIDs (10%) as well as inappropriate and potentially subtherapeutic doses of anticonvulsants (40%), often led to additional pharmacologic therapy which may have resulted in safety concerns and increased costs. Opioids (47%), muscle relaxants (9%), hypnotics (17%), and miscellaneous NSAIDs (5%) represented the majority of missed generic opportunities for insurance providers. Lastly, compensation for medications that may not be related to the accepted medical condition(s) such as sedative hypnotics (18%), proton pump inhibitors and H2 antagonists (14%), and antidepressants (17%) often resulted in unnecessary cost to the insurance providers.
CONCLUSIONS: Opioids, antidepressants, and sedative hypnotics should be targeted for "real-time alerts" adjustors and nurse case managers for early detection of drug related problems (STEP II).

Oncology

181. Imxpact of first-line chemotherapy regimen (oxaliplatin- or irinotecan-based) on exposure to fluoropyrimidine, oxaliplatin, and irinotecan, with or without targeted therapy in the community oncology setting (COS). *Russell Attridge, student*[1], Rebecca L. Owens, Pharm.D.[1], Trevor McKibbin, Pharm.D., M.S., BCPS[2], Jim Koeller, M.S.[1]; (1)The University of Texas at Austin College of Pharmacy, The University of Texas Health Science Center at San Antonio, San Antonio, TX; (2)University of Tennessee Health Science Center, Memphis, TN.

PURPOSE: Data suggests improved survival for patients with metastatic colorectal cancer (MCRC) who are able to receive all active agents (fluoropyrimidine, oxaliplatin, irinotecan) and a monoclonal antibody. This analysis was performed to determine if the starting regimen (oxaliplatin- vs. irinotecan-based) makes a difference in achieving the above goal in the COS.
METHODS: A national, multi-centered, retrospective chart review of patients with MCRC starting chemotherapy treatment after January 2003 was conducted at 10 community oncology practices across the US (TX, CA, FL, MA, ME, MT, OH, NV). Data was collected on baseline demographics, performance status (PS), medications administered, toxicity-related events (hospitalization, extra clinic visits, dose reduction, drug change/delay), non-drug related events (patient, physician, disease) and mortality.
RESULTS: A total of 307 patients received initial regimens with oxaliplatin (n = 257) or irinotecan (n = 40). Baseline characteristics were similar among the two groups (p>0.05). There was not a significant difference among oxaliplatin- and irinotecan-based initial regimens for either exposure to fluoropyrimidine, oxaliplatin, and irinotecan (37.7% vs. 30%, p=0.21, respectively) or exposure to the 3 cytotoxic drugs and bevacizumab (27.2% vs. 20%, p=0.16). 56%, 27%, 11%, and 4% of patients were able to progress to second, third, fourth, and fifth-line therapy in the group initiated on oxaliplatin, compared to 58%, 33%, 28%, and 8% of patients in the irinotecan-initiated group. No significant difference was found in cycles per patient subsequent to first-line therapy between the oxaliplatin- and irinotecan-based group (median, interquartile range): 6 (3–11) vs. 11 (5–18), p=0.07.
CONCLUSION: This retrospective analysis indicates that exposure to fluoropyrimidine, oxaliplatin, and irinotecan with or without bevacizumab in patients with MCRC is independent of whether the initial regimen is oxaliplatin- or irinotecan-based. Although cycles per patient given after first-line treatment are not statistically significant, the differences may be clinically relevant.

Pharmacoeconomics/Outcomes

182. Sweet success or lost in translation? A Comparison of Branded and Private-labeled Glucose Meters. *Alission Keillor, Pharm.D. Candidate*; Butler University College of Pharmacy and Health Sciences, 1520 N. Senate Ave, Indianapolis, IN.

BACKGROUND: Self-monitoring of blood glucose (SMBG) is a highly important component of diabetes care for both patients and health care practitioners. Recent marketing trends for glucose meters focuses on creating meters that require a minimal amount of blood, are painless, and provide results quickly. With the rising cost of branded meters, private-label meters have become a popular, cost-effective alternative. Apart from being more cost-effective, concerns regarding the accuracy of these generic meters compared to branded meters exist. The ADA recommends that home glucose meters not deviate from the laboratory value by more than ± 5%. Several studies have evaluated deviations of branded meters, but currently studies evaluating private-label meters are lacking.
STUDY OBJECTIVE: The objective of this study is to determine the differences, if any, in accuracy and variation between two study-designated private-label study meters, the TrueTrack Smart System® (Home Diagnostics) and the BD Logic® (Sanvita) and two study-designated control meters, the Ascensia Contour® and the FreeStyle Flash®.
METHODS: Consenting, English-speaking students or faculty/staff (> 18 years) of an Indiana College of Pharmacy will be eligible for the study. Four capillary blood samples will be collected via fingersticks from each participant to obtain glucose readings from each of the study meters. Blood glucose results from the two study meters will be compared to the two control meters via appropriate statistical analysis. The variation threshold for this study is 3%. A variation in glucose results greater than 3% will be considered inaccurate reading. Readings within 3% of the controls will be considered accurate.
RESULTS: An IRB application for this study has been submitted. Approval is pending. It is anticipated that data collection and analysis will be completed February 2008. There are approximately 535 students enrolled within and approximately 63 faculty and staff affiliated with the College of Pharmacy.

Pharmacogenomics/Pharmacogenetics

183. Does genotype predict the number of medications needed to control blood pressure?. *Joseph P. Stalder, BS*; UCSD Skaggs School of Pharmacy and Pharmaceutical Sciences, La Jolla, CA.

PURPOSE: To determine the association between known genetic polymorphisms affecting hypertension and the number of antihypertensive medications required to establish or maintain blood pressure control.
METHODS: This was a cross-sectional study of 20 single nucleotide polymorphisms (SNP) in hypertensive candidate genes measured by pyrosequencing and maldi-tof. Associations between SNPs and the number of antihypertensive medications prescribed to the patient (as abstracted from pharmacy fill records) were examined using Kruskal-Wallis tests.
RESULTS: In 2003–04, the VA San Diego Healthcare System cared for 5810 hypertensive patients in primary care VA clinics. Of these, 1532 diagnosed with primary hypertension consented to enroll in this study and were subsequently genotyped. Male patients with the GG variant of the â2-adrenergic SNP arg16gly required more medications than those with GA or AA variants (p=0.038). None of the other 19 gene polymorphisms demonstrated a statistically significant relationship with the number of antihypertensives used.
CONCLUSIONS: Of the 20 genes studied, one showed a statistically significant association with the number of medications required to control male patients' blood pressure. However, this is likely a result of chance rather than clinical importance. Thus, this study suggests that these SNPs are not independently pharmacogenetically useful in predicting which patients will require more antihypertensive agents in order to establish or maintain proper blood pressure control.

184. Interethnic comparison of SLCO1B1 haplotypes: relevance to clinical pharmacokinetic-pharmacogenetic studies. *Charles J. Foster, B.S.*, Shannon D. Knutsen, B.A., Christina L. Aquilante, Pharm.D.; University of Colorado Denver School of Pharmacy, Denver, CO

PURPOSE: The SLCO1B1 gene encodes a transporter that is responsible for uptake of drugs from the plasma into the liver. The effects of variant SLCO1B1 haplotypes (i.e., *1B, *5, *15, *16, and *17) on drug pharmacokinetics are frequently studied in Caucasian subjects. However, in African Americans, characterization of common variant SLCO1B1 haplotypes and the subsequent impact of these haplotypes on drug disposition have largely been ignored. The purpose of this investigation was to compare the frequencies of commonly studied SLCO1B1 haplotypes in African Americans versus Caucasians.
METHODS: The study population consisted of 100 African Americans (DNA obtained from the Coriell Institute), and 143 Caucasians (DNA obtained during University of Colorado studies). Samples were genotyped for the following SLCO1B1 polymorphisms: -11187G/A, -10499A/C, 388A/G, and

521T/C. SLCO1B1 haplotypes were computationally assigned as follows: *1A (-11187G/-10499A/388A/521T); *1B (GAGT); *5 (GAAC); *15 (GAGC); *16 (GCGC); *17 (AAGC); and *21 (AAGT). χ^2 tests were used to test for Hardy-Weinberg equilibrium.
RESULTS: SLCO1B1 genotype frequencies were in Hardy-Weinberg equilibrium. SLCO1B1 variant allele frequencies differed between African Americans and Caucasians. In African Americans, the -11187A, -10499C, 388G, and 521C allele frequencies were 1%, 0%, 77.5%, and 3%, respectively; while in Caucasians the frequencies were 4.9%, 3.1%, 38.1%, and 16.8%, respectively. SLCO1B1 haplotype frequencies also differed between races (table).

SLC01B1 genotype frequencies

SLCO1B1 Haplotype	Frequency in African Americans	Frequency in Caucasians
*1A (wild-type)	21%	59.8%
*1B	75.5%	21.3%
*5	1.5%	2.1%
*15	1%	8.7%
*16	0%	3.2%
*17	0.5%	2.8%
*21	0.5%	2.1%

CONCLUSIONS: The SLCO1B1 *5, *15, *16, and *17 haplotypes, which have been associated with decreased transporter function, are rare in African American individuals. As such, future studies that elucidate common functional SLCO1B1 haplotypes in African American individuals, and their impact on drug disposition in clinical pharmacokinetic studies, are warranted.

Pharmacokinetics/Pharmacodynamics/Drug Metabolism/Drug Delivery

185. Comparison of aminoglycoside pharmacokinetics in average weight, overweight, and obese pediatric populations. *Megan A. McKee, Pharm.D., Candidate*, Laura E. Marran Wicks, Pharm.D. Candidate, Melanie McLoud, Pharm.D. Candidate, John E. Murphy, Pharm.D.; University of Arizona College of Pharmacy, Tucson, AZ.

PURPOSE: This retrospective collection of data will 1) provide standards for dosing aminoglycosides in obese pediatrics, 2) increase awareness of drug monitoring in obese populations, and 3) reduce medication errors and adverse drug reactions in obese children.
METHODS: This study is a retrospective chart review from past and current patients at University Medical Center Hospital in Tucson, Arizona. Patients between the ages of three and seventeen that have been/are being treated with aminoglycoside concentrations will be included in this study. Subjects will be divided into three groups based on weight and height percentiles as defined by the Center for Disease Control (CDC) growth charts. Collecting retrospective data from electronic and hard copy charts will provide measured concentrations of aminoglycosides in order to evaluate pharmacokinetics. Data specific to the antibiotic will include: dose and frequency; time dose was given; length of infusion; two measured concentrations (peak and trough); and time concentration was measured. Aminoglycoside clearance, volume of distribution, and half-life are the primary outcomes that will be compared using ANOVA. Specifically, *t*-tests will also be used to compare the volume of distribution between the three groups. A p-value of < 0.05 will be considered statistically significant.
RESULTS: Charts are in the process of being reviewed and data is currently being analyzed. This will conclude December 2007 and researchers will analyze potential differences between the pharmacokinetics of aminoglycosides in obese pediatric patients as compared to average weight pediatric patients.

186. Characterization of antidepressant binding sites on the nicotinic acetylcholine receptor. *Carl L. Sullivan, Master's, student*, Matt Crunden, undergraduate student, Hugo R. Arias, Ph.D.; Department of Pharmaceutical Sciences, Midwestern University, Glendale, AZ.

PURPOSE: Characterization of the antidepressant (AD) binding sites on the nicotinic acetylcholine receptor (AChR) in the resting and desensitized states.
METHODS: [3H]doxepin Scatchard-plots using Torpedo AChR membranes, competition binding experiments using well known noncompetitive antagonists (i.e., [3H]TCP, [3H]dizocilpine, and [14C]amobarbital) and agonist (i.e., [3H]cytisine) radioligands, Schild-type analysis, and molecular modeling of the Torpedo AChR ion channel and molecular docking of imipramine.
RESULTS: (1) There is one (0.99 ± 0.19 binding sites/AChR) binding site of modest affinity (Kd = 1.6 ± 0.3 μM) for [3H]doxepin; (2) the antidepressant affinity for the [3H]TCP and [3H]dizocilpine loci in the desensitized state follows the sequence: imipramine (I) = amitriptyline (A) > fluoxetine (F) > doxepin (D) > bupropion (B), whereas in the resting state the sequence is: F = A > I > D = B; (3) Schild-type analysis suggests that antidepressants may sterically interact with both TCP and dizocilpine sites in the desensitized state; (4) antidepressants inhibit [14C]amobarbital binding in the resting state. However, the observed Ki values were higher than that for [3H]TCP inhibition; (5) [3H]cytisine binding was enhanced by antidepressants when the AChR is in the resting state but activatable state, but not in the desensitized state; and (6) imipramine interacts with a domain formed between valine (position 13') and serine (position 6') rings.
CONCLUSIONS: binding and modeling results indicate that the antidepressant binding site overlaps both the TCP and dizocilpine loci located in the middle of the desensitized ion channel, and that antidepressants may inhibit AChR function by increasing the desensitization process.

187. Using scavenge samples to determine ampicillin pharmacokinetics in infants. *Lina Meng, B.S.*[1], Keary Zhou, Pharm.D.[2], Steven S. Rossi, Ph.D.[3], Rowena Espina, B.S.[3], Neil Finer, M.D.[2], Edmund V. Capparelli, Pharm.D.[3], Brookie Best, Pharm.D., M.A.S.[1]; (1)University of California San Diego Skaggs School of Pharmacy and Pharmaceutical Sciences, La Jolla, CA; (2)University of California, San Diego Medical Center, San Diego, CA; (3)School of Medicine, University of California, San Diego, San Diego, CA.

PURPOSE: The objectives of this study were to determine if scavenged samples can be used to determine ampicillin pharmacokinetics (PK) in infants, and to develop a high-pressure liquid chromatography (HPLC) assay to monitor ampicillin in human plasma.
METHODS: This study prospectively examined scavenged blood samples of 44 neonates in the Neonatal Intensive Care Unit at UCSD Hillcrest Medical Center. 'Scavenge samples' refers to any residual samples left over in the NICU or laboratory after standard-of-care clinical evaluations. Inclusion criteria included infants of any estimated gestational age (EGA) receiving IV ampicillin and post-natal age younger than 120 days. After obtaining informed consent, samples were scavenged approximately once daily along with demographic information and complete ampicillin dosing history. An HPLC assay with isocratic elution was developed based on previously published methods using as little as 13 μL of human plasma with a range of sensitivity of 0.244 to 125 μg/mL. A naïve pool analysis was performed with a regression of log of concentrations versus time.
RESULTS: Twenty-one infants with the EGA of > 32 weeks and 23 infants with the EGA of ≤32 weeks were enrolled. In the first 23 patients enrolled, 103 scavenged blood samples were collected. In these samples, 95% appear evaluable based on sample volume. Time after dose vs. concentration is consistent with previously published data. Neonates ≤ 32 weeks EGA had higher ampicillin concentrations and slower elimination as expected based on their less mature renal function. Half-life values from pooled data were 3.4 hours (> 32 weeks EGA) and 4.6 hours (≤ 32 weeks EGA), $r^2 = 0.58$ and 0.73, respectively.
CONCLUSIONS: Assays can be developed to accurately measure ampicillin concentrations from very small sample volumes. With small volume assays, scavenged samples are a feasible approach to obtain meaningful PK information in neonates where traditional PK studies are difficult to perform.

188. Development of an assay system for testing EP2 and EP4 prostanoid agonists and antagonists. *Sean T. Ustic, BA*, Anthony J. Hutchinson, B.A., John W. Regan, Ph.D; University of Arizona, Tucson, AZ.

Prostaglandins are the downstream products of the action of cyclooxygenase (COX) enzymes on arachidonic acid. Through their interaction with G-protein coupled receptors, these compounds stimulate intracellular signaling cascades that regulate cell physiology in virtually all tissues of the body. Prostaglandin-E_2 (PGE_2) is one of the prostaglandins produced by the actions of COX and is important in pain, inflammation, fever, bone metabolism and is becoming appreciated for its potential role in cancer. Two of the PGE_2 receptor subtypes, EP_2 and EP_4, are similar in their activation of adenylyl cyclase (AC) and subsequent up regulation of cAMP production. These receptors differ, however, in that EP2 more efficiently stimulates cAMP production and EP4 signaling involves the activation of phosphatidylinositol 3-kinase (PI3K) and extracellular signal related kinases (ERKs). We have obtained and isolated plasmids containing cDNAs encoding FLAG-tagged EP_2 and EP_4 receptors for transient expression in HEK-293 cells. The sequences of these plasmids were confirmed by restriction enzyme analysis and DNA sequencing. Transfected cells were treated with vehicle, PGE2 or forskolin to assess appropriate receptor functionality based on cAMP induction. The PGE_2-treated cells responded as predicted with intracellular production of cAMP, with the EP_2 receptor responding more efficiently than the EP_4 receptor. In the future we plan to generate cell lines of HEK-293 cells stably expressing the FLAG-tagged EP_2 or EP_4 receptors. These cell lines will be characterized using with selective agonists in assays for radioligand binding and cAMP productions. Additionally, we will use antagonists and inhibitors to examine the signaling properties of these receptors. We intend for these cells to be used as a novel assay system for the development of future selective EP_2 and EP_4 agonists. This research could potentially benefit in

selectively targeting EP_2 or EP_4 pathways linked to prevalent ailments such as pain, fever, inflammation, possibly cancer or bone growth.

Pharmacy Residency

189. Mandating residencies for all pharmacy graduates by the year 2020: a study of existing programs' plans for expansion. *Helen B. Kim, MS, Pharm.D., Candidate*, Hien Tran, Pharm.D. Candidate, Quang Bui, Pharm.D. Candidate, Faria Nusrat, Pharm.D. Candidate, Olivia Ng, Pharm.D. Candidate, Christina Thanawiwat, Pharm.D. Candidate, Danielle Richardson, Pharm.D. Candidate, Diane Nguyen, Pharm.D. Candidate, Quan Tran, Pharm.D. Candidate, Julia Nguyen, Pharm.D. Candidate; Touro College of Pharmacy, Vallejo, CA.

PURPOSE: As the role of pharmacists evolves from primarily dispensing activities, pharmacy residencies play an important role. As a result, in 2006, the American College of Clinical Pharmacy (ACCP) made the bold recommendation of mandating residency training for all pharmacy graduates by the year 2020 before entry into pharmacy practice involving direct patient care. Our aim was to assess the current number and distribution of residencies and estimate the residency growth required if all Doctor of Pharmacy (Pharm.D.) graduates participate in PGY1 residency training by the year 2020.
METHODS: A 4-question email survey was sent to the designated contact person for the American Society of Health-System Pharmacists (ASHP) accredited PGY1 programs inquiring about the number of past, current, and future residency positions. If no response was received within 7–10 business days, we followed up with up to 2 telephone calls.
RESULTS: ASHP listed 553 accredited PGY1 residency programs and 23 managed care PGY1 programs in the U.S. and Puerto Rico in April, 2007. The survey response rate was 57%. Current number of ASHP accredited residency positions increased 50% from 5 years ago and 153% from 10 years ago. Within the "next few years" (estimated at 3 years), residency positions are predicted to increase by 22% overall or 6.8% per year. Fulfillment of the ACCP mandate will require approximately 17% annual PGY1 residency growth rate while respondents collectively projected a 6.8% annual growth rate for all types of residences.
CONCLUSIONS: While PGY1 residency programs have shown substantial growth over the past 10 years, PGY1 positions will need to increase approximately 8-fold or 17% per year over the next 13 years to meet the mandate that by 2020 all Pharm.D. graduates complete a PGY1 residency. The needed growth will vary depending on the percent of pharmacists involved with providing direct patient care.

Substance Abuse/Toxicology

190. Interaction of ibogaine anlogs with the nicotinic acetylcholine receptor. *Mary E. Ghafoori, undergraduate, student*[1], Krzysztof Jozwiak, Ph.D.[2], Irving W. Wainer, Ph.D.[2], Hugo R. Arias, Ph.D.[1]; (1)Department of Pharmaceutical Sciences, Midwestern University, Glendale, AZ; (2)Gerontology Research Center, NIA-NIH, Baltimore, MD.

PURPOSE: Characterization of the binding sites for ibogaine analogs on the nicotinic acetylcholine receptor (AChR) in the resting and desensitized states.
METHODS: [3H]18-methoxycoronaridine ([3H]18-MC) Scatchard-plots using Torpedo AChR membranes, [3H]TCP (a well characterized noncompetitive antagonist) competition binding experiments and Schild-type analysis, analog-induced binding modulation of the agonist [3H]cytisine, and molecular modeling of the Torpedo AChR ion channel and molecular docking of 18-MC.
RESULTS: (1) there is one (0.86 ± 0.13) high-affinity (Kd = 0.23 ± 0.04 μM) binding site for [3H]18-MC in the desensitized AChR; (2) the affinity (in μM) of each 18-MC congener for the [3H]TCP locus in the desensitized state follows the sequence: 18-MC (0.17 ± 0.01) > 2-methoxyethyl-18-MC (1.3 ± 0.1) ~ 18-methylaminocoronaridine (1.3 ± 0.2) > (+)coronaridine (3.2 ± 0.4) ~ albifloranine (3.2 ± 0.3) > ibogaine (5.4 ± 0.3). Whereas, the affinity sequence in the resting state is: 18-MC (12 ± 1) > 18-methylaminocoronaridine (20 ± 2) > (+)coronaridine (48 ± 5) > 2-methoxyethyl-18-MC (82 ± 8) > ibogaine (182 ± 17) > albifloranine (252 ± 24); (3) Schild-type analysis suggests that 18-MC interacts with the TCP site in a steric manner; (4) [3H]cytisine binding is enhanced by the 18-MC congeners when the AChR is in the resting but activatable state, but not in the desensitized state; and (5) 18-MC interacts with a domain formed between valine (position 13') and leucine (position 9') rings.
CONCLUSIONS: binding and modeling results indicate that the 18-MC binding site overlaps the TCP locus located in the middle of the desensitized ion channel, and that ibogaine congeners may inhibit the AChR by inducing the desensitization process.

191. Analysis of fentanyl diversion using multi-wavelength UV absorbance. *Tamar M. Rice, Pharm.D. Candidate*[1], BethAnn F. Johnson, Pre-Pharmacy Student[2], Lisa A. Beregi, Pharm.D.[3], Peter J. Rice, Pharm.D., Ph.D.[2]; (1)Mercer University College of Pharmacy and Health Sciences, Johnson City, TN; (2)East Tennessee State University, Johnson City, TN; (3)Johnson City Medical Center, Johnson City, TN.

PURPOSE: Diversion of controlled substances is a significant concern in the operating room pharmacy. Fentanyl is of particular concern since many pharmacies use refractive index to monitor returned formulations and fentanyl injection has a refractive index similar to sterile water. The goal of this project was to evaluate multiple wavelength ultraviolet (UV) absorbance as a cost-effective method for identifying and quantifying fentanyl returned to the pharmacy from the anesthesia department.
METHODS: Samples of at least 0.3 mL from all returned control substances were collected over a several month period; no record of sample sources was maintained. Samples were stored in sealed 96-well plates prior to analysis of 0.25 mL in 96 well Corning 3635 UV plates. UV absorbance was measured at 215, 275, 290, 305, and 320 nm using a Spectramax 384 (Molecular Devices) UV-Visible plate reader and compared to standards of fentany (50 μg/mL), midazolam (1 mg/mL) and ketamine (10 and 100 μg/mL). Quality control samples were included with the samples and used for assay control and to ensure that false samples were recognized.
RESULTS: Each preparation produced a pattern of absorbance at the measured wavelengths, which was used to identify samples as fentanyl (50 μg/ml), midazolam (1 mg/ml), ketamine (100 mg/ml or 10 mg/ml), or unidentified. The pattern of absorbance also suggested approximate dilutions for quality control samples of fentanyl. Fentanyl absorbance at 215 nm was proportional to concentration and could be used to directly estimate fentanyl concentration. By examining a large number of samples a "normal distribution" was established to identify samples that merited further evaluation by HPLC.
CONCLUSIONS: Results suggest that UV absorbance can be used to easily assay large numbers of fentanyl samples as long as no other drugs are present in the syringe.

192. Why do we smoke? A look into the rationale of adolescent smoking. *Acaysia Webster, High School Student*[1], Kristal L. Williams, Pharm.D.[2]; (1)Crispus Attucks Medical Magnet High School, 1520 N. Senate Ave, Indianapolis, IN; (2)Butler University College of Pharmacy and Health Sciences / IU Methodist Family Practice Center, Indianapolis, IN.

INTRODUCTION: Tobacco use is a leading health indicator of Healthy People 2010 (HP2010). Concerning tobacco use several objectives targeting the adolescent population have been established. Adolescent-targeted objectives include, but are not limited to, reducing overall tobacco use and its initiation, increasing the average age of first use of tobacco products, and increasing tobacco cessation attempts. Since FDA-approved smoking cessation medications are not indicated for individuals < 18 years of age, behavioral and cognitive interventions are the only recommended smoking cessation therapies for adolescents. To ultimately prevent tobacco use among adolescents and to culturally target education and interventions to ethnically diverse adolescents it will be important to understand the rationale for and influencing factors of adolescent tobacco use. To date, ethnic specific behavioral and cognitive interventions have not been identified for the adolescent population. Many health care professionals, particularly pharmacist are providing smoking cessation management.
OBJECTIVE: To determine the factors that influence cigarette use and smoking habits among Minority and White adolescents and to identify gender- and racial/ethnic-specific smoking cessation interventions to assist adolescents to quit smoking.
METHODS: Volunteering students, with parental consent, if warranted, who are greater than 13 years of age, fluent in English and attend one of the selected volunteering middle, junior high and high schools within Marion County, Indiana will be given an anonymous and confidential 29-item questionnaire on their smoking environment, smoking habits healthy lifestyle habits and perceptions of smoking and tobacco use. Schools were selected based on demographic profiles to meet the study population for age, cultural diversity and socio economical status. The responses to the survey will be evaluated for age, gender and racial/ethnic differences, smoking environment and socioeconomic status using appropriate statistical methods.
RESULTS: A total of five schools were identified for study inclusion. Complete study results will be presented.

Transplant/Immunology

193. Evaluating the safety and efficacy of daptomycin and linezolid in the treatment of vancomycin resistant enterococcus (VRE) after orthotopic liver transplantation. *Shannon L. Holt, B.S.*[1], Matthew T. Harris, Pharm.D., BCPS[2]; (1)University of North Carolina at Chapel Hill, School of Pharmacy, Chapel Hill, NC; (2)Duke University Hospitals, Durham, NC.

PURPOSE: Current treatment options for VRE infections include daptomycin and linezolid. Limited data exists on the safety and efficacy of these agents in

liver transplant recipients. This study will be evaluating the efficacy and safety of either daptomycin or linezolid in the treatment of VRE for this defined population.
METHODS: This study has been approved by the Institutional Review Board. This is a single site retrospective cohort analysis that includes 20 liver transplant recipients with documented VRE treated with either daptomycin or linezolid. The primary endpoints include resolution of infection and rate of VRE reoccurrence. Secondary endpoints assess the safety/tolerability of daptomycin and linezolid. Liver transplant recipients will be screened for a history of VRE infections between the dates of 1/04–1/07 by looking at past microbiological results. Inclusion criteria for the study include: liver transplant recipient, age > 18-years-old, and a documented VRE infection between the above dates treated with either daptomycin/linezolid. Patients were excluded if they were < 18-years-old, received daptomycin/linezolid for another indication, and patients on daptomycin/linezolid for <3 doses. The safety and efficacy will be evaluated by looking at survival, resolution and reoccurence of infection, and adverse events. Other data collected includes: demographics, site of infection, time to infection, dose/duration of treatment, prior vancomycin use, co-infections, statin use with daptomycin, SSRI use with linezolid, and labs. A descriptive analysis will be performed on all data.
RESULTS: Twenty liver transplant recipients were treated with either daptomycin or linezolid for VRE infections. The average age was 44-years-old (18–64), 60% were male, 90% were primary transplant recipients, and 80% had prior vancomycin exposure. Eight of 20 patients received daptomycin, 5/20 received linezolid, and 7/20 were treated with both. Overall patient survival was 80%. Of those who died, the average survival time was 30 mos. Final results and conclusions will be completed prior to presentation.