ABSTRACTS

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ORIGINAL RESEARCH

ADR/Drug Interactions

1. Ramipril-induced acute liver toxicity. *Holli A. Winters, Pharm.D.*, Shiv Seth, R.Ph., Ph.D., Lee Hebert, M.D.; The Ohio State University Medical Center, Columbus, OH.

PURPOSE: Hepatotoxicity is a rare adverse effect associated with angiotensin-converting enzyme inhibitors (ACEI). The incidence of liver toxicity is estimated to be less than 0.1%. Our case report describes ramipril-induced hepatotoxicity with a rechallenge.
METHODS: T.T. is a 70-year-old white woman with a medical history significant for hypothyroidism, migratory arthiritis, leukocytoclastic vasculitis of the lower extremities, and Type II cryoglobulinemia. Her medications included prednisone, cyclophosphamide, levothyroxine, and hydrochlorothiazide. Ramipril 5 mg once/day was initiated for hypertension. One month after starting ramipril the patient was admitted to the hospital with severe painless jaundice, elevated liver function tests (LFTs), and complaining of malaise, fatigue, and decreased appetite. Her LFTs on admission were alanine aminotransferase (ALT) 3796 U/L, aspartate aminotransferase (AST) 1909 U/L, and total bilirubin 5.5 mg/dL (baseline 2 months prior; ALT 13 U/L, AST 19 U/L, total bilirubin 0.7 mg/dL). The patient's cyclophosphamide was held prior to admission for suspected hepatotoxicity. Her antihypertensives were also held upon admission, and her LFTs began to decline (ALT 2174 U/L, AST 824 U/L, total bilirubin 6.5 mg/dL). On preparation for discharge the patient's ramipril was reinitiated. Approximately 1 week after discharge, all LFT parameters were significantly elevated (ALT 2313 U/L, AST 1011 U/L, total bilirubin 9.7 mg/dL). The patient was instructed to discontinue the ramipril, and all LFTs returned to normal within 6 weeks.
CONCLUSIONS: Hepatoxocity is a potential adverse effect associated with ramipril therapy. The onset of liver toxicity was within 6 weeks in our case. We recommend monitoring liver function at baseline and for the first few months after initiating ACEI therapy.

Adult Medicine

2. Incidence and risk factors for upper extremity thrombosis in hospitalized patients with peripherally inserted central catheters. *Bob Lobo, Pharm.D., BCPS*[1], Georgeta Vaidean, M.D., MPH, Ph.D.[2], Ron Shorr, M.D., M.S.[2], Terry Hodge, B.S.[3], Anne Reaves, Pharm.D.[1], Joyce Broyles, Pharm.D., M.S., BCNSP[1]; (1)Methodist University Hospital, Memphis, TN; (2)University of Tennessee Department of Preventive Medicine, Memphis, TN; (3)University of Tennessee, Memphis, TN.

PURPOSE: The objective of this study was to estimate the frequency and clinical correlates of upper limb deep vein thrombosis (UDVT) and pulmonary embolism (PE) in patients with peripherally inserted central catheters (PICC).
METHODS: We collected data by retrospective review of the electronic medical record on all hospitalized patients who had a PICC inserted between August 1, 2005, and November 1, 2005, at Methodist University Hospital, Memphis, TN. All patients who had a PICC inserted sucessfully during the study period were included. Patients were excluded if they already had an upper extremity DVT or sepsis at the time of PICC insertion. Clinically suspected UDVT was confirmed by ultrasound, and PE was confirmed by either high-resolution CT or VQ scan.
RESULTS: There were 954 PICC lines inserted in 781 patients. The mean duration of catheterization was 9.7 days (7119 PICC days). Among the 781 patients with single lines, 61% were women, 70% were African American, and the mean age was 60 years. Most catheter tips (78%) were placed in the superior vena cava. UDVT occurred in 25 patients (3.2%), and PE occurred in 27 patients (3.5%) with a single line. Overall, VTE occurrd in 6.27% of patients with a single line (3 patients experienced UDVT with PE). The VTE rate was 6.9 per 1,000 PICC-days. The average length of hospital stay was 15 days in those without VTE and 22 days in those with VTE. The patients with multiple PICC lines had a VTE rate of 9.7 per 1,000 PICC-days. The length of stay was 42 days in patients with multiple PICC lines with VTE versus 30 days without VTE.
CONCLUSIONS: UDVT and PE occur frequently in hospitalized patients with PICC lines, especially when multiple PICC lines are placed.

3. Evaluation of the relationship between level of education and preferred learning method in inpatients receiving warfarin. *Erin P. Simone, Pharm.D.*, David A. Kuhl, Pharm.D., Marilyn D. Lee, Pharm.D., N. Elizabeth Piana, Pharm.D.; The Regional Medical Center at Memphis, Memphis, TN.

PURPOSE: A prior study in warfarin patients identified level of education as a factor associated with poor anticoagulation control and increased bleeding. However, the preferred method of learning in relation to education level has not been described in this population. This study evaluated self-described education level and preferred method of learning in hospitalized patients receiving warfarin.
METHODS: Electronic records of warfarin patients admitted to the study institution between January 1 and June 30, 2006, were included. Readmissions and patients with incomplete data were excluded. Data collected included age, gender, race, and self-described education level (grade school, high school, high school degree, college) and preferred method of learning (audio, demonstration, written, visual, no preference). Patients were subsequently combined into two groups (degree, no degree). Univariate and multivariate analyses assessed the association of education level to demographic variables and preferred learning method.
RESULTS: 204 patients were included with no significant difference being identified between grade school versus high school and high school degree versus college for any study variable. There was no significant difference in female gender between degree (61/150) and no degree (25/54). Patients without a degree were more likely African American (76% vs. 61%, $p<0.005$), older (53 ± 19 vs. 44 ± 14, $p<0.005$), and preferred audio (24% vs. 9%, $p<0.005$), while the degree group chose no preference (47% vs. 28%, $p<0.05$) more frequently. Multivariate analysis revealed that the no degree group preferred audio (OR 3.9 (1.5–10.7), $p=0.007$), and no degree was more common with increasing age (OR 1.04 (1.01–1.06), $p<0.005$).
CONCLUSIONS: Patients without a degree, who were more likely to be older, highly preferred audio learning methods. Institutions should assess current patient education tools and incorporate appropriate audio methods into educational programs. Further studies are needed to assess the impact of learning method on patient outcomes in warfarin patients.

4. Adherence with advanced cardiac life support guidelines during in-hospital cardiac arrest: a role for clinical pharmacy. *Heather M. Draper, Pharm.D.*[1], Rima A. Mohammad, Pharm.D.[1], G. Robert DeYoung, Pharm.D., BCPS[2]; (1)University of Tennessee College of Pharmacy, Knoxville, TN; (2)Saint Mary's Health Care and Advantage Health Physicians, Grand Rapids, MI.

PURPOSE: Limited published research has evaluated adherence to advanced cardiac life support (ACLS) guidelines during in-hospital cardiac arrest. Recent reviews of ACLS practices indicate that an audit of in-hospital resuscitation practices be performed to guide future resuscitation training programs for hospital personnel. The primary objective of this study was to assess adherence to ACLS guidelines at a community teaching hospital and determine the potential role for pharmacist presence during resuscitation practices.
METHODS: A retrospective chart review of 74 consecutive in-hospital cardiac arrests occurring from January 1, 2003, to June 30, 2004, were evaluated for 1) administered treatment interventions, 2) adherence with the 2000 American Heart Association (AHA) ACLS treatment guidelines, and 3) pharmacist presence at the resuscitation. Non-adherent interventions were classified into the following categories: deviation in the sequence of interventions, omission of indicated treatment, incorrect dosage of medication or defibrillation, or time delay in provided intervention.
RESULTS: Of the 650 treatment interventions identified, 10.6% were non-adherent with ACLS guidelines. The most common reasons recorded for non-adherence were an incorrect dosage of medication (35%), prolonged period of time between sequential interventions (25%), and omission of an indicated treatment (19%). A pharmacist was present at 36.5% of documented arrests.
CONCLUSIONS: Based on the modes of non-adherence noted, a pharmacist trained in ACLS could have the potential to influence drug therapy, resulting in improvement of non-adherence rates during in-hospital resuscitation practices. ACLS education of pharmacists and participation on the resuscitation team is warranted to affect the rates and modes of non-adherence.

Ambulatory Care

5. Evaluation of patient perceptions and outcomes related to anticoagulation point-of-care testing in ambulatory care clinics. *Amy N. Thompson, Pharm.D.*, Kelly R. Ragucci, Pharm.D., FCCP, BCPS, CDE; Medical University of South Carolina, Charleston, SC.

PURPOSE: The study aim is to analyze humanistic and clinical outcomes in patients currently on warfarin and being monitored through an anticoagulation point-of-care testing (POCT) device within ambulatory care clinics at our institution.
METHODS: All patients currently on warfarin therapy, who are being followed by clinical pharmacists for anticoagulation monitoring at the Medical University of South Carolina Family Medicine Center and University Diagnostics Center were enrolled. All patients were asked to complete a satisfaction survey with regard to their anticoagulation monitoring. In addition, we collected data on these patients with regard to emergency room visits, hospitalizations, and percent of time in INR therapeutic range for 6 months pre- and post-implementation of the POCT device. This information was obtained through our electronic patient information database, Oacis.
RESULTS: A total of 180 patients were evaluated from the two clinics. The majority (41%) of these patients were taking warfarin for atrial fibrillation. Satisfaction surveys were completed by 86 patients. These surveys revealed that the POCT device was preferred over venous puncture in 95% of patients. Reasons for the preference included more face-to-face interaction, less wait time, less pain/blood, and quicker results. Of the 145 patients who were included in the objective data analysis, no significant differences were found in the number of hospitalizations, emergency room visits, or percent of time in INR therapeutic range pre- and post- implementation of the POCT device.
CONCLUSIONS: Limited information is published on both the humanistic and clinical outcomes of such a device in pharmacy-run ambulatory care clinics. Although the results of this project show no significant differences in clinical outcomes between the POCT device and conventional venous puncture for INR monitoring, patient satisfaction was greatly improved.

6E. Double blind, randomized clinical trial to evaluate the effectiveness of ezetimibe 5 mg versus ezetimibe 10 mg when added to statin therapy. *Alison Sandherr, Pharm.D.*[1], Brian Peek, Pharm.D.[1], Angela Porter, Pharm.D.[1], Angela Pentecost, Pharm.D.[1], Antoine Al-Achi, Ph.D[2]; (1)Asheville Veterans Affairs Medical Center, Asheville, NC; (2)Campbell University School of Pharmacy, Buies Creek, NC.

Presented at the 37th Annual Southeastern Residency Conference, Athens, GA, April 27-28, 2006.

Cardiovascular

7E. Pharmacist-provided metabolic syndrome screening and educational program reduces prevalence of cardiometabolic risk factors. *Amy M. Franks, Pharm.D.*, T. Scott Warmack, Pharm.D., Donna S. West, Ph.D.; University of Arkansas for Medical Sciences, Little Rock, AR.

Presented at the 47th Annual Conference on Cardiovascular Disease Epidemiology and Prevention of the American Heart Association, in association with the Council on Nutrition, Physical Activity, and Metabolism, Orlando, FL, February 28–March 3, 2007.

8E. Arterial stiffness and renal function in patients with coronary artery disease. *Bushra S. Ilyas, B.Pharm.(Hons), M.Pharm.*, Donna Markie, R.N., David E. Newby, BA, B.Sc.(Hons), BM, MRCP, M.D., David J. Webb, M.D., DSc, FRCP, FRSE, FMedSci; University of Edinburgh, Western General Hospital, Edinburgh, United Kingdom.

Presented at ARTERY-6 Conference of the Association for Research into Arterial Structure and Physiology, Athens, Greece, September 22-23, 2006.

9. Does dosing intensity effect a statin's ability to reduce post-cardiac surgery atrial fibrillation? *Craig I. Coleman, Pharm.D.*[1], C. Michael White, Pharm.D., FCCP, FCP[1], Jeffrey Kluger, M.D.[2], Kirkeith Lertsburapa, M.D.[3], Osman Faheem, M.D.[3]; (1)University of Connecticut, Hartford, CT; (2)Hartford Hospital, Division of Cardiology, Hartford, CT; (3)Hartford Hospital, Hartford, CT.
PURPOSE: The ARMYDA-3 trial demonstrated that preoperative statin use can reduce postoperative atrial fibrillation (POAF), but the optimal statin dosing intensity was not elucidated. Therefore, we sought to determine whether different preoperative statin dosing intensities had varying effects on the development of POAF following cardiac surgery.
METHODS: Patients undergoing coronary artery bypass grafting (CABG) and/or valvular surgery from the randomized, controlled Atrial Fibrillation Suppression Trials II and III (AFIST II and III) were evaluated in this nested cohort evaluation. Patient demographics, surgical characteristics, medication use, and the incidence of POAF (defined as AF lasting at least 5 minutes in duration documented by telemetry) were all uniformly and prospectively collected as part of AFIST II and III. The low-dosing intensity statin group consisted of patients who received no statin or less than 40 mg/day (in atorvastatin dosing equivalents). The high-dosing intensity group consisted of those receiving greater than or equal to 40 mg/day. Multivariate logistic regression was used to calculate adjusted odds ratios (AORs) with 95% confidence intervals (CIs).
RESULTS: A total of 338 patients were evaluated of which 287 (84.9%) received low-dosing intensity statin therapy and 51 (15.1%) received high-dosing intensity statin therapy. The study population was 65.7 ± 9.1 years of age; 77.8% were male; 11.2% underwent valve surgery; 3.6% had prior AF; 10.1% had heart failure; and 84.0% and 37.9% received postoperative β-blockade and prophylactic amiodarone, respectively. In total, 110 (32.5%) patients developed POAF. Upon multivariate logistic regression, the preoperative use of high-dosing intensity statin therapy was associated with a statistically significant 57% reduction in patients' odds of developing POAF compared to those receiving low-dosing intensity statin therapy [AOR; 0.43 (95% CI=0.19–0.96), p=0.04].
CONCLUSIONS: The use of high-dosing intensity statin therapy is associated with the greatest reductions in the development of POAF.

10. Preoperative statins for the prevention of infectious complications following cardiac surgery. Diana M. Lucek, Pharm.D.[1], C. Michael White, Pharm.D., FCCP, FCP[2], *Craig I. Coleman, Pharm.D.*[2]; (1)Hartford Hospital, Hartford, CT; (2)University of Connecticut, Hartford, CT.

PURPOSE: Recent observational studies have suggested that statins can decrease the incidence and severity of various infections including pneumonia and bacteremia. However, the effect of statins on post-cardiac surgery infection has not been adequately evaluated. Therefore, we sought to determine whether preoperative statin use results in a reduction in infection following cardiac surgery.
METHODS: This was a cohort evaluation of all consecutive patients who underwent coronary artery bypass graft (CABG) and/or valve surgery at our institution between January 1, 2004, and August 31, 2006. Our primary outcome measure was the combined incidence of postoperative infectious complications [pneumonia, bacteremia, sternal wound, leg vein harvest site infection, urinary tract infection, or tracheotomy site infection]. We used multivariate logistic regression to control for potential confounding and to calculate adjusted odds ratios (AORs) and 95% confidence intervals (CIs).
RESULTS: A total of 1,934 patients were included in this evaluation of which 1,248 patients received a statin preoperatively and 686 did not. The study population was 66.3 ± 11.6 years of age, 71.3% male, 34.0% valve surgery, 71.5% hypercholesterolemic, and 32.0% diabetic. In total, 151 (7.8%) patients developed an infectious complication. Upon multivariate logistic regression, preoperative statin use was associated with a significant reduction in the development of infection [AOR; 0.67 (95% CI=0.46–0.99), p=0.04].
CONCLUSIONS: Preoperative statin use is associated with a 33% reduction in patients' odds of developing a postoperative infection following cardiac surgery.

11E. Lipoprotein particle size, concentration and lipid ratio effects of colesevelam HCl in combination with ezetimibe and simvastatin. Harold Bays, M.D., FACP[1], James Rhyne, M.D.[2], Stacey Abby, Pharm.D.[3], *Chhaya Shah, Pharm.D.*[3], Yu-Ling Lai, RNC, MSN[3], Michael Jones, Ph.D.[3]; (1)Louisville Metabolic and Atherosclerosis Research Center, Louisville, KY; (2)The Lipid Center, Statesville, NC; (3)Daiichi Sankyo, Inc., Parsippany, NJ.

Presented at the Annual Meeting of the American Heart Association, Chicago, IL, November 12-15, 2006.

12. Early remodeling is associated with functional improvement after acute candesartan treatment in stroke. *David J. Rychly, Pharm.D.*[1], Anna Kozak, M.S.[1], Adviye Ergul, M.D., Ph.D.[2], Azza El-Remessy, Ph.D.[1], Livia S. Machado, B.Pharm.[1], Hazem F. Elewa, B.Pharm.[1], Susan C. Fagan, Pharm.D.[1]; (1)University of Georgia College of Pharmacy, Veteran's Affairs Medical Center, Augusta, GA; (2)Medical College of Georgia, Augusta, GA.

PURPOSE: We have shown that acute treatment with candesartan in an experimental model of stroke in rats resulted in improved neurovascular outcomes at 24 hours post stroke, but the long-term effects are unknown. We now examine the 7-day outcomes using the same treatment paradigm and measuring blood pressure (BP), neurobehavioral performance, and two markers of vascular remodeling: matrix metalloproteinase (MMP) activity and vascular endothelial growth factor (VEGF) expression.
METHODS: Male Wistar rats underwent 3 hours of middle cerebral artery occlusion (MCAO). A single dose of candesartan 1 mg/kg was given

intravenously at reperfusion. BP was measured continuously by telemetry from 2 days before to 7 days after MCAO. Animals were given neurobehavioral testing before MCAO, at 24 hours after MCAO, and at 7 days. Neurobehavioral testing included elevated-body swing test (EBST), Bederson, elevated beam walk, and paw grasp.
RESULTS: A single dose of candesartan 1 mg/kg administered at reperfusion significantly lowered BP for 3 days compared with saline controls. The treatment group had no difference in infarct size at 7 days compared to controls. Treatment improved Bederson scores (2.1 vs. 2.9, p=0.0083), EBST performance (22.9 vs. 39.4, p=0.021), and paw grasp (1.29 vs. 2.88, p=0.0001) at all time points. Beam walk was improved in the treatment group at 24 hours (1.79 vs. 2.88, p=0.0001), but not at 7 days. MMP-2 activity and VEGF expression was significantly higher in the treatment group (p=0.035, p=0.042, respectively).
CONCLUSIONS: Acute blood pressure lowering with a single dose of candesartan after reperfusion provides long-term benefits as measured by a variety of neurobehavioral tests. The beneficial effects of candesartan may involve enhancement of early angiogenic remodeling.

13. Do statins increase risk of hemorrhagic stroke? Nickole N. Henyan, Pharm.D.[1], Pamela N. Gann, Pharm.D.[2], *Daniel M. Riche, Pharm.D.*[1]; (1)The University of Mississippi School of Pharmacy, Jackson, MS; (2)The University of Mississippi Medical Center, Jackson, MS.

PURPOSE: Evidence from randomized, controlled trials suggests that low-density-lipoprotein (LDL) reduction by statins in patients at high risk for cardiovascular disease reduces the incidence of ischemic stroke; however, data from large epidemiologic observational studies suggest an inverse relationship between risk of hemorrhagic stroke and cholesterol levels. We performed a meta-analysis of randomized, controlled trials to assess the effect of statin therapy on total, ischemic, and hemorrhagic stroke.
METHODS: A systematic literature search of MEDLINE, EMBASE, CINAHL, and Web of Science was performed through September 2006 to identify randomized, controlled trials of statin therapy. Trials were included if they met the following criteria: 1) Randomized, controlled trials versus placebo, 2) Well described protocol, 3) Data reported on incidence of total, ischemic, and/or hemorrhagic stroke. All data were independently extracted by three investigators using a standardized data abstraction tool. Weighted averages are reported as Relative Risk (RR) with 95% confidence intervals (CI) using a random effects model.
RESULTS: A total of 29 trials (n=106,085) reported total stroke incidence. Six trials (n=46,206) reported incidence of ischemic stroke, and 12 trials (n=64,186) were included in the hemorrhagic stroke analysis. Statin therapy significantly reduced the risk of any stroke, RR 0.82 (95% CI=0.76–0.87). Statin therapy also significantly reduced the risk of ischemic stroke, RR 0.79 (95% CI=0.67–0.94). Statin therapy did not reduce risk of hemorrhagic stroke RR 1.07 (95% CI=0.77–1.47). Significant statistical heterogeneity was seen in the ischemic stroke group (p=0.03), but not in the total or hemorrhagic stroke groups (p>0.2 for both).
CONCLUSIONS: Statin therapy significantly reduces overall stroke and ischemic stroke risk; however, it is associated with a non-significant increase in risk of hemorrhagic stroke.

14E. Controlled blood pressure lowering after experimental cerebral ischemia provides neurovascular protection. *Hazem F. Elewa, B.Pharm.*[1], Anna Kozak, M.S.[1], Adviye Ergul, M.D., Ph.D.[1], Maribeth H. Johnson, M.S.[2], Susan C Fagan, Pharm.D.[1]; (1)Univesity of Georgia, Augusta, GA; (2)University of Georgia, biostatistics, Augusta, GA.

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15. Confirmation of renal events following the use of antifibrinolytic therapy during on-pump coronary artery bypass graft (CABG) surgery. Alissa K. Langley, Pharm.D., Jennifer J. Oh, Pharm.D., M.S., Heather H. Hesselson, Pharm.D., Stacy A. Voils, Pharm.D., BCPS, *Heath R. Jennings, Pharm.D., BCPS*; Saint Joseph HealthCare, Lexington, KY.

PURPOSE: Mangano and colleagues recently postulated that the use of aprotinin during coronary artery bypass grafting (CABG) is associated with increased incidence of renal events. Renal event rates in this study appeared higher versus national Society of Thoracic Surgeons (STS) benchmarks. This study was designed to evaluate the incidence of renal dysfunction and/or dialysis following intraoperative use of aprotinin and aminocaproic acid (EACA) during CABG and compare against STS quality databases.
METHODS: This retrospective cohort study evaluated patients undergoing bypass during CABG from January 2004 to June 2006. Patients were stratified according to antifibrinolytic therapy per physician discretion: aprotinin, EACA, or none (control). Patients were further stratified by primary versus complex surgery. Primary outcome was incidence of renal dysfunction and/or dialysis at 72 hours post-op and anytime during hospitalization. Secondary end points were rate of cardiovascular events and cerebrovascular events.
RESULTS: Final analysis included 3170 patients (EACA, n=1174; aprotinin, n=939; control, n=1057). Majority of aprotinin (73.8%) and EACA patients (94.4%) were treated with high-dose therapy (> 4 million KIU and > 20 g, respectively). Aprotinin was associated with significantly increased incidence of renal end points versus EACA and control during both primary CABG (12.5% versus 7.4% and 8.2%, p<0.003) and complex CABG (20.9% versus 9.8% and 9.5%, p<0.001). Relative risk (RR) of renal events with aprotinin was 2.34 (95% confidence interval {CI} = 1.87–2.93) and 0.61 (CI = 0.48–0.78) with EACA. Renal end points were confirmed using STS standards. Cardiovascular events were significantly higher with aprotinin (RR 1.45, CI = 1.14–1.83) than EACA (RR 0.96, CI = 0.76–1.22). Cerebrovascular events were not significant with either aprotinin (RR 1.17, CI 0.84-1.62) or EACA (RR 0.75, CI = 0.54–1.05).
CONCLUSIONS: These results are consistent with previously published data and confirm aprotinin renal dysfunction risk. STS definitions for renal dysfunction are significantly more conservative yet are conclusive with these results.

16. Reducing adverse drug events, inpatient length of stay, and hospital costs through an inpatient pharmacist anticoagulation program. *Heath R. Jennings, Pharm.D., BCPS*, Stacy A. Voils, Pharm.D., BCPS, Kevin L. Poe, Pharm.D., BCPS, Anthony Morano, M.D.; Saint Joseph HealthCare, Lexington, KY.

PURPOSE: This interdisciplinary project was conducted to improve the use of anticoagulant medications and to evaluate the impact of clinical pharmacists providing patient centered anticoagulation therapy.
METHODS: Three-month evaluation of warfarin prescribing practices by physicians served as the historical control group. Clinical pharmacist-managed anticoagulant therapy consult service was then established. Prospective comparisons between physician and pharmacist anticoagulation management practices ensued for 12 months (active physician control group and pharmacist study group). Primary outcomes included occurrence of major and minor bleeding and thrombotic reactions. Descriptive statistics and multivariate analysis were used during data analysis. Economic analysis evaluated hospital resource input costs and the cost-benefit ratio for the pharmacist anticoagulant services.
RESULTS: In the historical physician control group, 629 managed patients were observed. A total of 1162 and 361 patients were managed in the active physician control group and pharmacist study group, respectively. Better anticoagulation outcomes were observed among patients managed by pharmacists versus physicians: occurrence of INR > 4.0 (6.6% versus 23.6%, respectively); major and minor bleeding events (0.0% versus 3.3% and 0.8% versus 3.5%, respectively); thrombosis (0.0% versus 3.9%); and length of stay (5.2 ± 1.7 days versus 7.2 ± 2.3 days). Pharmacists were associated with significant reductions in bleeding risk (OR 0.09; 95% confidence interval {CI} = 0.01–0.6) and shortened length of stay (OR 0.4; CI = 0.2–0.8). Cost-benefit ratio for pharmacist anticoagulation services was 1 to 13.9 or a return of $13.90 for every $1 invested in the program. Annual financial impact of the consult service was $495,502 for adverse event avoidance. An additional $794,200 may be realized depending on length of stay capture.
CONCLUSIONS: A clinical pharmacist-managed anticoagulant service significantly improves patient care by reducing anticoagulant ADE and hospital length of stay. This cost-benefit analysis may assist pharmacy leaders in established support for expanded clinical pharmacy programs.

17. Dyslipidemia control in an indigent population with medication assistance compared to an insured population. *Joel C. Marrs, Pharm.D.*[1], Joseph J. Saseen, Pharm.D.[2]; (1)Oregon State University College of Pharmacy, Portland, OR; (2)University of Colorado Health Sciences Center, Denver, CO.

PURPOSE: To compare dyslipidemia management in indigent patients receiving medication assistance with insured patients.
METHODS: This retrospective study evaluated patients with dyslipidemia who received statin-based therapy at the University of Colorado Hospital (UCH) outpatient pharmacy. Prescription records identified 665 patients between October 1, 2004, and September 30, 2005; 40 UCH PacifiCare insured patients and 625 Colorado Indigent Care Program (CICP) patients. A sample of 200 CICP patients was randomly extracted using a block scheme. Primary study measurements were LDL-C goal attainment, and use of a moderate potency lipid-lowering regimen capable of achieving 30% LDL-C reduction, recommended by 2004 NCEP guidelines.
RESULTS: 240 patients met study criteria (200 CICP, 40 PacifiCare); 26 patients did not have baseline and on treatment LDL-C measurements. LDL-C goal attainment was 68.9% (122/177) in the CICP group versus 78.4% (29/37) in the PacifiCare group (p=0.34). Use of a moderate potency regimen was 90.9% in the CICP and 85% in the PacifiCare groups (p=0.41). In patients classified as moderately high, high, or very high cardiovascular risk, LDL-C goal attainment was 67.3% (103/153) in the CICP group versus 69.6%

(16/23) in the PacifiCare group (p=0.83). In this subgroup, use of a moderate potency regimen was 94.8% and 95.7% in the CICP and PacifiCare groups, respectively (p=0.86). Among very high risk patients from both groups, an LDL-C goal of < 70 mg/dL was attained in 52.6% (30/57), and use of a moderate potency regimen was 96.5% (55/57).
CONCLUSIONS: Our data suggest that quality of dyslipidemia management is similar between indigent and insured populations. Overall LDL-C goal attainment rates were higher than what has been reported in the literature. Of importance, the majority of patients with significant cardiovascular risk, including those at very high risk, were treated according to guidelines.

18. Identification and care of non-obese, non-diabetic patients with metabolic syndrome in a large, tertiary care center. *Marcel D. Bizien, Pharm.D.*[1], Tracy E. Macaulay, Pharm.D.[2]; (1)Mayo Clinic, Rochester, MN; (2)The Ohio State University Medical Center, Columbus, OH.

PURPOSE: Metabolic syndrome (MS) criteria are considered modifiable risk factors, and control of these risk factors could aid in preventing the development of type II diabetes and resulting co-morbidities. Our primary aim was to quantify identification of MS in overweight individuals meeting Adult Treatment Panel III (ATP III) criteria for the condition and seen in a wide range of clinical settings. Secondary objectives included an assessment of predictors of MS identification and an evaluation of lifestyle and pharmacologic interventions in both identified and unidentified subjects.
METHODS: We used the five qualification characteristics for MS to screen all adult subjects aged 18–61 seen at the Mayo Clinic Rochester between 2001 (immediately after publication of ATP III) and 2004. Electronic records of qualifying subjects were searched for ICD9 codes or terms associated with MS and lifestyle interventions. We documented all pharmacologic interventions relevant to MS.
RESULTS: Of the 16,338 qualifying subjects, only 369 (2.26%) were identified as having metabolic syndrome. Nominal logistic regression of available data revealed that of all 5 qualifying characteristics, BMI, fasting blood glucose (FBG), high-density lipoprotein, and triglycerides were statistically significant predictors of MS identification. FBG most strongly predicted identification (OR = 3.35, 95% CI = 2.57–4.41, p<0.0001). Positive identification of MS did not significantly affect treatment of hyperlipidemia or hypertension. In a smaller random sample of qualifying subjects (n=1281), we found essentially no record documenting lifestyle interventions.
CONCLUSIONS: Identification of MS and care of associated cardiovascular risk factors in a wide range of clinical settings are less than optimal. Our findings indicate that prevention of diabetes and cardiovascular disease mandates continued education of all health professionals, systematic recognition of MS, and more diligent insistence on lifestyle and therapeutic interventions.

19. Barriers to adherence with clopidogrel following placement of drug-eluting stents. *Maria Jose Pallares, Pharm.D.*, Eric R. Powers, M.D., FACC, Peter L. Zwerner, M.D., Jean M. Nappi, Pharm.D., FCCP, BCPS; Medical University of South Carolina, Charleston, SC.

PURPOSE: Nonadherence with clopidogrel therapy after drug-eluting stent (DES) placement may result in late in-stent thrombosis and adverse cardiac events. This study identified the incidence of nonadherence in patients receiving DES and postulated that several barriers associated with nonadherence could be identified.
METHODS: All patients who received a DES between March 1, 2004, and August 31, 2005, were eligible. Telephone interviews were conducted using a prespecified questionnaire. Multiple attempts were made to contact each patient. Nonadherence was defined as premature discontinuation of clopidogrel or less than 80% adherence (missing 2 or more doses per week). Patients were asked to identify issues that were barriers to adherence.
RESULTS: Of the 635 patients identified, 245 (39%) had either an invalid telephone number or could not be reached, 23 (4%) were deceased, and 125 (20%) refused to participate, leaving 242 (38%) to participate. The overall nonadherence rate was 20%. Of those patients nonadherent, 54% discontinued therapy prematurely and 46% frequently missed 2 or more doses per week. For nonadherent patients, the overall incidence of experiencing at least 1 adverse effect was 42% (25% bleeding, 10% rash, 10% GI). Patients that did not recall receiving discharge counseling involving indication, benefit, or adverse effects of clopidogrel therapy accounted for 48% of nonadherent patients. Difficulty paying for clopidogrel was reported by 46% of nonadherent patients, despite 64% of these patients having medication insurance. A lack of transportation to a pharmacy was reported by 13% of nonadherent patients.
CONCLUSIONS: In our population, 20% of patients were nonadherent with clopidogrel therapy following DES placement. Several barriers to adherence were identified including adverse effects, lack of knowledge regarding medication, and financial constraints despite having insurance. These data suggest that more intense patient education prior to discharge may improve adherence rates.

Clinical Administration

20E. Clinical pharmacist activities in Riyadh City, Saudi Arabia. *Yousef Ahmed Alomi, B.Sc., M.Sc., BCPS*, Areej Melhani, B.Sc., Naif Bakerman, B.Sc., Noura Albinyan, B.Sc.; Riyadh Medical Complex, Riyadh, Saudi Arabia.

Presented at the 9th International Pharmaceutical Science Conference, Riyadh, Saudi Arabia, December 18-21, 2005.

Critical Care

21E. Pharmacist intervention in critical care unit at Security Forces Hospital, Riyadh, Saudi Arabia. *Yousef Ahmed Alomi, B.Sc., M.Sc., BCPS*; Riyadh Medical Complex, Riyadh, Saudi Arabia.

Presented at the 1st International Symposium on Critical Care Medicine, Riyadh, Saudi Arabia, March 6-10, 2005.

22. Erythropoiesis-stimulating protein (ESP) prescribing practices in intensive care unit (ICU) patients. *Gretchen M. Brophy, Pharm.D.*[1], Spencer E. Harpe, Pharm.D., Ph.D.[1], Michael Pyles, Ph.D.[1], David Holdford, Ph.D.[1], Thomas Comstock, Pharm.D.[2], Paul Audhya, M.D.[2]; (1)VCU Medical College of Virginia, Richmond, VA; (2)Amgen, Inc, Thousand Oaks, CA.
PURPOSE: To evaluate prescribing practices for the ESPs Epoetin alfa (EA) and darbepoetin alfa (DA) in patients admitted to the ICU.
METHODS: A retrospective study of 61,711 adult ICU patients admitted to the ICU between January 2004 and December 2005. Administrative discharge data were abstracted from the Solucient® ACTracker® database.
RESULTS: Mean (SD) age was 65 (15.6) years, and 52.6% were men. The most common primary discharge diagnoses were congestive heart failure (8.4%), acute renal failure (4.4%), and acute respiratory failure (4.0%). The prevalence of chronic kidney disease was 37.4%. The median (IQR) ICU length of stay (LOS) was 7 (4–14) days and hospital LOS was 12 (7–22) days. The median time to first ESP dose from ICU admission was 4 days; 86.5% of patients received their first dose in the ICU. Of these patients, the median (IQR) dose per administration was 15,000 (10,000–39,000) Units for EA and 100 (60–150) µg for DA. The median (IQR) number of doses in the ICU was 2 (1–3) for EA and 1 (1–2) for DA (p<0.001). Single doses of 40,000 Units for EA and 100 µg for DA were given to 21.6% and 39.7% of patients, respectively. The duration of ESP therapy in the ICU was ≤ 1 week in 78.8% of patients. ESP therapy was not continued in 49% of patients after discharge from the ICU.
CONCLUSIONS: In this retrospective analysis, ESP therapy was initiated in patients a median of 4 days after ICU admission, and ESP dosing was not uniform. The duration of ESP therapy was ≤ 1 week and was limited to the ICU setting in most cases. Considering that the median hospital LOS stay was 12 days, these utilization data suggest a need for ESP therapy practice guidelines for patients admitted to the ICU.

23. Retrospective evaluation of recombinant activated factor VII in surgical patients with nonhemophilia-related hemorrhage. *Lauren Barton, Pharm.D.*[1], Eric W. Mueller, Pharm.D.[1], Neil E. Ernst, Pharm.D.[1], Michelle M. Gearhart, Pharm.D.[1], Jay A. Johannigman, M.D.[2]; (1)The University Hospital, Department of Pharmacy Services, Cincinnati, OH; (2)University of Cincinnati, College of Medicine, Cincinnati, OH.

PURPOSE: Review clinical characteristics and outcomes of surgical patients administered recombinant activated factor VII (rFVIIa) for nonhemophilia-related coagulopathy or hemorrhage.
METHODS: All nonhemophilia surgical patients who received at least one dose of rFVIIa between November 2, 2003, and February 28, 2006, were included. Patient demographics, clinical characteristics, and outcomes were recorded.
RESULTS: Seventeen patients were identified. Mechanisms for coagulopathy and hemorrhage were trauma (n=8), liver transplant (n=3), cardiac surgery (n=4), and neurosurgery (n=2). The mean rFVIIa dose was 81.3 ± 24.7 µg/kg. Coagulopathy was reversed (INR < 1.5) within 8 hours in all trauma patients and 6 (67%) nontrauma patients. Units of packed red blood cells and fresh frozen plasma 24 hours pre- and post-rFVIIa were 24 ± 16 vs. 1.5 ± 1 units and 21 ± 12 vs. 0.2 ± 0.4 units, respectively (p<0.001 for both). Seven (41%) patients survived to hospital discharge (trauma, n=2; nontrauma, n=5), and had significantly lower APACHE II scores (p=0.007) and higher temperatures at administration (p=0.018) compared with nonsurvivors. Overall, 3 (17.6%) patients had documented thrombosis during hospitalization (splenic artery thrombosis, n=1; sinus thrombosis, n=1; pulmonary embolus, n=1).
CONCLUSIONS: rFVIIa improved coagulopathy and was associated with a reduction in blood product requirements after administration. rFVIIa may be most beneficial in patients with lower APACHE II scores and higher body

temperatures. Large comparison studies are needed to evaluate the safety and efficacy of rFVIIa in nonhemophilia-related hemorrhage.

24. Octreotide versus octreotide and continuous infusion pantoprazole in the treatment of variceal hemorrhage. *Rima A. Mohammad, Pharm.D.*[1], Cesar Alaniz, Pharm.D.[2], Lynda S. Welage, Pharm.D.[2]; (1)University of Tennessee College of Pharmacy, Knoxville, TN; (2)University of Michigan Health System and College of Pharmacy, Ann Arbor, MI.

PURPOSE: Recommendations for controlling active variceal bleeding include intravenous octreotide with urgent endoscopic therapy. Continuous infusion proton pump inhibitor (PPI) therapy has been shown to be effective in the management of bleeding peptic ulcers but has not been evaluated in the management of acute variceal hemorrhage. The primary objective of this study was to compare octreotide therapy with the combination of octreotide and pantoprazole therapy with respect to control of bleeding in adult patients with acute variceal hemorrhage.
METHODS: A retrospective review was conducted in 134 adult patients who received either octreotide monotherapy (53 patients) or combination octreotide with continuous infusion pantoprazole (81 patients). Data collected included serum hemoglobin, hematocrit, indices of hepatic function, octreotide and pantoprazole dosage regimens, duration of therapy, amount of blood products administered, and ICU and hospital length of stay.
RESULTS: The two treatment groups were similar at baseline with respect to demographic data, bilirubin, albumin, hemoglobin, hematocrit and Child-Pugh score. The number of packed red blood cell transfusions was similar between the two groups (octreotide: 5.8 units vs. combination group: 6.4 units, p=0.87). The combination group trended toward more fresh frozen plasma transfusion compared with the octreotide group (6.1 vs. 2.9 units, p=0.054). Serum hemoglobin was similar between the two groups on ICU discharge (octreotide: 10.6 vs. combination group: 10.8, p=0.58). The octreotide group mortality rate was 17.3% compared with 13.2% for the combination group (p=0.56). Lastly, ICU length of stay was greater in the combination group compared to the octreotide group (6.1 days vs. 3.3 days, p=0.01).
CONCLUSIONS: The addition of continuous infusion pantoprazole does not appear to improve outcome of patients admitted for acute variceal bleed with respect to blood product transfusion, mortality, or length of ICU stay.

25E. Treatment of moderate to severe acute hypocalcemia in critically ill trauma patients. *Roland N. Dickerson, Pharm.D.*, Laurie M. Morgan, R.N., Martin A. Croce, M.D., Gayle Minard, M.D., Rex O. Brown, Pharm.D.; University of Tennessee, Memphis, TN.

Presented at the 5th Annual Nutrition Week of the American Society for Parenteral and Enteral Nutrition, Phoenix, AZ, January 29, 2007.

26E. Dose-dependent characteristics of intravenous calcium therapy for hypocalcemic critically ill trauma patients. *Roland N. Dickerson, Pharm.D.*, Laurie M. Morgan, R.N., Martin A. Croce, M.D., Gayle Minard, M.D., Rex O. Brown, Pharm.D.; University of Tennessee, Memphis, TN.

Presented at the 5th Annual Nutrition Week of the American Society for Parenteral and Enteral Nutrition, Phoenix, AZ, January 29, 2007.

27E. Low serum total calcium concentration as a risk factor for predicting hypocalcemia in critically ill patients. *Roland N. Dickerson, Pharm.D.*, Natohya Y. Henry, Pharm.D. candidate, Patrice L. Miller, Pharm.D. candidate, Gayle Minard, M.D., Rex O. Brown, Pharm.D.; University of Tennessee, Memphis, TN.

Presented at the 5th Annual Nutrition Week of the American Society for Parenteral and Enteral Nutrition, Phoenix, AZ, January, 2007.

28E. Risk factors for mortality in critically ill patients receiving appropriate or inappropriate empiric antibiotic therapy for pneumonia or bacteremia. *Scott D. Hanes, Pharm.D.*[1], Dennis Hong, M.D.[2], Allison S. Beck, Pharm.D., candidate[1], Lynley S. Heinrich, Pharm.D., candidate[1], Marlos Viana, Ph.D.[3]; (1)University of Illinois at Chicago, College of Pharmacy, Chicago, IL; (2)University of Illinois at Chicago, College of Medicine, Chicago, IL; (3)University of Illinois at Chicago, Chicago, IL.

Presented at the Annual Congress of the Society of Critical Care Medicine, Orlando, FL, February 18-21, 2007.

Drug Information

29E. The compatibility of Vitrase® combined with Kenalog®. James A. Gow, M.D., Bruce A. Aird, Ph.D., Timothy R. McNamara, Pharm.D., Clara K. Song, Pharm.D., Terence W. Joe, M.S., *George A. Baklayan, M.S.*; ISTA Pharmaceuticals, Inc., Irvine, CA.

Presented at the Annual Meeting of the Association for Research in Vision and Ophthalmology, Ft. Lauderdale, FL, April 30-May 4, 2006.

30. Evaluation of gender equality in publishing original research in pharmacy journals. *Katie J. Suda, Pharm.D.*, Susannah E. Motl Moroney, Pharm.D., Michael A. Haile, Pharm.D., Kimberly Walker, Pharm.D. Candidate, Marian K. Ores, Pharm.D., Candidate, Bhavin L. Patel, Pharm.D., Candidate; University of Tennessee Health Science Center, Memphis, TN.

PURPOSE: A 2006 New England Journal of Medicine article suggested that women physicians have narrowed the gender gap as first or senior author in six prominent medical journals. Based on recent statistics from the American Association of Colleges of Pharmacy, female enrollment in Pharmacy programs is double that of males from 2000-2005, and female applicants are 40%–50% greater than male applicants from 1998-2005. We question whether the increasing number of women pharmacists is also adding to the published pharmacy literature. This analysis was accomplished by comparing the frequency of female Pharm.D.s that serve as first or senior authors in 5 pharmacy specific journals in 1995 and 2005 for original research articles and editorials.
METHODS: Authorship (i.e., sex and institutional affiliation) of all original research articles and editorials for the years 1995 and 2005 was evaluated for 5 pharmacy journals: AJHP, AJPE, Pharmacotherapy, Annals of Pharmacotherapy, and JAPhA. Chi-squared analyses were used to compare the frequency of male and female authors in 1995 and 2005. A p-value less than 0.05 was deemed statistically significant. Institutional affiliation was summarized.
RESULTS: There were 388 original research articles and editorials published in 1995 compared to 621 articles in 2005. Forty percent of the first authors were female in 1995 compared with 46.2% in 2005, and 30% of senior authors were female in 1995 compared with 40% in 2005 (p=NS for both comparisons). Additional analyses within journals did not reveal any significant increases of female first or senior authors within the 10-year time period (p-values ranged from 0.1 to 0.77). In 1995, JAPhA had the highest percentage of female first authors (54.6%) whereas AJPE had the highest (57.9%) in 2005.
CONCLUSIONS: Although the percentage of female pharmacists has increased over the past several years, this is not evident in pharmacy-specific research literature.

31. Drug information and pharmacy resource services in Egypt. *Sheri Kamal, BSC*; Children's Cancer Hospital, Cairo, Egypt.

Most countries in the Middle East are struggling with providing chemotherapy medications and supportive treatment medications for their patients not only because of the lack of financial resources, but also because of: 1) lack of drug procurement procedures that would ensure the best quality drug for the best price; 2) lack of preparation standards ensuring quality control, batching and saving drugs; and 3) lack of long-term inventory and financial planning for medications. Our team developed Oncology Clinical Pharmacy settings in more than 15 hospitals across Egypt. Our biggest project is developing the department of pharmaceutical services in the new Children's Cancer Hospital. We helped all oncology centers across the country to allocate their resources and introduced a lot of concepts into their daily practice starting from safety reaching pharmaceutical care plans and pharmacoeconomic studies. The aim of this study is to provide a clear guideline on how to implement a Drug Information and Pharmacy Resource Service (DIPRS) in Egypt and the Middle East. This study is aiming to provide: 1) a brief description of the DIPRS; 2) importance and benefits of the DIPRS; 3) the problems that DIPRS will solve in daily health care activities; and 4) the implementation plan of the DIPRS project.

Education/Training

32. Research experiences and research-related coursework in the education of entry-level doctors of pharmacy: a 9-year update. *John E. Murphy, Pharm.D.*[1], Marion K. Slack, Ph.D.[1], Kevin P. Boesen, Pharm.D.[1], Duane M. Kirking, Pharm.D., Ph.D.[2]; (1)University of Arizona College of Pharmacy, Tucson, AZ; (2)University of Michigan, Ann Arbor, MI.

PURPOSE: Research is critical to the advancement of the pharmacy profession, and understanding the outcomes of research is important for all clinicians in order to effectively apply the results to patient care. The purpose of this study was to evaluate the current role of research-related coursework and research experiences in Pharm.D. programs and to compare the results to those found previously.

METHODS: A questionnaire patterned after one used in previous studies was mailed to the 88 colleges of pharmacy in the United States (including Puerto Rico) in May 2006. An appropriate individual was identified to receive the questionnaire. Non-respondents received a follow-up e-mail, and a second individual was identified and sent a questionnaire if the first never responded. Information was requested in four areas: 1) formal research-related coursework (statistics, drug information, literature evaluation, and research methods); 2) required student research experiences; 3) elective research experiences; and 4) respondents' perceptions of the value of student-conducted research.
RESULTS: There was an 88% response. 20% required students to conduct a project, and the size of the student body didn't influence whether projects were required. More private than public colleges required projects, and students could often work in teams. Most colleges (> 90%) required biostatistics and drug information/literature evaluation whereas only about half required research methods coursework. When research experiences were elective, < 10% of graduates took advantage of them at most colleges. Respondents generally thought participation in research had some value for motivated students, but some thought it had no place in the training of Pharm.D.s. Many identified lack of resources as the primary hindrance to requiring research experiences.
CONCLUSIONS: Results are somewhat similar to the 1998 survey. The finding that increased class sizes didn't reduce the percent of colleges requiring research and that students were often encouraged to work in teams was positive.

Endocrinology

33E. Colesevelam HCl improves glycemic control in subjects with type 2 diabetes mellitus (T2DM) managed with insulin therapy. Ronald B. Goldberg, M.D.[1], Kenneth Truitt, M.D.[2], *Jessa Ford, Pharm.D.*[3]; (1)University of Miami Miller School of Medicine, Miami, FL; (2)Daiichi Sankyo Pharma Development, Edison, NJ; (3)Daiichi Sankyo, Inc., Parsippany, NJ.

Presented at the Scientific Sessions of the American Heart Association, Chicago, IL, November 12-15, 2006.

34E. Do plant sterols provide additional cholesterol reduction when added to statin-based combination therapy? *Sunny A. Linnebur, Pharm.D.*[1], Warren H. Capell, M.D.[2], Joseph J. Saseen, Pharm.D.[1], Pamela Wolfe, M.S.[1]; (1)University of Colorado at Denver and Health Sciences Center, Denver, CO; (2)University of Colorado at Denver and Health Sciences Center, Aurora, CO.

Presented at the 56th Annual Scientific Session of the American College of Cardiology, New Orleans, LA, March 24-27, 2007.

Gastroenterology

36. Cost effectiveness analysis of high-dose consensus interferon plus ribavirin versus PEG-interferon afa-2a plus ribavirin in hepatitis C non-responders. *Anthony S. Dalpiaz, Pharm.D.*, David M Peterson, Pharm.D.; University of Utah Hospitals and Clinics, Salt Lake City, UT.

PURPOSE: This economic analysis was performed to compare the cost effectiveness of treating patients with hepatitis C (HCV) who are non-responders to combination PEG-interferon alfa-2a (PEG-IFN2a) and ribavirin with either re-treatment with PEG-IFN2a/ribavirin or high-dose consensus interferon (CIFN) plus ribavirin.
METHODS: Literature values were used in the cost-effectiveness analysis to calculate the cost/cure of re-treating a non-responder with PEG-IFN2a/ribavirin or CIFN/ribavirin. An Incremental Cost-Effectiveness Ratio (ICE-R) was calculated and sensitivity analysis was performed to test robustness of the conclusions. A cure was defined as a sustained virologic response (SVR) or negative HCV viral load 6 months post-treatment. This analysis was from an institutional perspective using acquisition costs.
RESULTS: Data from 3 trials (2 with CIFN and 1 with PEG-IFN2a) were used. Dosing regimens for CIFN were 9 µg/day x 48 weeks or 27 µg/day x 4 weeks, 18 µg x 8 weeks, then 9 µg x 36 weeks in one trial and 15 µg/day x 12 weeks then 15 µg 3 times/week x 36 weeks in the other. The SVR in the trials was 23%, 27%, and 37% (7/30, 8/30, and 51/137) for CIFN and 18% (109/604) for PEG-IFN2a. Estimated treatment costs for the regimens were $220,332, $346,230, and $1,350,198, and the cost/cure was $31,476, $43,279, and $26,474, respectively. Treatment cost for PEG-IFN2a was $4,736,508, and the cost/cure was $43,454. The ICE-R showed it will cost $117, $2, and $293 less for using CIFN (with the 3 treatment regimens, respectively) over PEG-IFN2a.
CONCLUSIONS: CIFN/ribavirin was more cost-effective than PEG-IFN2a/ribavirin when re-treating HCV non-responders to previous combination therapy. Despite the higher medication cost of CIFN, greater SVR rates were achieved and the cost/cure was decreased.

Hematology/Anticoagulation

37. Quality of anticoagulation care in stable patients discharged from a pharmacist-managed anticoagulation clinic. *Candice L. Garwood, Pharm.D.*[1], Peter Dumo, Pharm.D.[2], Stephanie Baringhaus, Pharm.D. Candidate[1], Kristyn Laban, Pharm.D. Candidate[1]; (1)Wayne State University, Detroit, MI; (2)Harper University Hospital, Detroit, MI.

PURPOSE: To determine whether transitioning patients experiencing "highly stable" anticoagulation from an anticoagulation clinic (AC) to their primary care provider (PCP) will alter anticoagulation control.
METHODS: Retrospective chart review in an urban academic medical center outpatient anticoagulation clinic. Forty-two patients seen in the AC met the definition of "highly stable" and were transitioned back to their PCP for warfarin management. Highly stable is defined as the last 5 out of 6 INR values in range for target ranges covering 1.0 INR units and 4 out of 6 INR values in range for those with target ranges covering 0.5 INR units. Analysis was performed on 40 patients.
RESULTS: Data were collected for 6 months before transition from the AC to the PCP and 6 months after transition to PCP. Prior to transition, 76% of INRs were in target versus 48% after transition ($p<0.05$ Chi-square). There was a significant increase in number of INRs > 4.5 and < 1.5 ($p<0.05$ for both; Chi-square). There was an increase in need for anticoagulation-related medical care as follows: 1 emergency room visit prior to discharge from the AC compared with 12 cases of additional medical care among 7 patients after transition. Six of these cases required an office visit with the physician, 6 resulted in emergency room evaluation. None of these events resulted in hospitalization. Frequency of INR assessments over 6 months decreased significantly from 8.9 assessments per patient to 5.1 per patient after discharge ($p<0.05$). Three patients continued to receive warfarin after transition from the AC without a single INR determination during the 6 months post-transition.
CONCLUSIONS: The transition of "highly stable" patients on warfarin therapy, managed in a pharmacist-run AC, back to their primary care physician resulted in decreased control of INR and an increase in medical care needed for anticoagulation-related problems.

38. Warfarin-dose adjustment after orthopedic surgery. Petra Jacobsen, M.Sc.[1], *Gloria R. Grice, Pharm.D.*[2], Paul E. Milligan, R.Ph.[1], Charles Eby, M.D.[1], Eric Millican, B.S.[1], Susan Gatchel, CCRC[1], John Clohisy, M.D.[1], R. Stephen J. Burnett, M.D.[1], Robert L. Barrack, M.D.[1], Elena Deych, M.S.[1], Brian F. Gage, M.D.[1]; (1)Washington University, St. Louis, MO; (2)St. Louis College of Pharmacy, St. Louis, MO.

PURPOSE: Warfarin is the most commonly prescribed anticoagulant to prevent thrombosis in the orthopedic population, but the approach to warfarin-dose refinement is not systematic. Although many nomograms have been proposed, none are commonly used partly because they do not allow for the dose-refinements to be customized to patient-specific clinical factors. Our goal was to develop such a nomogram.
METHODS: We prospectively evaluated a cohort of 229 patients undergoing total hip or knee replacement (median hospital length of stay 3–4 days). They were prescribed warfarin beginning 24 hours prior to arthoplasty for a total of 1 month and managed by our anticoagulation service for the duration of their prophylaxis. Initial warfarin doses were algorithm-based and usually given 24 hours prior to surgery. From each participant we collected demographic variables, height, weight, smoking status, medical history (assessing for history of liver disease, hypertension, cancer, or GI bleeding), current medications, and pre- and post-operative laboratory values, such as INR and estimated blood loss (EBL) during surgery.
RESULTS: We used a multiple regression model to develop our dose-refinement nomogram. More than half of the variability in the therapeutic warfarin dose (R2adj of 55.5%) could be explained by the model. The INR after 3 warfarin doses was associated with a 36% reduction in the therapeutic dose per 0.25 unit increase in INR. Other significant ($p<0.03$) predictors of therapeutic dose were the first and second warfarin doses (+6.7% and +7.3% respectively, per 1 mg), fluvastatin or simvastatin use (-16%), EBL (which interacted with INR), and current smoking (+13%).
CONCLUSIONS: By combining clinical and laboratory values, we developed a nomogram to estimate the therapeutic dose after 3 warfarin doses. This model could provide a safer, more effective process for adjusting warfarin therapy after orthopedic surgery. We are currently validating this model in additional orthopedic patients.

39E. Corticosteroid therapy for immune thrombocytopenic purpura: assessing the risks. *Judith A. Smith, Pharm.D., FCCP, BCOP*[1], Todd D. Gadberry, Pharm.D.[2], Gary J. Okano, Ph.D.[3], Joseph A. Leveque, M.D.[3];

(1)The University of Texas, M.D. Anderson Cancer Center, Houston, TX; (2)Alta Bates Summit Comprehensive Cancer Center, Berkley, CA; (3)Amgen, Inc., Thousand Oaks, CA.

Presented at the 47th Annual Meeting of the American Society of Hematology, Atlanta, GA, December 10-13, 2005.

40. Evaluation of intensive dietary education in patients receiving chronic oral anticoagulation. *Jeremy L. Thomas, Pharm.D.*[1], Gale L. Hamann, Pharm.D.[2], Jennifer D. Campbell, Pharm.D.[1], David A. Kuhl, Pharm.D.[3], Laura R. Spraybery, M.D.[1], Craig S. Dorko, M.D.[2], Madeline S. Walker, M.S., RD[2]; (1)University of Tennessee Health Science Center, Memphis, TN; (2)Regional Medical Center, Memphis, TN; (3)The Regional Medical Center at Memphis, Memphis, TN.

PURPOSE: The objective of our study was to evaluate the effect of education on the level of knowledge regarding dietary vitamin K in patients receiving chronic oral anticoagulation. We also endeavored to evaluate the effect of this education on time spent within the therapeutic range.
METHODS: Patients followed by the Anticoagulation Clinic of the Regional Medical Center completed an oral questionnaire evaluating their knowledge of dietary vitamin K and its role in anticoagulation. Patients were formally educated on two separate occasions and provided with a patient-specific vitamin K diet. Following the dietary education, patients completed the questionnaire a second time. INR values were evaluated on the 3 clinic visits before study enrollment and the 3 clinic visits after the final questionnaire was completed to determine time spent in the therapeutic range.
RESULTS: One-hundred three patients completed the study. On a 16-point scale, median test scores increased from a baseline of 13 ± 2.8 to 15 ± 1.3 ($p<0.001$). Eighteen percent of patients responded incorrectly when questioned regarding the effect of dietary vitamin K on warfarin therapy. Thirty-two percent and 43% responded incorrectly when questioned on the appropriate frequency of consumption and serving size, respectively. Patients frequently failed to identify mayonnaise, broccoli, and coleslaw as containing large amounts of vitamin K. Time spent in the therapeutic range increased from 43% ± 29.2 to 49%, ± 31.2 ($p=0.1$) post dietary vitamin K education.
CONCLUSIONS: In this study, intensive dietary education improved patients' knowledge of dietary vitamin K and its effects on warfarin therapy. Our study did not show an increase in the time spent in the therapeutic range of anticoagulation after intensive dietary education, possibly due to the short time frame of INRs examined.

HIV/AIDS

41. 48-week results of a stable switch study: changing combivir to tenofovir/emtricitabine. *James D. Scott, Pharm.D., M.Ed., B.S.*[1], Bill Guyer, Pharm.D.[2], Jason Bethel, B.S.[3], David Anderson, M.D.[2], Robert K. Bolan, M.D.[3]; (1)Western University of Health Sciences, Pomona, CA; (2)Gilead Sciences, Foster City, CA; (3)Jeffrey Goodman Clinic, Los Angeles, CA.

PURPOSE: Although Combivir has shown effectiveness as a NRTI backbone when combined with an NNRTI or a PI, tolerability and twice daily dosing often make it a less desirable option than other NRTI backbones, including tenofovir and emtricitabine (TDF/FTC). This 48-week prospective, pilot study was conducted to assess the feasibility of switching from Combivir to TDF/FTC, while maintaining the same NNRTI or PI.
METHODS: Subjects who were virologically stable (< 50 copies/ml ≥ 6 mos) on a PI (n=5) or NNRTI (n=2)-based regimen containing Combivir were consented for this study. Baseline HIV labs, chemistries, liver function tests, CBC, and an adherence assessment were performed (using the AACTG adherence assessment tool), and then monitored every 8 weeks for 48 weeks after switching Combivir to TDF/FTC (administered as Viread and Emtriva). Quality of Life (QOL) was measured at baseline and at weeks 24 and 48 using the FAHI questionnaire. Physical exam was performed at baseline and as per standard of care.
RESULTS: 7 subjects enrolled (6 male, 1 female, average age 41yrs ± 2.8; 5-PI-based and 2-NNRTI-based HAART). All patients completed the study. CD4 counts did change significantly between baseline (493 ± 169) and 48 weeks (518 ± 104). No significant changes in serum creatinine, hematocrit, cholesterol, or triglycerides were observed. Although adherence did not change over time, regimen satisfaction improved as early as week 8, and continued through week 48 ($p<0.05$). QOL did not change over the 48 weeks. 4 subjects had VL blips > 50 copies/ml, 2 increased to > 400 copies/mL; all subjects re-suppressed to < 50 copies/ml without changing therapy.
CONCLUSIONS: Changing Combivir to TDF/FTC maintained viral suppression, and CD4 counts remained stable. Subjects reported a greater level of satisfaction on the TDF/FTC combination. TDF/FTC appears to be a viable alternative to Combivir, but larger studies will be needed to validate this.

Infectious Diseases

42. Response to oral metronidazole for *Clostridium difficile*-associated diarrhea (CDAD). *April D. Miller, Pharm.D.*, P. Shane Winstead, Pharm.D., Kelly M. Smith, Pharm.D., Craig A. Martin, Pharm.D.; University of Kentucky HealthCare, Lexington, KY.

PURPOSE: Recent outbreaks of highly toxigenic strains of *C. difficile* have led to controversy on the appropriate initial treatment. Metronidazole has been the primary treatment for CDAD due to both cost and vancomycin resistance concerns. This study compared the rates of metronidazole treatment failure between the year 2000 and the year 2004 to determine whether a change in response rates exists at our institution and to help guide initial treatment.
METHODS: Medical records for patients with positive toxin assays in 2000 and 2004 who received > 7 days of metronidazole therapy were reviewed. The primary end point of treatment failure was defined as detection of *C. difficile* toxin or failure to improve clinically after > 7 days of metronidazole, need for an additional drug, or recurrence of disease within 30 days. Additional data on CDAD risk factors were collected.
RESULTS: Twenty-eight subjects in 2000 and 23 subjects in 2004 were included in this study. Treatment failure rates were 31% in 2000 and 47.8% in 2004 ($p=0.22$). The groups were similar except with regard to proton pump inhibitor and intravenous vancomycin use, which were both higher in 2004. There were no statistically significant differences in length of stay (LOS), ICU stay, or post-positive toxin LOS. A statistically significant difference in age was observed in patients with treatment failure (average age- failure 60.15 years, non-failure 50.13 years; $p=0.048$).
CONCLUSIONS: A trend in metronidazole failure rates has been observed. Its role in initial treatment at our institution has not changed. However, the association between treatment failure and increased age has prompted clinicians to closely monitor elderly patients' response to metronidazole therapy.

43. Activation of transcriptional regulatory networks associated with azole antifungal resistance in clinical isolates of *candida glabrata*. *Kelly D. Earhart, Pharm.D.*[1], Kathy S. Barker, Ph.D.[1], Lijing Xu, Ph.D.[1], Ramin Homayouni, Ph.D.[1], Thomas D. Edlind, Ph.D.[2], Shelley S. Magill, M.D.[3], P. David Rogers, Pharm.D., Ph.D.[1]; (1)University of Tennessee, Memphis, TN; (2)Drexel University College of Medicine, Philadelphia, PA; (3)Johns Hopkins University School of Medicine, Baltimore, MD.

PURPOSE: Recent reports have described the acquisition of azole resistance in *Candida glabrata* clinical isolates from patients receiving hematopoietic stem cell transplants, patients with AIDS, and patients receiving radiation for head and neck cancer. In order to identify transcriptional regulatory networks associated with this phenotype, we examined changes in the gene expression profile of a matched azole-susceptible and azole-resistant pair of clinical isolates obtained from a patient who experienced failure with fluconazole therapy for invasive candidiasis and candidemia.
METHODS: Isolates used in this study were SM1 (fluconazole MIC = 8 mg/mL, itraconazole MIC = 1 mg/mL, voriconazole MIC = 0.25 mg/mL, posaconazole MIC = 0.25 mg/mL) and SM3 (fluconazole MIC ≥ 64 mg/mL, itraconazole MIC = 8 mg/mL, voriconazole MIC = 4 mg/mL, and posaconazole MIC = 8mg/mL). RNA was extracted for microarray analysis.
RESULTS: Among genes differentially expressed in association with azole resistance were those encoding the transcriptional regulators Pdr1p and Upc2p. We identified 27 putative Pdr1p target genes and 18 putative Upc2p target genes that were also up-regulated in the azole resistant isolate. Putative Pdr1p targets included those encoding efflux pumps, proteins involved in lipid and sphingolipid biosynthesis, the transcriptional regulator gene *RPN4*, and *PDR1* itself. Putative Upc2p targets included those encoding the ergosterol biosynthesis genes and the sterol uptake transporter gene *AUS1*.
CONCLUSIONS: Gain-of-function mutations in Pdr1p have been implicated in azole resistance. Activation of Pdr1p and its target transporter genes likely contribute to azole resistance in the isolates studied here. *ERG11* encodes the target enzyme of the azole antifungals and is a putative target gene of Upc2. Likewise, *AUS1* is a putative Upc2p target gene and is associated with azole resistance in *S. cerevisiae*. We hypothesize that a gain-of-function mutation in the *UPC2* gene of isolate SM3 constitutively up-regulates *ERG11* and *AUS1* and contributes to its resistance to azoles.

44. Complications following elective and non-elective cesarean section: a neural network analysis approach and prediction of post-surgical febrile morbidity and infections. *Loai M. Saadah, Pharm.D., M.Sc., B.Sc.*[1], Ronald A. Herman, Ph.D., M.Sc., B.Sc.[2], Samer M. Saadah, Ph.D., candidate, M.Sc., B.Sc.[3]; (1)Al Wasl Hospital Pharmacy Section—Department of Health and Medical Services, Dubai, United Arab Emirates; (2)Iowa Drug Information Network and the University of Iowa, Iowa City, IA; (3)Napier University, Edinburgh, United Kingdom.
PURPOSE: We used clinical data to train a neural network with the objective

of predicting cases where an infectious complication may occur, following cesarean deliveries, and differentiate them from the majority that will have a normal course.
METHODS: The 9 factors included in the logistic multivariate analysis in our previous study were used to train an excel add-in neural network, NeuralTools 1.0 (Palisade Corporation, UK). Data were preprocessed to exclude cases with missing information. We used one dichotomous output, 0 being no complication and 1 meaning a febrile morbidity, and 8 continuous or categorical input nodes. Training was supervised and performed, in batch, with a probabilistic net. Testing was performed on 20% of the training set. The net used a self-generated learning rate and we set the error limit to 0.01%. We used 6 scenarios, 2 with and 4 without the primary outcome, for prediction. Moreover, we used the prevalence (5.3 percent) in our study population, together with calculated sensitivity and specificity, to determine positive and negative predictive values.
RESULTS: A total of 419 cases were used to train the network with 335 cases actually used in the optimization algorithm and 84 cases for testing. The neural net converged successfully after 63 trials and in less than 5 seconds. It was able to predict 5 out of 6 new cases (83 percent) with a sensitivity of 50% and a specificity of 100%. The positive and negative predictive values were 100 and 97 percent, respectively.
CONCLUSIONS: We strongly recommend a revival of artificial intelligence modeling in clinical pharmacy. We will use our trained network to predict outcomes for larger sets of data and to conduct a comparative study of the predictive abilities of the network to those of skilled clinicians in the fields of obstetrics and infectious diseases.

45E. Increases in chitin production and expression of mitogen-activated protein kinase A are associated with attenuated caspofungin activity in *Aspergillus fumigatus*. *Nathan P. Wiederhold, Pharm.D.*[1], Brian L. Wickes, Ph.D.[2], Thomas F. Patterson, M.D.[2]; (1)University of Texas at Austin College of Pharmacy, San Antonio, TX; (2)University of Texas Health Science Center at San Antonio, San Antonio, TX.

Presented at the 46th Interscience Conference on Antimicrobial Agents and Chemotherapy, San Francisco, CA, September 27-30, 2006.

46. The efficacy of vancomycin compared to metronidazole in the treatment of *Clostridium difficile*-associated diarrhea. *Rania M. El-Lababidi, Pharm.D.*, Corinne Chahine-Chakhtourah, M.S., Pharm.D., BCPS, Stephen M. Smith, M.D.; Saint Michael's Medical Center, Newark, NJ.

PURPOSE: It is uncertain whether vancomycin is more effective than metronidazole in the treatment of *Clostridium difficile*-associated diarrhea (CDAD). This study compared the efficacy of both therapies in patients with CDAD.
METHODS: This was a prospective, randomized, open-label study. Adult patients were eligible for inclusion if they presented with an acute diarrhea and a positive *Clostridium difficile* toxin assay, or other clinical findings consistent with CDAD. Eligible patients were randomized to either vancomycin or metronidazole 250 mg orally 4 times/day for 10 days. The primary outcome was clinical cure rate, defined as the resolution of diarrhea and gastrointestinal symptoms after the third day of therapy. The secondary outcome was clinical relapse rate at 30 days following the end of therapy. During the treatment period, patients were monitored for treatment-related adverse events. Patient demographics, co-morbidities, concomitant medications, and other pertinent data were documented for each patient. Data analysis was performed using descriptive statistics and the Chi-Square test.
RESULTS: Twenty patients completed the 10-day treatment regimen: 10 patients in the metronidazole group (4 males, mean age 60.8 ± 17.9 years) and 10 patients in the vancomycin group (5 males, mean age 57.1 ± 17.0 years). The cure rate was 50% (5/10 patients) in the metronidazole group and 100% (10/10 patients) in the vancomycin group ($p \leq 0.01$). At 30 days post-treatment, the relapse rate was 60% (3/5 patients) in those who were cured with metronidazole, and 20% (2/10 patients) in those who were cured with vancomycin ($p \leq 0.20$). Adverse events were similar between the study groups, with minor gastrointestinal complaints being the most frequent.
CONCLUSIONS: Metronidazole therapy was associated with a significantly lower clinical cure rate than vancomycin in the treatment of CDAD. The clinical relapse rate was similar in both treatment arms.

47E. The impact of multidrug resistance on the outcomes of critically ill patients with Gram-negative bacterial pneumonia. Andrea L. Kwa, Pharm.D.[1], Jenny G.H. Low, MBBS[1], Erin Lee, B.Sc. (Pharm)[1], Asok Kurup, MBBS[1], Huei-Leng Chee, MBBS[1], *Vincent H. Tam, Pharm.D.*[2]; (1)Singapore General Hospital, Singapore, Singapore; (2)University of Houston College of Pharmacy, Houston, TX.

Presented at the Interscience Conference on Antimicrobial Agents and Chemotherapy, San Francisco, CA, September 27-30, 2006.

48E. Prevalence and mechanisms of carbapenem resistance in bloodstream isolates of *Pseudomonas aeruginosa*. *Vincent H. Tam, Pharm.D.*[1], Kai-tai Chang, Ph.D.[1], Mark T. LaRocco, Ph.D.[2], Amy N. Schilling, B.S.[1], Keith Poole, Ph.D.[3], Kevin W. Garey, Pharm.D.[1]; (1)University of Houston College of Pharmacy, Houston, TX; (2)St. Luke's Episcopal Hospital, Houston, TX; (3)Queen's University, Kingston, ON, Canada.

Presented at the Interscience Conference on Antimicrobial Agents and Chemotherapy, San Francisco, CA, September 27-30, 2006.

Medication Safety

49. Safety and tolerability of C.E.R.A. (continuous erythropoietin receptor activator) in patients with chronic kidney disease: pooled data from 10 phase II-III trials. *Steven Fishbane, M.D.*[1], Paula Dutka, R.N., MSN, CNN[1], Richard Beswick, Ph.D.[2], Juliane Essig, M.D.[3], Allen R. Nissenson, M.D., FACP[4]; (1)Winthrop University Hospital, Mineola, NY; (2)Roche Laboratories, Inc., Nutley, NJ; (3)F. Hoffmann-La Roche, Ltd, Basel, Switzerland; (4)David Geffen School of Medicine, UCLA, Los Angeles, CA.

PURPOSE: This analysis of 10 phase II-III clinical trials reviews the safety and tolerability of C.E.R.A. for treating anemia of chronic kidney disease.
METHODS: Pooled data from the 4 phase II and 6 phase III trials provided an overall safety population (n=2737) that was similar to previous studies in this therapeutic area with respect to risk factor profiles, including the prevalence of hypertension, diabetes, and chronic heart failure. Patients received C.E.R.A. (n=1789) or a comparator drug (epoetin alfa/beta [EPO] or darbepoetin alfa [DAR]; n=948). In phase III studies, C.E.R.A. was administered every 2 weeks for 24 or 28 weeks (correction treatment; hemoglobin [Hb] range 11-13 g/dL) or every 2 weeks or every 4 weeks for 36 or 52 weeks (maintenance treatment; Hb range 10–13.5 g/dL), intravenously or subcutaneously. Comparator drugs were administered 1–3 times/week (EPO) or every week or every 2 weeks (DAR). In phase II studies, C.E.R.A. was administered every week, every 2 weeks, every 3 weeks, or every 4 weeks for 12–21 weeks. The phase II safety population had no reference group.
RESULTS: The percentage of patients experiencing ≥ 1 AE was similar between C.E.R.A. and reference groups (89% vs 91%). The majority of AEs were mild or moderate in intensity, and both groups averaged ~5 AEs per patient. The most frequent (≥ 10%) AEs, common to both groups, were hypertension, diarrhea, and nasopharyngitis. Rates of serious AEs (37% vs 40%) and AEs leading to withdrawal (3% vs 2%) were similar between C.E.R.A. and comparator groups. The most frequent (≥ 5%) AEs of special interest were hypertension, vascular access thrombosis, arrhythmia, and congestive heart failure, which showed the same incidence between groups. No association was found between AEs and Hb level and rate of rise, except for Hb levels > 13 g/dL and vascular access thrombosis in both treatment groups.
CONCLUSIONS: C.E.R.A. was well tolerated in phase II-III trials, with a safety profile similar to reference drugs.

Nephrology

50E. Evaluation of clinical methods to assess kidney function in African Americans. *Darius L. Mason, Pharm.D.*, Kim Huch, M.D., Larry J. Hak, Pharm.D., Joanna Q. Hudson, Pharm.D.; The University of Tennessee Departments of Clinical Pharmacy and Medicine, Memphis, TN.

Presented at the Annual Meeting and Scientific Exposition of the American Society of Nephrology, San Diego, CA, November 16, 2006.

51. 2-Hydroxypropyl beta cyclodextrin transmembrane clearance during in vitro continuous venovenous hemodialysis. *Jignesh H. Patel, Pharm.D.*[1], Mariann D. Churchwell, Pharm.D.[2], Julie Seroogy, B.S.[3], Steven L. Barriere, Pharm.D.[3], Bruce A. Mueller, Pharm.D.[1]; (1)University of Michigan, College of Pharmacy, Ann Arbor, MI; (2)University of Toledo College of Pharmacy, Toledo, OH; (3)Theravance, Inc, South San Francisco, CA.

PURPOSE: 2-Hydroxypropyl beta cyclodextrin (HP-CD) is used to increase solubility, improve bioavailability, resist degradation, or enhance safety profile of lipophilic drugs. HP-CD is renally eliminated; therefore, its use in acute kidney injury (AKI) is not recommended. Clinicians using drugs containing HP-CD have concerns about its accumulation in AKI, and there are no published data regarding HP-CD disposition during renal replacement therapy. The purpose of this study was to determine HP-CD transmembrane clearance using a validated continuous hemodialysis (CVVHD) in vitro model.
METHODS: HP-CD 1.25 gm was added to 1L of bovine blood dialyzed with a Diapact CRRT machine. Experiments were run five times using new AN69

(M100, Gambro) and polysulfone (F160NR, Fresenius) hemofilters. Dialysate flow rates (Qd) were 1, 2, 3 and 6 L/hr with sufficient blood flow (200–350 mL/min) to maintain appropriate transmembrane pressures. Blood samples were collected from the pre-filter arterial and post-filter venous ports. Dialysate samples were obtained from a dialysate side port. Plasma and dialysate samples were assayed for HP-CD using qualified HPLC-fluorescence detection methods, and clearance was determined using standard pharmacokinetic equations. Statistical analysis was performed using two-way Analysis of Variance with post-hoc Scheffé analysis.
RESULTS: The AN69 mean clearance of HP-CD at 1, 2, 3, and 6 L/hr was 18 ± 2.3, 33 ± 3.8, 47 ± 7.1, and 63 ± 4.3 mL/min, respectfully. Similarly, the mean clearances were 23 ± 3.6, 38 ± 5.2, 53 ± 2.8, and 103 ± 9.9 mL/min with the polysulfone membrane. No statistical differences in clearance between the two filter types were observed until Qd reached 6 L/hr ($p<0.001$).
CONCLUSIONS: HP-CD was substantially cleared in our in vitro CVVHD model. If similar CVVHD clearance is seen in vivo, given the small volume of distribution of HP-CD, CVVHD may prevent HP-CD accumulation in critically ill patients with AKI.

52. Continuous erythropoietin receptor activator (C.E.R.A.): efficacy results of six global phase III studies on anemia of chronic kidney disease (CKD). *Nathan Levin, M.D.*[1], Rebecca Schmidt, D.O., FACP, FASN[2], Steven Fishbane, M.D.[3]; (1)Renal Research Institute, New York, NY; (2)West Virginia University School of Medicine, Morgantown, WV; (3)Winthrop University Hospital, Mineola, NY.

PURPOSE: C.E.R.A. is a new anti-anemia agent with unique receptor activity and a prolonged half-life, allowing for extended dosing intervals. Six randomized, open-label, multicenter, parallel-group trials evaluated the efficacy of C.E.R.A. in correction and maintenance of hemoglobin (Hb) levels in patients with anemia of CKD.
METHODS: The AMICUS and ARCTOS correction studies enrolled patients naive to anemia therapy, whereas the MAXIMA, PROTOS, STRIATA, and RUBRA maintenance studies enrolled patients previously maintained on epoetin (EPO) or darbepoetin (DAR).
RESULTS: Per-protocol primary efficacy results are shown in the Table.

Study	Per-protocol population	Primary efficacy measure	Primary efficacy results (per-protocol)
AMICUS Dialysis IV 24-wk initiation 28-wk extension	C.E.R.A. Q2W, 119	% pts with Hb increase ≥1.0 g/dL from baseline to evaluation	98.32%
	EPO TIW, 36		97.22%
ARCTOS Nondialysis SC 18-wk correction 10-wk evaluation 24-wk extension	C.E.R.A. Q2W, 139	% pts with Hb % pts with Hb from baseline to evaluation	99.28%
	DAR, 144		99.31%
MAXIMA Dialysis IV 28-wk titration 8-wk evaluation	C.E.R.A. Q2W, 188	Change of Hb from baseline to evaluation (g/dL, mean ± SD)	-0.10 ± 1.06
16-wk safety	C.E.R.A. Q4W, 172		0.01 ± 0.96
	EPO, 180		-0.10 ± 0.92
PROTOS Dialysis SC 28-wk titration 8-wk evaluation	C.E.R.A. Q2W, 154	Change of Hb from baseline to evaluation (g/dL, mean ± SD)	0.00 ± 0.96
16-wk safety	C.E.R.A. Q4W, 153		-0.11 ± 0.97
EPO, 167	-0.12 ± 1.04		
STRIATA Dialysis IV 28-wk titration 8-wk evaluation 16-wk additional safety	C.E.R.A. Q2W, 123	Change of Hb from baseline to evaluation (g/dL, mean ± SD)	0.05 ± 0.96
	DAR, 126		-0.10 ± 0.92
RUBRA Dialysis IV or SC, pre-filled syringes 28-wk titration 8-wk evaluation	C.E.R.A. Q2W, 123	Change of Hb from baseline to evaluation (g/dL, mean ± SD)	0.14 ± 0.93
	EPO, 133		-0.01 ± 1.03

CONCLUSIONS: C.E.R.A. successfully corrected and maintained Hb levels in dialysis and nondialysis patients with anemia of CKD. C.E.R.A.'s efficacy in Hb correction and maintenance mirrored that of EPO and DAR but required less frequent administration.

53E. Combined citrate anticoagulation and bicarbonate containing dialysate in continuous veno-venous hemodiafiltration. *Sheryl E. Doung, Pharm.D.*, Linda Awdishu, Pharm.D., Ravindra L. Mehta, M.D.; University of California, San Diego, Medical Center, La Jolla, CA.

Presented at the 39th Annual Meeting and Scientific Exposition of the American Society of Nephrology, San Diego, CA, November 16-19, 2006.

Neurology

54. Rasgiline is safe and well tolerated in Parkinson's disease (PD) patients with levodopa-related motor fluctuations receiving serotonin reuptake inhibitors (SSRIs). *Jack J. Chen, Pharm.D.*; Loma Linda University, Loma Linda, CA.

PURPOSE: Interactions between non-selective MAO inhibitors and selective serotonin reuptake inhibitors (SSRIs) can provoke a hyperserotonergic state with mild to serious sequelae, including death. Rasagiline mesylate is a novel, selective, potent, and irreversible MAO-B inhibitor with demonstrated efficacy in PD patients with levodopa-related motor fluctuations (PRESTO and LARGO studies). This evaluation assessed the safety and tolerability of rasagiline treatment in a subset of PRESTO patients who were also receiving an SSRI.
METHODS: PRESTO was a randomized, placebo-controlled, double-blind, multicenter study of once-daily rasagiline 0.5 mg/day, 1 mg/day, or placebo in 472 patients with moderate to advanced PD who were "optimally" treated with levodopa, with or without additional dopaminergic therapy. Patients receiving stable doses of an SSRI (citalopram, sertraline, or paroxetine) before entry could participate. Safety was assessed by adverse event (AE) frequencies and vital signs, and tolerability was assessed by early discontinuation rates.
RESULTS: Patients taking SSRIs (SSRI+; n=77) were more likely to be female and were more impaired at baseline as measured by UPDRS score than the remainder of the study cohort (SSRI–; n=395). With the exception of vomiting (5% vs 1%, respectively, $p=0.02$), there were no significant differences between SSRI+ and SSRI– patients in incidence of AEs, nor were there consistent differences in vital signs between groups. Within the SSRI+ cohort, there were no differences in AE incidences or vital sign changes in patients receiving rasagiline compared with those receiving placebo. Proportions of patients discontinuing the study for any reason or due to an AE did not significantly differ among treatment groups ($p=0.85$).
CONCLUSIONS: This study showed no deleterious effects of concomitant SSRI (citalopram, sertraline, or paroxetine) use with rasagiline in patients with advanced PD taking levodopa and other dopaminergic therapies.

55. Rasagiline is effective and well tolerated as adjunct therapy in Parkinson's disease (PD) patients receiving levodopa and entacapone. *Jack J. Chen, Pharm.D.*; Loma Linda University, Loma Linda, CA.

PURPOSE: Rasagiline, a selective and irreversible MAO-B inhibitor, has demonstrated efficacy in PD patients with levodopa-related motor fluctuations. The catechol-O-methyltransferase (COMT) inhibitor, entacapone, is also commonly used for motor fluctuations. The efficacy and tolerability of rasagiline were assessed in subsets of patients receiving optimized levodopa with and without the catechol-O-methyltransferase (COMT) inhibitor, entacapone.
METHODS: PRESTO was a randomized, placebo-controlled, double-blind, multicenter study of once-daily rasagiline 0.5 mg/day, 1 mg/day, or placebo in 472 PD patients with motor fluctuations. Before baseline, all patients were judged by investigators to be receiving optimal levodopa/carbidopa (LD/CD) doses; 165 patients (35%) were also taking entacapone. Efficacy end points between entacapone(-) and entacapone(+) groups included change in total daily "off" time (assessed by home diaries), investigator-rated global improvement, UPDRS ADL score while "off," and UPDRS motor score while "on." The UPDRS mental subscale scores and adverse events (AEs) were measured to assess cognitive and behavioral changes.
RESULTS: Overall, 34% (55/164), 33% (49/149), and 38% (61/159) of patients in the rasagiline 0.5 mg/day, rasagiline 1.0 mg/day, and placebo groups, respectively, were receiving concomitant entacapone with LD/CD. Benefits of rasagiline on daily "off" time and on secondary measures of efficacy were similar within dose groups, regardless of concomitant entacapone use. Relative to placebo, rasagiline 1.0 mg/day reduced off time by 0.91 [95% CI: -1.64– -0.17] and 0.95 (95% CI: -1.5– -0.41) hours in the entacapone(+) and entacapone(-) subgroups, respectively. There was no significant worsening of UPDRS mental subscores or increased AEs in rasagiline-treated patients receiving concomitant entacapone.
CONCLUSIONS: Adjunct rasagiline therapy decreased daily "off" time in patients receiving LD/CD and entacapone. Adverse effects, including mental impairment, were not increased when rasagiline was added to multiple dopaminergic agents. Because it is a selective MAO-B inhibitor, rasagiline may be combined with levodopa, with or without a COMT inhibitor.

56. Comparing the efficacy and tolerability of labetalol and nicardipine in stroke patients. *Jody L. Carswell, Pharm.D.*[1], Sara Kauffman, Pharm.D. Candidate[2], Christiana E. Hall, M.D.[3], David Rychly, Pharm.D.[2], Jill P. Williams, R.N.[1], Susan C. Fagan, Pharm.D.[2]; (1)Medical College of Georgia Health System, Augusta, GA; (2)University of Georgia College of Pharmacy, Augusta, GA; (3)Medical College of Georgia, Augusta, GA.

PURPOSE: Hypertension is the most important modifiable risk factor and a

major complication of stroke. Although there is some controversy about the impact of hypertension on stroke outcome, there is a potential for worsening with severe blood pressure elevations. In many situations immediate blood pressure control is necessary. Both labetalol (L) and nicardipine (N) are recommended as first line agents for blood pressure treatment after stroke (AHA), but no randomized studies currently exist comparing the two drugs. The purpose of this study was to retrospectively evaluate the efficacy and tolerability of the two drugs in clinical practice.
METHODS: A chart review was conducted, examining all patients admitted to the neuroscience center from May 2004 to February 2006 with orders for intravenous infusions of labetalol or nicardipine within 24 hours of admission. Data were collected throughout the entire duration of the infusion.
RESULTS: Twenty-four patients experiencing an intracerebral hemorrhage (ICH) 58%; subarachnoid hemorrhage (SAH), 16.7%; or ischemic stroke, 12.5%, received labetalol (n=7), nicardipine (n=14), or both (n=3). Baseline demographics were similar except age: African American (L=85%, N=78.6%), male (L=57%, N=50%), average age (L=48 yr, N=65 yr). Initial blood pressures were similar (L= 205/108, N=206/98). Average length of infusion was 46 hours for labetalol and 36 hours for nicardipine. The average number of dose increases (L=4.6, N=5.2) and dose decreases (L=6.1, N=5.6) were similar. The majority of patients had at least one target parameter ordered (L=85.7%, N=78.6%). Patients reached targets earlier with the labetalol group (L=2hr, N=6.4hr), but more nicardipine patients stayed below the target consistently (L=28.6%, N=50%). Both groups had 3 episodes of hypotension (SBP<90) noted during the infusions.
CONCLUSIONS: Our findings demonstrate that nicardipine may have an advantage in consistent blood pressure control, but we cannot conclude that nicardipine is superior to labetalol. Both agents were well tolerated.

57. Delayed minocycline is an inhibitor of MMPs activated by stroke: Implications for neurovascular protection. *Livia S. Machado, B.Pharm.*[1], Anna Kozak, M.S.[1], Hazem F. Elewa, B.Pharm.[1], Adviye Ergul, M.D., Ph.D.[2], Susan C. Fagan, Pharm.D.[1]; (1)University of Georgia College of Pharmacy and Veteran's Affairs Medical Center, Augusta, GA; (2)Medical College of Georgia, Augusta, GA.

PURPOSE: Minocycline has anti-inflammatory effects independent of its antimicrobial properties and is neuroprotective in multiple disease models of brain injury. Matrix metalloproteinases 2 and 9 are proteolytic enzymes responsible for degrading the extracellular matrix and are involved with the development of hemorrhage after acute ischemic stroke. The purpose of this study was to determine the effect of acute minocycline on MMP inhibition and on outcome after acute ischemic stroke.
METHODS: Rat middle cerebral artery occlusion (MCAO) was performed by suture insertion. The protocol was 3 hours of occlusion and 21 hours reperfusion. The animals were divided into minocycline 45 mg/kg and phosphate-buffered saline groups. MMPs were studied with immunoblotting and gelatin zymography. Hemorrhage formation was assessed by hemoglobin ELISA. Infarcted tissue and edema were studied by image analysis after TTC staining. All animals were evaluated with the Bederson motor-behavior test. Minocycline selectivity for MMPs was studied by cell-free in vitro studies with recombinant enzyme.
RESULTS: MMP-2 and MMP-9 were both strongly inhibited at all concentrations studied, with MMP-9 being more sensitive to minocycline inhibition at the micromolar concentrations ($p<0.05$). Minocycline also significantly inhibited enzymatic activity ($p<0.0003$) and protein expression ($p<0.05$) of both MMPs 2 and 9 in the rat brain. Hemorrhage formation, edema, and infarct size were not improved by minocycline in this experimental model.
CONCLUSIONS: Minocycline affects the MMP proteolytic cascade generated by ischemia after acute stroke. This inhibition does not translate in neurovascular protection in our model. Minocycline should be further studied in a model of shorter occlusion time and different route of administration. Lastly, minocycline MMP inhibition is relevant for acute stroke because thrombolysis with tPA is a potentiating and independent factor for MMP activation and vascular breakdown. Minocycline should be studied in context of an adjuvant drug for tPA thrombolysis after experimental stroke.

Nutrition

58E. Osteonecrosis of the jaw in chronic home parenteral nutrition patients receiving intravenous pamidronate. Reid A. Nishikiawa, Pharm.D., *John K. Siepler, Pharm.D.*, Frank Sasaki, B.S., Mathew Muramoto, B.S., Tom Diamantidis, Pharm.D., Rod Okamoto, R.Ph.; Nutrishare, Inc, Elk Grove, CA.

Presented at the 28th Congress of the European Society for Clinical Nutrition and Metabolism, Istanbul, Turkey, October 19-22, 2006.

59E. Exit-site infections are more common in home parenteral nutrition patients with ostomies. *John K. Siepler, Pharm.D.*, Reid A Nishikawa, Pharm.D., Tom Diamantidis, Pharm.D., Mathew Muramoto, B.S., Marianne Opilla, R.N., Rod Okamoto, R.Ph.; Nutrishare, Inc, Elk Grove, CA.

Presented at the Clinical Nutrition Week of the American Society for Parenteral and Enteral Nutrition, Phoenix, AZ, January 28-31, 2007.

60E. Aluminum exposure in adult patients with acute renal failure requiring parenteral nutrition. *Vilas Rajanna, B.S.*, Rex O. Brown, Pharm.D., Laurie M. Morgan, R.N., Syamal Bhattacharya, Ph.D., Patti L. Johnson, B.S., Gayle Minard, M.D., Roland N. Dickerson, Pharm.D.; University of Tennessee Health Science Center, Memphis, TN.

Presented at the Clinical Nutrition Week of the American Society for Parenteral and Enteral Nutrition, Phoenix, AR, January 28-31, 2007.

Oncology

61E. Safety, pharmacokinetics (PK), and activity of panitumumab monotherapy in patients with advanced solid malignancies. Louis Weiner, M.D.[1], Arie Belldegrun, M.D.[2], Jeffrey Crawford, M.D.[3], Anthony Tolcher, M.D.[4], *Bing-Bing Yang, Ph.D.*[5], Lynn Navale, M.S.[5], Rafael G. Amado, M.D.[5], Robert Figlin, M.D.[6]; (1)Fox Chase Cancer Center, Philadelphia, PA; (2)UCLA School of Medicine, Los Angeles, CA; (3)Duke University Medical Center, Durham, NC; (4)Cancer Therapy and Research Center, San Antonio, TX; (5)Amgen Inc., Thousand Oaks, CA; (6)City of Hope, Los Angeles, CA.

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62E. The patient's experience of fatigue: a cross-sectional study of cancer patients. *David H. Henry, M.D.*[1], Hema N. Viswanathan, Ph.D.[2], Shawn M. Wade, Ph.D.[3], Mariana Servin, M.Phil.[3], David Cella, Ph.D.[4]; (1)Joan Karnell Cancer Center, Philadelphia, PA; (2)Amgen Inc., Thousand Oaks, CA; (3)Harris Interactive Inc., Claremont, CA; (4)Evanston Northwestern Healthcare and Northwestern University, Evanston, IL.

Presented at the 48th Annual Meeting of the American Society of Hematology, Orlando, FL, December 9-12, 2006.

63. Evaluation of guideline adherence and length of stay in the treatment of febrile neutropenia in pediatric and adult patients. Phyllis Hemerson, Pharm.D. Candidate[1], Mark K. Sorenson, B.S.[2], *Erika J. Ernst, Pharm.D.*[1]; (1)University of Iowa, Iowa City, IA; (2)University of Iowa Hospitals and Clinics, Iowa City, IA.

PURPOSE: To compare guideline adherence for the treatment of neutropenic fever in pediatric and adult patients at a university hospital. We evaluated the applicability of adult febrile neutropenia guidelines to pediatrics and identified factors influencing guideline adherence, including patient factors and use of preprinted orders. At our institution, preprinted febrile neutropenia admission orders are available for pediatrics but not adults.
METHODS: All patients admitted between July 1, 2004, and June 30, 2005, with agranulocytosis as their primary diagnosis were included, because a diagnostic related group for neutropenic fever does not exist. Data were collected retrospectively, including among others, age, gender, absolute neutrophil count (ANC), temperature, and guideline adherence. Adult and pediatric groups were compared using paired t-test or chi square as appropriate. Factors associated with guideline adherence and length of stay (LOS), were determined using regression analysis.
RESULTS: 64 pediatric and 72 adult patients were included in the analysis. Guideline adherence at admission was higher for pediatrics, 90.6% compared to 77.8% for adults, $p=0.042$. At 24 hours, adherence was 87.5% for pediatrics and 72.2% for adults ($p=0.053$). By 72 hours, adherence was similar between groups (57.8% vs. 47.8%, $p=0.249$). There was no difference in time to defervescence between pediatrics (19.2 hours) and adults (22.5 hours), $p=0.58$. LOS was significantly longer in adults than in pediatric patients (5.9 vs. 4.1 days, $p=0.036$). Regression analysis revealed that positive blood cultures, admission temperature, admission ANC, hours to defervescence and following initial guidelines were correlated with LOS.
CONCLUSIONS: Adult neutropenic fever guidelines were successfully applied to pediatric patients. Use of preprinted admission orders increased initial guideline adherence; however, this adherence was not maintained throughout hospitalization. Because following guidelines initially was associated with decreased LOS, our results suggest that use of preprinted neutropenic fever orders may increase adherence and decrease LOS. Further study is needed to confirm these findings.

64. Outcomes in febrile neutropenia oncology patients with hyperglycemia. *Heather R. Frank, Pharm.D., B.S.*, Cindy L. O'Bryant, Pharm.D., Samuel Ellis,

Pharm.D.; University of Colorado at Denver Health Sciences Center, Denver, CO.

PURPOSE: This study documented outcomes in patients with febrile neutropenia oncology and hyperglycemia requiring inpatient admission.
METHODS: Medical records of 180 patients admitted for febrile neutropenia from January 2004 to January 2006 were reviewed. Patients were admitted to the University of Colorado Hospital, a 450-bed academic medical center. Additional review identified patients with hyperglycemia, defined as having a fasting blood glucose ≥ 126 mg/dL or random blood glucose ≥ 200 mg/dL. Patients' demographic and medical history, including oncologic diagnosis and treatment, anti-infective therapy, microbiologic data, length of stay, time to absolute neutrophil count (ANC) recovery, and use of GCSF, time to defervescence and glycemic control were collected.
RESULTS: Hyperglycemia was identified in 16 patients admitted for febrile neutropenia. The mean patient age was 51 years old (Range: 19–73 years). Seven (44%) patients were female, and subjects were included with a variety of malignancies, including hematologic (56%) and solid tumors (44%). A control group of 12 patients without hyperglycemia was also identified. There was no difference between the groups in the following outcomes: time to defervescence (2.3 vs. 2.7 days: NS), time to ANC recovery (3.7 vs. 4.1 days: NS) and length of stay (5.4 vs. 5.1 days: NS). A subgroup analysis of eight patients with blood glucose > 200 mg/dL demonstrated a trend in increased length of stay, 6.1 days vs. 5.1 days, but was not statistically different (p=0.47) when compared to non-hyperglycemic patients.
CONCLUSIONS: Hyperglycemia was associated with a trend toward increased length of stay in the setting of febrile neutropenia. Further data collection is needed to evaluate this outcome.

65E. Administration of panitumumab every 2 weeks (Q2W) as a 30-minute or 60-minute infusion: safety and pharmacokinetics (PK) from a phase 1 study in patients with solid tumors. Joseph Stephenson, M.D.[1], Allen Cohn, M.D.[2], Jeffrey Crawford, M.D.[3], Anne-Marie Maddox, M.D.[4], *Suzanne Jones, Pharm.D.*[5], Peggy Lum, B.S.[6], Xinqun Yang, M.S.[7], Rafael G. Amado, M.D.[6], Howard Burris, M.D.[5]; (1)Cancer Center of the Carolinas, Greenville, SC; (2)Rocky Mountain Cancer Center, Denver, CO; (3)Duke University Medical Center, Durham, NC; (4)University of Arkansas Medical Sciences, Little Rock, AR; (5)The Sarah Canon Cancer Center, Nashville, TN; (6)Amgen Inc., Thousand Oaks, CA; (7)Amgen Inc., South San Francisco, CA.

Presented at the 2007 Gastrointestinal Cancer Symposiums, Orlando, FL, January 19-21, 2007.

66. Administration of greater than 2 cycles of fludarabine (FLU) increases the risk of infection independent of other risk factors. *Sarah L. Scarpace, Pharm.D., BCOP*[1], Nalini Ramanathan, M.D.[2], Jeyanthi Ramanarayanan, M.D.[2], Amy I. Jackson, R.N., OCN[2], Donald Pasquale, M.D.[2]; (1)Albany College of Pharmacy, Albany, NY; (2)Stratton Veterans Administration Medical Center, Albany, NY.

PURPOSE: We reported individualized dosing of FLU results in less drug administered, lower incidence of NCI grade 3/4 infections (IN) (p=0.011), and equivalent survival in patients with lymphoproliferative disorders (LD). This report extends these observations to assess whether risk factors such as age, number of comorbidities, myelosuppression, and number of different prior chemotherapies (PC) could account for this effect.
METHODS: We conducted a retrospective chart review of LD patients who received FLU treatment from 1992 to 2005, identified through the pharmacy system. The number of cycles per treatment course is defined as the number of 5-day treatment courses of FLU 25 mg/m^2 not interrupted by a > 3-month hiatus between treatment cycles. We individualize the number of monthly cycles of FLU based on response, usually 1 cycle of therapy when rapid and substantial response is obtained, or 1 cycle past best response. The number of comorbidities, PC, and IN within 6 months of the last therapy was determined. ALC and ANC were recorded at day 1 of each course for patients without infection and at the time of infection.
RESULTS: Twenty-eight patients (15 CLL, 9 low-grade lymphoma, 4 macroglobinemia) received a total of 44 treatment courses. Results are mean ± SD.

	With Infection	Without Infection	P value (χ^2)
Age	68.2 ± 10.5 years	69.5 ± 11.5 years	0.087
PC	0.9 ± 1.3	0.7 ± 0.9	0.400
#Comorbidities	3.1 ± 1.8	2.0 ± 1.9	0.050
ALC	5800 ± 5600 /uL	2200 ± 4700 /uL	0.359
ANC	3900 ± 5100 /uL	2900 ± 1100 /uL	0.367
Survival	76.9 ± 64.2 months	76.3 ± 40.5 months	0.611 (Kaplan-Meier)

CONCLUSIONS: In our sample, age at diagnosis, number of different PC, and ANC/ALC suppression did not influence the infections observed in patients with LD treated with FLU. However, a higher number of comorbidities may increase risk.

67E. Efficacy and safety of panitumumab across five clinical studies in patients with metastatic colorectal cancer (mCRC). Jordan Berlin, M.D.[1], Eric Van Cutsem, M.D., Ph.D.[2], Marc Peeters, M.D., Ph.D.[3], J. Randolph Hecht, M.D.[4], Rolando Ruiz, M.D.[5], Michael Wolf, M.S.[5], *Theresa Michelini, Pharm.D.*[5], Rafael G. Amado, M.D.[5], Neal J. Meropol, M.D.[6]; (1)Vanderbilt University Medical Center, Nashville, TN; (2)University Hospital Gasthuisberg, Leuven, Belgium; (3)Ghent University Hospital, Ghent, Belgium; (4)UCLA School of Medicine, Los Angeles, CA; (5)Amgen Inc., Thousand Oaks, CA; (6)Fox Chase Cancer Center, Philadelphia, PA.

Presented at the 31st Congress of the European Society for Medical Oncology, Istanbul, Turkey, September 28–October 3, 2006.

Pain Management/Analgesia

68. Concomitant ingestion of tested levels of alcohol with polymer-coated extended-release morphine sulfate capsules: no significant impact on mean morphine blood levels. *Franklin Johnson, M.S.*, Stephen Sun, M.D., George Wagner, B.S., Joseph Stauffer, D.O.; Alpharma Branded Products Division, Inc, Piscataway, NJ.

PURPOSE: The removal of hydromorphone hydrochloride extended-release capsules (Palladone™) from the market in 2005 due to data indicating that co-ingestion with 240 mL of 40% alcohol yielded dangerous increases in peak plasma hydromorphone concentrations[1] has prompted studies of interactions of other extended-release products with alcohol. This study assessed single-dose relative bioavailability of polymer-coated extended-release morphine sulfate (P-ERMS) capsules[2] taken with alcohol.
METHODS: In this open-label, randomized, single-dose, 3-way crossover study, 32 opioid-naïve, healthy male volunteers, aged 21–40 years, moderate drinkers (7–21 drinks/week) took a 100 mg P-ERMS capsule along with 240 mL of 40% alcohol (4 shots [101 mL] 190-proof Everclear®, 139 mL water, consumed within 20 minutes of dosing) fasted and fed, and with 240 mL of water (fasted) as a reference. Open-label arm of immediate-release 20 mg morphine solution was included for comparison. Oral naltrexone hydrochloride was administered 12 hours and 2 hours before treatment to counter morphine effects.
RESULTS: Twenty-seven subjects had evaluable data for ≥ 1 treatment arm. Eleven subjects vomited after taking P-ERMS+alcohol; none vomited after P-ERMS+water. Median T_{max}in subjects taking P-ERMS+alcohol fasted, with alcohol fed, and with water fasted was 6.0, 8.0, and 8.0 hours, respectively, consistent with maintenance of a sustained-release profile. Excluding patients who vomited during the 12-hour dosing interval,[3] means of log-transformed C_{max} values were 16.7, 16.0, and 15.6 ng/mL, respectively. ANOVA showed ratios of least square means for C_{max} and AUC of both regimens of P-ERMS+alcohol within 80%–125% confidence interval boundaries when compared with P-ERMS+water. In contrast, the pharmacokinetic profile of 20 mg solution was markedly different from the test treatments.
CONCLUSIONS: P-ERMS taken with 240 mL of 40% alcohol continued to display extended-release characteristics, with no significant impact on mean morphine blood levels. References: [1]FDA 2005. www.fda.gov/cder/drug/InfoSheets/HCP/hydromorphoneHCP.htm. [2]KADIAN®, PI. Piscataway, NJ: Alpharma Branded Products Division Inc. [3]FDA. Guidance for Industry: Bioavailability and Bioequivalence Studies for Orally Administered Drug Products—General Considerations. Rockville, Md: CDER; 3/03.

69. An evaluation of the bioavailability of methadone administered topically. *Robert K. Sylvester, Pharm., D.*[1], Caroline Schauer, R.N.[2], John Thomas, M.D.[2], Alan Weisenberger, Pharm., D.[1]; (1)College of Pharmacy, North Dakota State University, Fargo, ND; (2)Hospice of the Red River Valley, Fargo, ND.

PURPOSE: To evaluate systemic absorption of methadone (MTD) administered topically to hospice patients
METHODS: Two trough steady-state plasma MTD concentrations were determined in hospice patients administered MTD topically or by mouth and in a healthy subject administered placebo gel. Topical doses were prepared by dissolving MTD in ethoxy diglycol which was then incorporated into pluronic lecithin organogel (PLO) in concentrations of 5%–15%. MTD/PLO gel was applied to the inner surface of a patient's wrist 2–3 times daily. Doses of MTD were titrated to desired level of symptom control. Plasma samples were frozen and later analyzed by gas chromatography. The reporting limit of the assay is 10 ng/mL.
RESULTS: Seventeen of 20 samples collected after topical MTD were identical to the MTD concentrations achieved in the placebo control (< 10 ng/mL). Measurable MTD concentrations were achieved in 2 patients administered topical MTD. None of the methadone levels achieved after MTD/PLO administration exceeded the lower limit of the reference range (50 ng/mL). All 5 patients administered oral MTD achieved plasma

concentrations > 50 ng/mL. Summary data are provided below.

group	#	mean dose/day (range)	median concs.	mean concs. (range)
topical MTD	10	19.5 mg (10–45 mg)	<10 ng/ml	5.1 ng/ml (0–35 ng/ml)
topical placebo	1	0 mg	<10 ng/ml	0 mg
oral MTD	5	30.5 mg (15–40 mg)	120.5 ng/ml	150.9 ng/ml (62–393 ng/ml)

CONCLUSIONS: The topical application of a MTD/PLO gel in doses ≤ 45 mg/day did not result in trough MTD concentrations associated with analgesia. A placebo response may explain perceived benefit of MTD applied topically as a PLO gel in doses ≤ 45 mg/day. The evaluation of systemic absorption of MTD administered in doses > 45 mg/day in a PLO gel is warranted.

Pediatrics

70. A pilot study comparing daily peak flow monitoring to weekly nitric oxide monitoring for asthma exacerbation in children. *Holly J. Watson, Pharm.D.*, Cliff Fuhrman, Ph.D.; South Carolina College of Pharmacy, Columbia, SC.

PURPOSE: Compare daily peak flow monitoring to weekly exhaled nitric oxide (FENO) monitoring to determine which parameter is the earliest predictor of asthma exacerbation in children.
METHODS: Five children with asthma and five healthy controls were followed for 5 months. FENO samples were obtained weekly for the asthma group and every 2 weeks for the control group. The children in the asthma group maintained a daily peak flow diary. FENO samples were collected using an off-line method of exhalation into a collapsible bag of nonreacting material and analyzed with a Sievers NO analyzer model 280i. These measurements were based on a chemiluminescence reaction between NO and ozone. Asthma exacerbation was determined by weekly chest exam, medication changes, and patient-reported symptoms (wheeze, activity, nocturnal cough). Daily home peak flow monitoring was compared to weekly FENO monitoring to determine the earliest marker of asthma exacerbation.
RESULTS: Five children with asthma (mean age 8 years; range 6–12 years) and five controls (mean age 7.2 years; range 4–11 years) were prospectively monitored for 5 months. The mean FENO level in the control group was 16.1 ± 15.3 ppb and in the asthmatic group was 24.3 ± 17.9 ppb (p=0.020). Two children were excluded from further analysis due to noncompliance with home peak flow monitoring. The remaining three children experienced three moderate and four mild asthma exacerbations during the monitoring period. The FENO levels and peak flow levels were graphed over time for these three patients. The graphs include the time and severity of each patient's exacerbations.
CONCLUSIONS: A significant difference in FENO was observed between children with asthma and healthy controls. Further longitudinal studies are needed to determine whether FENO is an earlier marker of airway inflammation than reduction in airway caliber as measured by a decrease in peak flow.

71. The medical expenditures among childhood cancer patients/survivors at different time since diagnoses. *Junling Wang, Ph.D.*, Zhiyong Dong, M.S.; University of Tennessee, Memphis, TN.

PURPOSE: Since 1960, an increasing number of childhood cancer patients enjoy sustained cures or remission. This study has the following study aims: (1) to document the medical expenditures among childhood cancer patients or survivors; (2) to determine the relationship between the expenditures and the duration of time since diagnoses.
METHODS: Children (younger than age 20) with diagnosis of cancer in the Medical Expenditure Panel Survey (MEPS; 1996 to 2003) were included in the analysis. Consumer price indices for medical care released by the Department of Labor were used to convert cost from all years to 2003 dollars. The cost categories included (1) total health care expenditures, (2) expenditures on office-based visits, (3) outpatient visits, (4) hospitalization and emergency room visits, (5) home health care, (6) prescription drugs, and (7) visual, dental, and other health care expenditures.
RESULTS: There were 149 (weighted to 1,327,754) childhood cancer patients or survivors in the study sample. The annual health care expenditures of treating childhood cancer patients or survivors were $2488.92 for each patient/survivor. Of this amount, expenditures on office-based visits accounted for the highest percentage (42.66%), and hospitalization and emergency room visits accounted for the second-highest percentage (15.77%). Individuals who survived the most years since diagnosis had their cancers diagnosed 23 years ago. The years with highest expenditures were the year of diagnosis ($12,898) and the year after diagnosis ($17,655). However, the medical expenditures were still high several years after diagnosis: the medical expenditures had another spike in the 7th year after diagnosis (over $9000), and again in the 9th year after diagnosis (over $5,000).
CONCLUSIONS: The cost of treating childhood cancer patients and survivors is not limited to the first few years after diagnosis. It might be cost-effective if measures are taken to improve the health status and reduce health expenditures among these individuals.

72. The influence of assent document format on children's comprehension. *Kim G. Adcock, Pharm.D.*[1], Jennifer G. Ostrenga, Pharm.D.[2], Shirley M. Hogan, Pharm.D.[1], Jake H. Olivier, Ph.D.[2]; (1)University of Mississippi, Jackson, MS; (2)University of Mississippi Medical Center, Jackson, MS.

PURPOSE: Guidelines state that research protocols that involve children must contain methods for obtaining a child's assent. Little direction is available on how investigators and review committees should implement this requirement in practice. Most standard assent documents are a simple form written in paragraphs that the investigator reads with the child. An assent booklet was created that used pictures and written information so that it resembled a storybook. The purpose of this study was to determine which of these assent documents was preferred and which was better understood by the study population. A secondary analysis was conducted to determine a correlation between demographic information and comprehension of either document.
METHODS: This prospective, randomized, crossover study evaluated the comprehension of children, 7 to 12 years of age, who reviewed two different types of assent forms. Participants were randomized as to which document they received first to decrease bias. The participant was shown the first document as it was read to them by the investigator. A short quiz was then administered that consisted of 6 questions. This process was then repeated for the second document. After both documents were read and both sets of questions answered, the participants were asked which they preferred and which was easier to understand.
RESULTS: Thirty-four participants were enrolled. The average quiz score for the standard form was 86.8 ± 14.1% correct, and the average score for the booklet was 85.8 ± 16.0% correct. All of the participants (100%) responded that they preferred the booklet to the standard form (95% CI=0.899–1), while 21 reported that the booklet was easier to understand than the standard form (61.8%).
CONCLUSIONS: Not finding a significant difference in quiz scores would indicate that the style of the document is not the most important factor for participant understanding, but it is the document is explained.

73E. Effect of omalizumab on measures of control in adolescents with moderate-severe persistent asthma. Stephen J. Pollard, M.D.[1], Robert J. Maykut, M.D.[2], *Marc Massanari, Pharm.D.*[2], Farid Kianifard, Ph.D.[2], Robert K. Zeldin, M.D.[2], Gregory P. Geba, M.D.[2]; (1)Family Allergy and Asthma, Louisville, KY; (2)Novartis Pharmaceuticals Corporation, East Hanover, NJ.

Presented at the Annual Meeting of the American Academy of Allergy, Asthma and Immunology, San Diego, CA, February 23-27, 2007.

74. Utilization of prescription records to assess the risk of developing community-acquired methicillin-resistant *Staphylococcus aureus* infections in children. *Peter N. Johnson, Pharm.D.*[1], Robert P. Rapp, Pharm.D., FCCP[2], Christopher T. Nelson, M.D.[2], J.S. Butler, Ph.D.[3], Robert Kuhn, Pharm.D.[2]; (1)University of Oklahoma College of Pharmacy, Oklahoma City, OK; (2)University of Kentucky Chandler Medical Center, Lexington, KY; (3)University of Kentucky College of Pharmacy, Lexington, KY.

PURPOSE: To document prior antibiotic therapy (PAT) from prescription records 3 months prior to hospital/clinic admission between patients < 18 years of age (YOA) with community-acquired methicillin-resistant *Staphylococcus aureus* (CA-MRSA) as defined by the Centers for Disease Control and control to 1) compare the number of antibiotic courses between groups and 2) evaluate the risk of developing CA-MRSA as a function of age and PAT.
METHODS: Patients with CA-MRSA were identified in 2004-2005; the control included patients in the hospital/clinic without *Staphylococcus aureus* infections. Data collection included demographics, antibiotic courses and classes, and description of antibiotic susceptibilities in patients with CA-MRSA. Linear regression corrected for heteroscedasticity was used for assessment of the dependent variable (e.g., risk of developing CA-MRSA) controlling for age, PAT, and interaction between age and PAT.
RESULTS: PAT was reviewed in nine patients with CA-MRSA and 17 control patients. The median age was 1.75 (0.08–14) years in the CA-MRSA group and 2.75 (0.005–15) years in the control. A statistical difference was noted in PAT in patients with CA-MRSA versus control [8 (88.9%) versus 6 (35.3%), respectively (p=0.01)], but not in the number of antibiotic courses. β-lactam antibiotics represented 60% of antibiotics prescribed in both groups. Only one CA-MRSA isolate was not 100% susceptible to all antibiotics tested.

Antibiotic exposure was a significant independent risk factor (p=0.005; 95% CI=0.167–0.846) for the development of CA-MRSA. The interaction between PAT and age < 3 was the most significant predictor of CA-MRSA (p=0.019; 95% CI=0.139–1.40).
CONCLUSIONS: The results suggest both PAT in addition to age < 3 years are risk factors for the development of CA-MRSA. Further larger prospective studies should clarify the utility of objective methods for gathering PAT, such as pharmacy prescription records, and their utility to explain antibiotic susceptibility patterns.

75. Empiric monotherapy for febrile neutropenia in children: a meta-analysis. *Renee M. St. Germain, Pharm.D.*, Jennifer M. Ellis, Pharm.D., BCPS; University of Connecticut/Conn Children's Med Center, Hartford, CT.

PURPOSE: Children with febrile neutropenia are at high risk for infection and mortality. Early appropriate antibiotic therapy has led to decreased morbidity and mortality. Only small studies have compared empiric monotherapies for pediatric febrile neutropenia. As such, a meta-analysis was conducted to determine whether any monotherapy was associated with a higher rate of treatment success without antibiotic modification (TSWOM) between 72 and 96 hours.
METHODS: A systematic literature search of MEDLINE and EMBASE was conducted from 1966 to October 2006 by two independent investigators. All studies were reviewed for the following inclusion criteria: 1) prospective, randomized controlled trial or prospective, observational trial 2) two empiric monotherapies compared in children for febrile neutropenia and 3) TSWOM assessed between 72 and 96 hours. Any antibiotic that included at least 200 patients and 4 studies was evaluated independently against all other monotherapies, using a random effects model.
RESULTS: Seven trials were identified that met the inclusion criteria for the meta-analysis. These trials included 711 pediatric febrile neutropenia episodes treated with ceftazidime (n= 279), cefepime (n=221), imipenem (n=129), meropenem (n=57), and piperacillin/tazobactam (n=25). Both ceftazidime and cefepime were evaluated independently. No significant differences in TSWOM were shown between ceftazidime and all other monotherapies [odds ratio (OR) 0.98 (95% CI=0.66–1.47)] or cefepime when compared to all other monotherapies [OR 0.94, (95% CI=0.62–1.43)]. Further, upon subgroup analysis, no difference in TSWOM was identified between the two most common monotherapies, cefepime and ceftazidime [OR 1.08, (95% CI=0.63–1.85)].
CONCLUSIONS: Meta-analysis showed no differences between either ceftazidime or cefepime when compared to all other empiric monotherapies combined for TSWOM between 72 and 96 hours. Further, no differences were found between ceftazidime and cefepime for TSWOM between 72 and 96 hours.

Pharmacoeconomics/Outcomes

76E. Use of medication coverage methodology in measurement of patient. *Lee Stern, M.S.*, John J Doyle, DrPH, Lisa R Siegartel, MPH, Laura M Katz, MPH, Margarita Dolgitser, B.S.; Analytica International, New York, NY.

Presented at the 11th Annual International Meeting of the International Society for Pharmacoeconomics and Outcomes Research, Philadelphia, PA, May 23, 2006.

77. Evaluation of the cost-effectiveness of vancomycin and linezolid in Methicillin-resistant Staphylococcus aureus (MRSA) skin and soft tissue infection using a decision analysis (DA) model. *Mark Bounthavong, Pharm.D.*, Mark P. Okamoto, Pharm.D., Donald Hsu, Pharm.D.; Western University of Health Sciences, Pomona, CA.

PURPOSE: To evaluate the cost-effectiveness of vancomycin versus linezolid in skin and soft tissue infections with Methicillin-resistant Staphylococcus aureus (MRSA) using a decision analysis (DA) model.
METHODS: A decision model was created to evaluate the cost-effectiveness of vancomycin and linezolid in the treatment of MRSA infections. Outcome probabilities were determined from published clinical trials. The main dependent variables of interest were clinical outcomes (clinical cure and microbiologic cures), total direct costs of treatment, cost-effectiveness ratios (CER), and incremental cost-effectiveness ratios (ICER). Sensitivity analyses were conducted for drug costs, efficacy, and length of stay (LOS).
RESULTS: In the clinical evaluation, total direct costs and average CER for linezolid and vancomycin treatment were $9,330.00 and $10,547.43 per patient and $14,268.45 and $16,822.56 per clinical cure, respectively. The ICER for linezolid compared to vancomycin indicated a dominant strategy (less costly and more effective). One-way sensitivity analyses varying the efficacy (clinical cure) or LOS indicated sensitivity across the range. Vancomycin would have to increase in efficacy by 5.7% or decrease LOS by 3 days to have similar CER as linezolid. In the microbiologic evaluation, total direct costs and average CER for linezolid and vancomycin treatment were $8,441.58 and $11,120.96 per patient and $10,497.34 and $20,984.17 per microbiologic cure, respectively. The ICER(ME) for linezolid compared to vancomycin indicated a dominant strategy. One-way sensitivity analysis varying microbiologic cure rates indicated that the efficacy of vancomycin must increase by 35 percent to have equal CER to linezolid. Additional one-way sensitivity analysis for drug costs and LOS for microbiologic cure did not show any sensitivity across the range. The cost-effectiveness analysis of the microbiologic cure mirrored those of the clinical cure.
CONCLUSIONS: Based on this decision model, linezolid was a more cost-effective strategy compared with vancomycin primarily because of improved clinical and microbiologic cure and lower LOS.

78E. Hematologic outcomes and erythropoiesis-stimulating therapy (EST) costs in epoetin alfa (EPO)- and darbepoetin alfa (DARB)-treated cancer patients: results of the dosing and outcomes study of ESTs (D.O.S.E. registry). Er Chen, MPP[1], Cyrus Peake, M.S.[2], Erminia Buscaino, -[2], Jamie Forlenza, Pharm.D., M.S.[3], Brahim Bookhart, MBA, MPH[3], *R. Scott McKenzie, M.D.*[3]; (1)Abt Associates - HERQuLES, Bethesda, MD; (2)Abt Associates - HERQuLES, Lexington, MA; (3)Ortho Biotech Clinical Affairs, LLC, Bridgewater, NJ.

PURPOSE: National Comprehensive Cancer Network (NCCN) anemia treatment guidelines recommend maintenance of hemoglobin (Hb) between 11 g/dL and 12 g/dL. To investigate hematologic outcomes and costs of ESTs, data were analyzed from the D.O.S.E. Registry, an ongoing, prospective registry collecting real-world practice patterns and outcomes in cancer patients treated with ESTs.
METHODS: Data from U.S. hospital and community-based outpatient practices were assessed from 1/04 to 6/06. Adults with a non-myeloid malignancy and receipt of ≥ 2 doses of either EPO or DARB were included. Outcomes assessed included mean treatment duration; mean cumulative dose; Hb maintenance of 11–12 g/dL; mean Hb level at Weeks 4, 8, 12, and 16; and proportion of patients receiving blood transfusions. EST costs were based on 5/2006 wholesale acquisition costs.
RESULTS: 861 patients (312 EPO, 549 DARB) from 45 sites were identified. Mean baseline characteristics were similar between groups (entire cohort: age 62.4 years, 64.1% women, weight 75.9 kg, and Hb 10.4 g/dL) except a significantly higher iron supplementation in the DARB-treated group (EPO 18%, DARB 29%, p<0.01). Both groups had similar mean treatment duration (about 8 weeks), number of Hb assessments (about 8) and proportion of patients requiring blood transfusion following the initial four weeks of treatment (EPO 9%, DARB 11%, p=0.32). Mean cumulative doses of EPO (373,827 Units) and DARB (1,185 µg) were associated with EST costs of $4,550 for EPO and $5,267 for DARB, (p<0.001). Mean Hb level was ≥ 11g/dL at all post-baseline timepoints in the EPO-treated group; however, it was < 11g/dL in the DARB-treated group at Weeks 12 and 16. Mean Hb level was significantly higher in the EPO-treated group at Week 12 (EPO 11.3 g/dL, DARB 10.8 g/dL, p=0.03).
CONCLUSIONS: In this prospective observational study, EPO-treated patients achieved and maintained NCCN target Hb levels at all timepoints. Also, EST cost was observed to be 16% higher in the DARB-treated group than in the EPO-treated group.
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79. Drug utilization and cost considerations of erythropoietic stimulating agents in cancer patients from a large managed-care database. Francis Vekeman, M.A.[1], Patrick Lefebvre, M.A.[1], Samir H. Mody, Pharm.D., MBA[2], Brahim Bookhart, MBA, MPH[2], *R. Scott McKenzie, M.D.*[2]; (1)Groupe d'Analyse, Ltée., Montreal, QC, Canada; (2)Ortho Biotech Clinical Affairs, LLC, Bridgewater, NJ.

PURPOSE: Erythropoietic stimulating agent (ESA) resource use in cancer patients is of importance to managed care organizations (MCOs). To understand current real-world use of ESAs, this study examined epoetin alfa (EPO) and darbepoetin alfa (DARB) treatment patterns (dosing and treatment duration), dose ratio, and ESA treatment costs.
METHODS: A medical claims analysis from January 2004 through December 2005 using the PharMetrics Patient-Centric database of more than 85 health plans was conducted. Patients included in the study were ≥ 18 years of age, had ≥ 1 claim for cancer within 90 days before ESA treatment initiation, were newly initiated on EPO or DARB, and received ≥ 2 doses. Mean cumulative ESA dose was used to calculate drug cost (based on September 2006 WAC) and dose.
RESULTS: 2,072 EPO patients and 1,675 DARB patients met inclusion criteria and formed the study population. EPO-treated patients were slightly older (years: EPO 55, DARB 53, p<0.0001). A greater proportion of women was observed in the DARB-treated group (EPO 67%, DARB 73% p<0.0001). There was no significant difference in the mean treatment duration between the two groups (days: EPO 59, DARB 57, p=0.1378). The mean (SD) dose

per injection was 42,645 (11,527) Units for EPO and 234 (108) µg for DARB. The mean (SD) cumulative ESA dose administered was EPO 317,599 (275,513) Units and DARB 1,164 (922) µg, resulting in a dose ratio of 273:1 (Units EPO: µg DARB). Drug cost was significantly higher, $1,311 per treatment episode, in the DARB group (EPO $3,865; DARB $5,176; p<0.0001).
CONCLUSIONS: This study of 3,747 cancer patients reported a dose ratio of 273:1 (Units EPO: µg DARB) and 34% DARB price premium. The findings from this study are similar to those in previously published clinical trials and real-world utilization studies.

Pharmacoepidemiology

80E. Predictors of ESP use in patients with chronic kidney disease (CKD) and anemia. *Brian Bradbury, Ph.D.*, Q. Shan Qian, Ph.D., Reshma Kewalramani, M.D., Denise Globe, Ph.D., Arie Barlev, Pharm.D., Catherine Stehman-Breen, M.D.; Amgen Inc., Thousand Oaks, CA.

Presented at the 39th Annual Meeting and Scientific Exposition of the American Society of Nephrology, San Diego, CA, Nov 16-19, 2006.

81. Characterization of an Ecuadorian medical mission brigade. *Melody Ryan, Pharm.D.*, Douglas T. Steinke, Ph.D.; University of Kentucky College of Pharmacy, Lexington, KY.

PURPOSE: Medical missions have become a popular way for health care professionals to provide care to underserved populations in developing countries. However, there is only scant descriptive information regarding these missions in the literature. The goal of this research is to conduct a limited health needs assessment in communities visited in South Quito, Ecuador by analyzing data from a medical brigade and comparing household public health indicators to those from the 2001 census data for Quito.
METHODS: A medical record was completed for each patient. Demographics, vital signs, symptoms, diagnosis, and treatments were collected and entered into a spreadsheet for analysis. A representative from each household attending the clinic was asked questions regarding living conditions (water source, human waste disposal, cooking fuel, home ownership, electricity, telephone, and number of people in the home).
RESULTS: During the 5-day brigade, 959 patients were seen. The mean age was 21.68 ± 21.11 years. Sixty percent of participants were children. Females made up 64% of the sample. A total of 1692 diagnoses were recorded; the mean number of diagnoses per patient was 1.76 ± 0.95. The most common diagnoses were parasites, body aches, and headaches. A total of 2254 prescriptions were dispensed to the participants; the mean number of prescriptions per patient was 2.35 ± 1.11. The most commonly dispensed medications were vitamins, antiparasites, and analgesics. In all public health and economic indicators except for owning a home, the residents of the neighborhoods visited by the medical brigades were disadvantaged compared to the residents from all areas of Quito (p=0.0001).
CONCLUSIONS: The results from this study are an important first step in conducting a needs analysis of the neighborhoods visited by the brigades. They will be useful for recruiting medical personnel and planning the types of medications needed for future brigades.

82E. Documentation pattern of clinical pharmacist interventions, Riyadh, Saudi Arabia. *Yousef Ahmed Alomi, B.Sc., M.Sc., BCPS*, Areej Melhani, B.Sc., Naif Bakerman, B.Sc., Noura Albinyan, B.Sc.; Riyadh Medical Complex, Riyadh, Saudi Arabia.

Presented at the 9th International Pharmaceutical Science Conference, Riyadh, Saudi Arabia, December 18-21, 2005.

83E. Prescribing errors at inpatient pharmacy, Riyadh, Saudi Arabia. *Yousef Ahmed Alomi, B.Sc., M.Sc., BCPS*, Manal Bashihab, B.Sc.; Riyadh Medical Complex, Riyadh, Saudi Arabia.

Presented at the 9th International Pharmaceutical Science Conference, Riyadh, Saudi Arabia, December 18-21, 2005.

Pharmacogenomics/Pharmacogenetics

84. Frequency of CYP3A4 variant alleles in cardiovascular patients on clopidogrel that experience repeat acute coronary events. *Marcia L. Brackbill, Pharm.D.*[1], Robert S. Kidd, Pharm.D, M.S.[1], April D. Abdoo, student[1], James G. Warner, M.D.[2], Arthur F. Harralson, Pharm.D., BCPS[1]; (1)Shenandoah University School of Pharmacy, Winchester, VA; (2)Winchester Cardiology and Internal Medicine, Winchester, VA.

PURPOSE: Clopidogrel is a standard therapy for the prevention of subacute stent thrombosis after cardiac catheterization and for the management of acute coronary syndromes. It is a prodrug primarily activated by cytochrome P4503A (CYP3A). SNPs in CYP3A may reduce the enzymes' activity, and therefore reduce the activation of clopidogrel. The purpose of this research was to assess the frequency of SNPs in the gene coding for CYP3A enzymes in a group of patients receiving clopidogrel and experiencing a repeat acute coronary event.
METHODS: Patients were prospectively enrolled upon admission with a repeat acute coronary event. Inclusion criteria included a minimum of 3 months of prior or current clopidogrel treatment before admission and a documented history of cardiac interventions. Informed consent and a buccal swab sample were obtained. Cardiovascular disease history and demographic information were also collected. Genotyping was performed using real-time PCR and TaqMan® allelic discrimination assays. A case control group of patients with atrial fibrillation and not receiving clopidogrel were used for allelic frequency comparisons.
RESULTS: Patients (n=100) were enrolled over a 3-month period, and complete data were obtained for 92 patients. The allelic frequencies of CYP3A*1F, *16B, and CYP3A5*10 were 8.8% 15.1% and 12.4%, respectively, in the clopidogrel group compared to 6.5%, 9.2% and 7.4% in the control group. In addition, at least one CYP3A variant allele was found in 46.7% of the clopidogrel patients, but in only 29.8% of the control subjects.
CONCLUSIONS: Patients on clopidogrel that presented with repeat acute coronary events have a high frequency of CYP3A variant alleles. Decreased activation of clopidogrel due to the presence of CYP3A variant alleles may contribute to the observed clopidogrel resistance.

Pharmacokinetics/Pharmacodynamics/Drug Metabolism/Drug Delivery

85. Morphine release profile is not altered in a formulation containing polymer-coated extended-release morphine sulfate plus sequestered naltrexone. *Franklin Johnson, M.S.*, Stephen Sun, M.D., George Wagner, B.S., Joseph Stauffer, D.O.; Alpharma Branded Products Division, Inc, Piscataway, NJ.

PURPOSE: Concern over misuse, abuse, and diversion of prescription pain relievers has created a demand for pharmaceutical products with reduced abuse liability.[1] This study assessed the morphine pharmacokinetics of an extended-release abuse deterrent product containing morphine sulfate around a sequestered core of naltrexone, an opioid antagonist, which is released if product tampering occurs by crushing, chewing, or dissolving.
METHODS: This was an open-label, two-period crossover (fed and fasting) study in which eight healthy subjects (four men, four women) ages 21–45 years fasted overnight, then either received study drug (containing 60-mg morphine sulfate) or consumed a standard high-calorie, high-fat breakfast and took the study drug 30 minutes later. Blood samples for pharmacokinetic analysis of morphine were drawn prior to dosing and at intervals from 0.5 to 168.0 hours postdose.
RESULTS: Mean morphine T_{max} was 7.50 hours for patients in the fasted state and 8.75 hours for the fed state, consistent with an extended-release profile and with prescribing information for a morphine sulfate extended-release product which does not contain a sequestered core of naltrexone by the same manufacturer.[2] C_{max} of this 60-mg oral dose was 10.70 ng/mL fasted and 9.18 ng/mL fed, and AUCinf was 260.6 and 246.0 hr*ng/mL. Adverse events, reported in five subjects, were either mild or moderate in intensity and resolved.
CONCLUSIONS: Extended-release characteristics of morphine in this abuse deterrent product were similar to characteristics demonstrated in the current formulation of polymer-coated extended-release morphine sulfate. The study formulation was well tolerated. References: [1]Wright C IV, Kramer ED, Zalman MA, Smith MY, Haddox JD. Risk identification, risk assessment, and risk management of abusable drug formulations. Drug Alcohol Depend 2006;83(suppl 1):S68–S76. [2]KADIAN® [package insert]. Piscataway, NJ: Alpharma Branded Products Division Inc.

86E. Population pharmacokinetic analysis of varenicline in adult smokers. Hélène M. Faessel, Ph.D.[1], *Patanjali Ravva, M.S.*[1], Marc Gastonguay, Ph.D.[2], Kevin D. Rohrbacher, M.S.[1], Thomas G. Tensfeldt, M.S.[1]; (1)Pfizer Clinical Research and Development, Groton/NL, Groton, CT; (2)Metrum Research Group LLC, Avon, CT.

Presented at the 108th Annual Meeting of the American Society for Clinical Pharmacology and Therapeutics, Anaheim, CA, March 21–24, 2007.

87. Using modeling and simulation to assess topotecan dosage and schedule in pediatric neuroblastoma. *Paula S. Schaiquevich, Ph.D.*[1], John C. Panetta, Ph.D.[2], Victor M. Santana, M.D.[3], Clinton F. Stewart, Pharm.D.[2];

(1)Department of Pharmaceutical Sciences, St. Jude Children's Research Hospital (SJCRH), Memphis, TN; (2)Dept. Pharmaceutical Sciences, St. Jude Children's Research Hospital (SJCRH). Dept. Pharmaceutical Sciences, Univ. of Tennessee, Memphis, TN; (3)Department of Oncology, St. Jude Children's Research Hospital (SJCRH), Memphis, TN.

PURPOSE: The antitumor activity of topotecan observed in neuroblastoma is dependent upon systemic exposure and schedule. When topotecan was administered with a protracted schedule (i.e., 10 doses over 12 days) using a pharmacokinetically guided dosing approach, unlike traditional dosages given over shorter schedules (i.e., 5 days) promising antitumor results in chemotherapeutic-naïve children were observed. However, significant toxicity, including neutropenia and thrombocytopenia was reported. The objective of this analysis was to develop a pharmacokinetic/pharmacodynamic model to assess the contributions of topotecan systemic exposure and schedule on the antitumor activity in pediatric patients with neuroblastoma while accounting for myelosuppression.
METHODS: Pharmacokinetic and pharmacodynamic data were obtained from children with untreated high-risk neuroblastoma. In this Phase II study, patients received topotecan as a 30-min infusion daily for 5 days over 2 consecutive weeks for two cycles. Tumor volume was determined before and after topotecan therapy and myelosuppression data was obtained 2 times/week. Four mathematical models were developed for describing topotecan plasma pharmacokinetics, the kinetics of tumor growth and the kinetics of neutrophil and platelet dynamics.
RESULTS: the results showed that daily doses for 5 days over 2 consecutive weeks had significantly more complete and partial responses compared with the schedule of daily doses for 5 days even if the systemic exposure of the latter schedule was 1.5 times higher (69% vs. 5%, $p<0.001$). In addition, given the same total systemic exposure, the more protracted schedule of daily doses for 3 days repeated 3 times over 2 consecutive weeks had significantly more clinical responses compared with the daily doses for 5 days over 2 weeks schedule (69% vs 77%, $p<0.01$). Myelosuppression toxicity was equivalent across regimens and was clinically acceptable.
CONCLUSIONS: the use of pharmacokinetic/pharmacodynamic modeling and simulation can be helpful to determine effective treatment strategies for topotecan to treat children with high-risk neuroblastoma.

88E. Evaluation of factors influencing enoxaparin bioavailability in critically ill patients. *Philippe Vincent, B.Pharm., M.Sc.*[1], Marie-Christine Champagne, BPharm, MSc[2], Théodora Zikos, B.Pharm., M.Sc.[2], Martin Albert, M.D., FRCPC[2], Isabelle Boulanger, B.Pharm., M.Sc.[2], Lucie Blais, Ph.D.[2], David R. Williamson, B.Pharm., M.Sc., BCPS[2]; (1)Hôpital Louis-H. Lafontaine, Montreal, QC, Canada; (2)Hôpital du Sacré-Coeur de Montréal, Montreal, QC.

Presented at the Toronto International Symposium on Acute Care, Totonto, ON, Canada, October 25-27, 2006.

Pulmonary

89E. Assessment of physician prescribing for primary care patients with chronic obstructive pulmonary disease (COPD) in a national electronic medical research (EMR) database. Carl V. Asche, Ph.D.[1], Diana I. Brixner, R.Ph., Ph.D[1], Craig S. Conoscenti, M.D., FCCP[2], David C. Young, Pharm.D.[1], Hemal Shah, Pharm.D.[2], *Amy L. Phillips, Pharm.D.*[2]; (1)University of Utah College of Pharmacy, Salt Lake City, UT; (2)Boehringer Ingelheim Pharmaceuticals, Inc., Ridgefield, CT.

Funded by Boehringer Ingelheim Pharmaceuticals, Inc. Published in Chest 2006;130(4):175S.

Rheumatology

90. Assessment of effectiveness and safety of anti-TNF-alpha therapies in rheumatoid arthritis (RA). *Catarina Penteado Rodrigues, Doctor*, Ana Paula Santos, Doctor, Maria José Santos, Doctor, José Antonio Canas Silva, Doctor, Armando Alcobia, Doctor; Hospital Garcia de Orta, Almada, Portugal.

PURPOSE: The choice of biological treatment for RA may depend pragmatically on a number of factors, including patient preference, the tolerability of methotrexate, and day-case infusion facilities. The anti-TNF-α therapies have subtly different adverse-effect profiles, all associated with an increase in infection, which may be serious and a cause to stop treatment. Our objective was to assess the effectiveness of biologics in reducing the Disease Activity Score (DAS) in patients with RA and additionally its safety.
METHODS: A retrospective and comparative study of effectiveness of Anti-TNF-α therapies (infliximab, etanercept, adalimumab).
RESULTS: 44 RA patients with active disease (DAS > 3,2) were included in our study. These patients failed at least 2 disease-modifying anti-rheumatic drugs (DMARDS). The DAS median reduction was 1.9 for infliximab, 1.5 for etanercept, and 1.4 for adalimumab. Before the anti-TNF-α therapy the median of swollen and tender joints was 6.8 and 14.5 for infliximab, 5.3 and 7.7 for etanercept, and 2.8 and 8.1 for adalimumab. After therapy, the values were 2.5 and 5.4 for infliximab, 1.5 and 3.6 for etanercept, and 0.4 and 4.6 for adalimumab, which represents a 58% and 69% reduction for infliximab, 54% and 42% for etanercept, and 51% and 41% for adalimumab. 25% of the patients switch anti-TNF-α therapy due to ineffectiveness or adverse effects. The most common adverse effects are respiratory and urinary tract infections and allergy.
CONCLUSIONS: The three currently licensed biologic anti-TNF-α drugs have all been clearly shown to suppress disease activity in RA, showing a DAS reduction > 1.2, which according to EULAR (European League Against Rheumatism) criteria is a good level of response. Our data indicate, as in many other studies, that some patients with RA may respond to one anti-TNF-α agent but not to another, suggesting that patients failing one anti-TNF-α drug may still benefit from another.

Substance Abuse/Toxicology

91. Meta-analysis of nicotine replacement therapy (NRT) for smoking cessation in patients with a history of alcohol problems. *Ayana K. Rowley, Pharm.D.*[1], Gyorgy Csako, M.D.[2], Robert Wesley, Ph.D[3], Karen G. Smith, M.L.S[4], Jacqueline Hersh, B.A.[5], Frank Pucino, Pharm.D.[1], David Herion, M.D.[5]; (1)Pharmacy Dept., Clin. Ctr., NIH, Bethesda, M.D.; (2)Dept. of Lab. Med., Clin. Ctr., NIH, Bethesda, MD; (3)Biostatistics and Clin. Epidemiol. Service, Clin. Ctr., NIH, Bethesda, MD; (4)Office of Res. Services, NIH, Bethesda, MD; (5)NIAAA, NIH, Bethesda, MD.

PURPOSE: To compare the efficacy of NRT for smoking cessation outcomes in individuals with and without a history of alcohol problems and in those currently receiving treatment for alcohol dependence.
METHODS: Criteria for meta-analysis included prospective randomized controlled trials (RCTs) of NRT in smokers with a history of alcohol problems. Data regarding smoking cessation rates were extracted from qualified studies using 11 biomedical literature databases (1966 to October 2006). The primary outcomes included smoking abstinence rates (a) in individuals either with or without a history of alcohol problems (alcoholics vs. non-alcoholics), and (b) among patients currently being treated for alcohol dependence and receiving NRT either concurrently or after at least 6 weeks of alcohol treatment (concurrent vs. delayed group). Combined odds ratios were estimated using a random effects model.
RESULTS: Of 10 relevant studies, 6 were eligible with 2168 subjects for meta-analysis. Overall, the weighted pooled smoking abstinence rates were 10–20%. There was no significant difference in long-term (26–52 weeks) smoking cessation outcomes with NRT between alcoholics and non-alcoholics (4 studies; OR 0.76, 95% CI=0.43–1.32, I-squared 37). However, short-term (8–12 weeks) smoking cessation rates were significantly higher in the concurrent group compared with the delayed group (3 studies; OR 2.43, 95% CI=1.10–5.46, I-squared 46).
CONCLUSIONS: There have been few large RCTs for NRT in patients with alcohol problems, and the smoking abstinence rates reported in these studies are generally low. Because the available evidence suggests that a history of alcohol dependence does not affect long-term smoking abstinence rates and the abstinence rates are higher with early NRT in patients currently receiving treatment for alcohol dependence, concomitant treatment for both nicotine and alcohol dependence appears to be reasonable. Larger prospective RCTs are needed for validation, especially as newer treatment strategies for nicotine dependence are being developed.

92. Impact of elevated percent carbohydrate-deficient transferrin at hospital admission on outcomes in trauma patients. *Brian McKinzie, Pharm.D.*, Cathy L. Worrall, BSN, Pharm.D., E Douglas Norcross, M.D., Stuart Leon, M.D.; Medical University of South Carolina, Charleston, SC.

PURPOSE: The prevalence of alcohol use disorder (AUD) has been documented to be as high as 46% in trauma patients. AUD has been shown to increase ICU and hospital length of stay (LOS), and has been linked to numerous post-operative complications. The percent carbohydrate-deficient transferrin (%CDT) test, a biological marker of chronic heavy alcohol consumption, may help identify trauma patients at risk for these complications.
METHODS: The records of 356 adult trauma patients admitted through our emergency trauma unit over 12 weeks were reviewed. The primary outcome evaluated was ICU LOS. Secondary outcomes included ventilator days, hospital LOS, hospital charges, and postoperative complications. Outcomes were compared in patients with a LOS ≥ 2 days who presented with and without %CDT elevation. Statistical tests included t test and chi square for

continuous and categorical variables, respectively. Logarithmic transformation and ordinary least squares regression were also used.
RESULTS: Demographics between the groups were similar. Drinking histories were more significant in the elevated %CDT group (p=0.0006). The mean %CDT was 1.7 vs. 3.9 in the normal and elevated %CDT groups, respectively (p<0.0001). Patients with elevated %CDT had significantly longer ICU and hospital LOS (3.9 vs. 5.1 days, p=0.01; 7.1 vs. 8.7 days, p=0.0052), and ventilator days (1.5 vs. 2 days, p=0.0286). Complications and hospital charges were similar between groups. However, when charges were analyzed controlling for the number of packed red blood cell transfusions, the additional cost per patient with elevated %CDT was expected to average $10,000–$25,000.
CONCLUSIONS: The %CDT test is an easy way to identify patients that should be targeted for interventions aimed at improving care for patients with AUD. Further study is needed to assess the relationship between elevated %CDT and postoperative complications in trauma patients.

93E. A pooled-analysis of Varenicline, a nicotinic receptor partial agonist, vs. Bupropion, for smoking cessation. *Elbert D. Glover, Ph.D.*[1], Mitchell Nides, Ph.D.[2], Clare B. Billing Jr., M.S.[3], Karen R. Reeves, M.D.[3], Kathryn Williams, Ph.D.[3]; (1)University of Maryland, College Park, MD; (2)Los Angeles Clinical Trials, Los Angeles, CA; (3)Pfizer Global Research & Development, Groton, CT.

Presented at the 12th Annual Meeting of the Society for Research on Nicotine and Tobacco, Orlando, FL, February 15-18, 2006.

94. Cost comparison of intravenous versus oral N-acetylcysteine for the treatment of acetaminophen toxicity in a community public hospital. *Erik D. Maki, Pharm.D.*[1], Geoffrey C. Wall, Pharm.D.[1], Tyler Schwiessow, MD[2]; (1)Drake University College of Pharmacy and Health Sciences, Des Moines, IA; (2)Iowa Methodist Medical Center, Des Moines, IA.

PURPOSE: Intravenous (IV) N-acetylcysteine (NAC) recently became commercially available in the U.S. for the treatment of acetaminophen toxicity. When compared with oral NAC therapy, intravenous NAC has a significantly higher acquisition cost. This cost may be offset by a shorter treatment course and length of hospital stay (LOS). A retrospective chart review of all patients who received oral or intravenous NAC in a community public hospital was undertaken to assess the difference in total hospital costs between these regimens.
METHODS: Medical records of patients who received NAC for acetaminophen toxicity between January 2004 and May 2006 were reviewed. Patients' medical history, laboratory values, drug management of acetaminophen toxicity, adverse reactions, outcomes, hospital and drug charges were documented.
RESULTS: Forty-two patients received NAC of which 19 (45%) received oral, 16 (38%) received intravenous, and 7 (17%) received both. Significant variability was found in dosing regimens of patients who received both oral and intravenous NAC. Excluding patients who received both therapies, there were no statistically significant differences between groups in age, admission acetaminophen level, and pre/post-treatment AST/ALT levels. Length of stay (1.8 vs. 4.2 days), total drug cost ($160 vs. $1428) and total hospital cost ($3620 vs. $11580) were all significantly higher in patients who received intravenous therapy (p<0.05). This statistical significance was maintained when several outliers were excluded. Nine patients receiving oral NAC developed nausea and vomiting while two significant adverse reactions (IV infiltration and bronchospasm) occurred in patients who received intravenous NAC. Acute liver toxicity occurred in two patients who recovered fully.
CONCLUSIONS: Despite a shorter treatment course, intravenous NAC was not associated with a shorter hospital stay or reduced hospital costs in a small community hospital. Selection bias may account for the differences seen. A protocol for treating acetaminophen toxicity should be developed to standardize treatment.

Transplant/Immunology

95. A comparison of two intravenous immunoglobulin preparations in kidney transplant desensitization. *Holli A. Winters, Pharm.D.*, Caron George, Pharm.D., Jerry Siegel, Pharm.D.; The Ohio State University Medical Center, Columbus, OH.

PURPOSE: A high level of donor-specific alloantibody (DSA) traditionally has been a contraindication for kidney transplant. Plasmapheresis and intravenous immunoglobulin have been shown to decrease DSA and allow for successful transplantation. Due to a change in the intravenous immunoglobulin product used in our protocol, patients have received either intravenous immune globulin (IVIG) or cytomegalovirus immunoglobulin (CMVIG). The purpose of this study is to compare the outcomes of the kidney transplant desensitization protocol using two different intravenous immunoglobulin products.
METHODS: This is a retrospective review of patients who were transplanted following participation in the desensitization protocol. Patients received plasmapheresis and IVIG (Caramune® NF 1 g/kg) or CMVIG (Cytogam® 100 mg/kg) until the DSA was undetectable and transplantation was performed. Plasmapheresis and IVIG therapy were continued after transplant per protocol. Graft survival, acute rejection rates, cytomegalovirus infection rates, mortality, and adverse effects were compared between the two groups.
RESULTS: Twelve patients were treated with IVIG, and 12 patients received CMVIG. Fifty eight percent of the patients in the IVIG group and 42 percent of the CMVIG patients experienced an acute rejection episode within the first year after transplant (p=0.68). Mortality rates and graft function at 1 year were similar between the two groups. There was no difference in rate of cytomegalovirus infection. The most common adverse events associated with both IVIG products were nausea, vomiting, pain, fever, and chills.
CONCLUSIONS: There is no difference in rates of acute rejection, mortality, and graft function when IVIG or CMVIG is used in the kidney transplant desensitization protocol. Larger studies are warranted to determine whether there is a significant difference in these parameters when using different IVIG products in kidney transplant desensitization. Product selection may be based on cost, availability, or ease of administration rather than differences in clinical outcome.

96. Associations of characteristics of renal transplant recipients with clinicians' perceptions of adherence to immunosuppressant therapy. *Marie A. Chisholm, Pharm.D.*[1], W. Jacqueline Kwong, Pharm.D., Ph.D.[2], Christina A. Spivey, Ph.D.[3]; (1)University of Georgia College of Pharmacy and Medical College of Georgia School of Medicine, Augusta, GA; (2)University of Georgia College of Pharmacy, Athens, GA; (3)University of Georgia College of Pharmacy, Augusta, GA.

PURPOSE: To determine a profile of renal transplant recipients (RTRs) who are at highest risk for immunosuppressant therapy (IST) non-adherence.
METHODS: Retrospective analysis was performed on follow-up non-adherence data routinely reported by transplant centers to the United Network for Organs Sharing in the United States Renal Data System. Those who received transplants on or after January 1, 1995, who had at least 36 months of follow-up data, and who did not receive a second renal transplant were included in the analyses. Random effects logit regression was used to estimate risk of non-adherence while controlling for age, race, education, donor type, primary insurance, and IST including cyclosporine (CSA), tacrolimus (TAC), azathioprine (AZA), mycophenolate mofetil (MMF), and steroids. Association between IST non-adherence and graft failure was also examined.
RESULTS: 53,997 individuals met the inclusion criteria. Mean age at time of transplant was 44 years (SD =15). Sixty percent were male, 74% were Caucasian, 29% had college education, and 39% had living donor transplants. At time of transplant, 5% were on Medicaid and 44% were on Medicare. CSA, TAC, AZA, MMF and steroids were used by 61%, 34%, 13%, 72%, and 97% of RTRs, respectively. About 5.5% of RTRs were reported as non-adherent, and 3% had graft failure within 36 months post-transplant. Non-adherence risk increased with time and decreased with age (p<0.001). RTRs who were male, non-Caucasian, not on Medicare, or who used MMF or TAC had higher risk for non-adherence, with odds ratios (OR) of 1.4, 2.0, 1.6, 1.1, and 1.3 respectively (p<0.05), while RTRs who used CSA, steroids or AZA had lower risk (OR=0.8, 0.5 and 0.7 respectively, p<0.001). Non-adherent RTRs had higher risk for graft failure (OR=5.2, p<0.001).
CONCLUSIONS: Interventions aimed at improving adherence should target younger RTRs, male RTRs, non-Caucasian RTRs, and those not on Medicare to reduce risk of graft failure.

97E. Preliminary results from a randomized controlled trial to evaluate the effect of corticosteroids on tacrolimus and mycophenolate mofetil pharmacokinetics. Nihar Bhakta, M.D.[1], *Theodore M. Sievers, Pharm.D.*[2], Curtis Holt, Pharm.D.[2], Margaret Holloway, R.N.[1], Stephanie Okimoto, B.S.[1], Minnie Sarwal, MD[3], Oscar Salvatierra, M.D.[3], Albin Gritsch, M.D.[1], Robert Ettenger, M.D.[1]; (1)Mattel Children's Hospital at UCLA, Los Angeles, CA; (2)Dumont-UCLA Transplant Center, Los Angeles, CA; (3)Lucille Packard Children's Hospital at Stanford, Palo Alto, CA.

Presented at World Transplant Congress, Boston, MA, July 22-26, 2006.

CLINICAL PHARMACY FORUM

98. Voriconazole-sirolimus interaction in kidney transplant patients. *Jaewook Yang, Ph.D., Pharm.D*[1], David I. Min, Pharm.D.[2], Tariq Shah, M.D.[3]; (1)Western University of Health Sciences, College of Pharmacy and National Institute of Transplantation, Los Angeles, CA; (2)Western University of Health Sciences, College of Pharmacy, Pomona, CA; (3)St. Vincent Medical Center and National Institute of Transplantation, Los Angeles, CA.

PURPOSE: Azole antifungal agents are well known inhibitors of CYP3A and P-glycoproteins. Drug interactions between antifungal azoles and calcineurin inhibitors such as cyclosporine and tacrolimus have been reported. However, interaction between sirolimus and voriconazole in kidney transplant patients is not well documented. The objective is to report significant drug interaction between voriconazole and sirolimus in two kidney transplant patients.
CASE REPORT: The first case was a 64-year-old Hispanic gentleman who was admitted for severe diarrhea. His immunosuppression included sirolimus (3 mg/day orally), mycophenolate mofetil (500 mg orally 2 times/day) and prednisone 20 mg daily. Three days after admission, voriconazole (200 mg orally 2 times/day) was started to treat his Aspergillus infection. On day 2 in voriconazole therapy, his sirolimus trough concentration was raised from 13.2 ng/mL to 44.9 ng/mL (therapeutic range 5–15 ng/mL). Sirolimus was discontinued; however, sirolimus level was still 13.4 ng/mL 9 days after voriconazole was discontinued. The second case was a 54-year-old Caucasian female who was admitted for diarrhea. The patient had been on sirolimus (2 mg/day orally) and fluconazole (200 mg/day orally) before admission with stable sirolimus level 10.5–13.4 ng/mL. After fluconazole was replaced by voriconazole (300 mg orally 2 times/day) for treatment of possible pulmonary Aspergillus infection, her sirolimus level went up to 26.9 ng/mL and 49.2 ng/mL on day 2 and day 5 in voriconazole therapy. Sirolimus was discontinued on day 5; however, sirolimus concentration remained high with 42.6 ng/mL on day 7. In both cases, there were mild adverse effects including nausea, vomiting, and reduced WBC and platelet counts.
CONCLUSIONS: Voriconazole appears to be a more potent inhibitor of CYP3A and P-glycoprotein than fluconazole. When voriconazole is used with sirolimus, even in patients who have been stable in fluconazole, sirolimus concentration should be monitored carefully because it increases sirolimus blood concentration approximately four times and it prolongs elimination of sirolimus.

99. A pharmacy-run vaccine screening program improves the immunization rate of high-risk adults. *Jamie L. Cronin, Pharm.D.*, M. Delight Joslyn, RNC, MSN, Carolyn Corey, B.A., James A. Raczek, M.D.; Eastern Maine Medical Center, Bangor, ME.

PURPOSE: Systems that require physician intervention for vaccine orders fall short of meeting quality guidelines. Our objective was to develop a system to identify, screen, and administer pneumococcal and influenza vaccine to high-risk patients over age 65 years with an admitting diagnosis of community acquired pneumonia (CAP) without a physician's prescription.
METHODS: Medicare's core measure standards (CMS) evaluate hospitals on their compliance with the quality indicators. Failure to meet the standards affects the rating and reputation of a providing hospital. A computer-generated report identifies high-risk patients by age, co-morbid conditions, and antibiotics prescribed. A trained pharmacy technician screens and obtains patient consents for vaccine. Vaccine orders and the consent tool are entered into the electronic medical record. The vaccines are scheduled for administration by nursing. A nurse will administer the immunizations and document administration in the electronic medication administration record (MAR). Prior to initiating our program, our compliance with vaccination was at 8% of eligible patients with an admitting diagnosis of CAP being vaccinated prior to discharge. After just 6 months, our compliance rose to 93% of eligible patients vaccinated.
CONCLUSIONS: Busy physicians often forget to prescribe vaccines for eligible patients. Our pharmacy-run program identifies, screens, obtains consents, and generates vaccine orders for high-risk patients without physician oversight. Our program has yielded tremendous success and has elevated us to the status of the top 10% of Joint Commission of Accredited Hospitals (JCAHO) on that core measure.

100. An evaluation of the Asthma Control Test (ACT)™ as a tool to monitor asthma in a VA primary care clinic. *Amanda Keller, Pharm.D.*[1], Sona S. Hepfinger, Pharm.D., BCPS[1], Michelle S. Wilhardt, Pharm.D.[1], Karen A. Sauer, Pharm.D., MSPH[2], Charley Hepfinger, Pharm.D., BCPS[1], Joseph Yusin, M.D., FAAAAI[1]; (1)Carl T. Hayden VA Medical Center, Phoenix, AZ; (2)University of Arizona College of Pharmacy, Tucson, AZ.

PURPOSE: The purpose of this study was to prospectively evaluate the Asthma Control Test (ACT), in conjunction with spirometry, as a tool to facilitate communication between patient and clinician and to identify veterans with uncontrolled asthma. The primary objective of this study was to compare the change in forced expiratory volume at 1 second (FEV_1) from baseline to 3 months following asthma medication adjustment. Secondary objectives were to compare changes in: 1) ACT score, 2) asthma medication adherence based on the medication possession ratio (MPR), 3) the number of asthma-related urgent/emergent health care visits, and 4) asthma medications based on the pharmacist's assessment.
METHODS: Veteran patients with asthma were included in the study. Patients were excluded if they were enrolled in the pulmonary/asthma specialty clinic, co-managed for asthma by non-VA providers, or had an acute respiratory condition. Information related to FEV_1, ACT scores, and patient demographics were reported using descriptive statistics. The baseline FEV_1 values and ACT scores were compared to the follow-up values using paired t-tests. The association between FEV_1 values and ACT scores were analyzed using Pearson correlation.
RESULTS: There was no difference in FEV_1 from baseline to follow-up. However, there was a statistically significant improvement in the ACT score ($p=0.028$). No differences were observed in the other secondary outcomes. There was a low correlation between FEV_1 and ACT scores at baseline and a slight correlation at follow-up. Appropriateness of asthma medication regimens improved following the clinical pharmacist's assessment at the baseline visit.
CONCLUSIONS: Use of the ACT and in-clinic spirometry by a clinical pharmacist was feasible and led to improvements in asthma medication regimens. There was a significant improvement in the ACT score at the follow-up visit but no change in FEV_1. ACT score and FEV_1 correlation results were consistent with previously published reports.

101. The contribution of a pharmacy clinic on productivity in a private physician practice. *Jeanna A. Miller, Pharm.D.*[1], Jeffrey M. Brewer, Pharm.D.[2], Gary Noronha, M.D.[3]; (1)University of Pennsylvania Health System, Philadelphia, PA; (2)The Johns Hopkins Hospital, Baltimore, MD; (3)Johns Hopkins Hospital, Baltimore, MD.

PURPOSE: Pharmacists have long been established practitioners in academic outpatient clinics. Outpatient clinics routinely measure the productivity of practitioners to determine their contribution towards the practice. Pharmacists as practitioners have not measured their contribution toward the practice in terms of productivity. Measures of productivity examine the types and number of patient encounters. The primary purpose of this project was to calculate productivity of a pharmacy disease management clinic at a private physician practice.
METHODS: A retrospective, descriptive study reviewing the billing report for the pharmacy disease management clinic from Jan. 1, 2004 to Dec. 31, 2005. All completed encounters were analyzed based on CPT codes associated with each encounter. All encounters were stratified by year and CPT code tallied. The quantity was converted to a productivity value based on the relative value unit for the CPT code.
RESULTS: The quantity of completed encounters for the pharmacy disease management clinic increased by about 20% from 2004 to 2005. The productivity increased by about 25% during this time frame.
CONCLUSIONS: The Pharmacy Disease Management Clinic made a positive contribution on productivity in a private physician practice. Productivity increased with increased volume and complexity of patient encounters.

102. A pharmacist-managed smoking cessation program in an ambulatory care clinic: a pilot program. *Kathy E. Fit, Pharm.D.*; Midwestern University - Chicago College of Pharmacy, Downers Grove, IL.

PURPOSE: Tobacco-related illnesses are the No. 1 preventable causes of premature death. The objectives of this study are to describe the smoking cessation success rates for patients enrolled in a pharmacist-managed smoking cessation program and to describe patient satisfaction with the program.
METHODS: In this practice site, a pharmacist-managed smoking cessation program was piloted. This study documents the point prevalence and continuous abstinence rates for participating patients. The program was designed to see patients in a group class for the initial visit and then individually. All patients received phone follow-up. Patients were called within 1 week, 3 weeks, 2 months, 3 months, 6 months, and 1 year after their quit date. The abstinence rates were determined from self-reports during these phone calls. Point prevalence was defined as abstinence for at least 7 days prior to the time point. Continuous abstinence was defined as abstinence since the quit date. Patients were provided with satisfaction surveys 6 weeks after their quit date. Descriptive statistics were employed to describe the abstinence rates and patient satisfaction.
RESULTS: During the first year, 82 patients participated. The mean patient age was 53.9 (± 11.34) years old and 63.4% were female. The 1-week, 3-month, and 6-month point prevalence rates were 50%, 44.4%, and 46.3%, respectively. The 1-week, 3-month, and 6-month continuous abstinence rates were 50%, 22.2%, and 19.5%, respectively. About 86% (n=30) stated they were “very satisfied” with the program, and 46.1% stated the phone calls were the most beneficial.
CONCLUSIONS: This pilot program provided data to support pharmacists who are effective providers of smoking cessation. Abstinence rates were sustained long-term and may have been the result of continuous phone follow-up, which was highly rated by the patients. The efficacy and patient satisfaction data support the continued operation of this program.

103. Documentation of student pharmacists' interventions from medication histories in ambulatory care. *Kathy E. Fit, Pharm.D.*; Midwestern University - Chicago College of Pharmacy, Downers Grove, IL.

PURPOSE: Medication safety is a major concern in primary care. Student pharmacists can assist by identifying and offering solutions to drug-related problems. The objectives of this study were to describe the number and types of interventions made by student pharmacists following a medication history and to describe physician acceptance rates.
METHODS: This prospective study documents the interventions from medication histories of 2 student pharmacists in their final year of training. In this new practice site, students assist with clinical services, such as smoking cessation and anticoagulation management. In addition, the students, with faculty supervision, perform medication histories and vital signs prior to physician appointments. This is done about 1.5 days per week. At the time of the medication history, the students review the chart and provide needed patient education. Recommendations to the physician are made before the exam. Type of recommendation, patient demographics, and physician acceptance were documented on a paper form by the student and submitted to the faculty member. All interventions were entered into a PDA with a Pendragon Forms® database, developed for this project. Descriptive statistics were employed to describe the type and frequency of interventions with the physician acceptance rates.
RESULTS: Over 6 weeks, 109 interventions were documented. The mean patient age was 61.8 (± 14.94) years, and 63.3% were female. The mean number of prescriptions was 4.43 (± 2.99) per intervention. The most common interventions documented were lab monitoring (22.1%), drug information (17.4%), patient education (14.7%), and indication without drug (12.8%). Of the applicable interventions, 69% (49/71) were accepted by the physician.
CONCLUSIONS: Student pharmacists in this private physician's office provided a variety of recommendations following provision of medication histories. A majority of the interventions were accepted. Such data document the benefit of student pharmacists and the significant role they play in patient care.

104. Utilization of a group clinic for the management of dyslipidemia. *Kristen E. Locke, Pharm.D.*, Philip J. Schmitt, M.D., Judy A. Monroe, B.S.N.; Cincinnati Veterans Affairs Medical Center, Cincinnati, OH.

PURPOSE: The Cincinnati VAMC had the highest use of high-cost, non-formulary lipid lowering agents in its network, without corresponding improvement in LDL goal achievement. Also, non-formulary lipid medication requests were evaluated inconsistently, especially if the patient was not referred to a clinical pharmacy clinic. A multidisciplinary group lipid clinic was established to 1) improve lipid goal achievement, particularly in patients on high cost, non-formulary lipid medications, 2) use time, personnel, and medication resources more efficiently, and 3) improve patient satisfaction and access to care.
METHODS: Primary care providers and clinical pharmacy specialists (CPS) refer patients to the group lipid clinic. The CPS evaluates group patients to identify coronary heart disease (CHD) risk factors, determine lipid goals, and develop a treatment plan. Nursing staff check vital signs, screen for adverse drug events, complete all pertinent health maintenance evaluations, and document the visit in the electronic medical record. The CPS, dietician, and physician co-facilitate a group discussion to educate patients on a low cholesterol diet, their lipid medications, CHD risk factors, and individual lipid goals.
RESULTS: The 90-minute group lipid clinic meets monthly and has a current capacity of 12 patients, doubling the number of patients that could be seen by individual practitioners. Seventy percent of the patients have achieved their LDL goal. In addition, patients have reported a high level of satisfaction with the group lipid clinic, averaging 4.5 on a 5-point Likert scale.
CONCLUSIONS: The group lipid clinic has improved the management of dyslipidemia at the Cincinnati VAMC.

105. Implementation and evaluation of a pharmacist-managed diabetes consultative service in an internal medicine teaching clinic. *Kristie Ramser, Pharm.D.*, Christa George, Pharm.D., BCPS, CDE, Gale Hamann, Pharm.D., BCPS, CDE, Laura Sprabery, M.D., Craig Dorko, M.D., Dave Kuhl, Pharm.D., Ellen Taylor, Pharm.D., Jennifer Campbell, Pharm.D., CDE; The Regional Medical Center, Memphis, TN.

PURPOSE: The Diabetes Initiative Program is a pharmacist-managed diabetes consultative service that was implemented in August 2005 with the aim of evaluating the impact of individualized education and medication management in patients with uncontrolled diabetes who failed to respond to usual care.
METHODS: Inclusion criteria were diagnosis of diabetes for at least 1 year and an A_{1c} > 9%. Once identified, a comprehensive interview was performed to review medical history, baseline laboratory values, medication compliance, blood glucose monitoring routine, psychosocial issues, and nutrition and exercise habits. Data were collected regarding potential barriers to obtaining medications and attending clinic visits. Interventions included individualized diabetes education, optimization of pharmacotherapy, and options for resolution of identified barriers. Pharmacists' interventions were performed through telephone visits, physician office visits, and pharmacists' specialty clinics every 1–6 weeks depending on the level of glycemic control.
RESULTS: One hundred and one patients were enrolled in the program between August 2005 and August 2006. Baseline and post intervention data were available in 56 of 101 (55%) patients. There was an average decrease in A_{1c} from 10.9% ± 1.7 to 9.4% ± 2.2. The average reduction in A_{1c} was 1.5% ± 2.6 ($p<0.0001$). Of the 56 patients, 30 (54%) completed the program defined as a reduction in A_{1c} to less than 9%. There was an average decrease in A_{1c} in this group from 10.9% ± 1.9 to 7.8% ± 0.8. The average reduction in A_{1c} was 3.1% ± 2.0. Five of these 30 (16.6%) patients obtained their goal A_{1c} of < 7%. Fifty-four patients are currently being treated in the program, and 17 patients were lost to follow-up.
CONCLUSIONS: The Diabetes Initiative Program demonstrates the value of a pharmacist-managed diabetes consultative service within an internal medicine clinic targeting patients with diabetes resistant to usual care.

106. Evaluation of the appropriate use of proton pump inhibitor therapy in an ambulatory Medicaid population. *Kristie Ramser, Pharm.D.*, Gale Hamann, Pharm.D., BCPS, CDE, Laura Sprabery, M.D., Christa George, Pharm.D., BCPS, CDE; Regional Medical Center, Memphis, TN.

PURPOSE: The State of Tennessee Medicaid Program implemented formulary changes regarding the use of proton pump inhibitors (PPIs) requiring patients to have experienced a failed trial of histamine 2 blocker therapy (H2B) or obtain prior authorization for PPI therapy depending on the indication. The purpose of this study was to evaluate the use of PPIs in a group of Medicaid patients and adjust therapy as indicated.
METHODS: A list of Medicaid patients who were prescribed PPI therapy was generated from a pharmacy database. Indications for PPI therapy were verified through chart review and patient interview. PPI therapy was discontinued if no indication was identified. Prior authorization for PPI therapy was obtained if the indication met Medicaid qualifications. PPI therapy was changed to an H2B for documented indications that did not meet Medicaid qualifications for PPI therapy. Another chart review and patient interview were conducted 6 months after PPI therapy was discontinued or changed to an H2B. Patients were interviewed regarding the effectiveness of the current acid-suppression therapy.
RESULTS: There were 149 patients evaluated. PPI therapy was discontinued in 19% of patients. Prior authorization was obtained in 30% of patients. PPI therapy was changed to an H2B in 51% of patients. Six months after the intervention, 34% of patients whose PPI therapy was discontinued remained controlled without medication. Acid suppression was restarted in 10% of patients, and 55% of patients were lost to follow-up. Of the 76 patients whose PPI therapy was changed to H2B therapy, 46% remained on H2B therapy, 5% were restarted on PPI therapy, 14% discontinued acid suppression therapy, and 34% were lost to follow-up.
CONCLUSIONS: PPI therapy was changed or discontinued in 70% of patients. Of patients successfully contacted, 89% remained off PPI therapy, demonstrating the potential over use of PPIs.

107. Implementation of a pharmacist-run lipid clinic in a Veterans Affairs medical center. *Mary Choy, Pharm.D.*; St. John's University, Queens, NY.

PURPOSE: To describe the implementation of a pharmacist-run lipid clinic within a primary care medical setting and review the results.
METHODS: A pharmacist-run lipid clinic was implemented at the Veterans Affairs New York Harbor Healthcare System. Potential patients were identified by screening the primary care physician's appointment list. Patients were then contacted via telephone 1 week prior to their primary care appointment. In addition to the facilitation of these operational issues, clinical activities and barriers to the clinic will also be discussed. For study inclusion, patients were required to have an initial pharmacist intervention and baseline lipid panel, followed by at least 1 follow-up lipid panel. The interventions of the pharmacist during the initial patient visit included counseling non-compliant patients, optimizing drug dose, and recommending additional therapy. The changes in lipid panel were then reviewed in the follow-up visit. The Veterans Affairs Hyperlipidemia Treatment Algorithm used in the clinic was based on the National Cholesterol Education Program – Adult Treatment Panel III guidelines and incorporated medications that were on the formulary.
RESULTS: 18 patients were enrolled in the study between January 15, 2006, and June 9, 2006. The interventions of the pharmacist had an effect on the lipid panel, and it was observed that low-density-lipoprotein cholesterol decreased by 25%, high-density-lipoprotein cholesterol increased by 11%, triglycerides decreased by 22%, and total cholesterol decreased by 13%. Interventions included counseling non-compliant patients (61%), optimizing drug dose (22%), and recommending additional therapy (17%).
CONCLUSIONS: A pharmacist-run lipid clinic can be implemented and integrated into a primary care setting. Pharmacists can effectively manage lipid therapy and have a definitive impact on the patient lipid panels.

108. Development of an asthma shared medical appointment. *Teresa B. Klepser, Pharm.D.*; Ferris State University, Kalamazoo, MI.

PURPOSE: Asthma guidelines emphasize the importance of classification, provision of controller medications, and self-management skills. A planned-care visit is a proactive clinical encounter that focuses on patient goals and aspects of care not delivered during an acute-care visit. The National Heart Lung and Blood Institute recommends planned visits at intervals ranging from 3 months to 12 months depending on the asthma classification. The objectives of the asthma shared medical appointment (SMA) model are to increase patient asthma knowledge, use of asthma action plans, use of anti-inflammatory medications in persistent asthma, and clinic revenue. Secondary objectives are to decrease emergency department visits and hospital admissions.
METHODS: Potential patients for the SMA were identified by reviewing asthma claims in our billing system. Components of the SMA were based on the National Asthma Education and Prevention Program Guidelines and patient needs. The SMA targets various processes of care including patient assessment and disease and medication knowledge. The SMA is a 90-minute session for 5–8 adults with asthma. Providers include a pharmacist, nurse practitioner (NP), and nursing staff. At the SMA patients join a session with other patients and the providers. Each patient completes an asthma status questionnaire and is seen by an NP and pharmacist. Following a physical assessment, the pharmacist and NP educate the patients on signs and symptoms of worsening asthma, measures to control asthma triggers, written asthma action plans, monitoring of β_2-agonist inhaler use, appropriate use of peak flow meters, and proper inhaler technique. Evaluation: A seven-point quality assurance review will be conducted annually. Adaptability: This SMA model may be adapted to other ambulatory care clinic settings or outpatient retail settings and applied to a variety of chronic diseases.
CONCLUSIONS: Previous published SMA models have not used a clinical pharmacist as a team member.

109. Pharmacist managed dietary supplement clinic. *Teresa B. Klepser, Pharm.D.*; Ferris State University, Kalamazoo, MI.

PURPOSE: Use of dietary supplements has grown exponentially in the last decade. It is estimated that one in five patients is at risk for drug-dietary supplement interactions. This is a particular concern among the elderly who are at the greatest risk for polypharmacy. In 2002, a dietary supplement consultant was added to the Bronson Center for Integrative Medicine (BCIM). Dietary supplement consultation provides evidence-based guidance to patients regarding the safe and effective use of dietary supplements. The primary objective for dietary supplement consultation is to ensure that the patient is safely taking dietary supplements. Incorporation of a pharmacist at the BCIM was intended to increase patient/caregiver dietary supplement knowledge, improve medication reconciliation (particularly dietary supplements), improve evaluation of dietary supplements for efficacy and toxicity, and enhance provider awareness of dietary supplement concerns.
METHODS: Patients are either self-referred or provider-referred to BCIM. Patients bring all dietary supplements consumed to the clinic, if possible in the original containers, to aid in identification. The clinical pharmacist evaluates each dietary supplement for potential drug and disease interactions, counsels on potential side effects, and recommends laboratory tests for monitoring of safety and efficacy. Patients are given written and verbal consultation. The patient typically pays, out of pocket, $50/hour of consultation. Adaptability: This clinic may be adapted to other ambulatory care clinic or retail pharmacy settings.
CONCLUSIONS: Compiling dietary supplement histories can be challenging and time consuming, as many of the individual products contain multiple constituents and patients commonly use multiple supplements. Because patients do not routinely use dietary supplements according to accepted dosing strategies, accurate usage patterns can be difficult to ascertain. A clinical pharmacist can perform accurate and complete dietary supplement medication histories to help prevent potential adverse outcomes.

110. Medication reconciliation by a clinical pharmacist in a cerebral palsy clinic. *Teresa B. Klepser, Pharm.D.*, Sarah E Raguckas, Pharm.D.; Ferris State University, Kalamazoo, MI.

PURPOSE: In July 2004, the Joint Commission announced 2005 National Patient Safety Goal No. 8 to "accurately and completely reconcile medications across the continuum of care." Accredited organizations were required to develop and implement processes to meet this goal by January 2006. In response, the Kalamazoo Center for Medical Studies Pediatric Subspecialty Cerebral Palsy Clinic (CPC) requested a clinical pharmacist to join the team. Medication reconciliation is the process of comparing a patient's medication orders to all medications that the patient has been taking to avoid medication errors such as omissions, duplications, dosing errors, or drug interactions. Reconciliation should be conducted at every transition of care in which new medications are ordered or existing orders are rewritten. Medication reconciliation is composed of five steps: 1) creation of a current medication list; 2) listing of medications to be prescribed; 3) comparison of those medication lists; 4) development of clinical recommendations; and 5) communication with appropriate caregivers and the patient. Incorporation of a pharmacist in the CPC was intended to increase patient/caregiver medication knowledge, improve accuracy of the electronic medication record (including prescription, over-the-counter, and dietary supplements), improve evaluation of drug therapies for efficacy and toxicity, and enhance provider awareness of drug therapy concerns.
METHODS: The CPC is a multidisciplinary clinic including a pediatrician, orthopedic physician, physical therapist, occupational therapist, social worker, dietician, and nurse. In 2005 a clinical pharmacist joined the team. The pharmacist performs about 30 medication histories monthly and recommends drug interventions on 16% of those patients. Adaptability: This clinic may be adapted to other ambulatory care clinic settings and applied to a variety of chronic diseases.
CONCLUSIONS: Previous published cerebral palsy clinics have not used a clinical pharmacist as a team member to perform accurate and complete medication reconciliation to prevent prescribing and administration errors.

111. The role of the pharmacist in an ambulatory pain management clinic. *Tibb F. Jacobs, Pharm.D.*, Emily W. Evans, Pharm.D.; University of Louisiana at Monroe, Shreveport, LA.

PURPOSE: To describe the development and implementation of pharmacy services for non-cancer chronic pain management within an academic Family Medicine Clinic. Pharmacists have long held a role in inpatient and oncology pain management. There is very little literature regarding the role of clinical pharmacy in managing chronic pain in an outpatient setting.
METHODS: October 2005: A College of Pharmacy (COP) faculty member placed in an academic hospital's Family Medicine Clinic (FMC) became involved in the Pain Management Clinic (PMC). Pharmacy (faculty member or Pharm.D. student) took medication histories, sat in on physician interviews, and counseled patients. Recommendations were made verbally regarding drug dosing, interactions, adverse effects (ADEs), and therapeutic alternatives. Summer 2006: FMC implemented a new electronic medical records (EMR) system, allowing for new pharmacy capabilities, including pre-appointment medication review and formal intervention documentation. An additional 2 COP faculty members were added to FMC. October 2006: Formal pharmacy participation process in the PMC was implemented. Prior to appointment: Pharmacy reviews patient medications/notes and documents concerns in EMR. During appointment: Pharmacy completes medication history and pain assessment, addressing concerns that arose during medication review, assuring accuracy of records, and further assessing efficacy, ADEs, and regimen appropriateness. Recommendations regarding drug-related problems (DRP) are made in the EMR, which is checked by the physician prior to the patient interview/examination. Patients are counseled by pharmacy on medications prior to departure. After appointment: Physician co-signs pharmacy note, which becomes a permanent medical record.
CONCLUSIONS: The paucity of literature regarding pharmacy involvement in ambulatory pain management necessitates further research. Data concerning the types of interventions made by pharmacy and physician acceptance of recommendations are being collected via the EMR. A survey regarding patient satisfaction with pharmacy services is also being administered.

112. Clinical and economic benefits of monitoring unfractionated heparin therapy using antifactor Xa activity compared to activated partial thromboplastin time testing. *Bryan K. Robinette, Pharm.D., BCPS, (AQ-Cardiology)*; NorthEast Medical Center, Concord, NC.

PURPOSE: Patient outcomes in venous and arterial thromboembolic disorders are correlated with heparin serum concentrations. The medical literature consistently shows problems with using activated partial thromboplastin time (aPTT) to monitor therapeutic unfractionated heparin therapy (UFH). Variability in pharmacokinetic and pharmacodynamic parameters with UFH makes precise predictions of heparin concentrations using aPTT testing inaccurate. Using a specific heparin assay such as antifactor Xa (HA) to monitor UFH offers many potential advantages.
METHODS: Retrospective, unmasked, cohort, single-center studying in a 457-bed, private, community teaching hospital. Ninety-two patients were treated with therapeutic UFH therapy for arterial or venous thrombo-embolism using adjusted body weight (70 units/kg bolus, 15 units/kg/hour initial infusion). HA was implemented as the standard monitoring test for UFH in March 2006. A random sample of 50 patients prior and post initiation of HA was selected to assess the quality of heparin therapy including: achievement of therapeutic anticoagulation at 6 and 24 hours, number of tests performed per 24 hours, number of dosage adjustments per 24 hours, and bleeding complications. A cost analysis was also performed.
RESULTS: Both groups were comparable in baseline patient characteristics.

The HA group had fewer laboratory tests and dosage adjustments per 24 hours, and achieved a therapeutic level of anticoagulation more frequently at 6 and 24 hours after initiation of therapy. There was no difference in bleeding. The cost of monitoring heparin therapy with HA was slightly more than aPTT testing.
CONCLUSIONS: Monitoring therapeutic UFH using HA improves the quality of anticoagulation therapy with only a slightly increased cost compared to aPTT testing. It is likely that the increased cost of the HA is outweighed by improved quality of anticoagulation, reduced nursing time, and reduced risk for dosage errors that accompany frequent dosage adjustments.

113E. Metoprolol succinate usage by PCMs at an Army community hospital. *Cathy Dement, Pharm, D, BCPS*; Martin Army Community Hospital, Cataula, GA.

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114E. Evaluation of osteoporosis prevention in chronic users of glucocorticoids at an Army community hospital. *Cathy Dement, Pharm, D, BCPS*[1], Azra Khan, Pharm, D[2]; (1)Martin Army Community Hospital, Cataula, GA; (2)Martin Army Community Hospital, Fort Benning, GA.

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115. Utilization of bivalirudin plus eptifibatide in patients undergoing elective percutaneous coronary intervention. *Mytrang K. Le, Pharm.D.*, Abir O. Kanaan, Pharm.D., Matthew A. Silva, Pharm.D., BCPS; Massachusetts College of Pharmacy and Health Sciences, Worcester, MA.

PURPOSE: This retrospective, observational cohort evaluated drug therapy utilization in patients undergoing elective percutaneous coronary intervention (PCI) at a community teaching hospital to 1) compare characteristics of patients receiving bivalirudin or bivalirudin plus eptifibatide (concurrent or provisional) and 2) evaluate blood transfusion, length of stay (LOS), and drug acquisition costs.
METHODS: Medical records of 255 patients undergoing elective PCI between January and December 2005 were reviewed. Medical history, drug therapy, target vessels, blood transfusion, and LOS were evaluated.
RESULTS: Bivalirudin (B) and bivalirudin plus eptifibatide (BE) were used in 138 (54%) and 117 (46%) patients, respectively. Drug costs doubled in the BE vs. B group ($723.21 vs. $354.11). More patients in the BE vs. B group had diabetes (41.9% vs. 27.5%, p=0.019). More blood transfusion occurred in the B vs. BE group (range: 1–8 vs. 1–3 units, p=0.038). There were no differences between B and BE groups in LOS (2.62 vs.3.56, p=0.908), average units of blood transfusion per patient (3.4 vs. 4.3, p=1.0), age greater than 75 years (34.8 % vs. 35%, p=1.0), hypertension (75.9% vs. 76.1%, p=0.121), dyslipidemia (73.2% vs. 75.2%, p=0.331), renal failure/dialysis (5.1% vs. 6.8%, p=1), chronic ASA (34.1% vs. 37.6%, p=0.554), prior MI (30.4% vs. 29.9%, p=0.662), prior PCI (28.3% vs. 25.6%, p=1.0), prior CABG (18.1% vs. 6%, p=0.347), balloon use (41.3% vs. 37.7%, p=0.079, drug-eluting stents (81.9% vs. 78.6%, p=0.153), and bare metal stents (20.3% vs. 23.1%, p=0.108).
CONCLUSIONS: Interventionalists use bivalirudin with provisional or concurrent eptifibatide more frequently with diabetes at baseline and double the cost of procedural antiplatelet and antithrombin pharmacotherapy. Other patient risk features were not associated with the choice of provisional or combination therapy during elective PCI.

116. Inappropriate use of sotalol in renal insufficiency: a need for clinical pharmacist intervention. *Shannon W. Finks, Pharm.D.*[1], Kelly C. Rogers, Pharm.D.[1], Amy H. Manguso, Pharm.D.[2]; (1)University of Tennessee College of Pharmacy, Memphis, TN; (2)Baptist Memorial Healthcare - Memphis, Memphis, TN.

PURPOSE: Due to risk of adverse drug events (ADE) sotalol use is limited in renal insufficiency (RI) and heart failure (HF). In addition, sotalol use in HF is not supported by evidence-based guidelines. To reduce potential life threatening ADEs, avoidance or dose adjustment may be necessary.
METHODS: We evaluated patients receiving sotalol in a community hospital over a 6-week time period. Information was collected on indication, dosing, concomitant disease states, symptoms of toxicity, and readmissions. Clinical pharmacist recommendations were made when necessary and were followed to determine outcomes.
RESULTS: All patients (n=36) were prescribed sotalol for either atrial or ventricular tachyarrhythmias. Thirty-two (89%) were dosed inappropriately per renal function. Twenty (56%) had significant left ventricular dysfunction as defined by an ejection fraction < 40%. Amiodarone was concomitantly prescribed in 13 (36%) patients. At time of initial assessment 50% were exhibiting signs and symptoms of potential sotalol toxicity (bradycardia, shortness of breath, fatigue, weakness, QT prolongation). Clinical pharmacists provided recommendations regarding discontinuation or dosage adjustment on 32 patients with a 50% acceptance rate. Readmission rates for patients receiving appropriate therapy, including those after pharmacist recommendations were accepted (Group A), were compared to those remaining on inappropriate therapy (Group B). Patients requiring at least one readmission within 6 months were not similar between groups (30.8% Group A; 52.4% Group B). Patients in Group A were admitted 0.308 times during the 6 months compared to 1.43 times in Group B, which was 4.64 times more often.
CONCLUSIONS: Sotalol was found to be inappropriately prescribed in the majority of patients with RI. Dosage adjustment or avoidance in patients with relative contraindications such as HF is often necessary. Clinical pharmacist evaluation of patients on sotalol is important and beneficial by reducing readmissions and avoiding potential toxicity.

117. Iloprost improves cardiac hemodynamic parameters of pulmonary hypertension in open heart surgery. *Teena Abraham, M.S., Pharm.D., BCPS*, Charles Oribabor, M.D., Larry Bernstein, M.D., Nasser Saad, Pharm.D., Fabienne Vastey, Pharm.D., Eric Balmir, M.S.; New York Methodist Hospital, Brooklyn, NY.
PURPOSE: This study evaluated the systemic and hemodynamic effects of inhaled iloprost using the SERVO-I ventilator via ultrasonic nebulization in acutely ill postoperative open-heart surgery patients. In addition, the cost difference between iloprost and standard nitric oxide therapy was evaluated.
METHODS: Patients with elevated mean pulmonary artery pressure (mPAP) received iloprost (40 µg) administered via ultrasonic nebulization with SERVO-I ventilators postoperatively. MPAP, pulmonary artery systolic pressure, pulmonary artery diastolic pressure, cardiac index (C.I.), and pulmonary artery occlusion pressure (PAOP) were measured with a pulmonary artery catheter. Pulmonary and systemic vascular resistance (PVR and SVR) was calculated. In addition, the average cost of iloprost to nitric oxide was calculated.
RESULTS: Ten patients with similar demographic data received inhaled iloprost. Iloprost achieved peak effect of pulmonary vasodilation within 20 minutes of ultrasonic nebulization. This effect lasted about 90 minutes and then wore off slowly over the next 30 minutes. Iloprost reduced mPAP (32 vs. 20 mm Hg, p<0.0001), pulmonary artery systolic pressure (70 vs. 45 mm Hg, p=0.0001), pulmonary artery diastolic pressure (37 vs. 23 mm Hg, p=0.0001), PVR (550 vs 220 dynes•sec X cm-5, p=0.022), with no effect on SVR. An additional improvement of ventricular performance with an increase in CI (2.32 vs. 2.75 L/min/m^2) and a decrease in PAOP (25 vs. 15 mm Hg, p=0.0001) was observed after inhalation of iloprost. Cost savings for iloprost versus nitric oxide is about $9000 per patient.
CONCLUSIONS: Iloprost administered via ultrasonic nebulization with SERVO-1 ventilators in critically ill patients resulted in statistically significant reductions in mPAP and PVR with an increase in CI. Cost savings for inhalation iloprost versus nitric oxide provides another advantage for its use.

118. Implementation of a hospital protocol for the use of perflutren lipid microspheres (Definity®) in echocardiographic procedures. *Kimberly C. Mason, Pharm.D.*, Anjali Arora Todd, Pharm.D.; University of Tennessee Medical Center, Knoxville, TN.

PURPOSE: Regulatory standards require that pharmacists review all medication orders. Therefore, this protocol was necessary to maintain control of purchasing and use of contrast-related media, such as perflutren lipid microspheres.
METHODS: Nurses, pharmacists, sonographers, and physicians contributed to the development of a written protocol for the use of this novel product to improve visualization during echocardiographic studies. Included in the protocol are criteria for use, dosing tables, administration information, precautions, and adverse effects. Refrigeration and activation requirements, as well as expense of the product precluded storage on each nursing unit. These obstacles presented logistical concerns related to timely delivery to the nurse and sonographer.
RESULTS: The protocol was approved by the Pharmacy and Therapeutics Committee as well as the Medical Executive Committee, and appropriate education was provided to hospital staff. Sonographers have begun to use this protocol for suboptimal echocardiograms in this institution.
CONCLUSIONS: With the expanded definition of what is considered a medication, hospital pharmacies must now acquire and control nontraditional drug products. Prospective pharmacist review of IV contrast is a growing issue among hospitals throughout the United States. This protocol facilitates compliance with the new JCAHO standard and allows multiple professionals to provide better patient care.

119. Job sharing in pharmacy: an innovative opportunity in academia. *Kelly C. Rogers, Pharm.D.*[1], Shannon W. Finks, Pharm.D.[1], David K. Solomon,

Pharm.D.[2], Richard A. Helms, Pharm.D.[1]; (1)University of Tennessee College of Pharmacy, Memphis, TN; (2)Veterans Affairs Medical Center, Memphis, TN.

Although 67% of pharmacy students in 2004 were female, only 40% of full time faculty positions were filled by women. Pharmacist shortages and an increasing number of female pharmacists are reasons to develop unique work arrangements for women who wish to work part-time. Between 2000 and 2004 the percentage of pharmacists working part-time increased. Most part-time pharmacists are women who care for children or family members. Opportunities are available to job share in health care; however, outside of the retail setting these opportunities are limited for pharmacists. We describe an innovative practice model for clinicians in an academic setting who wish to job share. Because of an increased class size and the need for more clinical practice sites in the Memphis area, a job share position was proposed to the administrators at The University of Tennessee College of Pharmacy and the VA Medical Center (VAMC) in Memphis. An integrated model was developed to provide a year-round clinical pharmacy teaching service on an adult cardiology team at the VAMC. Including a selective rotation, this allowed for a 68% increase in cardiology rotation sites available to Pharm.D. students in the Memphis area. Job sharing works best when common goals are shared between partners. In addition, regular ongoing communication, flexibility with scheduling, and appropriate division of workload is necessary for success. Benefits to the employee include greater professional fulfillment while maintaining the flexibility for personal responsibilities. Benefits to the employer include continuity of patient care and retaining experienced practitioners while also meeting the increasing demands of pharmacy services. Job sharing can be successful for pharmacists with advanced clinical training who wish to continue their practice in a part-time capacity. Administrators should consider the benefit of alternative work schedules in recruiting and retaining women in academic pharmacy.

120. A survey of community pharmacy practices related to care of Spanish-speaking patients in Alabama. Grady L. Pearson Jr., Pharm.D., *Mary A. Worthington, Pharm.D.*, Kim W. Benner, Pharm.D., Jennifer Beall, Pharm.D., Teresa Wilborn, Pharm.D., Ph.D.; McWhorter School of Pharmacy Samford University, Birmingham, AL.

PURPOSE: To assess local pharmacy practices related to the care of, and services provided to, Spanish-speaking patients in a metropolitan area in Alabama.
METHODS: A three-page survey was developed and mailed to 250 pharmacies in the Jefferson County area of Alabama. A single pharmacist was asked to complete the 26-question survey, which was divided into three sections: background pharmacy information, interpretive methods used by the pharmacy, and cultural competency.
RESULTS: Out of 227 surveys, 117 were returned, giving a response rate of 52%. Two-thirds of the pharmacies surveyed were chain pharmacies with 108 pharmacies reported to have less than 10 percent of patients who primarily speak Spanish. About 72% reported some need to speak and/or understand Spanish; however, 49.6% reported that the pharmacy staff was unable to speak and/or understand Spanish. The ability to print Spanish labels and counseling sheets was noted by 77.8% of responders. Pharmacy employees were used as interpreters by 23.9% of the pharmacies while approximately two-thirds of the respondents reported using a family member to serve as an interpreter. Of the times a family member was used only 24.8% reported never using a minor with 6% of all pharmacies reporting solely using a minor. Fifty-four (46.2%) respondents reported that the pharmacy was not culturally competent. In comparison, when asked how often the pharmacist asks questions about a Spanish-speaking patient's culture, 70.1% responded that they never asked questions about the patients' culture, which is similar to the percentage who were completely unfamiliar with folk remedies, 80.3%.
CONCLUSIONS: There is a need for pharmacists to develop an understanding of the Spanish language, interpretation, and culturally competent care in order to optimally serve this growing minority group.

121. Pharmacy involvement in camp huff n' puff. *Kendra A. Keeley, Pharm.D.*, Donna G. Beall, Pharm.D., BCPS; University of Montana, Missoula, MT.

PURPOSE: To involve pharmacists as part of a multidisciplinary health care team at a camp for children with respiratory illnesses. The goal of the camp is to educate children in an active learning environment.
METHODS: A pharmacist first attended camp in 2004 and became the director of the camp the following year. The director is responsible for the development and implementation of all activities as well as staff coordination. The director trains pharmacy students and residents in preparation for their involvement at camp. Prior to camp, students set 3–5 goals and keep a daily reflective journal. The "Asthma Adventures" Asthma Camp Activities Manual is used as a key tool for education. Students educate the children by incorporating games such as LUNGO and the asthma challenge to the learning process. Pharmacy staff also participate in medication checks twice a day, during which they monitor the administration of medications, perform peak flow measurements, critique administration techniques, and quiz children on medication knowledge. The students are also available to answer drug-related questions from other medical staff. Students answered post-camp questions regarding their goals, satisfaction, preparedness, confidence, and attitudes and empathy towards children with respiratory illnesses.
RESULTS: Since 2004, two residents and four pharmacy students have attended camp. Pharmacy involvement has been well accepted. The students felt they had met all of their goals, stated they had a better overall understanding of respiratory illnesses, felt more confident about making recommendations, and felt that they were more empathetic toward the children.
CONCLUSIONS: Adding pharmacists and pharmacy students to the medical team at a camp has been a positive experience for all involved, has allowed students to gain hands on experience with children to learn more about their disease states, and more importantly has given the campers an opportunity to learn more about their medications.

122. The impact of a pharmacist-assisted anticoagulation protocol on INR control in a family medicine residency program. *Cathleen Edick, Pharm.D.*[1], Allison Bernknopf, Pharm.D.[2]; (1)Ferris State University, Lansing, MI; (2)Ferris State University, Kalamazoo, MI.

PURPOSE: In the Sparrow family medicine residency (SFMR) program, patients on anticoagulation therapy are managed primarily through telephone follow-up. This study was designed to evaluate whether collaborative care, including a pharmacist, can use guideline-based protocols to improve INR goal attainment, even when telephone follow-up is used. A secondary objective of the study was to examine whether INR goal attainment has any relation to a physician's "comfort level" in using collaborative care for anticoagulation management.
METHODS: Prior to this study, pharmacists did not assist with anticoagulation management. Because SFMR is a medical residency program, we sought to find a collaborative solution to the current system of monitoring anticoagulation therapy using telephone follow-up. A protocol was developed, whereby pharmacists were involved in the follow-up for anticoagulation management. Two chart reviews will be completed to assess the effectiveness of this protocol. The first will assess INR results obtained between July 2005 and March 2006, prior to the implementation of the pharmacist-driven protocol. The second chart review will be completed in December 2006, and will include 6 months of data following implementation. Chart reviews will assess the percentage of time anticoagulation patients remain within their desired INR range, and data from pre- and post-protocol implementation will be compared. In addition to the chart reviews, a medical resident questionnaire will also be conducted pre- and post-protocol implementation. The resident questionnaire will evaluate the medical residents' "comfort level" with the protocol and use guidelines for INR management. Resident "comfort level" and INR goal attainment will then be analyzed to determine whether there is a correlation between the two variables.
RESULTS: Data collection is ongoing. Currently all of the retrospective data are collected. Post protocol data were collected in December of 2006. Results will be presented at the Spring Practice and Research Forum.

123. Gaining efficiency in a family medicine residency program through appropriate formulary utilization. *Cathleen Edick, Pharm.D.*[1], Chris Beaver, R.N., MPA[2], George Smith, M.D.[2]; (1)Ferris State University, Lansing, MI; (2)Michigan State University Family Medicine Residency Program, Lansing, MI.

PURPOSE: Medication formularies are used to control costs, but often vary according to the patient's individual health plan. Failure to consult the appropriate formulary before prescribing often results in patient or pharmacy "call-backs" requesting medication substitution and/or prior authorization for non-preferred or off-formulary medications. Such "call-backs" are inconvenient and time consuming for the patient, pharmacy and medical practice. The purpose of this study was to evaluate whether appropriate provider education and easy formulary access at the point of care substantially reduces the need for unnecessary "call-backs."
METHODS: An initial analysis of "call-backs" was conducted prior to provider education and improved formulary access. Following this initial data collection, each of the major insurance carriers accepted at the Family Medicine clinics were contacted and current formularies were obtained. Formulary folders were created for each exam room, as well as the resident precepting room. A one-page list of tier 1 agents common to each plan for the most frequent disease states was also created. Throughout the study period, formulary changes were received and formulary packets updated. Providers were also educated and made aware of "call-backs" that could have been averted by following the new guidelines. Six months after implementation, the number of "call-backs" was reanalyzed.
RESULTS: Prior to implementation, the clinic received an average of 170 "call-backs" per month over a 3-month period of time. This resulted in 8.5

"call-backs" per day. Six months after implementation of this new process, "call-backs" decreased to 9 per month. This resulted in 0.45 "call-backs" per day or fewer than three per week.
CONCLUSIONS: The formulary folders and education allowed providers to make appropriate medication decisions at the point of care, resulting in time saved, increased efficiency and increased patient, staff, and pharmacist satisfaction.

124. Acid-suppressive agents use in the general medicine unit. *Corinne Chahine-Chakhtoura, M.S., Pharm.D., BCPS*, Humberto Jimenez, Pharm.D., Manisa Tanprayoon, Pharm.D., Ashmi Anand, Pharm.D., Mini Varghese, Pharm.D.; Saint Michael's Medical Center, Newark, NJ.

PURPOSE: To assess the prevalence and appropriateness of using acid-suppressive agents on inpatients in the general medicine unit.
METHODS: The data were collected prospectively over a period of 2 months on non-critical patients receiving acid-suppressive drugs or sucralfate in the general medicine unit. Relevant medical history and type of drug used were documented. We assessed the appropriateness of therapy indication, dosing frequency, and route of administration. The appropriateness was based on internally developed criteria derived from standard published guidelines. During data collection, recommendations for therapy adjustments were made as needed.
RESULTS: A total of 200 patients (94 males, mean age 59.5 ± 16.1 years) were enrolled. Sixty-one patients received acid-suppressive agents before hospital admission, with 56 (91.8%) being on proton-pump inhibitors (PPIs), 4 (6.6%) on histamine-2 receptor antagonists, and 1 (1.6%) on sucralfate. Upon admission, 195 patients (97.5%) received PPIs and 5 (2.5%) received sucralfate. The indications were for stress ulcer prophylaxis (79%), gastroesophageal reflux disorder (6.5%) and a history of gastrointestinal bleed or peptic ulcer disease (14.5%). Based upon our criteria, the indication was appropriate in 101 patients (50.5%), the dosing frequency appropriate in 185 patients (92.5%), and the route of administration appropriate in 168 patients (84%). For the non-appropriate indications, 76 patients (75.2%) received PPIs for stress ulcer prophylaxis. The remaining 23 patients (22.8%) had no discernable indication. A total of 112 recommendations were made for therapy adjustment; 60 (53.6%) were accepted. Post-pharmacist interventions, the usage of acid-suppressive drugs decreased to 144 patients. If all recommendations to discontinue inappropriate indications were accepted, the usage would have decreased to 101 patients.
CONCLUSIONS: The usage of acid suppressive agents in the general medicine unit is excessive, particularly for inappropriate stress ulcer prophylaxis. Pharmacists' interventions play an important role in reducing the overusage.

125. Identification and categorization of drug-related problems among Medicaid patients: variability between pharmacist reviewers. *Joanne LaFleur, Pharm.D., MSPH*, CarrieAnn McBeth, Pharm.D., Carin Steinvoort, Pharm.D., Lynda Oderda, Pharm.D., Marianne Paul, Pharm.D., Karen Gunning, Pharm.D., Gary M. Oderda, Pharm.D., MPH; Pharmacotherapy Outcomes Research Center, Salt Lake City, UT.

PURPOSE: As part of ongoing efforts to improve drug utilization among Utah Medicaid patients, drug-related problems (DRPs) were identified by clinical pharmacists for patients exceeding seven medications per month in 2004-2005. Before implementation of quality-assurance efforts, baseline variability between pharmacists for identifying and coding DRPs was analyzed.
METHODS: Pharmacists retrospectively reviewed drug regimens for Medicaid patients and identified DRPs in 12 predetermined categories, including therapeutic duplications, drug-drug interactions, and untreated indications. Logistic regression was used to estimate odds ratios (ORs) for differences in DRP identification between pharmacists, adjusting for patient-specific characteristics (age, gender, nursing home status, and reviewed medications). Pseudo R^2 statistics were compared to determine the proportion of modeled variance due to 1) pharmacist variability, 2) patient-specific characteristics, or 3) shared variance.
RESULTS: A total of 5,174 patients were reviewed; 75.7% had ≥ 1 DRP. The median number of DRPs per patient was 2 (range 0–15). The mean age was 57.6 (SD 17.4). A total of 30.7% were nursing home residents, and 74.5% were female. The adjusted OR for the pharmacist with the highest probability of identifying ≥ 1 DRP versus lowest was 3.1 (95% CI=1.2–8.2); the model accounted for 14.1% of the differences in DRPs of which 2.5% was attributed to pharmacist variability and 45.1% to patient characteristics. Within specific DRP categories, adjusted ORs for the pharmacist with the highest probability versus the lowest ranged from 2.7 (95% CI=1.4–5.4) for excessive durations of therapy to 95.5 (95% CI=18.5–492.6) for untreated indications. The models accounted for 3.8%–24.9% of the variability, of which 3.7%–44.6% was attributed to pharmacist variability and 35.5%–91.3% to patient-specific characteristics.
CONCLUSIONS: Pharmacists exhibited high variability in DRP identification or categorization; variability could be attributed to differences in clinical judgement or heuristics for DRP coding. These findings suggest that quality-improvement efforts are needed to achieve consistency between reviewers.

126. Comparison of adherence to fixed dose combination versus free-prescribed therapy. *Libby Black, Pharm.D.*, Sandra E Talbird, MSPH; GlaxoSmithKline, Research Triangle Park, NC.

PURPOSE: A literature review was conducted of studies comparing adherence to fixed dose combination (FDC) therapy versus adherence to free-prescribed individual components to assess whether adherence/ compliance advantages have been demonstrated for FDC products.
METHODS: OVID and PUBMED databases were searched using the following terms: "fixed dose combination" and ["adherence" or "compliance"]. No restrictions on language of study were employed. Studies using patient-reported measurements of adherence, which can be unreliable, were excluded. This initial analysis focused on comparisons of 1 product (FDC) vs. 2 products (free-prescribed individual components).
RESULTS: Five studies between 1980 and 2006 met our inclusion criteria. Four of the studies were retrospective analyses of prescription claims data, and one was a prospective crossover study. Medications studied included antihypertensives and antihyperglycemics. A variety of methods were used to measure adherence, with the medication possession ratio (MPR) being the most common. Four out of five studies found a statistically significant higher rate of adherence for patients on the FDC product compared with free-prescribed individual components.
CONCLUSIONS: Relative to the number of FDC products on the market, few studies have assessed whether the FDC improves adherence over treatment regimens including each component individually. The results of this analysis provide preliminary evidence to support an improvement in adherence with FDCs over free-prescribed components in the management of the evaluated chronic illnesses. Additional studies should be conducted to further evaluate this topic.

127. Diagnosing and testing for heparin-induced thrombocytopenia. *Marybeth Boudreau, Pharm.D.*, Loretta Chiu, Pharm.D., Astrid Andreescu, M.D., Irwin Gross, M.D.; Eastern Maine Medical Center, Bangor, ME.

PURPOSE: Direct thrombin inhibitors (DTIs) are paramount for the treatment of heparin-induced thrombocytopenia (HIT). To minimize the risk of bleeding, ensure patient safety, and reduce cost, it is important that DTIs be prescribed appropriately. It is equally important that the testing for HIT be timely, sensitive and specific. The purpose of this study was to determine whether two different HIT testing methods (the AHAT platelet aggregation test and the PF4 ELISA test) correlated with a clinical diagnosis of HIT.
METHODS: A retrospective chart review included all adult patients in 2005 who had an AHAT and PF4 ELISA test simultaneously performed. Patients with negative AHAT and PF4 ELISA results were excluded.
RESULTS: From January through December 2005, 134 AHAT tests were performed. Of these 134 patients, 58 patients went on to have a PF4 ELISA test performed. There was a direct correlation between a clinical diagnosis of HIT and the PF4 ELISA test results ($r=0.66$; $p<0.001$). However, the AHAT platelet aggregation test revealed no correlation ($r= -0.065$; $p=0.677$). The AHAT test demonstrated 93% sensitivity and only 4.7% specificity for HIT. Conversely, the PF4 ELISA was 80% sensitive and 88% specific. Many of the patients evaluated (60%; n=35) had positive AHAT test results without any clinical evidence of HIT. Of those patients, 57% (n=20) went on to receive HIT treatment including IV DTI therapy for 5.6 days. In addition, 19 patients were discharged home with a documented heparin allergy. Sadly, these patients did not have a heparin allergy, nor did they have HIT.
CONCLUSIONS: Accurate HIT testing directly affects the administration of DTI therapy, hospital length of stay, and patient safety. The AHAT platelet aggregation test is sensitive but not specific and does not correlate with a clinical diagnosis of HIT.

128. Defining an argatroban therapeutic range in a large community hospital. *Stephanie A. Baumhover, Pharm.D.*, Stephanie B. Hollowell, Pharm.D.; CJW Medical Center - Chippenham Campus, Richmond, VA.

PURPOSE: A retrospective medication use evaluation was conducted to evaluate the efficacy and safety of an argatroban protocol using a facility-defined therapeutic range 1 year after protocol implementation.
METHODS: All patients receiving argatroban from January 1, 2006, through August 31, 2006, were reviewed. Indications for use, patient baseline PTT data, and heparin-induced thrombocytopenia (HIT) diagnostic testing were obtained. In addition, all PTT values and dose adjustments were recorded and analyzed. Adverse events were compiled as well as overall efficacy. Each patient's goal range as defined by the manufacturer (1.5–3 x patient's baseline) was compared with the facility therapeutic range (45–65 seconds).
RESULTS: Twelve patients received argatroban during this 8-month period. All patients had suspected HIT, with subsequent diagnostic testing performed. Only 17% of patients had confirmed HIT. Eighty-three percent of patients had

baseline PTTs drawn prior to initiation of argatroban (range 23.4–46.4 seconds, mean 30 seconds). The laboratory control PTT value was 24–33 seconds, with a mean of 28 seconds. The starting dose and ending argatroban dose for each patient was calculated. The average dose of all patients was 0.78 µg/kg/minute. Adverse reactions were infrequent. For all PTT values drawn for all patients, the time within the facility's therapeutic range was 59%. For all 12 patients, using the facility target range, the range of dosing was 0.86–2.8 x baseline. The majority of patients (80%) ended with a lower dose than the starting dose.
CONCLUSIONS: The manufacturer of argatroban recommends dosing patients to a goal PTT of 1.5–3 x patient's baseline (not to exceed 100 seconds or 10 µg/kg/min). At this facility, using a defined therapeutic range of 45–65 seconds lead to a lower dosing target of 0.86–2.8 x baseline. There did not appear to be any impact on efficacy, with 80% of patients exhibiting improvement of HIT/absence of new thrombus at completion of therapy.

129. Anticoagulation clinic workflow analysis. *Sara R. Vazquez, Pharm.D.*[1], Jennifer Campbell, Pharm.D., CDE[2], Gale Hamann, Pharm.D., CDE, BCPS[2], Christa George, Pharm.D., CDE, BCPS[2]; (1)University of Utah Hospitals and Clinics, Salt Lake City, UT; (2)The Regional Medical Center at Memphis, Memphis, TN.

PURPOSE: Data evaluating the workflow efficiency of anticoagulation clinics are limited. This study documented workflow efficiency parameters and subsequent interventions with the objective of streamlining patient appointments in an anticoagulation clinic treating primarily indigent patients.
METHODS: For 7 weeks, three pharmacist providers documented patient visit length and presence of predefined factors affecting visit length such as overbooking, decreased staffing, and physician availability. Also, types of problems addressed during the visit were classified as anticoagulation- or nonanticoagulation-related. Guided by results from the data analysis, changes were implemented in clinic workflow. Post-intervention data were collected for 7 weeks to assess the impact of these changes on clinic efficiency.
RESULTS: Interventions included implementing a signed patient-provider agreement, scheduling changes, and referrals to physicians for nonanticoagulation-related problems. The overall mean patient visit length was 96 ± 43 minutes post-intervention (n=246 patient visits), which was not significantly different when compared with pre-intervention (94 ± 46 minutes, n = 240 patient visits). However, significant improvements were made in the incidence of provider-specific factors affecting patient visit length such as overbooking ($p<0.0001$) and physician availability ($p=0.0047$). Issues unrelated to anticoagulation such as uncontrolled hypertension and insurance problems were addressed in 18.3% of visits pre-intervention and were not improved by the attempted interventions (25.6% post-intervention, $p=0.09$).
CONCLUSIONS: The data indicate that the most successful interventions to clinic workflow are those that target a specific problem, such as, in this study, overbooking and physician availability. The broader problem of addressing unrelated issues during anticoagulation clinic visits negatively affects the efficiency of the clinic. The pharmacist providers must often address the factors concerning the indigent patient population such as multiple medical and financial problems, transportation, and educational hardships. Regardless of the clinic setting and patient population, this evaluation can be used as a tool to assess and improve workflow efficiency.

130. Analysis of a multidisciplinary approach to pneumococcal vaccine screening and administration at a teaching hospital. *John C. Kuth, Pharm.D.*[1], Michael Basile, Pharm.D.Candidate[2], Daniel Dauner, Pharm.D., MSPH[1], Tad A. Gomez, R.Ph., M.S.[1], Dianne B. Williams, Pharm.D., BCPS[1]; (1)Medical College of Georgia Health System, Augusta, GA; (2)University of Georgia College of Pharmacy, Augusta, GA.

PURPOSE: The Joint Commission on Accreditation of Healthcare Organizations' PN-2 Core Measure focuses on reducing pneumococcal infections. This study analyzed the effectiveness of a newly implemented pneumococcal vaccine screening and administration process at the Medical College of Georgia Health System (MCG) that was initiated to meet this Core Measure.
METHODS: Inpatients ≥ 65 years old were identified through the hospital information system. Medical and pharmacy records were examined for use of a pneumococcal vaccine assessment and order form, ordering of the vaccine, and nursing documentation of administration of the vaccine. An audit by the MCG Quality Department from the second quarter of 2005 was used as a baseline reference. Four separate audits were conducted during the following time periods: audit 1 (February 2006); audit 2 (April 1, 2006, through May 19, 2006); audit 3 (August 17, 2006, through September 17, 2006); and audit 4 (October 17, 2006, through October 31, 2006.)
RESULTS: The baseline audit (n=56) showed 14% and 9% of indicated vaccines were prescribed and documented as being administered, respectively. Audit 1 (n=75) showed 60% and 52% of indicated vaccines were prescribed and documented as being administered, respectively. Audit 2 (n=189) showed 83% of indicated vaccines were documented as being administered. Audit 3 showed 23% (n=29) and 44% (n=55) of indicated vaccines were prescribed and documented as being administered, respectively. Audit 4 (n=34) showed 59% of indicated vaccines documented as being administered.
CONCLUSIONS: Implementation of the multidisciplinary program has increased the assessment and prescribing of pneumococcal vaccines for MCG inpatients ≥ 65 years old. This program has also greatly increased the documentation of vaccine administration. Future efforts will concentrate on physician education about this Core Measure, education of nursing staff on proper and complete administration documentation, and expansion of this program to other patients at risk of pneumococcal infections.

131. Application of failure mode effect and criticality analysis and its impact on surgical site infections. *Mark A. Newnham, Pharm.D., BCPS, BCNSP*, Diane Spicer, R.N., B.S., CIC; Lawnwood Regional Medical Center and Heart Institute, Fort Pierce, FL.

The hospital formed an interdisciplinary task force to decrease the occurrence rate of surgical site infections. The task force applied quality improvement methodologies, including a Failure Mode Effect and Criticality Analysis, to identify common failure modes and to prepare mitigation strategies. The task force determined that a cultural change was needed. Rather than administer the antibiotic on the floor on-call, the facility determined that the operating room staff in the holding and outpatient surgical areas would be responsible for documenting the antibiotic administration and justify that the timing was correct for the operating room schedule. The pharmacy service implemented automated dispensing technology and pre-manufactured antibiotic preparations to improve delivery of antibiotics to these preoperative areas. The Infection control nurse and a pharmacist audited the timing of pre-operative antibiotic doses and retrospectively reviewed all surgical site infections for antibiotic prescribing failure modes. Timing of antibiotic administrations meeting absolute criteria (< 120 minutes pre incision) improved from 71% to 96% during the measurement period while those meeting optimal timing criteria (< 30 minutes) increased from 7% to 83% over the same period. The number of antibiotic prescribing failure modes was reduced from 25 per year (2002) to 11 per year (2005). For 2002, 2003, 2004, and 2005 the hospital has reported 52, 44, 28, and 18 SSI reports respectively. Comparing 2002 to 2005, this result is a 46% reduction in actual SSI and reaches statistical significance ($p<0.001$). Controlling for clean and clean contaminated procedures, the reported infection rate (infections per 100 cases) was 1.23, 1.07, 0.68, and 0.43 respectively. This represents a 65% reduction in SSI per 100 cases from 2002 through 2005 ($p<0.001$). Improved antibiotic timing and selection, and reduced antibiotic prescribing failure-modes, have been associated with a statistically significant decrease in reported surgical site infections.

132E. Evaluation of empiric antibiotic use in the treatment of health care-associated pneumonia. Jennifer Le, Pharm.D., Ji Young Kim, Pharm.D., *Samantha Taing, Pharm.D.*, Carl Kildoo, Pharm.D.; Long Beach Memorial Medical Center, Long Beach, CA.

Presented at the Midyear Clinical Meeting of the American Society of Health-System Pharmacists, Anaheim, California, December 5, 2006.

133. A multidisciplinary approach in developing a policy for the proper handling of oral chemotherapy agents and pregnancy category X medications. Agnieszka Koniecka, Pharm.D.[1], *Antonia Alafris, B.S., Pharm.D., CGP*[1], Henry Cohen, M.S., Pharm.D., FCCM, BCPP, CGP[1], Jane Lederer, R.N., Ed.D.[2], Kurt Kodroff, M.D[2], Gemma Moore, R.N.[2], Mary Anne Rose, B.S.[2]; (1)Kingsbrook Jewish Medical Center, Arnold and Marie Schwartz College of Pharmacy and Health Sciences, Brooklyn, NY; (2)Kingsbrook Jewish Medical Center, Brooklyn, NY.

PURPOSE: To avoid potentially dangerous exposures to health care workers directly involved with handling oral chemotherapy and oral pregnancy category X medications, the departments of pharmacy, nursing, and risk management collaborated to develop a policy on the proper handling of these agents.
METHODS: A search using primary and secondary literature was conducted to identify pregnancy category X and oral chemotherapy agents. Then, the package inserts of all those agents identified were reviewed to confirm their pregnancy category and obtain manufacturer guidance on the proper handling of these medications. All information was communicated to the department of nursing to design a policy on the proper handling of these agents.
RESULTS: We identified 19 oral chemotherapy agents and 50 oral medications classified as pregnancy category X. From the oral chemotherapy agents, only 9 of 19 (47.4%) package inserts listed administration precautions. The manufacturers state that procedures for proper handling should be considered, and although guidelines have been published, there is no general agreement that all of the procedures recommended in the guidelines are necessary or appropriate. Only the package insert for hydroxyurea provides detailed instruction that includes the use of gloves and

mask. From the oral pregnancy category X medications, only 2 of 50 (4%) package inserts [finasteride, dutasteride] provided administration precautions or detailed recommendations to avoid handling capsules or crushed or broken tablets. In order to limit health care workers' exposure when handling these agents, the departments of pharmacy and nursing created a policy requiring the use of a facial mask and surgical gloves.
CONCLUSIONS: Regulatory guidelines for the proper handling of oral chemotherapy agents and pregnancy category X medications are nebulous and lacking. We suggest that all institutions create a hospital-wide policy that includes wearing a facial mask and surgical gloves when handling these agents.

134. Impact of a customized cPOE model for enoxaparin ordering in an urban medical center. *Alina Youssef, Pharm.D.*[1], Christopher McCoy, Pharm.D., BCPS[2], Margarita DiVall, Pharm.D., BCPS[3], Katherine Cunningham, Pharm.D., BCPS[2], David Feinbloom, MD[2], Kevin Afonso, BS[2]; (1)South Shore Hospital, South Weymouth, MA; (2)Beth Israel Deaconess Medical Center, Boston, MA; (3)Northeastern University School of Pharmacy, Boston, MA.

PURPOSE: Ordering of anticoagulants in computerized Provider Order Entry (cPOE) systems is often complicated by a wide range of indications, dosing protocols, drug interactions, and safety precautions. The purpose of this study is to assess the impact of a customized cPOE model on prescribing practices of enoxaparin and bleeding complications associated with the use of this anticoagulant.
METHODS: In phase I of this study, a prospective medication use evaluation (MUE) of the formulary low-molecular-weight heparin, enoxaparin, revealed inconsistent prescribing practices with regard to indications, dosing, and monitoring of anti-factor Xa levels in patients with obesity and/or renal impairment. In addition, bleeding complications were observed in renal patients who had been dosed inappropriately. As a result, a customized entry pathway in cPOE was created and implemented for enoxaparin in phase II of this study. The intent of the model was to incorporate patient weight, renal function, and indication for use to ensure appropriate dose and schedule of enoxaparin, as well as monitoring of anti-factor Xa levels in high-risk patients. In phase III, a retrospective medication use evaluation of enoxaparin was conducted using data generated from the customized cPOE model. Data collected were compared with original MUE data.
RESULTS: Patient demographics were similar in both groups. Percent of patients prescribed enoxaparin for off-label indications decreased in the post-cPOE model group. Percent of patients dosed appropriately increased in the post-cPOE group. Number of bleeding complications was similar in both groups; however, in the post-cPOE group, patients with renal insufficiency were not more likely to be dosed inappropriately or experience more bleeding complications.
CONCLUSIONS: A customized cPOE entry pathway helps facilitate appropriate dosing of enoxaparin in patients with renal impairment and/or obesity. A customized cPOE entry pathway may reduce off-label prescribing of enoxaparin.

135E. Enhancing diabetes patient safety with standardized sliding scale insulin. *Kerry Wilbur, BScPharm, ACPR, Pharm.D.*, Christine Yu, B.Sc.Pharm., ACPR; Vancouver General Hospital - CSU Pharmaceutical Sciences, Vancouver, BC, Canada.

Presented at at the BC Branch Residency Presentation Night of the Canadian Society of Hospital Pharmacy, Vancouver, BC, Canada, May 31, 2006.

137E. A nutrition support service Web application to manage parenteral nutrition patients. *Kim D. Hawksworth, R.Ph.*, Jennifer L. Hanje, Pharm.D, Brett A. Payne, R.D, L.D., Jay M. Mirtallo, M.S., R.Ph.; The Ohio State University Medical Center, Columbus, OH.

Presented at Nutrition Week 2007 of the American Society for Parenteral and Enteral Nutrition, Phoenix, AZ, January 28–31, 2007.

138. Evaluation of an ICU calcium replacement protocol. *Mary Beth Shirk, Pharm.D.*, Kevin Donahue, B.S., Kelly Reilly, B.S.; The Ohio State University Medical Center, Columbus, OH.

PURPOSE: The decision to treat hypocalcemia intravenously, especially asymptomatic, must consider risks, such as tissue injury and necrosis with extravasation and benefits. The objectives of this project were to compare the frequency of prn calcium (Ca) replacement pre and post protocol implementation and to evaluate protocol compliance and effectiveness.
METHODS: A Ca replacement protocol was developed based on published literature and local expert opinion and implemented in our 25 bed MICU. 4g Ca gluconate IVPB X1 and 950 mg Ca citrate q12 hours X 6 doses were given if an ionized Ca (iCa) was < 3.6 mmol/L. 30 pre (1/05 to 5/05) and 30 post (1/06 to 5/06) protocol patients were randomly selected to compare replacement frequency. Patients on dialysis or receiving Ca infusions were excluded. The effectiveness evaluation included all patients receiving protocol doses 1/06 to 5/06. Fishers exact test was used to compare patients receiving doses pre- and post-protocol implementation; otherwise, descriptive statistics were used.
RESULTS: In the pre-protocol group 18/30 patients (60%) received replacement; mean pre dose iCa, when available, was 4.15 ± 0.35 mmol/L. 3 different doses and 3 different Ca salts were given. In the post protocol group 1/30 patients (3.3%) received replacement ($p<0.0001$); predose iCa was 3.5 mmol/L. Compliance with the protocol was 97%. The only patient violating the protocol did not receive maintenance doses. Only three patients required replacement between 1/06 and 5/06. The Ca protocol was effective for 2/3 patients. The third patient received multiple blood transfusions and eventually required a continuous IV Ca infusion.
CONCLUSIONS: The implementation of a standard Ca replacement regimen in our ICU significantly decreased the number of replacement doses and patient exposure to a potentially toxic drug while simplifying replacement procedures. Based on our results, patients receiving multiple blood transfusions need to be replaced more aggressively than our current protocol.

139. Clinical pharmacy in Egypt. *Sherif Kamal, B.Sc.*, Sherif Aboulenaga, Professor of Pediatric Oncology, Patricia Pruden, Nurse, Consultant; Children's Cancer Hospital, Cairo, Egypt.

Most countries in the Middle East are struggling with providing chemotherapy medications and supportive treatment medications for their patients not only because of the lack of financial resources but also because of: 1) lack of drug procurement procedures that would ensure the best quality drug for the best price; 2) lack of preparation standards ensuring quality control, batching and saving drugs; and 3) lack of long-term inventory and financial planning for medications. Our team developed Oncology Clinical Pharmacy settings in more than 15 hospitals across Egypt. Our biggest project is developing the department of pharmaceutical services in the new Children's Cancer Hospital. We helped oncology centers across the country to allocate their resources and introduced a lot of concepts into their daily practice starting from safety reaching pharmaceutical care plan and Pharmacoeconomic studies. The aim of our presentation is to share with you our experience and the challenges of working in Egypt.

140. Successful treatment of invasive aspergillosis (IA) utilizing combination antifungal therapy (CAT) in a pediatric patient with hematologic malignancy (HM). *Jennifer L. Costello, Pharm.D.*, Monica Shah, Pharm.D., Stacey Rifkin-Zenenberg, M.D., Rafael Barilari, M.D.; Newark Beth Israel Medical Center, Newark, NJ.

PURPOSE: IA is often a devastating complication in immunocompromised patients. Despite availability of new antifungal agents, mortality rates remain high and little is known about appropriate antifungal regimens, especially in pediatric patients. We report a case in which salvage CAT resulted in complete resolution of IA in a pediatric patient with acute myelogenous leukemia (AML).
CASE DESCRIPTION: A 17-year-old male diagnosed with AML was admitted for consolidation chemotherapy, which included idarubicin, cytarabine, etoposide, thioguanine, daunomycin, and dexamethasone. The second chemotherapy cycle, consisting of the same regimen, was started 7 days later. On day 14 of consolidation, patient became febrile neutropenic and was started on vancomycin, cefepime, and fluconazole. Because patient remained febrile neutropenic despite antibacterial and fluconazole therapy, ambisome was started and fluconazole discontinued. Patient had multiple episodes of hematemesis, which prompted a Computed Tomography (CT) scan of chest to rule out fungal pneumonia. The CT scan showed multiple cavitary lesions bilaterally, most likely representing IA. Cytology from bronchial bushings revealed presence of fungal organisms suggestive of aspergillosis. Based on these findings the diagnosis of probable aspergillosis was made (per EORTC/MSG criteria). Ambisome therapy was discontinued, and CAT with IV voriconazole and caspofungin was initiated. The patient received CAT for more than 2 weeks and was discharged home on oral voriconazole. A repeat CT scan, which was obtained 3 months after initial positive CT, showed complete resolution of cavitary lesions. The patient was treated with voriconazole as an outpatient for a total of 9 months with no adverse events.
CONCLUSIONS: Combination antifungal therapy appears promising when used as salvage treatment for invasive aspergillosis in pediatric patients with AML.

141. Development and implementation of a pharmacist-managed clinical pharmacogenetics service. *Kristine R. Crews, Pharm.D.*, Richard E. Mullins, Ph.D., John McCormick, Pharm.D., Mary V. Relling, Pharm.D.; St. Jude Children's Research Hospital, Memphis, TN.

This abstract describes the rationale, development, and implementation of a

pharmacist-managed Clinical Pharmacogenetics service at St. Jude Children's Research Hospital. The goal of the service is to provide clinical pharmacogenetic testing for gene products important to the pharmacodynamics of medications for our patient population: children with catastrophic diseases. The service is an extension of the therapeutic drug monitoring (TDM) function of our clinical pharmacokinetics laboratory. Based on medication usage and evidence-based criteria, we chose to implement genotyping for 5 genes as clinical tests: thiopurine methyltransferase (*TPMT*), cytochrome P450 2D6 (*CYP2D6*), *CYP2C9*, *CYP2C19*, and uridine glucuronosyltransferase 1A1 (*UGT1A1*), all enzymes that metabolize medications relevant to our patient population. In Fall 2005 we conducted a series of educational seminars for our pharmacists to establish competencies in providing pharmacogenetic consults for these 5 polymorphic genes. We announced to the institution's clinical staff the availability of the pharmacogenetic tests, and the pharmacists' involvement in the ordering, interpretation, and reporting of results. Insurance reimbursement was established according to the American Medical Association's Current Procedural Terminology codes. Each test requires 2–10 mL of whole blood, which is sent to a third-party laboratory for genotyping. As for all TDM tests at St. Jude, test results are placed in the electronic medical record accompanied by a patient-specific clinical pharmacy consult. Each consult includes the genotype results, interpretation, and any recommendations for changes to drug therapy. In the first year of the service, 66 clinical pharmacogenetic tests have been performed, and the service has been well-received. In the era of personalized drug therapy, clinical pharmacogenetics services will assist in identifying the most effective and safest dose of a drug from the outset of therapy. Clinical pharmacists are well-positioned to run these services.

142. A multidisciplinary approach to maximize successful weaning of mechanically ventilated patients. *Steven B. Levy, Pharm.D., BCPS, CGP*[1], Carren Samuel, MPA, RRT[1], Wilfrid Herard, M.D.[1], Maria Arias, RNC, BSN[1], Henry Cohen, M.S., Pharm.D., FCCM, BCPP, CGP[2]; (1)Kingsbrook Jewish Medical Center, Brooklyn, NY; (2)Arnold & Marie Schwartz College of Pharmacy and Health Sciences, Brooklyn, NY.

PURPOSE: To determine how a hospital-wide, multidisciplinary approach to mechanical ventilation (MV) weaning would have an impact on the number of patients weaned off MV, the total number of ventilatory days, the number of tracheotomy procedures, and all-cause mortality.
METHODS: In January 2006, we implemented a hospital-wide, multidisciplinary approach for weaning patients from MV. The multidisciplinary MV weaning team (MVWT) meets weekly and consists of a pulmonologist, respiratory therapist, clinical nurse manager, and a clinical pharmacist. A cohorting system was designed for managing MV patients at two specific locations, the intensive care unit and a ventilatory support unit. Communication between the MVWT and clinicians providing daily care was optimized through co-joint weekly rounds and meticulous daily follow-up from the MVWT. Candidates for weaning were carefully selected and closely monitored. The most up-to-date, evidence-based guidelines for weaning and discontinuation of MV were implemented. Strategies included replacement of synchronized intermittent mandatory ventilation (SIMV) to continuous positive airway pressure (CPAP) with pressure support ventilation (PSV) and/or daily spontaneous breathing (SB) trials using multiple SB trials through a t-piece. All eligible patients received deep vein thrombosis and stress ulcer prophylaxis. We ensured head elevation to prevent pneumonia, daily sedation holidays, and daily attempts at ventilator weaning. We compared 5-month outcomes data prior to and after implementing the MVWT (2005 vs. 2006).
RESULTS: After implementing the MVWT, 44 more patients were weaned from MV (p=0.035), there were 1,064 less ventilatory days (p=0.004), the number of tracheotomies decreased by 23 procedures (p>0.05), and all-cause mortality decreased by 6% (p>0.05).
CONCLUSIONS: Successful weaning from mechanical ventilation can be maximized by implementing a proactive multidisciplinary team approach using CPAP with PSV and/or daily and multiple SB trials as opposed to SIMV, and managing ventilator bundles for preventing common comorbid sequelae.

143. A model to predict overall satisfaction of clinical research volunteers: a pilot study. Jacqueline S. Marinac, Pharm.D.[1], *Julie Wright, Pharm.D.*[2], Karen B. Williams, Ph.D.[2]; (1)Kansas City University of Medicine and Biosciences, Kansas City, MO; (2)University of Missouri at Kansas City, Kansas City, MO.

PURPOSE: Being able to meet clinical trial volunteer recruitment and retention goals is difficult. Little is known about what motivates adults to volunteer and how they view the experience at the trials' end. The purpose is to identify factors predictive of participant satisfaction with clinical research using a 5-point Likert scale questionnaire.
METHODS: The 70-item telephone survey used a Likert scale to assess the eight domains: attitude toward research; knowledge of study methods; informed consent; perceived benefits and risks; volunteerism; locus of health control; community support; religiosity; and, overall satisfaction with the study. Forty-four adults who participated in Phase II-III industry-sponsored chronic disease clinical trials were recruited. Scale reliability was evaluated by calculating the coefficient alpha for each subscale performing item analysis to eliminate items that did not contribute meaningfully to the subscale. Linear regression was subsequently used to model the satisfaction domain as a function of other domains.
RESULTS: Coefficient for seven of the retained eight subscales ranged from 0.65 to 0.95. The resulting 38 survey items were found to be psychometrically important. Results of linear regression showed that three domains, informed consent, community support, and volunteerism (consisting of 8 items), were significant predictors of satisfaction (2 items) (r^2=0.78, p<0.0001).
CONCLUSIONS: In this pilot project, informed consent, community values and norms, and volunteerism were predictive of subject satisfaction. Validation using both a 40-item and 10-item survey is currently under way in a larger prospective trial. The goal of the work is to create a validated 3–5-item screening tool to be used by research personnel, to predict the volunteer's satisfaction with research at the time of study enrollment.

RESIDENTS AND FELLOWS RESEARCH IN PROGRESS

144. Propofol-induced torsades de pointes: a case report. *Cindy Chen, Pharm.D.*, Bishoy Luka, Pharm.D., Henry Cohen, Pharm.D., Rajat Muckherji, M.D.; Kingsbrook Jewish Medical Center, Brooklyn, NY.

145. Irreversible tenofovir-induced fanconi syndrome. *Margarita Gambetta, Pharm.D.*, Catherine Millares, Pharm.D., Bishoy Luka, Pharm.D., Henry Cohen, Pharm.D., Sonia Borra, M.D., Constantine Badea, M.D.; Kingsbrook Jewish Medical Center, Brooklyn, NY.

146. Evaluation of vitamin K use and impact on patient care. *L. Kathleen Hamby, Pharm.D*, Anne B. Reaves, Pharm.D, Carrie S. Oliphant, Pharm.D, BCPS, Frances Greene-Tate, Pharm.D; Methodist University Hospital, Memphis, TN.

147. Medication-related QTc prolongation in an academic medical center. *Angela R. Wills, Pharm.D.*, David J. Ritchie, Pharm.D., James M. Hollands, Pharm.D., Scott T. Micek, Pharm.D.; Barnes Jewish Hospital, Saint Louis, MO.

148. Assessment of venous thromboembolism prophylaxis utilization and adherence in an acedemic medical center. *Angela R. Wills, Pharm.D.*, Eli N. Deal, Pharm.D., James M. Hollands, Pharm.D., Scott T. Micek, Pharm.D.; Barnes Jewish Hospital, Saint Louis, MO.

149. An observational assessment of the effect of propofol on the incidence of adverse cardiovascular events as compared to benzodiazepines. *Jessica L. Chang, Pharm.D.*, Keri Roberts, Pharm.D., Toby Trujillo, Pharm.D., BCPS; Boston Medical Center, Boston, MA.

150. Evaluation of serum biomarkers during ultrafiltration for acute decompensated heart failure. *Patricia Schuler, Pharm.D.*, Kerry Pickworth, Pharm.D., Todd Yamokoski, M.S., R.N., CNS, Sondra Sierawski, R.Ph., MBA; The Ohio State University Medical Center, Columbus, OH.

151. Evaluation of angiotensin converting enzyme-inhibitors' effect on cardiovascular risk reduction in post-myocardial infarction patients with normal versus elevated cholesterol. *Sarah A. Saft, Pharm.D.*[1], Sarah T. Nordmeyer, Pharm.D.[2], Julie M. Koehler, Pharm.D.[1], Whitney M. Daniel, Pharm.D. Candidate[2]; (1)Clarian Health Partners, Indianapolis, IN; (2)Butler University, Indianapolis, IN.

152. Effect of inappropriate empiric antibiotic therapy on patient morbidity in the treatment of critically ill patients with pneumonia or bacteremia. *Jaclyn M. Sauve, Pharm.D.*, Scott D. Hanes, Pharm.D., Daniel R. Touchette, Pharm.D., M.A.; University of Illinois at Chicago, Chicago, IL.

153. Evaluation of glycemic control following discontinuation of an intensive insulin protocol. *Quinn A. Czosnowski, Pharm.D.*, Bob Lobo, Pharm.D., BCPS, Joyce Broyles, Pharm.D., BCNSP, Paul Deaton, M.D., Chris Finch, Pharm.D., BCPS; Methodist Healthcare, Memphis, TN.

154. Treatment of heparin-induced thrombocytopenia: adherence to ACCP guidelines. *Amanda M. Howard-Thompson, Pharm., D.*, Christopher K Finch, Pharm D., BCPS, Timothy H Self, Pharm D., BCPS, Frank White, M.D., Bob L

Lobo, Pharm D, BCPS; Methodist University Hospital and University of Tennessee, Memphis, TN.

155. A retrospective study of the lipid-lowering efficacy and safety of switching within non-nucleoside reverse transcriptase inhibitors in HIV-infected patients. *Amy Bain, Pharm.D.*[1], Kenna Payne, Pharm.D.[1], Anita P. Rahman, Pharm.D.[1], Roger Bedimo, M.D., M.S.[2], Anthony J. Busti, Pharm.D., BCPS[1]; (1)Texas Tech University Health Sciences Center, Dallas VA Medical Center, 4500 South Lancaster Rd, Dallas, TX; (2)The University of Texas Southwestern Medical Center, Dallas, Texas and the Dallas Veterans Affairs Medical Center, Dallas, Texas, Dallas, TX.

156. A retrospective study of the lipid lowering efficacy and safety of ezetimibe added to HMG-CoA reductase therapy in HIV-infected patients with hyperlipidemia. *Lisa M. Chastain, Pharm.D.*[1], Amy Bain, Pharm.D.[1], Krystal L. Edwards, Pharm.D., BCPS[1], Roger Bedimo, M.D., M.S.[2], Anthony J. Busti, Pharm.D., BCPS[1]; (1)Texas Tech University Health Sciences Center School of Pharmacy Dallas/Fort Worth Regional Campus, Dallas, TX; (2)The University of Texas Southwestern Medical Center, Dallas, Texas and the Dallas Veterans Affairs Medical Center, Dallas, TX.

157. Impact of a hospital-acquired/ventilator-associated/healthcare-associated pneumonia practice guideline on outcomes in surgical trauma patients. *Brian P. Anger, Pharm.D.*, Cathy L. Worrall, Pharm.D., BCPS, BCNSP, FAPhA; Medical University of South Carolina, Charleston, SC.

158. Evaluation of ciprofloxacin-resistance among *Escherichia coli* urinary isolates. *Karri Bauer, Pharm.D.*, Debra Goff, Pharm.D., FCCP; The Ohio State University Medical Center, Columbus, OH.

159. Antibiotic utilization in children diagnosed with acute otitis media. *Michelle L. Mayne, Pharm.D.*[1], Christopher T. Owens, Pharm.D.[2], Tracy K. Pettinger, Pharm.D.[2], Brooke Pugmire, Pharm.D.[3], Camille M. Nulph, Pharm.D.[4], Rex W. Force, Pharm.D., FCCP, BCPS[1]; (1)Departments of Family Medicine and Pharmacy Practice and Administration Sciences College of Pharmacy, Idaho State University, Pocatello, ID; (2)Idaho State University College of Pharmacy, Pocatello, ID; (3)Departments of Family Medicine and Pharmacy Practice, Idaho State University, Pocatello, ID; (4)Departments of Family Medicine and Pharmacy Practice and Administrative Sciences College of Pharmacy, Idaho State University, Pocatello, ID.

160. Assessment of safety with abbreviated, weight-based bevacizumab infusions. *Jim W. Hart, Pharm.D.*, Jose R. Murillo, Jr., B.S., Pharm.D., Michael S. Oholendt, Pharm.D., BCOP, H. Alejandro Preti, M.D., P.A.; The Methodist Hospital, Houston, TX.

161. Predictive factors for ifosfamide-induced neurotoxicity in soft tissue sarcoma: a case-control study. *Karen I. Sweiss, Pharm.D.*, Rakesh Beri, Pharm.D., BCOP, Stacy Shord, Pharm.D., BCOP; University of Illinois at Chicago College of Pharmacy, Chicago, IL.

162. Evaluation of hypertension induced by bevacizumab in oncology patients. *Patricia A. Rayner, Pharm.D.*, Chin Y. Liu, Pharm.D., BCOP; Karmanos Cancer Center, Detroit, MI.

163. Erythropoietin for anemia of prematurity and the risk of severe retinopathy of prematurity in extremely low birth weight infants. *Jacqueline K. Schneider, Pharm.D.*, Debra K. Gardner, Pharm.D., Leandro Cordero, M.D.; The Ohio State University Medical Center, Columbus, OH.

164. Vancomycin dosing in the pediatric population aimed at achieving trough concentrations of 10–20 µg/ml. *Rachel B. Sykes, Pharm.D.*, Elizabeth A. Farrington, Pharm.D., FCCP, BCPS; University of North Carolina Hospitals, Chapel Hill, NC.

165. Off-label use of a long-acting inhaled corticosteroid/β_2-agonist combination in a Medicaid population. *Camille M. Nulph, Pharm.D.*[1], Brooke Pugmire, Pharm.D.[2], Michelle L. Mayne, Pharm.D.[1], Christopher T. Owens, Pharm.D., BCPS[3], Rex W. Force, Pharm.D., FCCP, BCPS[1]; (1)Departments of Family Medicine and Pharmacy Practice and Administrative Sciences College of Pharmacy, Idaho State University, Pocatello, ID; (2)Departments of Family Medicine and Pharmacy Practice, Idaho State University, Pocatello, ID; (3)Idaho State University College of Pharmacy, Pocatello, ID.

206. Drug use evaluation: evaluating the use of amlodipine for the treatment of hypertension at two outpatient indigent-care clinics. *Rebecca C. Boustani, Pharm.D.*, Kira R. Brice, Pharm.D.candidate, Alissa M. Smith, Pharm.D., Eric F. Schneider, Pharm.D., Stacy L. Martin, Pharm.D.; Carolinas Healthcare System, Charlotte, NC.

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166. Effects of amiodarone on argatroban dosing. *Diana Wells, Pharm.D., candidate*[1], Kevin Flynn, Pharm.D., candidate[2], Robert L. Page III, Pharm.D., BCPS[2], Anne P. Spencer, Pharm.D., BCPS[3]; (1)Medical University of South Carolina, Charleston, SC; (2)University of Colorado School of Pharmacy, Denver, CO; (3)South Carolina College of Pharmacy, Medical University of South Carolina campus, Charleston, SC.

167. A probable decrease in INR with concomitant warfarin and isoniazid therapy. *Gabrielle Schicchi, Pharm.D., Candidate*, Roda Plakogiannis, B.S., Pharm.D., BCPS; Arnold & Marie Schwartz College of Pharmacy, Brooklyn, NY.

168. Retrospective analysis of the interaction of warfarin and macrolide antibiotics. *Misty N. Jones, B.S., Pharm.D., candidate*[1], Karissa Y. Kim, Pharm.D.[2]; (1)University of Cincinnati College of Pharmacy, Augusta, KY; (2)University of Cincinnati College of Pharmacy, Cincinnati, OH.

169. A retrospective study of adverse drug reaction causality determination using electronic vs. hardcopy medical records. *Obed M. Nyarenchi, Pharm.D., Student*; Texas Southern University College of Pharmacy and Health Sciences, Pearland, TX.

170. Retrospective analysis of the interaction between warfarin and ciprofloxacin, levofloxacin, and moxifloxacin. *Shannon J. Benner-Davis, M.S., B.S.*, Karissa Y. Kim, Pharm.D., CACP; University of Cincinnati College of Pharmacy, Cincinnati, OH.

171. Prescribing practices for maintaining bone health in patients on long-term antiepileptic medications. *Jennifer L. Tan, Pharm.D., candidate*, Jennifer Lee, Pharm.D., Devra K. Dang, Pharm.D.; University of Connecticut, Storrs, CT.

172. Patient satisfaction at a pharmacist-managed anticoagulation clinic compared with physician-managed anticoagulation care. *Stephanie Baringhaus, Pharm.D.Candidate*[1], Kristyn Laban, Pharm.D.Candidate[1], Candice L. Garwood, Pharm.D.[1], Peter Dumo, Pharm.D.[2]; (1)Wayne State University, Detroit, MI; (2)Harper University Hospital, Detroit, MI.

173. Pharmacists' perceived knowledge and level of comfort with selected pediatric issues. *Stephanie Baringhaus, Pharm.D.Candidate*[1], Paul J. Munzenberger, M.S., Pharm.D.[1], Victoria Tutag Lehr, Pharm.D.[1], Ronald Thomas, Ph.D.[2]; (1)Eugene Applebaum College of Pharmacy and Health Sciences, Wayne State University, Detroit, MI; (2)Department of Pediatrics, Children's Hospital of Michigan, Detroit, MI.

174. A retrospective analysis of the safety of aprotinin use in patients undergoing coronary artery bypass grafting surgery. *Charles P. Lawrence, Pharm.D., Candidate*, Jessica Starr, Pharm.D., BCPS; Auburn University, Birmingham, AL.

175. An evaluation of the effects of over-the-counter triglyercide-lowering agents on LDL concentration, particle size, and particle number. *Dawn Harris, Pharm.D., candidate*, Kristal Williams, Pharm.D.; Butler University College of Pharmacy and Health Sciences, 1520 N Senate Ave, Indianapolis, IN.

176. Patient outcomes associated with adherence to national clinical performance measures for hospitalized patients with acute myocardial infarction. *Glenn F. Woning II, Pharm.D., Candidate*, Jason M. Cota, Pharm.D., BCPS, Monica L. Miller, Pharm.D., Christopher R. Frei, Pharm.D., M.Sc., BCPS, Robert L. Talbert, Pharm.D., FCCP, BCPS; The University of Texas at Austin College of Pharmacy and The University of Texas Health Science Center at San Antonio, San Antonio, TX.

177. The pharmacist shortage in California: the aggregate demand index by county. Crystal J. Canlas, B.S., *Charlene K. Chiu, B.S.*, Ani Deukmedjian, B.S., James Dinh, B.S., Sandeep Kaur, B.S., Daria Kusior, B.S., Kelly D. Le, B.S., Vinhkhoa Nguyen, B.S., Joshua Speck, B.S., Laura Valencia, B.S.; Touro University - College of Pharmacy, Mare Island, CA.

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179. Thiazolidinedione durability in the treatment of type 2 diabetes mellitus. *Andrea Searle, Student*[1], Michael P. Kane, Pharm.D.[1], Robert S. Busch, M.D.[2], Gary Bakst, M.D.[2], Robert A. Hamilton, Pharm.D.[1], Jeffrey Stroup, Pharm.D.[3]; (1)Albany College of Pharmacy, Albany, NY; (2)The Endocrine Group, Albany, NY; (3)University of Oklahoma College of Pharmacy, Tulsa, OK.

180. Evaluation of adherence rates to American Diabetes Association (ADA) treatment guidelines for use of angiotensin converting enzyme inhibitors or angiotensin receptor blockers in patients with type-1 diabetes and microalbuminuria or macroalbuminuria. *Kimberly J. Seidman, M.S.*, Kathy E. Fit, Pharm.D.; Midwestern University - Chicago College of Pharmacy, Downers Grove, IL.

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183. Influences of International Normalized Ratio fluctuation in African Americans taking warfarin. *Jonathan L. Aston, B.S.*[1], Kathryn M. Momary, Pharm.D.[2], Nancy L. Shapiro, Pharm.D.[2], Larisa H. Cavallari, Pharm.D.[2]; (1)University of Illinois at Chicago College of Pharmacy, Oak Park, IL; (2)University of Illinois at Chicago College of Pharmacy, Chicago, IL.

184. Multivariate analysis of factors influencing the pharmacokinetics of nevirapine in HIV-1 infected children receiving highly active anti-retroviral therapy. *Elizabeth M. Sarles, BS*[1], Akihiko Saitoh, M.D.[1], Francesca Aweeka, Pharm.D.[2], Andrea Kovacs, M.D.[3], Sandra Burchett, M.S., M.D.[4], Andrew Wiznia, M.D.[5], Sharon Nachman, M.D.[6], Terence Fenton, Ed.D.[7], Stephen A. Spector, M.D.[1], Edmund Caparelli, Pharm.D.[1]; (1)University of California San Diego, La Jolla, CA; (2)University of California San Francisco, San Francisco, CA; (3)University of Southern California, Los Angeles, CA; (4)Harvard Medical School, Boston, MA; (5)Jacobi Medical Center, Bronx, NY; (6)State University of New York at Stony Brook Health Science Center, Stony Brook, NY; (7)Harvard School of Public Health, Boston, MA.

185. Pharmacokinetic evaluation of weight-band dosing strategy for lopinavir/ritonavir in a simulated pediatric HIV population. *Ivy J. Beck, B.S.*[1], Edmund Capparelli, Pharm.D.[2], Mark W. Kline, M.D.[3], Elaine J. Abrams, M.D.[4]; (1)Skaggs School of Pharmacy and Pharmaceutical Sciences, University of California, San Diego, La Jolla, CA; (2)Pediatric Pharmacology Research Unit, University of California at San Diego, La Jolla, CA; (3)Baylor College of Medicine, Houston, TX; (4)Columbia Univeristy, New York, NY.

186. The impact of levofloxacin exposure on the likelihood of resistance emergence in *Pseudomonas aeruginosa*. *Amy N. Schilling, B.S.*, Kai-Tai Chang, Ph.D., Vincent Tam, Pharm.D.; University of Houston College of Pharmacy, Houston, TX.

187. Antimicrobial use among hospitalized patients: a pilot pharmaco-epidemiologic study. *Christine U. Oramasionwu, Pharm.D., Candidate*, Christopher R. Frei, Pharm.D., M.Sc., BCPS; The University of Texas at Austin College of Pharmacy and The University of Texas Health Science Center at San Antonio, San Antonio, TX.

188. Relationship between clarithromycin minimum inhibitory concentration and survival in a pneumococcal murine lung infection model. *Stephanie A. Knechtel, Pharm.D., Candidate*[1], Michael E. Klepser, Pharm.D.[1], Erika J. Ernst, Pharm.D.[2], Douglas Keele, D.O.[2], Ellen Roling, D.O.[2], Loai Sa'adah, M.S.[2], Gary V. Doern, M.D.[3]; (1)Ferris State University, Kalamazoo, MI; (2)Universiy of Iowa, Iowa City, IA; (3)University of Iowa, Iowa City, IA.

189. Evaluate the prevalence of heteroresistance in community-associated methicillin-resistant *Staphylococcus aureus* isolates in an era of increased virulence and treatment failure. *Sonya Chhatwal, Pharm.D.Candidate*, Vanthida Huang, Pharm.D.; Mercer University College of Pharmacy and Health Sciences, Department of Clinical and Administrative Sciences, Atlanta, GA.

190. Influence of anti-emetic guidelines on anti-emetic prescribing for chemotherapy patients in a community hospital. *Jimmy Emmanuel, B.S., Pharmacy*[1], Kathy Fuller, Pharm.D.[2], Adel Eltantawy, Pharm.D.[1]; (1)Memorial Hospital West, Pembroke Pines, FL; (2)Nova Southeastern University, College of Pharmacy, Ft. Lauderdale, FL.

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192. Developing a protocol for the initial evaluation of HIV/AIDS medication therapy management service pilot program in California. *Ashley Rosenquist, Pharm.D., Candidate*, Jan D. Hirsch, Ph.D..; University of California, San Diego Skaggs School of Pharmacy and Pharmaceutical Sciences, San Diego, CA.

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194. Pharmacoeconomic impact of ropivacaine and fentanyl epidurals. *Brandon Deterding, Pharm.D., candidate*[1], Vijaya L. Duggirala, M.D.[2], John D. Bridges, D.Ph.[2], Cindy Nettle, Pharm.D.[2]; (1)University of Mississippi, Oxford, MS; (2)Baptist Memorial Hospital for Women, Memphis, TN.

195. Serotonin-norepinephrine reuptake inhibitor utilization for non-depression indications. *Jesse Owen, Pharm.D., Candidate*, Christopher T. Owens, Pharm.D., BCPS, Brooke Pugmire, Pharm.D.; Idaho State University College of Pharmacy, Pocatello, ID.

196. Utilization of migraine prophylaxis in a Medicaid population. *Kimball Owens, Pharm.D., Candidate*, Christopher T. Owens, Pharm.D., BCPS, Brooke Pugmire, Pharm.D.; Idaho State University College of Pharmacy, Pocatello, ID

197. Cost-analysis of anti-epileptic drugs (AED): Impact of addition of pregabalin to a Medicaid preferred drug list (PDL). *Michael E. Bolin, M.S.*; Florida A&M University, Tallahassee, FL.

198. Analysis of cardiovascular events among patients with diabetes: Implications of removing atorvastatin from the Florida Medicaid preferred drug list (PDL). *Michael E. Bolin, M.S.*; Florida A&M University, Tallahassee, FL.

199. Changes in utilization patterns for lipid lowering agents following removal of atorvastatin from a medicaid preferred drug list (PDL). *Michael E. Bolin, M.S.*; Florida A&M University, Tallahassee, FL.

200. Evaluation of intravenous immunoglobulin utilization in King Khalid University Hospital, Riyadh, Saudi Arabia. *Mohammed H. Abutaleb, M.Sc., Candidate*[1], Ahmed A. Albarraq, Pharm.D.[2], Abdullatif A. Al-Dhowailie, Ph.D..[1]; (1)King Saud University, College of pharmacy, Riyadh, Saudi Arabia; (2)King Saud University Hospital, Riyadh, Saudi Arabia.

201. The evaluation of prescribing patterns of mirtazapine for weight gain. *Carmela Avena, B.S.Pharmacy, Pharm.D.Candidate*, Lisa Charneski, Pharm.D., BCPS, Olga Hilas, Pharm.D., BCPS; St. John's University, Queens, NY.

202. An evaluation of benzodiazepine prescribing for the treatment of alcohol withdrawal. *Lena Kuruvilla, Pharm.D.Candidate*, Lisa Charneski, Pharm.D., BCPS, Olga Hilas, Pharm.D., BCPS; St. John's University, Queens, NY.

203. Herbal and dietary supplement use in older American women. *Linda L. Chang, Pharm.D., Candidate*[1], Claudine W. Shinoff, Ph.D.[2], Lily Lui, N/A[2], Francesmary Modugno, Ph.D., M.P.H.[3], Doug C Bauer, M.D.[2]; (1)University of

California, San Francisco, San Jose, CA; (2)San Francisco Coordinating Center, San Francisco, CA; (3)University of Pittsburgh Graduate School of Public Health, Pittsburgh, PA.

204. Thiopurine methyltransferase genotype predicts thiopurine metabolites in children with acute lymphoblastic leukemia. *Danielle M. Briones, Pharm, D., candidate*[1], John McCormick, Pharm.D.[2], Mary V. Relling, Pharm.D.[2], William E. Evans, Pharm.D.[2], Ching-Hon Pui, M.D.[2], Kristine R. Crews, Pharm.D.[2]; (1)University of Tennessee College of Pharmacy, Memphis, TN; (2)St. Jude Children's Research Hospital, Memphis, TN.

205. Comparison of ritonavir adherence in HIV-infected children as estimated by population pharmacokinetics and by a patient questionnaire. *Xiaoying Quan, Pharm.D., Candidate, 2009*[1], Jame R. Lane, Pharm.D.[2], Edmund Capparelli, Pharm.D.[3], Sandra Burchett, M.S., M.D.[4], Andrea Kovacs, M.D.[5], Vincent Carey, Ph.D.[6]; (1)University of California, San Diego, Skaggs School of Pharmacy and Pharmaceutical, La Jolla, CA; (2)UC San Diego Medical Center - Hillcrest, San Diego, CA; (3)University of Calfornia, San Diego, Skagg's School of Pharmacy & Pharmaceutical Sciences, La Jolla, CA; (4)Harvard Medical School, Boston, MA; (5)University of Southern California, Los Angeles, CA; (6)Harvard School of Public Health, Boston, MA.

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