ABSTRACTS

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Encore Presentations: Abstracts marked with an "E" are Encore Presentations. Encore Presentations undergo the same peer review process as do Original Presentations, but may have been presented elsewhere or published in abstract form only prior to the 2004 Annual Meeting. For Encore Presentations, the abstract title, authors, and original citation (if provided) are published in Pharmacotherapy. The full abstract will be published in the meeting program book.

ORIGINAL RESEARCH

These papers describe original research in therapeutics, pharmacokinetics, pharmacodynamics, pharmacoeconomics, pharmacoepidemiology, and pharmacogenomics.

ADR/Drug Interactions

1. A practical tool of predicting hepatotoxicity during anti-tuberculosis therapy. Fei-Yuen Hsiao, M.S.[1], Chun-Nin Lee, M.D.[2], Jen-Ai Lee, Ph.D.[3], *Hsiang-Yin Chen, M.S., Pharm.D.*[4]; (1)School of Pharmacy, Taipei Medical University; Institute of Public Health, National Yang-Ming University, Taipei, Taiwan; (2)Department of Internal Medicine, Taipei Medical University Affiliated Taipei Municipal Wan-Fang Hospital, Taipei, Taiwan; (3)School of Pharmacy, Taipei Medical University, Taipei, Taiwan; (4)Department of Pharmacy, Taipei Medical University Affiliated Taipei Municipal Wan-Fang Hospital, Taipei, Taiwan.

PURPOSE: Current recommended tuberculosis therapy had a high probability of hepatotoxicity risk but been lack of assessment tool before prescription. The study was designed to establish a practical tool of predicting hepatotoxicity during anti-tuberculosis therapy.
METHODS: Subjects were chosen from the Medication Management Computer System of Taipei Municipal Wan-Fang Hospital in Taiwan. Patients with tuberculosis diagnosis and anti-tuberculosis medications were included from July 2001 through July 2002. All subjects' data were retrospectively collected. This study consisted of two parts. In the first part, risk factors related to occurrence of hepatotoxicity were evaluated. In the second part of the study, a risk scale was constructed and validated to predict hepatotoxicity during anti-tuberculosis therapy.
RESULTS: A total of 245 patients were included and half of the patients (122, 49.8%) developed hepatotoxicity within six months after treatment. Occurrence of hepatotoxicity was associated with male, age over 35, other concomitant diseases, smoking, severe drinking, concurrent use of other hepatotoxic medications, multiple medication use, and abnormal baseline liver function test (AST,ALP). The Tuberculosis Therapy Hepatotoxicity Scale which consists of 9 risk factors including gender, age, concomitant disease, concurrent medication and baseline liver function is the best predictive scale after repeat validation. The average accuracy rate of the scale was 78.5% and 63.2% for hepatotoxicity group and all patients, respectively.
CONCLUSIONS: Clinicians could evaluate patients with potential to develop hepatotoxicity quickly and easier before prescribing anti-tuberculosis medications by using of the risk scale developed in present study.

2. A retrospective, comparative evaluation of dysglycemias in patients receiving fluoroquinolones. *John Mohr, Pharm.D.*[1], Peggy McKinnon, Pharm.D.[2], Patti Peymann, Pharm.D.[3], Irene Kenton, Pharm.D.[3], Edward Septimus, M.D.[3], Pablo Okhuysen, M.D.[1]; (1)The University of Texas Health Science Center at Houston, Houston, TX; (2)Barnes-Jewish Hospital, St. Louis, MO; (3)Memorial Hermann Healthcare System, Houston, TX.

PURPOSE: 1.) Compare rates of glucose abnormalities in patients receiving levofloxacin (L), gatifloxacin (G), ciprofloxacin (CP), and any fluoroquinolone (F) with ceftriaxone (CTX) (antibiotic not frequently associated with glucose intolerance) and 2.) Compare rate of glucose abnormalities between different F.
METHODS: A retrospective review of patients with a serum glucose level >200 or <50 mg/dl while receiving a F or CTX.
RESULTS: 17,108 patients were evaluated. Baseline characteristics in patients with glucose abnormalities while receiving G, L or CTX were similar. For all patients, the mean age, weight and estimated creatinine clearance was 67 ± 17 years, 79 ± 21 kg and 52 ± 32 ml/min, respectively. Dysglycemic rate relative to utilization was G: 76/7540 (1.01%), L: 11/1179 (0.93%), CTX: 14/7844 (0.18%), CP: 0/545 (0%) and any F: 87/9264 (0.94 %). There was a higher rate of dysglycemias in patients receiving any F than patients receiving CTX (RR=3.32, 95% CI= 2.31 to 4.78, p<0.05). Incidence of dysglycemias did not differ between G and L. (RR=1.07, 95% CI=0.62, 1.86, p=0.8). 9/101 (9%) experienced hypoglycemia and 92/101 (91%) hyperglycemia. In multivariate analysis, only concurrent sulfonylurea therapy was identified as a risk factor for hypoglycemia.
CONCLUSIONS: In a review of 17,000 patients, the prevalence of glucose abnormalities was greater in patients receiving L or G than patients receiving CTX. No patients receiving CP experienced glucose abnormalities. Among the F treated patients, there was not a difference in the incidence of glucose abnormalities between patients receiving L and G.

3. Efficacy, safety, and appropriateness of potassium replacement in adult inpatients. *Brian A. Hemstreet, Pharm.D., BCPS*, Marianne McCollum, R.Ph., Ph.D., BCPS; University of Colorado School of Pharmacy, Denver, CO.

PURPOSE: This retrospective descriptive study assessed potassium repletion in adult inpatients. Efficacy, safety, appropriateness of prescribing, and eligibility for oral therapy was evaluated.
METHODS: Adult inpatient medication profiles were randomly screened for use of potassium replacement products. Information regarding past medical history and laboratory aspects of each episode of potassium repletion was documented utilizing electronic laboratory and medical records. Eligibility for oral therapy was defined by the presence of at least one scheduled oral medication on the drug profile. Analysis using descriptive statistics was performed.
RESULTS: One-hundred-thirty-four episodes of potassium replacement in 92 patients were assessed. Mean admission and discharge potassium concentrations were 3.8 mmol/l and 4.0 mmol/l. Mean daily replacement dose was 36 mEq (range 10-80 mEq). Fifty-three percent of replacement episodes involved single doses of potassium. Intravenous (IV) potassium was utilized in 73% of replacement episodes (46% single doses, 54% within large volume IV fluids). Seventy-one percent of IV use was for normokalemia or mild cases of hypokalemia (3.1-3.4 mEq/l). Seventy-four percent of normokalemic or mild hypokalemic cases receiving IV potassium replacement were eligible for oral therapy. Fourteen patients received IV potassium without a documented baseline serum value. Normalization of potassium upon initial repeat lab assessment was 31%. Six cases of hyperkalemia were observed.
CONCLUSIONS: Intravenous potassium use predominated despite numerous cases of normokalemia or mild hypokalemia. Identification of patients not requiring replacement, or those eligible for oral therapy may lead to reductions in medication errors, adverse effects, and medication administration time by avoiding intravenous potassium-containing products.

4. Evaluation of hypotension and bradycardia in patients treated with dexmedetomidine for sedation in the intensive care unit and the operating room. *Joellen Stanley, BS, Pharm.D., Candidate*, Anthony Gerlach, Pharm.D., BCPS; The Ohio State University Medical Center, Columbus, OH.

PURPOSE: Dexmedetomidine (D) is a novel sedative approved for ICU sedation and is beneficial in reducing anesthetic and narcotic requirements during surgery. An evaluation was conducted to determine the incidence of hypotension and bradycardia with ICU versus perioperative use.
METHODS: Data were retrospectively collected in all patients receiving D in the ICU from July 2003 through June 2004 and 10% of patients receiving D perioperatively chosen by random number generation. Data collected included demographics, dosing, length of therapy and adverse effects. Hypotension was defined as systolic blood pressure < 90mmHg, and bradycardia was defined as heart rate < 60 beats per minute. Fisher's exact test and student t-test were used for statistical analysis.
RESULTS: 216 patients were identified, 37 patients were included for analysis (18 ICU, 19 OR). Adverse effects occurred more frequently with ICU versus OR use, 13 (72%) and 3 (16%), p=0.0008. In the ICU, hypotension, bradycardia or both developed in 6 (33%), 4 (22%) and 3 (16%), respectively. Bradycardia was the only adverse effect associated with OR use and occurred in 3 (16%).

	ICU n=18	OR n=19	p-value
Mean age (Years)	57.5	54	0.53
Male:Female	13:5	11:8	0.49
Loading Dose	3	13	0.0025
Mean Maximum dose (µg/kg/min)	0.46	0.4	0.46
Mean Length of infusion (Hours)	24.3	1.5	0.0007
Adverse effects	13	3	0.0008

CONCLUSIONS: Dexmedetomidine is used more frequently perioperatively than in the ICU, with significantly more loading doses and shorter infusion length. Conversely statistically more adverse effects occur with ICU use. Targets for improvement have been identified.

5. The impact of strong pharmacy leadership on inpatient medication error Web-based occurrence reports. Carol Hope, Pharm.D., MS[1], Andrew Brown, M.D., MPH[2], Jessica Bailey, PhD[2], *Lisa M. Murphey, Pharm.D., BCPS*[1], William Rudman, PhD[2]; (1)University of Mississippi School of Pharmacy, Jackson, M.S.; (2)University of Mississippi Medical Center, Jackson, M.S.

PURPOSE: This paper examines how significant changes in pharmacy leadership affected a web-based method of collecting medication error (ME) occurrence reports.
METHODS: A web-based, anonymous ME occurrence reporting system was used to collect data from a large, tertiary teaching hospital. In late 2003 the new proactive pharmacy manager changed the culture of the pharmacy toward patient safety and ME reporting. MEs from February through May 2003 (Feb-May, 2003) and February through May 2004 (Feb-May, 2004) were compared to remove seasonal changes and biases.
RESULTS: In Feb-May, 2003 and Feb-May, 2004 the total number of MEs reported were 359 MEs and 770 MEs, respectively. The majority of the errors were intercepted before they reached the patient with 191 ME (53.2%) for Feb-May, 2003 and 639 MEs (83.0%) for Feb-May, 2004. Actual temporary or permanent harm to the patient occurred in 38 patients (10.6%) in Feb-May, 2003 and 29 (3.8%) patients in Feb-May, 2004. In Feb-May, 2003 most of the errors (170) were discovered by the nurses while in Feb-May, 2004 most of the errors (625) were discovered by the pharmacists. In both years pharmacists made the greatest percentage of reported errors. The largest number of errors per 1000 patient-hospital days was 15.5 in March 2004.
CONCLUSIONS: Strong positive leadership can make a large difference in the voluntary reporting of medication errors in terms of total number of errors reported and who reports the errors. This study may be limited by variables besides the change in pharmacy leadership affecting the outcome.
Acknowledgements: We thank Mike Todaro, R.Ph., pharmacy manager, for his support.

Analgesia

6. Assessment of postoperative pain management in a private community hospital. *Carol Liotta-Bono, Pharm.D.*[1], Kathryn Bucci, Pharm.D.[2]; (1)St. Francis The Heart Hospital, Roslyn, NY; (2)Pfizer Inc., Southold, NY.

BACKGROUND: Effective postoperative pain management can result in earlier mobilization, shortened hospital stays, and reduced costs. However, pain still remains significantly undertreated despite the availability of effective analgesics.
PURPOSE: To evaluate the pain management of patients admitted for a variety of surgical procedures, specifically to include: orthopedic (knee/hip replacement), vascular (fem-pop bypass), CABG, and colorectal surgery.
METHODS: A chart review of 69 records randomly selected from of patients admitted for hip replacements, knee replacements, fem-pops bypass, amputation, colorectal surgery and CABG in a proportion that would represent the distribution of admissions in 2003. Data collection included admitting diagnosis, age, gender, past medical history (to include CAD, CHF, hypertension, s/p MI, CRI), documentation of pain scores, analgesic used during the hospital admission and upon discharge from the hospital.
RESULTS: 69 records were reviewed, average patient age was 69.6 (range 41-91); 46 (67%) men and 23 (33%) women; 58 (64%) with CAD, 45 (65%) with hypertension, and an average serum creatinine of 1.1mg/dl. Opiates in combination with acetaminophen or NSAIDs were used most frequently. Improvement in pain scores was documented in 51 (74%) of patients and of the 55 (80%) discharged on an analgesic, 40 (73%) were discharged on propoxyphene in combination with acetaminophen.
CONCLUSIONS: A hospital pain committee will use this information to develop and implement pain guidelines. Specifically targeted will be the limitations and concerns surrounding the use of propoxyphene/acetaminophen in the elderly.

Cardiovascular

7. An evaluation of adherence to treatment guidelines following acute myocardial infarction. *Kathleen E. Stapley, Pharm.D., Candidate*, Angela M. Plewa, Pharm.D., Candidate, Stephanie Schadd, Pharm.D., Candidate, Kirk Schubert, Pharm.D., Candidate, Elizabeth Ziccarelli, Pharm.D., Candidate, Amie D. McCord, Pharm.D., BCPS, CDE; Midwestern University Chicago College of Pharmacy, Downers Grove, IL.

PURPOSE: This study was performed to determine whether patients in a suburban HMO diagnosed with acute myocardial infarction (AMI) received quality care consistent with evidence-based medicine during hospitalization and at discharge.
METHODS: A retrospective chart review was conducted with 239 patients diagnosed with AMI between years 2002-2003. Data collection included diagnosis, discharge medications, contraindications to specific medications, smoking status assessment and other pertinent patient-specific information. Descriptive statistics were utilized to analyze overall trends in care.
RESULTS: After exclusions, 194 patients remained. Based on charted documentation, 85% of patients received aspirin, 82% received a beta-blocker, and 59% received an ACE-inhibitor. However, only 42% received all three medications at discharge. A higher percentage (46%) received a combination of two medications. Aspirin and a beta-blocker was the most common combination (31%). Smoking assessment by physicians was performed in 80% of patients. Out of the patients who were determined to be smokers, 82% were counseled to quit smoking.
CONCLUSION: Evidence-based medicine has shown that prophylactic use of aspirin, beta-blockers, and ACE-inhibitors are key components of secondary prevention. The investigation demonstrated that less than half of subjects received all three medications and smoking status was not assessed for all patients. The investigators found room for improvement in the prescribing patterns of physicians.

8. Apolipoprotein B/A ratio within the normal range is associated with elevated C-reactive protein in apparently healthy women. *Issam Zineh, Pharm.D.*[1], Christopher B. Arant, M,D,[2], Timothy R. Wessel, M.D.[2], Taimour Y. Langaee, Ph.D., M.S.P.H.[1], Gregory J. Welder, .[1], Richard S. Schofield, M.D.[2]; (1)Department of Pharmacy Practice, Cardiovascular Cytokine/Chemokine Core Laboratory, University of Florida College of Pharmacy, Gainesville, FL; (2)Division of Cardiovascular Medicine, University of Florida College of Medicine, Gainesville, FL.

PURPOSE: Coronary heart disease (CHD) events occur in many patients with normal cholesterol, and while young women tend to have more favorable lipid profiles than their male counterparts, CHD continues to be the leading cause of death for women in the United States. We investigated whether a high risk apoB/apoA phenotype exists in healthy women despite favorable cholesterol concentrations.
METHODS: Eleven healthy women with LDL<160 mg/dl and HDL>50 mg/dl and without known CHD were studied. Use of lipid-lowering or anti-inflammatory drugs was not allowed. In addition to fasting lipid profiles, high sensitivity C-reactive protein (CRP), apoB, apoA, and other biochemistry measurements were performed. Women were divided into two groups, those equal to or above the median and those below the median apoB/apoA ratio. CRP concentrations were compared between groups to determine whether inflammatory phenotype differed by apoB/apoA group.
RESULTS: Average age, total cholesterol, LDL, HDL, triglycerides, and apoB/apoA ratios were 29±11 years, 184±38 mg/dl, 93±32 mg/dl, 72±17 mg/dl, 99±51 mg/dl, and 0.53±0.19, respectively. The median apoB/apoA ratio was 0.48. The highest apoB/apoA ratio (0.94) was still within the normal range (0.29-1.3). Median CRP concentrations (range) in the low-normal and high-normal apoB/apoA ratio groups were 0.4 mg/L (0.2-1.4 mg/L) and 1.9 mg/L (0.2-4.6 mg/L), respectively (p=0.03). Furthermore, there was only one smoker (in the low-normal group), and the numbers of women on oral contraceptives or hormone replacement therapy were not different between apoB/apoA ratio groups.
CONCLUSIONS: Our population of apparently healthy, young women had favorable lipid profiles as indicated by low total cholesterol, LDL, and triglycerides, and high HDL. However, among these women, a specific apoB/apoA phenotype in the normal range was associated with 4.75-fold higher CRP concentrations. This phenotype might identify a group of young women at greater risk for CHD who may benefit from intensive monitoring or early pharmacotherapy.

9. Comparing resource use of patients with diastolic dysfunction to systolic dysfunction. Sandra L. Kane-Gill, Pharm.D, M.Sc., Melanie Shatzer, R.N., *Amy L. Seybert, Pharm.D.*, Jessica Spates, P.A., Melissa I. Saul, M.S., Levent Kirisci, Ph.D., Srinivas Murali, M.D.; Univeristy of Pittsburgh, Pittsburgh, PA.

PURPOSE: Since little information is known about the hospital resource use in different types of left sided heart failure (HF), we compared total hospital and departmental costs of HF patients with left ventricular diastolic dysfunction to those with systolic dysfunction.
METHODS: Adult patients with HF were identified retrospectively over 2 years in an electronic repository using DRG 127 and ICD-9 429. Patients admitted for implantation of cardiac defibrillator or pacemaker placement and cardiac surgery were excluded. Data obtained included demographics, de-identified admission and discharge information and ratio of cost to charge for hospital resources. Patients were categorized into left ventricular diastolic and systolic dysfunction if clearly delineated in the chart by the admitting physician. Comparisons were made using chi-square test, and t-test using log transformed data for costs.
RESULTS: There were 62 patients with diastolic dysfunction and 127 with systolic dysfunction.

	Diastolic	Systolic	P Value
Age (mean±SD), yrs	72±16	70±14	0.517
Gender	20% Male	66% Male	<0.001*
Length of stay (LOS), days	3.2±2.0	4.2±2.0	0.017*
Average Total Cost	$3878	$4613	0.090
Cost per Day	$1202	$1154	0.452
Echocardiogram (ECHO)**	$116	$97	0.019*
Emergency Department**	$357	$273	0.044*
Central Laboratory**	$307	$395	0.040*
Pharmacy Department**	$175	$236	0.111

*Statistically significant **Average costs are presented

CONCLUSIONS: 1) Total cost of a HF hospitalization trended higher for systolic dysfunction although this difference could be related to the increased length of stay. 2) Differences in costs were not contributed to the pharmacy department but instead ECHO testing, emergency department and central laboratory.

10. Cross-over comparison of amlodipine and valsartan using 24-hour ABPM in hypertensive African-Americans. *Stephanie Maciejewski, Pharm.D.*; Creighton Cardiac Center, Omaha, NE.

PURPOSE: RAAS inhibitors have been less effective than other antihypertensive agents in lowering BP in African American (AA) patients (pts). There is relatively little data concerning the efficacy of valsartan in the treatment of hypertension (HTN) in AA pts.
METHODS: AA with a history of uncomplicated HTN with a baseline BP >140/90 mmHg were randomized in double-blind fashion to amlodipine (A) or valsartan (V) for a period of 6 to 16 weeks depending on response. After baseline BP was re-established, pts were crossed-over. Doses were titrated based on clinic BP with a goal of <140/90 mmHg. Doses of A were 5 mg/d, 10 mg/d, and 10 mg/d plus HCTZ 12.5 mg/d. Doses of V were 80 mg/d, 160 mg/d, and 160 mg/d plus HCTZ 12.5 mg/d. At the optimal dose on each agent, pts underwent 24-hr ABPM.
RESULTS: Twenty pts (12 men, 8 women; mean age of 42+11 yrs) were randomized. BP prior to each ABPM was 155+12/100+8 mmHg. Final doses of A were 5 mg/d in 9 pts, 10 mg/d in 5 pts, and 10 mg/d plus HCTZ in 6 pts. Final doses of V were 80 mg/d in 9 pts, 160 mg/d in 4 pts, and 160 mg/d plus HCTZ in 7 pts. Based on clinic BP, success with A was 75% and 70% with V. Two pts on V and 1 pt on A failed to complete ABPM due to side effects. Four (20%) pts in each treatment group had drug-related side effects. ABPM results were not signigicantly different between A and V.
CONCLUSIONS: A and V produce similar reductions in BP in AA pts with uncomplicated HTN. Both clinic BP and ABPM data indicate that AA hypertensive pts respond similarly to to A and V.

11. Effect of nesiritide on renal function in patients with decompensated heart failure. *Judy W.M. Cheng, Pharm.D., BCPS, FCCP*[1], Man Yee Merl, Pharm.D., Candidate[2], Huan M. Nguyen, Pharm.D., Candidate[2]; (1)Long Island University, Mount Sinai Medical Center, New York, NY; (2)Long Island University, Brooklyn, NY.

PURPOSE: Earlier studies demonstrated nesiritide not only enhanced diuresis in heart failure, but also preserved renal function (RF). Conversely, diuretics may worsen RF. Recent meta-analysis demonstrated the contrary. These trials used serum creatinine to represent RF or only observed RF changes over short therapy duration (less than 24 hours). Belief of RF preservation was one reason leading to nesiritide overuse in our institution, reflected by a recent nesiritide utilization evaluation (NUE). This study examined whether nesiritide preserved RF in patients evaluated in this NUE.
METHODS: Nesiritide patient records from 10/1/03 to 3/31/04 were reviewed (n=162). Changes in calculated CrCl and number of patients demonstrating worsening RF (decreased in CrCl > 25%) during furosemide therapy before nesiritide initiation and during nesiritide therapy were compared using paired t-test/ Wilcoxon Signed-Ranks test (depends on data normality) and Chi-Square respectively.
RESULTS: On average, 293 mg of intravenous furosemide was used for diuresis before adding nesiritide. Average duration of nesiritide therapy was 6 days.

	% change in CrCl (Median)			# with > 25% reduction in CrCl		
CrCl (ml/min)	Nesiritide	Furosemide	P (Signed Ranks)	Nesiritide	Furosemide	P (X2)
Overall	0	-2.2	0.10	35	19	1
>70 (n=47)	-16.7	0	0.32	15	0	0.001
>50 and < 70 (n=25)	-8.3	-3.6	0.40	8	2	0.36
>30 and < 50 (n=50)	0	-14	0.012	7	10	0.04
<30 (n=40)	2.8	-10.5	0.033	5	7	0.008

CONCLUSIONS: Overall, nesiritide was not better in preserving RF than furosemide. However, in patients with CrCl < 50 ml/min, nesiritide may prevent further worsening of RF. Conversely, nesiritide may worsen CrCl in patients with CrCl > 70 ml/min, perhaps due to over-diuresis when used together with furosemide.

12. Efficacy and safety of statins in a veteran population seropositive for hepatitis C virus. *David Parra, Pharm.D., BCPS*[1], Marisel Segarra-Newnham, Pharm.D., M.P.H., BCPS[1], Ellen Martin-Cooper, Pharm.D.[2]; (1)Veterans Affairs Medical Center, West Palm Beach, FL; (2)Nova Southeastern University, Palm Beach Gardens, FL.

PURPOSE: Evaluate the efficacy and safety of statins in hepatitis C virus (HCV) seropositive patients.
METHODS: Retrospective chart review at a Veterans Affairs Medical Center from January 1, 1995 through September 11, 2003 of HCV seropositive patients who received a statin (n=371). Patients were excluded if baseline or follow-up lipid and liver panels were unavailable unless the statin was discontinued due to an adverse event prior to labs or baseline triglycerides were >400 mg/dl. Primary endpoints included changes in low-density lipoprotein (LDL) and liver transaminases. Secondary endpoint was the discontinuation rate due to alanine transaminase (ALT) elevations greater than 3 times the upper limit of normal (ULN).
RESULTS: 163 patients, all men, met inclusion criteria. Mean patient age was 57.4 ± 11.5 years and over 98% received therapy with simvastatin (median dose 20 mg) for an average of 2.3 years. Average LDL at baseline and most recent were 147 ± 43.4 mg/dL and 114 ± 37 mg/dL (p<0.01). Average ALT at baseline and most recent were 54.1 ± 38.1 U/L and 67.6 ± 138.7 U/L (p<0.01). Seven patients (4.3%) had elevations in ALT > 3 times ULN, prompting discontinuation of therapy in three patients (1.8%). However, two of the seven had baseline elevations in ALT > 3 times ULN.
CONCLUSIONS: In HCV seropositive men, simvastatin appears as efficacious as in other populations in reducing LDL, but with a higher incidence of ALT elevations > 3 times ULN than that reported in clinical trials (0.5-2%) which may require discontinuation of therapy.

13. Evaluation of lipid management in heart transplantation. *Stephanie B. Clayton, Pharm.D.*[1], Jean Nappi, Pharm.D., FCCP, BCPS[2], Naveen Pereira, M.D., FACC[2]; (1)John H. Stroger, Jr. Hospital of Cook County, Chicago, IL; (2)MUSC College of Pharmacy, Charleston, SC.

PURPOSE: Hyperlipidemia is a significant complication in heart transplantation contributing to the development of post-transplant accelerated coronary artery disease (CAD). In the absence of clear LDL targets for optimal outcomes in this population, we assessed the hypothesis that a specific LDL goal <100 mg/dL may be associated with a decrease in post-transplant morbidity and mortality.
METHODS: Ninety-eight heart transplant recipients were identified for review of demographic, laboratory, medication, adverse drug reaction (ADR), and clinical outcomes data. Correlations of LDL lowering to CAD progression, rejection, retransplantation, and death were assessed for statistical significance, as well as trends in medication choice or dosage.
RESULTS: Fifty-nine patients achieved LDL levels <100 mg/dL with an HMG-CoA reductase inhibitor dose of 32.4 (±23.1) mg (atorvastatin or equivalent), while those with LDL levels >100 mg/dL received 35.1 (±27.8) mg. Dosage increases in patients >100 mg/dL were limited by a higher number of ADRs or noncompliance (n=19; 49%) vs. those achieving target LDL (n=11; 19%). Clinical outcomes during a mean follow-up period of 4.6 (±1.9) years revealed 26 patients with CAD, 42 with rejection, 3 underwent retransplantation, and 5 died. The comparative differences among outcomes between patients achieving an LDL <100 vs. >100 mg/dL were not statistically significant.
CONCLUSIONS: National Cholesterol Education Panel guidelines for established CAD may not be applicable to heart transplant recipients and an attempt to achieve these goals may be associated with increased ADRs in this patient population.

14. Exploring the role of low-dose cyclosporine A in reducing homograft degeneration and its related complications in post-Ross procedure patients. Abdulrazaq S. Al-Jazairi, Pharm.D., *Delal A. Alkortas, B.Sc., Pharm*, Maie S. Al-Shahid, M.D., Ziad R. Bulbul, M.D., Sulaiman Al-Zubairy, B.Sc.. Pharm., Zuhair Al Halees, M.D.; King Faisal Specialist Hospital & Research Center, Riyadh, Saudi Arabia.

PURPOSE: The Ross procedure, use of native pulmonary valve in aortic position and a homograft in the pulmonary position, has proved to be effective for children with aortic valve disease. Homograft degeneration is a major cause of re-operation. Based on anecdotal data, cyclosporine (CsA) 1mg/kg/day was adapted for some of our patients. We aimed to assess CsA efficacy in post-Ross patients.
METHODS: This is a retrospective historical-controlled study. All children who underwent Ross procedure with at least 4-year echocardiography follow up, and received CsA were included and matched to an equal number of controls (based on date of surgery). All echocardiography films for all patients were reviewed by two blinded echocardiologists. All other data were collected through medical chart review. Study end-points included, homograft function (stenosis and/or regurgitation), readmissions, re-operations, death and safety outcomes.
RESULTS: A total of 10 patients were identified in each group. At the end of the follow up period (average 4.7 years for CsA group, and 3.9 years for controls), homograft malfunction presented in 6 [60%] vs. 5 [50%] patients in the CsA and control groups, respectively [NSS]. However, the rate of readmission due to graft malfunction was found to be one vs. six in the CsA and control groups, respectively, [p=0.096]. All admissions resulted in re-operations. No adverse events related to CsA use were reported.
CONCLUSION: Cyclosporine A may play a role in reducing readmission rate and re-operation in patients who undergo Ross procedure. Larger prospective, randomized, controlled trials are warranted to confirm these findings.

15. Fenofibrate impacts a greater number of cardiovascular risk factors compared to atorvastatin in treating mixed dyslipidemia among patients with metabolic syndrome or type 2 diabetes mellitus. *James M. Backes,*

Pharm.D., Jared S. Calish, Pharm.D., Cheryl A. Gibson, Ph.D., Janelle R. Ruisinger, Pharm.D., Eric T. Rush, B.S., Patrick M. Moriarty, M.D.; University of Kansas Lipid, Atherosclerosis, Metabolic and LDL-Apheresis Center, Kansas City, KS.

INTRODUCTION: Patients with Type 2 DM and the metabolic syndrome typically have a multitude of risk factors predisposing them to CHD. A major component of this risk is mixed dyslipidemia, while elevated fibrinogen has been shown to play a significant role as well. Recognition and aggressive treatment of these factors is essential to reduce vascular events in these high-risk and rapidly growing populations.
PURPOSE: To determine if fibrate or statin therapy is more effective at improving lipoprotein and fibrinogen levels among subjects with Type 2 DM or metabolic syndrome.
METHODS: In a double-blind design, subjects were randomized to fenofibrate 160mg daily or atorvastatin 20mg daily for 90 days. Lipid profiles and fibrinogen levels were drawn on days 0 and 90. All subjects were counseled on therapeutic lifestyle changes.
RESULTS:

	Factor	Day 0 (mg/dl)	Day 90 (mg/dl)	% Change	P Value
Fenofibrate N=18	TC	215±;30.2	180±;26.0	(-)16.5	<0.001
	Trigs	184±;70.4	108±;47.3	(-)40.9	<0.001
	HDL	39±;5.0	43±;8.0	(+)9.9	<0.005
	LDL	141±;30.6	128±;28.3	(-)8.9	0.109
	Fibrinogen	307±;39.7	261±;41.5	(-)14.9	<0.001
Atorvastatin N=18	TC	202±;51.3	149±;38.5	(-)27.6	<0.001
	Trigs	191±;137.5	163±;139.8	(-)14.6	0.251
	HDL	38±;6.9	40±;7.3	(+)4.2	<0.05
	LDL	132±;51.7	94.6±;37.6	(-)28.3	<0.001
	Fibrinogen	294±;47.5	298±;53.5	(+)1.3	0.951

CONCLUSIONS: Fenofibrate produced greater improvements in triglycerides, HDL and fibrinogen, while atorvastatin provided greater reductions in LDL. Although the alterations of these measures are substantial with the individual drugs, combination therapy using both agents may be necessary to achieve all lipoprotein goals and further reduce cardiovascular risk.

16. HMG-CoA reductase inhibition and gene expression in the pressure-overloaded rat heart. *Barry E. Bleske, Pharm., D.*[1], Georgina M. Cirrincione, BS[2], Hyun S. Hwang, Ph.D.[2], Marvin O. Boluyt, Ph.D.[2]; (1)University of Michigan, College of Pharmacy, Ann Arbor, MI; (2)University of Michigan, Division of Kinesiology, Ann Arbor, MI.

PURPOSE: HMG-CoA reductase inhibitors (statins) may further reduce cardiovascular risk by non-lipid effects, such as favorable ventricle remodeling. The purpose was to determine whether rosuvastatin (RSV), would inhibit the activation of the extracellular matrix genes in the left ventricle (LV) of the heart by acute pressure overload.
METHODS: 48 Sprague Dawley rats (300 g) were randomized to one of four treatment groups: sham-operation + vehicle (SH-V), aortic constriction + vehicle (AC-V), AC + RSV (2 mg/kg; AC-LO), AC + RSV (10 mg/kg; AC-HI). Rats were injected (IP) with either NaCl (V) or RSV once daily, beginning one day prior to surgery, and killed one or three days after AC or SH. Levels of transforming growth factor β1 (TGFβ1) and fibronectin (FN) mRNAs were measured in RNA isolated from the LV by Northern blotting.
RESULTS: AC induced a 25% increase in LV weight after 3 days; AC-LO and AC-HI-treated rats exhibited similar increases (all $p < 0.01$, AC-V vs. SH-V). Relative levels of TGFβ1 mRNA in the LV at one day post-operation were SH-V: 1.00 ± 0.15 (mean ± SE), AC-V: 1.70 ± 0.21, AC-LO 1.86 ± 0.29, and AC-HI: 2.20 ± 0.57 (all $p < 0.05$ vs. SH-V). Relative levels of FN mRNA in the LV at three days post-operation were sham 1.00±0.15 compared with AC-C: 7.33 ± 1.38, AC-LO: 6.85 ± 1.41, and AC-HI: 7.81 ± 1.49 (all $p < 0.05$ vs. SH-V). Thus, LV expression of TGFβ1 mRNA and FN mRNA was ~2-7 fold greater in hearts of AC-V compared to SH-V rats ($p < 0.05$) one-day and three-day post-operation, respectively, and was not significantly decreased by either dose of RSV.
CONCLUSION: Inhibition of HMG-CoA reductase does not attenuate the pronounced aortic constriction-induced increases in expression of the extracellular matrix genes that were measured in this model of ventricular remodeling in the rat.

17E. HMG-CoA reductase inhibition and markers of inflammation/ endothelial activation and endothelial function in non-diabetic patients with non-ischemic cardiomyopathy and average low density lipoproteins. *Barry E. Bleske, Pharm., D.*[1], Robert L. Bard, M.S.[1], John M. Nicklas, M.D.[2], Robert D. Brook, M.D.[1], Sanjay Rajagopalan, M.D.[1], Bertram Pitt, M.D.[1]; (1)University of Michigan, College of Pharmacy, Ann Arbor, MI; (2)The University of Michigan Health Care Systems, Ann Arbor, MI.

Presented at the Annual Conference of GTC Biotherapeutics, San Francisco, CA, January 27-28, 2005.

18. Impact of aprotinin on the incidence of postoperative atrial fibrillation. *Effie L. Gillespie, Pharm.D.*[1], Kristen A. Gryskiewicz, Pharm.D.[1], C. Michael White, Pharm.D.[1], Jeffrey Kluger, MD[2], Craig I. Coleman, Pharm.D.[1]; (1)University of Connecticut, Hartford, CT; (2)Hartford Hospital, Hartford, CT.

PURPOSE: During cardiothoracic surgery (CTS), inflammatory mediators are released. Post-CTS inflammation and pericarditis are risk factors for postoperative AF (POAF). Aprotinin, a serine protease inhibitor, has the potential to ameliorate the inflammatory response by regulating cytokine release and leukocyte activation. To date, no study has evaluated the efficacy of aprotinin alone for the reduction of POAF.
METHODS: A cohort study was undertaken to evaluate the impact of aprotinin on POAF. Patients receiving aprotinin were matched using nearest available Mahalanobis metric matching within calipers defined by the propensity score (1:1 matching) with patients not receiving aprotinin for age, valvular surgery, gender, beta-blocker intolerance, previous CTS, preoperative digoxin use and a history of atrial fibrillation (AF), renal failure, diabetes, heart failure, peripheral artery disease, angina and smoking. Secondary endpoints of perioperative transfusion use and the incidence of stroke, myocardial infarction (MI), renal failure, graft occlusion and mortality were also compared between groups.
RESULTS: A total of 438 patients (n=219 per group) were evaluated (68.4±12.0 years, 67% male, 74% valvular surgery). Utilization of aprotinin (275±124 mL) did not result in a significant reduction in POAF versus the non-aprotinin group (28% vs. 27%, p=0.92). In addition, secondary endpoints of perioperative transfusion use and the incidence of stroke, MI, renal failure, graft occlusion and mortality were not significantly impacted.
CONCLUSIONS: The utilization of aprotinin did not reduce hospital POAF incidence. It also did not appear to effect the utilization of transfusions or the incidence of stroke, MI, renal failure, graft occlusion or mortality.

19. Impact of intravenous magnesium on post-cardiothoracic surgery atrial fibrillation and length of hospital stay. *Nickole Henyan, Pharm.D.*[1], Effie L. Gillespie, Pharm.D.[1], C. Michael White, Pharm.D.[1], Jeffrey Kluger, MD[2], Craig I. Coleman, Pharm.D.[1]; (1)University of Connecticut, Hartford, CT; (2)Hartford Hospital, Hartford, CT.

PURPOSE: Postoperative atrial fibrillation (POAF) can occur in up to 65% of patients undergoing cardiothoracic surgery (CTS). While the majority of POAF is benign, it has been associated with a prolonged hospital length of stay (LOS), and consequently, increases in total hospital costs. Magnesium prophylaxis against POAF has been evaluated in several clinical trials; however, these trials were of small size and therefore conveyed mixed or inconclusive results. In an attempt to better understand magnesium's role in this setting, we conducted a meta-analysis of the literature to date.
METHODS: A systematic literature search was conducted through August 2004 to identify trials of prophylactic magnesium in the setting of CTS. The primary outcome measure was the incidence of POAF. LOS was also evaluated. Studies included in this meta-analysis met the following requirements: (1) randomized controlled trials versus placebo or routine treatment, (2) prevention of POAF following coronary artery bypass graft (CABG) and/or valvular surgery, (3) well described protocol, and (4) sufficient data on treatment efficacy.
RESULTS: Thirteen randomized trials of magnesium were identified. Upon meta-analysis, magnesium was found to prevent POAF with the following odds ratio (OR), 0.65 (95% CI 0.46 to 0.91). The impact of prophylactic magnesium on LOS (n = 6 studies) was -0.35 days (95% CI -0.62 to -0.09).
CONCLUSIONS: Prophylactic magnesium reduced patients' risk of POAF and hospital LOS in the setting of CTS.

20. In-home pharmaceutical care for patients with heart failure. *Darren M. Triller, Pharm.D.*, Robert A Hamilton, Pharm.D.; Albany College of Pharmacy, Albany, NY.

PURPOSE: Heart failure (HF) is the most common hospital diagnosis, and appropriate drug therapy and pharmaceutical care (PC) services have been shown to improve outcomes. Likewise, drug-related problems (DRPs) contribute to morbidity and mortality, particularly after hospital discharge. To measure the impact of in-home PC delivery on heart failure patients post-hospital discharge, a randomized, controlled study was conducted.
METHODS: Hospitalized patients (154) discharged to visiting nurse services (VNA) with diagnosis of HF were randomized to usual VNA care (UC) or UC plus (PC), which included three consecutive weeks of in-home pharmacist visits. The pharmacist inventoried medications, resolved DRPs, provided intensive counseling, and made recommendations to referring physicians. The study was powered to identify a 40% reduction in composite mortality or hospitalization at six months. Additional outcomes included total events, HF events, hospital days, VNA days, health costs, QOL, and acceptance of pharmacist recommendations.
RESULTS: Upon completion, 48 (62.3%) of UC patients and 47 (61%) of PC patients experienced composite endpoint (p=NS), with no significant differences being identified between rates of mortality (18.2% and 22.1%), hospitalization (58.4% and 54.5%), HF hospitalization (50.6% and 41.6%), or time to event (106.7 and 102.6 days), respectively.
CONCLUSION: The studied PC delivery model did not significantly improve outcomes as has been observed in other trials, perhaps because of limited

length of intervention (3 weeks) or lack of direct pharmacist-prescriber relationship. Rates of HF exacerbation and adverse drug events remain unacceptably high in the general population, and improved models of PC delivery warrant further study.

21E. Increases in HDL-cholesterol are the strongest predictors of risk reduction in lipid intervention trials. *Heather M. Abourjaily, Pharm.D.*[1], Alawi Alsheikh-Ali, MD[2], Eric Stanek, Pharm.D.[1], Mark McGovern, MD[1], Jeffrey Kuvin, MD[2], Richard H. Karas, M.D., PhD[2]; (1)Kos Pharmaceuticals, Weston, FL; (2)Tufts-New England Medical Center, Boston, MA.

Presented at the Scientific Sessions of the American Heart Association, New Orleans, LA, November 9, 2004.

22. Outcomes of a clinical pharmacy specialist-directed integrated blood pressure management program for established cardiovascular disease patients with or without diabetes mellitus. *Karen J. McConnell, Pharm.D.*, Angela M. Hardy, Pharm.D., Emily B. Zadvorny, Pharm.D., Thomas Delate, Ph.D., Jon R. Rasmussen, Pharm.D., John A. Merenich, M.D.; Kaiser Permanente Colorado Region, Aurora, CO.

PURPOSE: The Clinical Pharmacy Cardiac Risk Service (CPCRS) is a team of clinical pharmacy specialists at Kaiser Permanente - Colorado that utilizes a population-management approach to control risk factors in patients with cardiovascular disease (CVD). This study was designed to evaluate the impact of a CPCRS initiative to improve hypertension control among CVD patients with or without diabetes.
METHODS: This study utilized a prospective cohort design. Hypertensive patients with CVD were included. Enrollment occurred between October 1, 2002 and July 1, 2004 and enrollees were stratified based on a diagnosis for diabetes. BP control, rates of ACE inhibitor (ACEI) use and generic anti-hypertensive medication utilization were evaluated over a seven-month follow-up.
RESULTS: A total of 374 patients were enrolled (139 with hypertension and 235 with hypertension and diabetes). Groups were equivalent at baseline with the exception that non-diabetics had a higher mean systolic BP compared to diabetics (157.4 vs. 147.7, p<.001) and diabetics were more likely to be prescribed an ACEI (65% vs. 51%, p=.008). During the follow-up period, diabetics (-13.9) and non-diabetics (-18.6) both reduced their mean systolic BP from baseline (p<.001) but non-diabetics had a greater reduction (p<.001) and were more likely to achieve BP control (57% vs. 46%, p=.035). However, diabetics were more likely to be prescribed an ACEI (78% vs. 60%, p<.001). Both groups continued to have exceptionally high (~ 94%) generic fill rates for their anti-hypertensive medications.
CONCLUSION: CPCRS had a positive impact on both BP control and the implementation of evidence-based, cost-effective medication regimens.

23E. Pharmacoeconomic analysis of nesiritide in decompensated heart failure: a multicenter study. *Mark A. Malesker, Pharm.D.*, Thomas L Lenz, Pharm.D., Pamela A Foral, Pharm.D., Claire B Hunter, M.D., Daniel E Hilleman, Pharm.D.; Creighton University Medical Center, Omaha, NE.

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24. Renin-angiotensin system inhibition for conversion of atrial fibrillation and maintenance of normal sinus rhythm: a meta-analysis. James Kalus, Pharm.D., BCPS[1], *C. Michael White, Pharm.D.*[2], Craig I. Coleman, Pharm.D.[2]; (1)Wayne State University, Detroit, MI; (2)University of Connecticut/ Hartford Hospital, Hartford, CT.

PURPOSE: Atrial fibrillation (AF) causes atrial remodeling, which serves as a substrate for AF perpetuation. Since the renin-angiotensin system (RAS) stimulates ventricular remodeling in heart failure, this system could have a similar effect on atrial tissue. Recent studies demonstrate that inhibition of the RAS attenuates atrial remodeling. Small clinical studies suggest that RAS inhibition with an angiotensin-converting-enzyme inhibitor (ACEI) or angiotensin-receptor blocker (ARB) could play a role in the management of AF. However, to clarify the benefit of RAS inhibition in the conversion of AF or maintenance of normal sinus rhythm (NSR), we conducted a meta-analysis of the available literature.
METHODS: A systematic literature search through November 2004 was conducted to identify trials involving an ACEI or ARB in the conversion of AF or maintenance of NSR. Studies were included if they met the following criteria: (1) randomized, controlled trials versus placebo or conventional therapy, (2) Jadad score of >1, (3) well described study methodology, (4) adequately reported data on AF conversion and/or maintenance of NSR.
RESULTS: A total of 4 trials evaluating 396 patients were selected for inclusion. Upon meta-analysis, utilization of RAS inhibition resulted in a decreased likelihood of AF recurrence (n=4 studies) with the following odds ratio (OR), 0.34 (95%CI 0.22 to 0.53). ACEIs or ARBs did not significantly increase the rate of conversion to NSR (n=3 studies): OR, 1.32 (95%CI 0.73 to 2.38).
CONCLUSIONS: Use of RAS inhibition decreases the odds of AF recurrence. RAS inhibitors did not demonstrate a statistically significant increase in conversion to NSR; however, this meta-analysis may still be underpowered to evaluate this endpoint.

25. Safety and efficacy of enoxaparin bridge therapy in patients with mechanical heart valves. *Tracey H. Truesdale, Pharm.D.*[1], Krista Luck, Pharm.D.[2]; (1)Haywood Regional Medical Center, Clyde, NC; (2)Mission Hospitals, Asheville, NC.

PURPOSE: To evaluate the use and safety of enoxaparin bridge therapy (EBT) to warfarin anticoagulation in patients with mechanical heart valves.
METHODS: Retrospective chart review of patients with prosthetic heart valves receiving EBT from October 1, 1999 through September 30, 2003. Data collection included demographic information, use of weight-based dosing, performance of a procedure, use of enoxaparin during hospital stay and on discharge, and occurrence of bleeding or thromboembolic events. This study was approved by the IRB.
RESULTS: Forty patients met the inclusion criteria. Twenty-nine patients (73%) received weight based dosing (1 mg/kg/dose) and 95% had a procedure performed while in the hospital. Enoxaparin was started on average 42 hours after procedure with a mean duration of inpatient enoxaparin of 4 days (range 1-15 days). Average INR at discharge was 2 with 3.9 days of warfarin on discharge. Twenty-three patients (58%) were discharged with a subtherapeutic INR. Only 15 of those patients were discharged on enoxaparin. Complications included major bleeding in 5%, minor bleeding in 15%, no thromboembolic events, and stroke occurring in 1 patient. Any bleeding occurred in 20% of patients and all of those patients had a procedure performed while admitted.
CONCLUSION: Efficacy and safety were demonstrated with no thromboembolic events and few bleeding episodes which occurred in patients undergoing a procedure. However, only 73% of patients received weight-based dosing. No patients had a creatinine clearance less than 30 ml/min so other doses were not due to renal adjustment. EBT only appeared to decrease length of hospital stay and therefore cost in 38% of patients.

26. The electrocardiographic effects of an ephedra free multicomponent weight loss supplement in healthy volunteers. *Bokyung Min, Pharm, D*[1], Brian F McBride, Pharm.D[1], Michael Kardas, BSPharm[2], Agron Ismali, BSPharm[2], Vinnita Sinha, Pharm, D[1], Jeffrey Kluger, MD[1], C. Michael White, Pharm.D.[2]; (1)Hartford Hospital, Drug Information, Hartford, CT; (2)University of Connecticut, Hartford, CT.

PURPOSE: A weight loss has been desired for both the obese and the non-obese. While dietary supplements containing natural ("herbal") ingredient are popular measures for weight loss among general public, they do not undergo rigorous efficacy and safety evaluations. Metabolife 356®, an ephedra-containing weight loss supplement, increased QTc interval by 23msec and P-wave duration by 5msec potentially increasing the risk of arrhythmias. Since ephedra is banned, many ephedra-free products have appeared on the market. We sought to evaluate the electrocardiographic (ECG) effects of Metabolife®-Ephedra-Free.
METHODS: Twenty young (24.8+/-1.9 years) healthy volunteers without baseline ECG abnormalities entered this randomized, double-blind, placebo-controlled, and cross-over study. Each subject took either half the recommended dose of Metabolife® Ephedra-Free (ingredients: caffeine, green tea extract, garcinia cambogia, yerba mate, and 16 others) or placebo at phase 1 and after 7 days of washout, received opposite treatment at phase 2. At each phase, 12-lead ECGs were taken at baseline, 1, 3, and 5 hours post ingestion. The maximum QTc interval and other ECG variables were compared from baseline in each treatment.
RESULTS: No differences in baseline or maximum post-dosing QTc intervals occurred. No other ECG variables differed at baseline or during follow-up between the Metabolife® Ephedra-Free and placebo groups.
CONCLUSION: Half the recommended dose of Metabolife® Ephedra-Free does not impact the QTc interval or other electrocardiographic variables with a single dose over a 5-hour observation. Dose-response and longer-duration studies should be conducted.

27E. The safety of enoxaparin for venous thromboembolism prophylaxis in renally impaired patients. *Saeed Rasty, Pharm.D.*[1], Nehal Bhatt, M.D.[2], Marc Sierra, MD[2]; (1)Midwestern University, Buffalo Grove, IL; (2)Advocate Christ Medical Center, OakLawn, IL.

Presented at the Annual Congress of the Society of Critical Care Medicine, Phenoix, AZ, February 14-19, 2005.

Critical Care

28. Association between the bispectral index and plasma lorazepam concentrations in critically ill patients. *Jaclyn M. LeBlanc, Pharm.D.*[1], Joseph F. Dasta, M.Sc.[1], Maria C. Pruchnicki, Pharm.D.[1], Anthony T. Gerlach, Pharm.D.[2], Charles H. Cook, M.D.[2]; (1)College of Pharmacy, The Ohio State University, Columbus, OH; (2)The Ohio State University Medical Center, Columbus, OH.

PURPOSE: While the Bispectral Index (BIS) can be used in the Intensive Care Unit (ICU) to monitor sedation, little is known about the association between BIS and sedative concentrations. This study assessed which of several methods to evaluate BIS provides the best correlation with plasma lorazepam

concentrations in ICU patients.
METHODS: Mechanically-ventilated surgical ICU patients receiving lorazepam as continuous infusion for > 24 hours were prospectively evaluated. Main exclusions were: head trauma, cerebral edema, and facial burns. BIS (XP platform) values were recorded continuously at baseline every minute for 3 minutes before stimulation (routine endotracheal suctioning), and the highest value within 5 minutes after stimulation (peak). Derived BIS values were: ΔBIS (peak - 1 minute average) and AvgBIS ([peak + 1 minute average]/2). Pearson correlation coefficients were calculated between BIS and lorazepam concentration obtained at the time of recordings.
RESULTS: Six patients (four males, 2 receiving paralytics) were enrolled and contributed a total of 15 drug concentrations. Patients had a mean (SD) age of 49.3 ± 19.6 years and weight of 88.5 ± 39.6 kg. Mean steady-state lorazepam concentrations were 289.25 ± 116.82 ng/mL.

BIS variable	BIS (mean ± SD)	r^2 with lorazepam concentration
1 min	50.44 ± 23.96	0.55
2 min	49.47 ± 21.65	0.63
3 min	49.99 ± 21.28	0.59
Peak	67.62 ± 21.32	0.30
AvgBIS	59.03 ± 21.08	0.49
ΔBIS	17.19 ± 16.73	0.13

CONCLUSION: These data suggest that post-stimulation BIS and ΔBIS have weaker correlations to serum lorazepam concentrations than BIS recorded prior to stimulation.

29. Blood glucose concentration does not correlate with organ failure or outcome in trauma patients receiving enteral nutrition. *Jennifer L. Ash, Pharm.D.*[1], Jane M. Gervasio, Pharm.D., BCNSP[1], Gary P. Zaloga, M.D.[2], George H. Rodman Jr., M.D.[3]; (1)Butler University/Clarian Health Partners, Indianapolis, IN; (2)Indiana University School of Medicine/Clarian Health Partners, Indianpolis, IN; (3)Clarian Health Partners, Indianapolis, IN.

PURPOSE: The objective of this study was to evaluate the relationship between 1) blood glucose concentrations and outcomes and 2) blood glucose concentrations and nutrient intake in critically ill trauma patients receiving enteral nutrition (EN).
METHODS: This study is a retrospective chart review assessing the blood glucose concentrations in 120 adult trauma patients receiving EN during the first 7 days in the ICU. The relationship between blood glucose concentrations and organ function (renal, pulmonary, cardiovascular, central nervous system), ventilator days, amount of calories received, ICU LOS, hospital LOS, and number of infections was evaluated using linear regression.
RESULTS: Patients had a mean age of 43.6 ± 18.1 years; 73.3% patients were male; and 8.3% of the population had a diagnosis of diabetes mellitus prior to admission. Mean blood glucose concentrations versus various outcomes are summarized in the following tables:

Table 1: Blood Glucose vs. Organ Failure

Outcome	Renal Failure	Respiratory Failure	Cardiovascular Failure	CNS Failure
R^2	0.002	0.023	0.001	0.002

R^2 = regression coefficient of determination

Table 2: Blood Glucose vs. Outcomes

Outcome	Caloric Intake	Number of Infections	Ventilator Days	ICU LOS	Hospital LOS
R^2	0.018	0.022	0.010	0.021	0.006

R^2 = regression coefficient of determination

CONCLUSIONS: Blood glucose concentrations were not associated with organ failure, ventilator days, number of infections, ICU LOS, or hospital LOS in critically ill trauma patients receiving EN. In addition, blood glucose concentrations were not affected by the amount of calories administered to trauma patients while in the ICU.

30. Impact of education and implementation of electrolyte replacement guidelines on electrolyte replacement and assay ordering. *Lance J. Oyen, Pharm.D.*, Jenna K. Lovely, Pharm.D., Philip J. Kuper, Pharm.D., Michael P. Bannon, M.D.; Mayo Clinic Rochester - Mayo Foundation, Rochester MN, Rochester, MN.

PURPOSE: To evaluate the impact of education and implementation of electrolyte guidelines on 1) the frequency of electrolyte lab assays and 2) the frequency of total and guideline based replacements.
METHODS: A retrospective chart review was done over 1989 patient days from the surgical/trauma ICU (42%), Medical ICU (24%), and one surgical ward (34%) in a tertiary academic center. Data was collected for a 2-week period prior, post, and 4 months following education and implementation of electrolyte replacement guidelines and order form. Medical staff was constant from prior to post implementation, but new in the follow-up period. Lab values and treatments of potassium, magnesium, phosphorus, and calcium were collected, and were adjusted for patient days per period. Education included written guidelines, direct presentation, and an elective order form.
RESULTS: The number of electrolyte assays per patient day decreased from 3.5 pre to 2.4 post and remained at 2.3 at four months. The frequency of electrolyte treatments per 100 patient days decreased (39.7, 15.6, and 10.4, respectively) over the 3 discrete periods. The frequency of guidelines based electrolyte replacement decreased (17.3, 8.4, 7.6, all per 100 patient days respectively).
CONCLUSIONS: The education and implementation of institutional electrolyte replacement guidelines decreased the frequency of electrolyte lab assays with an increase in percent of guideline-based replacement. Effects from education, guidelines and order form implementation were maintained at four months even with different physicians groups.

31. Physician prescribing preferences in treating patients with presumed Pseudomonas aeruginosa pneumonia: mono- versus combination antibiotic therapy. Mallik Angalakuditi, PhD[1], *Rhonda S. Rea, Pharm.D.*[2], Kim C. Coley, Pharm.D.[1]; (1)University of Pittsburgh, School of Pharmacy, Center for Pharmacoinformatics and Outcomes Research, Pittsburgh, PA; (2)University of Pittsburgh, School of Pharmacy, Department of Pharmacy and Therapeutics, Pittsburgh, PA.

PURPOSE: There are no studies confirming combination therapy with a β-lactam and an aminoglycoside (BL-AM) produces better outcomes than monotherapy with a β-lactam (BL) for Pseudomonas aeruginosa pneumonia. We sought to identify patient characteristics that dictate physician prescribing preference and to determine factors that influence mortality.
METHODS: A retrospective review of ICU patients > 18 years of age, with Pseudomonas aeruginosa isolated from sputum or bronchoalveolar lavage initiated on BL or BL-AM within 4 days of a positive culture was conducted. Patients with cystic fibrosis, solid organ transplantation, or those receiving <7 days of therapy were excluded. A Cox proportional hazards model was used to estimate hazard ratios (HR) and 95% confidence intervals (CI) was used for in-hospital mortality.
RESULTS: The study evaluated 294 patients (BL n=146, BL-AM n=148). Patients prescribed BL-AM were younger (55 vs. 62 years, p<0.001) and were more likely to be septic (43% vs. 30%, p=0.02). The BL-AM group had longer mean lengths of antibiotic therapy (32 vs. 17 days), ICU LOS (47 vs. 27 days), and total hospital LOS (53 vs. 36 days). Increasing age (HR 1.52, 95% CI=1.11-2.07), congestive heart failure (HR 1.95, 95% CI=1.13-3.36) and acute renal failure (HR 2.13, 95% CI=1.29-3.51) were associated with increased mortality.
CONCLUSION: Combination antibiotic therapy is more common in patients with Pseudomonas pneumonia who are septic. Factoring in this difference, only increasing age, congestive heart failure, and acute renal failure contribute significantly to mortality.

Drug Information

32E. Tigecycline Evaluation Surveillance Trial (T.E.S.T.): in vitro antibacterial activity against selected species of Enterobacteriaceae in the United States. *Brian Johnson, BS*[1], Sam Bouchillon, MD[1], Tim Stevens, MT(ASCP)[1], Jack Johnson, Masters[1], Daryl Hoban, PhD[1], Meredith Hackel, MT(ASCP)[1], Mary Person, MT(ASCP)[1], Michael Dowzicky, PhD[2]; (1)International Health Management Associates, Inc., Schaumburg, IL; (2)Wyeth Pharmaceuticals, Collegeville, PA.

Presented at the 14th European Congress of Clinical Microbiology and Infectious Diseases, Prague, Czech Republic, May 1-4, 2004.

33E. United States in vitro antibacterial activity of tigecycline against methicillin-resistant and methicillin-sensitive Staphylococcus aureus isolates from the Tigecycline Evaluation Surveillance Trial (T.E.S.T.). *Brian Johnson, BS*[1], Sam Bouchillon, MD[1], Tim Stevens, MT(ASCP)[1], Jack Johnson, Masters[1], Daryl Hoban, PhD[1], Meredith Hackel, MT(ASCP)[1], Mary Person, MT(ASCP)[1], Michael Dowzicky, PhD[2]; (1)International Health Management Associates, Inc., Schaumburg, IL; (2)Wyeth Pharmaceuticals, Collegeville, PA.

Presented at the 14th European Congress of Clinical Microbiology and Infectious Diseases, Prague, Czech Republic, May 1-4, 2004.

34E. Tigecycline Evaluation Surveillance Trial (T.E.S.T.): United States in vitro antibacterial activity against selected species of glucose non-fermenting organisms. *Sam Bouchilon, MD*[1], Tim Stevens, MT(ASCP)[1], Brian Johnson, BS[1], Jack Johnson, Masters[1], Daryl Hoban, PhD[1], Meredith Hackel, MT(ASCP)[1], Mary Person, MT(ASCP)[1], Michael Dowzicky, PhD[2]; (1)International Health Management Associates, Inc., Schaumburg, IL; (2)Wyeth Pharmaceuticals, Collegeville, PA.

Presented at the 14th European Congress of Clinical Microbiology and Infectious Diseases, Prague, Czech Republic, May 1-4, 2004.

35E. Tigecycline Evaluation Surveillance Trial (T.E.S.T.): United States in vitro antibacterial activity against selected species of Enterococcus spp. *Sam Bouchillon, MD*[1], Tim Stevens, MT(ASCP)[1], Brian Johnson, BS[1], Jack Johnson, Masters[1], Daryl Hoban, PhD[1], Meredith Hackel, MT(ASCP)[1], Mary Person, MT(ASCP)[1], Michael Dowzicky, PhD[2]; (1)International Health Management Associates, Inc., Schaumburg, IL; (2)Wyeth Pharmaceuticals, Collegeville, PA.

Presented at the 14th European Congress of Clinical Microbiology and Infectious Diseases, Prague, Czech Republic, May 1-4, 2004.

Education/Training

36. A simulated healthcare system with Internet-based medical records to teach women's health. *Deborah A. Sturpe, Pharm.D.*[1], Stuart T. Haines, Pharm.D.[1], Michael C. Brown, Pharm.D.[2]; (1)University of Maryland School of Pharmacy, Baltimore, M.D.; (2)University of Minnesota College of Pharmacy, Minneapolis, MN.

PURPOSE: Women's health has been identified as a priority area for research and education. We developed a highly interactive Internet-based healthcare system simulation for a women's health elective course.
METHODS: Using a problem-based learning methodology, teams of 4 - 5 students were held accountable for the lifelong care of a female patient in a simulated healthcare system. Each week students accessed an Internet-based medical record containing notes from four simulated practitioners regarding each patient's on-going medical history, were given a new chief complaint, and during class were permitted to query and examine the patient, order tests, and prescribe formulary medications. Each team entered a note into the medical record detailing their problem assessment, variables that influenced decisions, recommended drug treatment, and monitoring plan. Student performance was evaluated using 10 standardized criteria and rated as not-acceptable, acceptable, or outstanding.
RESULTS: Teams developed appropriate plans for a variety of women's health problems within the constraints of the simulated healthcare system, scoring acceptable or outstanding on 339 (94%) of 360 elements evaluated. Student satisfaction was high. All students reported feeling prepared to care for women's health issues independently and/or with minimal help from colleagues. More than 2/3 of the class liked the simulations and opportunity to work in teams. All students liked the Internet-based medical record, with 58% reporting this course taught them to write notes more effectively than other courses in the curriculum.
CONCLUSIONS: This model may enable students to master high level clinical skills typically developed in an experiential learning environment.

37E. A survey of faculty and clinical applicants in the Personnel Placement Service (PPS) at the American Society of Health-System Pharmacists (ASHP) Midyear Clinical Meeting 2002 and 2003. *William J. McIntyre, B.S., Pharm.D.*[1], Jeri Siaz, Pharm.D.[2], L. Cliff Littlefield, Pharm.D.[3]; (1)University of Texas-Pan American, Edinburg, TX; (2)University of Texas El Paso, El Paso, TX; (3)University of Texas, Austin, TX.

Presented at the Annual Meeting of the American Associations of Colleges of Pharmacy, Salt Lake City, UT, July 10-14, 2004.

38. Family medicine residents' perceptions and opinions of clinical pharmacists. *Dana G. Carroll, Pharm.D.*, Douglas N. Carroll, Pharm.D.; University of Oklahoma College of Pharmacy, Tulsa, OK.

PURPOSE: To evaluate family medicine residents' perceptions and opinions of clinical pharmacists and their services related to their degree of exposure to clinical pharmacists in residency training.
METHODS: Twenty-one PGY-1 and PGY-2 family medicine residents participated in the study. Residents completed an initial 14 question survey in July 2002 and an identical follow-up survey in July 2003.
RESULTS: Initial: Both groups identified medication safety monitoring and rounding as the most beneficial services to be provided by a clinical pharmacist in the hospital. In the clinic, medication safety monitoring and patient education were identified. A clinical pharmacist was the 5th most frequently utilized source for drug information by PGY-1's and 3rd by PGY-2's. Areas identified where pharmacists could best assist with training were clinic consults, rounds, presentations and a pharmacotherapy rotation. Follow-up: The most beneficial hospital services remained the same with the addition of antibiotic consults by PGY-1's. Patient education and anticoagulation management were identified by both groups as beneficial services in the clinic as well as disease state management by PGY-1's and medication selection, drug information question responses and medication assistance programs by PGY-2's. A clinical pharmacist became the 3rd most frequently utilized source for drug information by PGY-1's and remained 3rd by PGY-2's. Areas where pharmacists could best assist with training remained unchanged.
CONCLUSION: PGY-1's had the greatest change in their perceptions and increased utilization of clinical pharmacists for drug information. A majority acknowledged clinical pharmacy services should be provided over distributive services.

39E. Pharmacy students and residency training: motivating factors and barriers. *Kathy E. Fit, Pharm.D.*, Suzanne M. Rabi, Pharm.D., Rosalyn S. Padiyara, Pharm.D., Jill S. Burkiewicz, Pharm.D., BCPS; Midwestern University - Chicago College of Pharmacy, Downers Grove, IL.

Presented at the 2004 Midyear Clinical Meeting of the American Society of Health-System Pharmacists, Orlando, FL, December 8, 2004.

40. Prospective analysis of the impact of the Early Patient Oriented Care (EPOC) program on the ethical development of pharmacy students. *Darren W. Grabe, Pharm.D.*, Rowland J. Elwell, Pharm.D., George R. Bailie, Pharm.D., Ph.D., Michael R. Brodeur, Pharm.D.; Albany College of Pharmacy, Albany, NY.

PURPOSE: The Early Patient-Oriented Care (EPOC) program is a competitive, elective, 3-semester long, early experiential clerkship program offered to students at our institution during the second and third professional years. Students follow individual patients over a prolonged period. The primary aim of this study was to examine and compare the impact of EPOC on the ethical development of pharmacy students.
METHODS: This prospective, multi-phase, controlled study was open to students entering the second professional year. In phase one, participating students were administered the defining issues test (DIT) during the fall semester of their second professional year. The DIT is a standardized, validated, multiple-choice questionnaire. DIT scores (P-scores) are highly correlated with ethical development. In phase two, students completed the DIT three semesters later, coinciding with completion of the EPOC program. P-scores at each phase of the study were compared. Results were analyzed using Student's t-test with significance defined as $p < 0.05$.
RESULTS: Fifty-nine students (EPOC, n = 20) completed phase one. Mean P-scores were significantly higher in EPOC students in phase one (34.3 vs. 23.4; $p < 0.05$). Forty students (EPOC, n = 17) completed phase two. Although, phase two P-scores increased in both EPOC and non-EPOC students (40.4 vs. 34.0, respectively; $p = 0.133$), the absolute change between phases (5.9 vs. 11.3, respectively; $p = 0.24$) was not significantly different. When compared to phase one, the change in EPOC students' scores was not significant ($p = 0.054$) while non-EPOC students' scores significantly increased ($p = 0.002$).
CONCLUSIONS: This study showed that all students had an increase in ethical reasoning ability as measured by the DIT. Although students who chose to pursue EPOC may have had greater ethical reasoning ability at baseline, EPOC did not appear to have a significant effect on the ethical development of pharmacy students.

41. The impact of oral contraceptive use on cardiovascular risk factor assessment in pharmacy students. *Elena M. Umland, Pharm.D.*, Cynthia A. Sanoski, Pharm.D.; Philadelphia College of Pharmacy, University of the Sciences in Philadelphia, Philadelphia, PA.

PURPOSE: This study evaluated whether oral contraceptive (OC) use influenced fasting lipid profiles measured as part of cardiovascular risk factor assessment among female, fifth-year Pharm.D. students.
METHODS: In Fall 2003, fifth-year Pharm.D. students reported their coronary heart disease (CHD) risk factors, perceptions of these risk factors and medication history via a questionnaire. Fasting lipid panel [total cholesterol (TC), low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C), triglycerides] and fasting blood glucose (FBG) were measured using the Cholestech LDX; blood pressure (BP) was also measured. These activities were repeated in Spring 2004.
RESULTS: Seventy-four students (mean age=23.7 years; 77% female; 49% Caucasian) had complete follow-up data. Twenty-six (46%) of the females were taking OCs in the Fall; 19 (33%) in the Spring. For the entire study population, at follow-up, the only observed significant difference among the lipid results was the triglycerides (160 mg/dL vs. 139 mg/dL at baseline; p=0.031). In the Fall, significant differences were observed between females taking OCs and non-users with regard to mean triglycerides (155 vs. 123 mg/dl; p=0.009), HDL-C (67 vs. 59 mg/dl; p=0.036), and FBG (87 vs. 95 mg/dl; p=0.006). Similar findings were observed between OC-users and non-users in the Spring (triglycerides: 191 vs. 146 mg/dl; p=0.013; HDL-C: 72 vs. 59 mg/dl; p=0.004; FBG: 86 vs. 92 mg/dl; p=0.004).
CONCLUSION: The use of OCs had a significant effect on triglycerides, HDL-C, and FBG concentrations among fifth-year pharmacy female students. Students' awareness to the impact that OC use may have on these metabolic parameters should be heightened.

42. The use of wireless laptop computers for computer-assisted learning in pharmacokinetics. *Myrna Y. Munar, Pharm.D., BCPS*, Harleen Singh, Pharm.D., Sandra B. Earle, Pharm.D., BCPS; Oregon State Univ., College of Pharmacy, Portland, OR.

PURPOSE: To implement wireless laptop computers in pharmacokinetics (PK) courses to test pharmacy students' ability to apply PK concepts in the selection of appropriate drug therapy regimens. To measure students' attitudes towards utilization of wireless laptop computers.
METHODS: Twenty-two wireless computers, security cart, and software were installed in a multi-use classroom for up to 85 students. Actual patient cases were used for computer-assisted learning of PK concepts. A computer spreadsheet program was used to build PK models to predict drug concentrations. Students constructed concentration vs. time curves through computer graphing to visualize how altering different patient and PK parameters affects drug concentrations. Surveys were conducted before and after computer implementation to determine the attitudes of students toward the use of computers in PK workshops.

RESULTS: Exam results were significantly higher after computer implementation (2004 (after computer implementation) 88.7% vs. 2003 (no computers) 84.3%, P=0.01). Eighty-eight percent (n = 61/69) and 82% (n = 55/67) of Pharm.D. students completed surveys before and after computer implementation, respectively. Prior to implementation, 95% of students agreed (median 4, mode 4, scale 1-5) that computers would enhance learning in PK. After implementation, 98% of students strongly agreed (median 5, mode 5, scale 1-5, P<0.05) that computers enhanced PK learning.
CONCLUSIONS: Implementation of wireless laptop computers in PK courses enables students to construct their own PK models that respond flexibly to changing parameters. Students have greater comprehension and are better able to interpret results to provide appropriate recommendations.

43. Using two-way interactive video (TWIV) conferencing to offer disease state management continuing education to rural pharmacists. *Thomas L. Lenz, Pharm.D.*; Creighton University Medical Center, Omaha, NE.

PURPOSE: The purpose of this study was to use two-way interactive video (TWIV) conferencing technology to offer disease state management continuing education in the area to heart failure to rural pharmacists and to assess its effectiveness at improving both the knowledge and confidence level of the participants.
METHODS: A heart failure continuing education program was simulcast from a metropolitan hospital to two rural hospitals via TWIV conferencing. A series of three surveys (pre-program, post-program and six month follow-up) were administered to assess heart failure knowledge and pharmacist confidence when treating patients with heart failure.
RESULTS: Fifteen pharmacists with a mean practice experience of 19.9 years and a mean age of 43.1 years participated in the study. The results showed that baseline heart failure knowledge significantly improved in the post-program quiz compared with the pre-program quiz (90% vs. 66%, P=0.002) as did the six month follow-up quiz compared with the pre-program quiz (81.3% vs. 66%, P=0.034). Heart failure knowledge did not, however, significantly change between the post-program quiz and the six-month follow-up quiz indicating retention of the newly learned information (P=0.066). In addition, confidence levels of heart failure patient management were significantly improved in the post-program evaluation compared with the pre-program evaluation (P<0.022).
CONCLUSIONS: This study was able to show that TWIV conferencing can be an effective way to offer live continuing education to pharmacists practicing in a rural hospital setting.

44. Virtual learning of cardiovascular hemodynamics in an advanced cardiovascular pharmacotherapy course. *Kai I. Cheang, Pharm.D.*, Veronica P. Shuford, M.Ed., Susan Deihl, B.S.; Virginia Commonwealth University, Richmond, VA.

PURPOSE: Various reports have documented the utility of online learning. However, reports documenting the use of online animations to teach complex physiological concepts in pharmacy are lacking. Our objective is to investigate whether student learning of complex hemodynamic concepts improves with online animations.
METHODS: We utilized Macromedia Flash animations to illustrate hemodynamic concepts. Septic and hypovolemic shocks were initially presented in class only, while cardiogenic shock was initially only provided via asynchronous learning using online animations. Students' knowledge was assessed via an online quiz. After a review of all topics during lecture and online, students were quizzed again in class. Students also completed a survey regarding the online modules.
RESULTS: After students completed the cardiogenic shock animation module online, and other shock topics in class, their first quiz grades were higher in the topics introduced with animations. Mean quiz grades were 97.1±8.3 for topics introduced online vs. 86.3±15.9 and 72.5±17.6 respectively for topics introduced in class (ANOVA p<0.001). Post-hoc analysis indicated quiz grades for online topics were higher than those introduced in class (p=0.035 and p<0.001 respectively). However, after students have been repeatedly exposed to all concepts both online and in class, final grades did not differ significantly from previous years' students who had no access to animation modules. In the survey, over 80% of students indicated that the animations improved their learning. However, over 70% of students viewed the online animations cannot substitute their in-class experience.
CONCLUSIONS: Animation-assisted modules were at least equivalent, if not better, than in-class introductions of hemodynamic topics. However, after repeated exposures to the topics, animation modules do not further add to overall students' learning of hemodynamic concepts perhaps due to a ceiling effect. Although students find the animations helpful in their learning, these animations are not viewed as a substitute to their in-class experience.

45. Vocabulary knowledge of pharmacy students whose first of best language is not English. *Miriam M. Diaz-Gilbert, B.A., M.Ed.*; Univesity of the Sciences in Philadelphia, Philadelphia, PA.

PURPOSE: To study the word knowledge of pharmacy students whose first or best language is not English and to identify problematic health and pharmacy related vocabulary and the linguistic obstacles that hinder word knowledge.
METHODS: Twenty-five pre-professional, first, third and fourth professional year pharmacy students completed a survey of 105 word prompts typically found in pharmacy curricula multiple-choice exams and completed a 10-sentence survey with 31 words in context. The purpose of the 105-word survey was for the students to indicate and demonstrate their knowledge of the words in isolation. The purpose of the 10-sentence survey was for students to indicate and demonstrate their knowledge of 31 words in context.
RESULTS: The respondents in this study demonstrated lack of fundamental knowledge of certain basic and common pharmacy and health-related vocabulary words when encountered in isolation as well as in context, falsely believed that they knew the meaning of certain words, and confuse similar words phonemically, graphemically and morphologically.
CONCLUSION: The students demonstrated significant misunderstandings of essential and commonly used health and pharmacy-related vocabulary.

46. Writing skills of clerkship students whose first or best language is not English: perceptions of clerkship students and preceptors. *Miriam M. Diaz-Gilbert, B.A., M.Ed.*; University of the Sciences in Philadelphia, Philadelphia, PA.

PURPOSE: To study the perceptions that clerkship students whose first or best language is not English have regarding their writing skills and the clerkship writing experience, and to study the perceptions and experiences that clerkship preceptors have about the writing skills of clerkship students whose first or best language is not English.
METHODS: Twenty-one clerkship students representing 3 pharmacy schools were individually interviewed using 20 guided questions to elicit information about, but not limited to writing, grammar, vocabulary and spelling skills and the clerkship writing experience, and 101 clerkship preceptors representing 48 pharmacy schools completed a 9-item Likert-type survey to rate students' grammar, writing, vocabulary, spelling skills and areas related to clerkship writing, and a tenth open-ended question to describe how writing strengths and weaknesses help or hinder the clerkship experience.
RESULTS: The students indicated the need to improve writing and writing-related skills, such as reading, paraphrasing and summarizing, and verbal communication skills. They made recommendations to future clerkship students and pharmacy schools about how to prepare students for the writing and verbal communication tasks found in clerkships. The preceptors indicated the writing skills and verbal communication skills of the clerkship students, whose first or best language is not English, range from dangerous, to weak, to needs improvement.
CONCLUSION: Lack of essential and acceptable writing and verbal skills hinders learning, interaction with patients and health professionals, pharmaceutical care and credibility. This research is relevant for pharmacy education in the areas of written and verbal communication.

47E. Evaluation of the impact of clinical pharmacists on family medicine residents' drug knowledge. Kelly L. Craft Ruby, Pharm.D.[1], *Ila M. Harris, Pharm.D.*[2], James S. Van Vooren, M.D.[3], Richard R. Cline, Ph.D.[1]; (1)University of Minnesota College of Pharmacy, Minneapolis, MN; (2)University of Minnesota College of Pharmacy and Medical School, St. Paul, MN; (3)University of Minnesota Medical School, St. Paul, MN.

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Endocrinology

48. Development and implementation of a standardized, sliding scale insulin order form. *Curtis L. Smith, Pharm.D.*[1], Susan Sugden, R.N.[2], Marie Ring, R.N.[2], Kelly Morgan, M.D.[2]; (1)Ferris State University College of Pharmacy, Lansing, MI; (2)Sparrow Health System, Lansing, MI.

PURPOSE: A sliding scale insulin order form was developed to standardize therapy and improve glycemic control in hospitalized patients.
METHODS: Initially, 100 random patients receiving sliding scale insulin regimens were evaluated. These patients received one of 33 different regimens. The regimens were highly variable including the initial insulin dose (1-8 units), the initial glucose concentration to give insulin (120-300 mg/dl), and the increments of insulin (1-5 units) and glucose concentration (10-100 mg/dl) for further doses. Because of this, and the potential for medication errors, a standardized order form for sliding scale insulin was developed. The order form has choices for the frequency of glucose monitoring, type of insulin and specific scale. The scale choices are "mild" for those with BMI < 25 kg/m2 and "aggressive" for those with BMI > 25 kg/m2. All patients receive the same bedtime scale. The orders must be renewed every 3-5 days and a reminder is given if the patient is not receiving long acting agents for glycemic control.
RESULTS: The order form was piloted and 100 patients were evaluated. Compared to the previous evaluation there were fewer hypoglycemic and hyperglycemic events (0.95 vs. 1.7% and 33.9 vs. 43.1% of all glucose concentrations, respectively). The percent of patients with diabetes not receiving long acting agents for glycemic control decreased with the form (4 vs. 14%).
CONCLUSIONS: A standardized order form for sliding scale insulin was

developed. It helps decrease the number of hypoglycemic and hyperglycemic events. It also facilitates ordering and potentially decreases medication errors.

49. Evaluation of pharmacists impact on providing comprehensive diabetes care to medicaid-eligible patients in an ambulatory care setting. *Natalie E. Bean, Pharm.D.*, Kerry A. Stiegler, Pharm.D.; University of Arkansas for Medical Sciences, Little Rock, AR.

PURPOSE: To determine the effectiveness of pharmacist-directed interventions in Medicaid-eligible diabetes patients in an ambulatory care clinic.
METHODS: We identified fourteen Medicaid eligible patients with diagnoses of diabetes. These patients were identified by the ambulatory care clinic pharmacist or referred to the pharmacist by a physician between January 2003 and October 2003. All of these patients had type 2 diabetes and ranged in age from 36-75 years old. Each patient was evaluated by a pharmacist monthly for a year. The pharmacist focused on helping each patient achieve the therapeutic goals recommended by the American Diabetes Association (ADA). For noncompliant areas, specific recommendations were made. A1C, blood pressure and LDL-C levels were collected at 3, 6, and 12 month intervals. Data were analyzed using NCSS.
RESULTS: Mean baseline A1C was 10.7% compared to 7.4% at 6 months and 7.8% at 12 months (p=.002). There were no statistically significant differences in the LDL-C levels or blood pressures when comparing baseline values to follow-up values, although the values trended downward.
CONCLUSION: There were clinically and statistically significant reductions in A1C in Medicaid patients who were evaluated by a pharmacist on a routine basis for one year. Collaborative efforts between pharmacists and physicians can lead to significant improvements on the glycemic control and care of patients with type 2 diabetes.

50. Impact of antipsychotic medication use on functioning in people with diabetes. *Samuel L. Ellis, Pharm.D.*, Marianne McCollum, R.Ph., Ph.D., BCPS, Lisa Lu, M.S., Patrick W. Sullivan, Ph.D.; University of Colorado Health Sciences Center, School of Pharmacy, Denver, CO.

PURPOSE: To evaluate the differences in mental and physical functioning between people with diabetes taking antipsychotic medications and people with diabetes not taking antipsychotic medications.
METHODS: This retrospective study used combined data from the 2000 and 2001 Medical Expenditure Panel Survey (MEPS). Antipsychotic medications (first and second generation) were identified using prescription records. Patients with diabetes were identified by ICD-9-CM code. Variables analyzed included demographics, clinical information, and health status (SF-12 Mental and Physical Component Summaries (MCS and PCS). Univariate analyses used t-test, chi-squared, or Fischer's exact tests as appropriate.
RESULTS: A total of 2,845 people with diabetes were included (2,782 without antipsychotic use, 63 with antipsychotic use). Compared with people with diabetes not taking antipsychotic medications, those taking antipsychotic medications were more likely to smoke ($p< 0.001$), had more comorbidities ($p < 0.001$) lower incomes ($p = 0.009$) and more physical limitations (e.g. problems with activities of daily living, $p < 0.001$). They also trended toward being younger ($p = 0.13$), and female ($p=0.058$). SF-12 MCS and PCS scores were significantly lower for those people taking antipsychotic medication ($p<0.001$ and $p=0.005$, respectively).
CONCLUSION: People with diabetes taking antipsychotic medications have lower SF-12 mental and physical component scores, and more physical limitations. These issues may adversely affect self-care and must be considered by health care professionals when providing diabetes education.

51. The sustained efficacy of an intensive diabetes education and management program on glycemic control over time. *Mary A. Halloran, Pharm.D., BCPS, CDE*[1], Robin R. Hill, Pharm.D., BCPS[2], Jennifer Chonlahan, Pharm.D., BCPS[1], Donald Harrison, Ph.D.[1]; (1)University of Oklahoma Health Sciences Center, College of Pharmacy, 1110 N. Stonewall, PO Box 26901, Oklahoma City, OK; (2)Total Longterm Care, Thornton, CO.

PURPOSE: To evaluate the sustained efficacy following discharge of an intensive diabetes education and management program provided for patients while enrolled in a multi-disciplinary diabetes service.
METHODS: Diabetic patients referred to the Continuum Care Clinic in a United States Air Force Medical Treatment Facility received intensive diabetes education and management to improve glycemic control. Patients meeting hemoglobin A1c (HbA1c) goals established by the American Diabetes Association were discharged to their primary care manager for follow-up. Periodic HbA1c results for discharged patients were tracked over time to assess changes in glycemic control as well as mean duration of follow-up after discharge.
RESULTS: One hundred sixty-six patients received at least one post-discharge HbA1c and were eligible for inclusion in the analysis. The mean HbA1c of all eligible patients at discharge was 6.446% ± 0.533 (mean ± SD). The mean most recent HbA1c was 6.838% ± 1.225. A paired t-test indicated an overall increase in HbA1c of 0.392% (95% CI 0.212 to 0.572) over a mean length of follow-up of 21.73 ± 9.426 months. While the HbA1c increased in 59% of patients, 41% of patients either improved or maintained glycemic control after discharge. An ANOVA comparing the number of months since discharge HbA1c indicated a non-significant difference among groups.
CONCLUSIONS: Despite a statistically significant increase in HbA1c in evaluated patients following discharge from the clinic, the change in glycemic control was not clinically significant. These findings support the value of an intensive diabetes education and management program in sustaining glycemic control over time.

52. Use of an angiotensin converting enzyme inhibitor or angiotensin receptor blocker for the prevention of diabetes mellitus: a meta-analysis. *Michael Kardas, B.S.Pharm.*[1], Effie L. Gillespie, Pharm.D.[2], C. Michael White, Pharm.D.[2], Craig I. Coleman, Pharm.D.[2]; (1)University of Connecticut, Storrs, CT; (2)University of Connecticut/Hartford Hospital, Hartford, CT.

PURPOSE: Diabetes increases the risk of cardiovascular morbidity and mortality and remains the leading cause of blindness, nontraumatic amputations and end-stage renal disease in adults. Angiotensin II has been shown to increase hepatic glucose production and decrease insulin sensitivity. Hence, patients who utilize either an angiotensin converting enzyme inhibitor (ACEI) or angiotensin receptor blocker (ARB) may experience a decreased incidence of new-onset diabetes. To better comprehend the benefit of utilizing an ACEI or ARB in this setting, we sought to conduct a meta-analysis of the literature to date.
METHODS: A systematic literature search through November 2004 was conducted to identify trials involving an ACEI or ARB with a primary or secondary endpoint of new-onset diabetes. Studies were included if they met the following criteria: (1) randomized, controlled trials verses placebo or conventional therapy, (2) Jadad score of >2, (3) well described study methodology, (4) adequately reported data on new-onset diabetes.
RESULTS: A total of 10 trials evaluating 60,982 patients were selected for inclusion. Upon meta-analysis, utilization of an ACEI or ARB prevented the new-onset of diabetes with the following risk ratio (RR), 0.80 (95%CI 0.76 to 0.86). The influence of either an ACEI (n=5) or ARB (n=5) alone on new onset diabetes was similar: RR, 0.83 (95%CI 0.74 to 0.92) and 0.78 (95%CI 0.73 to 0.84). In addition, regardless of indication for use (hypertension, coronary artery disease or heart failure), reductions in new-onset diabetes were maintained [(n=6) RR, 0.81 (95%CI 0.76 to 0.87); (n=2) RR, 0.77 (95%CI 0.61 to 0.97) and (n=2) RR, 0.71 (95%CI 0.52 to 0.97)]
CONCLUSIONS: Use of ACEIs or ARBs reduce the risk of developing diabetes mellitus compared with placebo or conventional therapy.

Geriatrics

53. The impact of pharmacist education on use of sleep aids in elders. *Karen McGee, Pharm.D.*[1], Amy Mincey, Pharm.D.[2]; (1)University of South Carolina College of Pharmacy, Columbia, SC; (2)Palmetto Health Richland, Columbia, SC.

Introduction: Palmetto SeniorCare, a medical adult day care program, located in central South Carolina, has a goal of providing all-inclusive medical care to frail, community-dwelling elders. The focus is to keep them well with less hospital and nursing home usage. They are seen on a routine basis in the daycare's medical clinic utilizing a multi-disciplinary team. The elders have an average age of 80 years and are diagnosed with an average of eight medical conditions. Most of the elders are widowed and depend on only one of their children to provide their care. Fifty percent have dementia; therefore, insomnia is a common medical problem. Insomnia can be a major burden for caregivers, especially those who work.
PURPOSE: The purpose of this project was to review the impact of caregiver education on the use of sleep aids in frail elders with insomnia.
METHODS: A retrospective chart review of 50 elders was conducted to assess sleep aid usage, to list medications which worsen insomnia, and to summarize disease states which may contribute to insomnia. A Pharmacist conducted a half-day seminar for caregivers to discuss expected changes in sleep patterns with aging and to discuss principles of good sleep hygiene.
RESULTS: There was a 25% decrease in medications used for insomnia.
CONCLUSIONS: Caregiver education decreased sleep aid usage in elders with insomnia. Communication about insomnia between the day health center staff and the caregiver also improved.

54. The quality of pharmacological care on an acute care for elders unit. *Victor Cohen, Pharm.D., BCPS*[1], Samantha P. Jellinek, Pharm.D., BCPS[2], Marcia Nelson, D.O.[1], Antonios Likourezos, M.A., M.P.H.[1], William Goldman, Pharm.D.[1], Barbara Paris, M.D.[1]; (1)Arnold & Marie Schwartz College of Pharmacy and Health Sciences, Long Island University, Brooklyn, NY; (2)Maimonides Medical Center, Brooklyn, NY.

PURPOSE: The Acute Care for Elders (ACE) Unit provides interdisciplinary, comprehensive care to elderly, hospitalized patients. There is no formal audit to assure that patients are receiving quality pharmacological care. Therefore, our objectives are 1) to determine baseline compliance with published pharmacological indicators using a pre-test and auditing house-staff chart notes monthly 2) to determine if a pharmacist, through daily interactions with physicians, improves compliance with these indicators, and 3) to compare the rates of compliance after education by auditing charts and

conducting a post-test.
CONCLUSION: This is a before and after study of the quality of pharmacological care given to hospitalized geriatric patients. All house-staff completing a rotation on the ACE Unit are included in the study. The pharmacist provides two-one hour formal lectures monthly. Informal education occurs daily through pharmacotherapeutic consultations. A pre-test is administered to the residents to assess their baseline level of knowledge on the quality indicators. These indicators are taken from the ACOVE (Assessing Care of Vulnerable Elders) Project and target four specific domains of care, 1) prescribing indicated medications, 2) avoiding inappropriate medications, 3) education, continuity and documentation 4) medication monitoring. This same test is administered at the completion of the rotation to assess the knowledge gained. The impact of the clinical pharmacist's interventions is measured by auditing patients' charts for compliance with these quality indicators at the beginning and end of the residents' monthly rotation.
RESULTS: Total scores increased from 12/15 to 13.5/15 ($p<0.05$). Compliance increased with prescribing osteoporosis treatment (27.8% v. 38.9%, $p<0.05$), angiotensin converting enzyme (ACE) inhibitors for diabetic patients with proteinuria (20.8% v. 29.2%, $p=0.089$) and for patients with heart failure (42.1% v. 57.9%, $p=0.075$), and beta-blockers for myocardial infarction patients (33.3% v. 50%, $p=0.093$).
CONCLUSION: Pharmacist's educational interventions increase medical residents' knowledge of and compliance with pharmacological indicators.

Health Services Research

55. Impact of comorbid depression on functioning in people with diabetes. *Marianne McCollum, R.Ph., Ph.D., BCPS*, Sam Ellis, Pharm.D., Lisa Lu, M.S., Patrick W. Sullivan, Ph.D.; University of Colorado School of Pharmacy, Denver, CO.

PURPOSE: To examine differences in mental and physical functioning between people with diabetes with depression and people with diabetes without depression.
METHODS: This retrospective study used data from the 2001 Medical Expenditure Panel Survey (MEPS). Diabetes was identified by ICD-9-CM code; depression was identified by ICD-9 CM code plus an antidepressant prescription. Demographic, clinical, and health status data (race/ethnicity, income, age, education, body mass index (BMI), smoking status, number of comorbidities, depression, and physical limitations, and SF-12 Mental and Physical Component Summaries (MCS and PCS)) were analyzed in univariate analyses using t-tests, X2, or Fischer's exact tests as appropriate.
RESULTS: 1,653 respondents with diabetes were included (1,524 without depression, 129 with depression). Compared with people with diabetes alone, those with diabetes and comorbid depression were younger ($p=0.036$) and were more likely to be female ($p\leq0.001$), white ($p=0.001$), and smokers ($p<0.001$). People with comorbid depression had more physical limitations (e.g., problems with activities of daily living, $p<0.001$) and cognitive limitations ($p<0.001$). SF-12 MCS and PCS scores were lower for people with diabetes and comorbid depression ($p<0.001$ and $p=0.001$, respectively).
CONCLUSIONS: People with diabetes and depression have more physical and cognitive limitations, and lower health status scores. These differences are likely to impact the ability of people with both diabetes and depression to engage in appropriate self-care activities. This issue warrants both further study and increased attention from diabetes care providers.

56. Sex-based differences in diabetes and potential effects on self-care. *Marianne McCollum, R.Ph., Ph.D., BCPS*, Laura B. Hansen, Pharm.D., Lisa Lu, M.S., Patrick W. Sullivan, Ph.D.; University of Colorado School of Pharmacy, Denver, CO.

PURPOSE: To examine sex-based differences in diabetes and the potential impact on the ability to engage in self-care abilities.
METHODS: This retrospective study used 2001 Medical Expenditure Panel Survey (MEPS) data. Diabetes was identified by ICD-9-CM code; analyses were stratified by sex. Variables investigated were demographic (race/ethnicity, income, age, education), clinical (body mass index (BMI), smoking, comorbidities, depression, and physical limitations), and health status-related (SF-12 Mental and Physical Component Summaries (MCS and PCS)). Univariate analyses used t-test, X2, or Fischer's exact test as appropriate. Multivariate analyses examined associations between sex and MCS and PCS scores adjusted for other variables.
RESULTS: A total of 1,653 respondents with diabetes were included (883 women, 770 men). Women with diabetes were older than their male counterparts (61.2 versus 59.1 years, $p<0.01$), had less education (11.1 versus 12.0 years, $p < 0.01$), and lower incomes ($p< 0.01$). Women also reported higher BMI (31.4 versus 30.3, $p < 0.01$), more comorbidities (7.8 versus 6.4, $p < 0.01$), more depression ($p < 0.01$), and more physical limitations ($p< 0.01$) than men with diabetes. MCS and PCS scores were lower for women (47.8 versus 49.9 and 38.2 versus 41.4, respectively, $p < 0.01$ for both). In multivariate analyses, depression, income, physical limitations, BMI, education, and number of comorbidities were significantly associated with both health status measures.
CONCLUSIONS: Women with diabetes score lower on factors likely to affect self-care ability. Diabetes educators and care providers should consider the impact of these sex-based differences when caring for women with diabetes.

57. Implementation of recommended antibiotic use control measures in a survey of VA and non-VA hospitals. *Alan J. Zillich, Pharm.D.*[1], Erika J. Ernst, Pharm.D.[2], Sutherland M. Jason, Ph.D.[3], Stephen J. Wilson, M.D.[3], Ann F. Chou, Ph.D.[4], Kim D. McCoy, M.S.[4], Brad N. Doebbeling, M.D., M.Sc[4]; (1)Purdue University School of Pharmacy, Indianapolis, IN; (2)Universiy of Iowa College of Pharmacy, Iowa City, IA; (3)Indiana University School of Medicine, Indianapolis, IN; (4)Center for Excellence on Implementing Evidence-based Practice, Roudebush VA Medical Center, Indianapolis, IN.

PURPOSE: The primary objective compared measures of antibiotic use control between VA and Non-VA hospitals. A secondary objective compared use of associated information technology (IT).
METHODS: A survey was developed to elicit information regarding adoption of recommended measures for prevention and control of antimicrobial resistance in hospitals. The survey addressed topics such as resistance patterns, outbreaks, use and implementation of guidelines or practice standards, policies, procedures, organizational structure, and IT. A national sample of 670 hospitals was stratified by bed-size, teaching status, geographic region, and VA status. Surveys were sent to the lead infection control professional at each institution. Antimicrobial use control (AUC) items assessed information on processes for antimicrobial ordering, use of antimicrobial formularies, and dissemination of clinical practice guidelines. Responses to the items related to AUC (n=6) and IT (n=6) were dichotomized using the median. Generalized estimating equation (GEE) models were constructed for each set of 6 items as dependant variables. Stratification variables and VA status were independent variables. A final multivariate model was constructed with the AUC items as a dependent variable, adding the IT items as independent variables.
RESULTS: There were 448 participants (response rate 67%): 91 (20%) VA and 357 (80%) non-VA. For the 6 items on antibiotic use control, VA hospitals are more likely to implement AUC measures than their non-VA counterparts (OR: 2.66, $p<0.01$). Similarly, the extent to which VA hospitals provide and utilize IT is greater than non-VA hospitals (OR:4.53, $p<0.01$). In the final multivariate model, use of IT ($p<0.01$) was a significant predictor of implementation of AUC measures while VA status was no longer significant ($p=0.08$).
CONCLUSIONS: VA hospitals are using guideline recommended measures to control antibiotic use more frequently than non-VA hospitals. Implementation of IT to support antibiotic control measures may explain much of this effect.

58. Travel-related savings through use of automated drug dispensing systems. *Darren M. Triller, Pharm.D.*[1], John Rugge, MD[2], James Donnelly, B.S.[2]; (1)Albany College of Pharmacy, Albany, NY; (2)Hudson Headwaters Health Network, Glens Falls, NY.

PURPOSE: Pharmacy access may be difficult and costly for rural poor, and automated drug dispensing systems (ADDSs) may improve access and reduce travel-related costs. To assess savings associated with ADDS use at 2 clinics, mileage and travel cost measurements were compared to those associated with nearest traditional pharmacy.
METHODS: Addresses of ADDS users were imported into mapping software, and distances from home to clinic, clinic to pharmacy, and home to pharmacy measured, and distance for medication procurement at ADDS and nearest traditional pharmacy was then computed for each. Cost estimates were generated and reported as percent weekly median income by county.
RESULTS: 145 of 268 individuals had addresses suitable for analysis. Patients lived close to clinics (Clinic A, mean 4.9 miles; Clinic B, 4.2) but traveled significantly farther to nearest pharmacy (Clinic A, 20.3; Clinic B 11.2, $p<0.05$). Based on calculated distances, Clinic A patients using ADDS saved average travel distance of 32.6 miles, and an estimated $12.23 on automobile travel per encounter, while Clinic B patients saved 18 miles and $6.75. As a function of weekly median income, travel-related expenses accounted for 3.4% of weekly income for Clinic A patients, as opposed to 1.7% for Clinic B. Considering median out of pocket expense for ADDS prescription ($13.31), patients traveling more than 35 miles round trip to obtain prescriptions will spend more on travel than on medication itself.
CONCLUSIONS: ADDS provide improved access to medications for rural patients, and travel-related savings may exceed out of pocket costs of medications.

Hematology/Anticoagulation

59. An evaluation of direct thrombin inhibitor use. *John M. Koerber, Pharm.D.*[1], Jillian Szczesiul, B.S.[2], Maureen A. Smythe, Pharm.D.[3]; (1)William Beaumont Hospital, Royal Oak, MI; (2)Wayne State University, Detroit, MI; (3)Wayne State University, Suite 2190, Detroit, MI.

PURPOSE: Our institution does not have a policy regarding the use of the direct thrombin inhibitors (DTIs) argatroban and lepirudin. The objective was to characterize our use of these DTIs over one year (April 2003 through

March 2004).
METHODS: Patients were identified through the pharmacy system. Medical records were retrospectively reviewed and the following extracted: demographics, indication for DTI, duration of DTI therapy, heparin platelet factor 4 antibody (HPF4) results, and time between HPF4 order and initiation of DTI therapy. Indication for DTI use was categorized as clinical diagnosis of heparin-induced thrombocytopenia (HIT) with a positive HPF4, clinical diagnosis with a negative HPF4, suspected HIT, history of HIT or other.
RESULTS: 133 patients (61 female) received a DTI (114 argatroban, 15 lepirudin, and 4 both). The mean age and weight were 69.7 years and 80.1 kg, respectively. 147 courses of therapy were assessed. Indication for DTI therapy included clinical or suspected HIT (70.7%), history of HIT (17.7%), and other (11.6%). The majority of other use (76.5%) was thrombocytopenia, non-HIT related. HPF4 antibody results were positive in 38.3% of patients tested. The mean duration of therapy was 154 hours. In 25% of patients, DTI therapy was initiated more than 48 hrs after the HPF4 was ordered.
CONCLUSION: The major use of DTIs was for HIT. The significant time delay between the order for HPF4 and the initiation of DTI therapy, as well as the frequent use of DTIs for non-HIT cases, indicates the need for more education regarding appropriate DTI use and HIT treatment.

60. Comparative safety and efficacy of urokinase and recombinant tissue plasminogen activator in peripheral arterial occlusion: a meta analysis. *Stephen Sander, Pharm.D.*, C. Michael White, Pharm.D., Craig I. Coleman, Pharm.D.; University of Connecticut/Hartford Hospital, Hartford, CT.

PURPOSE: Peripheral arterial occlusion (PAO) is associated with considerable morbidity and increases dramatically with age. Thrombolytic therapy remains a viable alternative to surgery and is the preferred treatment in acute (<14 days) ischemic occlusions. However, the risk of hemorrhage associated with thrombolytic agents greatly limits their use, particularly in this vulnerable population. Several small trials have compared the two most commonly used agents, urokinase (UK) and recombinant tissue plasminogen activator (rTPA), and found small, but statistically insignificant, differences in rates of successful clot lysis and hemorrhage. A meta-analysis may provide adequate power to reveal any differences in efficacy and safety between these two agents.
METHODS: A systematic literature search through October 2004 was conducted to identify prospective, comparative trials of UK and rTPA in PAO. The primary outcome measure was successful complete lysis of occlusion. Other outcome measures included hemorrhage (major, minor, or combined major and minor), intracranial hemorrhage (ICH), limb loss, and mortality.
RESULTS: Six trials were identified, five of which were randomized. Upon meta-analysis, rTPA was associated with a greater rate of clot lysis compared to UK (OR 1.54; 95%CI[1.12,2.10], p=0.007). However, UK was associated with lower rates of minor (OR 0.52; 95%CI[0.28-0.97], p=0.04) and total (OR 0.51; 95%CI[0.29-0.91], p=0.02) bleed. The incidences of major hemorrhage, ICH, limb loss, and mortality were similar between agents.
CONCLUSIONS: Compared to UK, rTPA significantly increases odds of successful complete lysis of an acute peripheral arterial occlusion. However, UK is associated with a reduced risk of minor and any bleeding complications.

61. Venous thromboembolism prevention in medical patients: identifying at-risk patients and evaluating if venous thromboembolism prophylaxis is received and in appropriate prophylactic dosing regimens. *Jenna L. Nikesch, Pharm.D.*, Paru Patel, Pharm.D., Kanella Tsilimingras, BS Pharm; Sinai-Grace Hospital (Detroit Medical Center), Detroit, MI.

PURPOSE: The purpose of this study is to determine if venous thromboembolism (VTE) prophylaxis is being prescribed and if so, is it appropriately dosed. The Agency for Healthcare Research and Quality has published the report entitled "Making Health Care Safer: a Critical Analysis of Patient Safety Practices." Of the 79 patient safety interventions, the highest ranked safety practice was the "appropriate use of prophylaxis to prevent venous thromboembolism in patients at risk." The relative risk for developing a VTE can be up to eight times greater in hospitalized, medical patients. Current statistics indicate approximately 70% of thromboembolic events that are symptomatic and 80% of fatal pulmonary embolisms occur in non-surgical patients. The current guidelines from the American College of Chest Physicians (ACCP) recommend prophylaxis with low dose unfractionated heparin (LDUH) or low molecular weight heparin (LMWH).
METHODS: We are conducting a prospective, randomized chart review of 100 medical patients to ascertain if they receive appropriate VTE prophylaxis as defined by ACCP guidelines.
RESULTS: Of patients evaluated to date at Sinai-Grace Hospital (Detroit Medical Center), 45% are obese, 18% have cancer and 45% have an infective process. Of patients with risk factors for VTE, only 42% received prophylaxis and of which 67% of these patients received inappropriate prophylaxis.
CONCLUSIONS: These alarming numbers illustrate the need for medical patients to be screened regarding their risk factors for VTE and for appropriate prophylaxis.

Herbal/Complementary Medicine

62. Echinacea for the prevention and treatment of the common cold: a meta-analysis. *Katelin Zaslow, BS, Pharm*[1], Effie L. Gillespie, Pharm.D.[2], Craig I. Coleman, Pharm.D.[2]; (1)University of Connecticut, Storrs, CT; (2)University of Connecticut/Hartford Hospital, Hartford, CT.

PURPOSE: Acute respiratory infections, "colds" are common in the US. Most adults experience 2 to 4 colds/year, with children experiencing as many as 10 colds/year. Colds generally last from 2 to 14 days, result in significant loss in work and school productivity and increased healthcare utilization eclipsing $3.5 billion/year. Echinacea species (E. angustifolia, E. pallida and E. purpurea) have been shown to have immunostimulatory properties and thus have been studied for both prevention and treatment of colds. These studies; however, have demonstrated conflicting results. Therefore, we conducted a meta-analysis regarding Echinacea's use for prevention and treatment of a cold.
METHODS: A systematic literature search through November 2004 was conducted to identify trials using Echinacea for the common cold. To be included in this meta-analysis, studies had to be randomized, controlled trials verses placebo, have a Jadad score of >1 and adequately reported data on either incidence or duration-of-illness.
RESULTS: Our initial search identified 25 trials evaluating Echinacea. Nine trials met the inclusion criteria and were evaluated in this meta-analysis. Echinacea reduced both the incidence of cold (n=7 studies) and duration-of-illness (n=4 studies): odds ratio (OR) 0.40 (95%CI 0.21 to 0.76; test for heterogeneity p=0.001) and weighted-mean difference (WMD) -1.37 (95%CI -1.92 to -0.82; heterogeneity p=0.02). When studies containing active ingredients other than Echinacea were excluded (n=2 studies), similar reductions in the incidence of cold and duration-of-illness were observed: OR 0.59 (95%CI 0.42 to 0.84; heterogeneity p=0.55) and WMD -1.43 (95%CI -2.69 to -0.18; heterogeneity p=0.02).
CONCLUSION: Echinacea may decrease a patient's risk of contracting a cold and shorten their duration-of-illness; however, significant heterogeneity was observed between trials in this analysis, a variety of Echinacea-containing preparations were utilized and the safety of Echinacea still requires additional evaluation before its wide spread use can be recommended.

63. Nutraceutical use among hospitalized cardiac patients. *Margaret Zheng, Pharm.D.*, Tammy Burns, Pharm.D., William Hamilton, Pharm.D., Stephanie Maciejewski, Pharm.D., Daniel Hilleman, Pharm.D.; Creighton University School of Pharmacy, Omaha, NE.

PURPOSE: Use of nutraceuticals (dietary supplements, vitamins, herbs, and botanicals) has increased over the past two decades. Routine medication histories often fail to elicit the use of nutraceuticals among hospitalized patients. We evaluated nutraceutical use in cardiac patients through the use of a specialized medication history tool administered by pharmacists.
METHODS: Patients admitted to the cardiology service at our hospital between March 1, 2004 and July 31, 2004 were interviewed by a pharmacist or pharmacy student with a tool specifically designed to evaluate the use of nutraceuticals. The pharmacy derived history was compared with that obtained during the routine medical history. The outcome of the two histories (number of patients taking 1 or more nutraceuticals) was compared using the χ^2 test.
RESULTS: 473 patients were interviewed which included 253 (53%) men and 220 (47%) women with a mean age of 66.7 ± 12.1 yrs. Ethinic background was as follows: Caucasian 327 (69%); African American 60 (13%); Latino 76 (16%); Native American 7 (1.5%); and Asian/Pacific Islander 3 (0.5%). Level of education was 12.2 ± 3.3 yrs. Admitting diagnoses were USA in 238 (50%), MI in 117 (25%), arrhythmia in 50 (11%), and heart failure in 45 (9%). Routine medication history indicated that 71 (15%) patients were using one or more neutraceuticals while the pharmacy medication history indicated that 194 (41%) were using nutraceuticals (p = 0.02). The most commonly used nutraceuticals were coenzyme Q10 in 65, garlic or garlic derivative in 49, fish oil in 48, saw palmetto in 43, vitamin E in 40, ginseng in 38, St. John's Wort in 30 and Echinacea in 25.
CONCLUSIONS: Routine medication histories fail to determine the use of nutraceuticals in a substantial portion of cardiac patients. More detailed histories specifically targeting nutraceutical use are needed to elicit and accurate medication history.

HIV/AIDS

64. Adherence with standards of care in an HIV primary care clinic. *Julie Wright, Pharm.D.*., Darcie L. Keller, Pharm.D.., Amira Ghazali, Medical student, Arthur J. Vaught, Medical student, Sharon Kathrens, ARNP; University of Missouri-Kansas City/Truman Medical Center, Kansas City, MO.

PURPOSE: To evaluate adherence with currently accepted HIV specific and

health maintenance standard of care goals in patients receiving primary care in an urban infectious diseases clinic. The impact of using a care goal checklist on the rate of adherence with selected goals was also assessed.
METHODS: The medical records of 100 HIV infected adult patients who received care during June and July 2004 were reviewed. The preceding 13 month period was reviewed for adherence with pre-specified standard of care elements.
RESULTS: Adherence with obtaining HIV RNA and CD4 and assessing medication adherence, mental health, tobacco and substance use were high (>80%). Evaluation of lipid profiles, medication side effects, and the additional monitoring from changes in antiretroviral therapy were lower (60%-79%). The care goal check list was used in 53/100 charts. Without the checklist pelvic exam (30%), mammography (33%), ophthalmic (32%), dental (7%), and osteoporosis (3%) evaluations were infrequent and immunization rates ranged from 11 to 41%. Use of the checklist significantly increased adherence rates with pelvic exam (65%), mammography (64%), ophthalmic exam (63%) and immunizations (range 55-70%) (each χ^2 comparison, p<0.001). Osteoporosis and dental exam rates did not change.
CONCLUSIONS: Use of the care goal checklist was associated with higher levels of adherence with standard of care goals. By employing such tools, HIV primary care providers may be better able to maintain goals where adherence is high and improve areas where adherence with standard of care goals are low.

65. Retrospective evaluation of antiretroviral pharmacotherapy in an urban infectious diseases clinic. *Darcie L. Keller, Pharm.D.*, Julie Wright, Pharm.D., Erin B Teeter, Medical student; University of Missouri-Kansas City/Truman Medical Center, Kansas City, MO.

PURPOSE: To measure the prevalence of problematic pharmacotherapy in HIV infected patients on HAART in an urban infectious diseases clinic.
METHODS: Medical records of 100 HIV infected adult patients on HAART who received care during June and July 2004 were reviewed. Data was collected to assess each patient's medication regimen for drug-drug and drug-disease state interactions, drug-related adverse effects and areas for additional pharmacotherapy optimization.
RESULTS: No clinically significant drug interactions were identified. However, 29% of patients had documentation of drug related adverse effects. Among the potential drug-disease state interactions, 32% (26/82) of patients on HAART were either on treatment for or had an elevated LDL cholesterol. Eighteen patients had no assessment of LDL cholesterol, (including 4 patients with hypertriglyceridemia) with ten of these patients on protease inhibitor (PI) based regimens. Of the 26, 65% of these patients were taking statin therapy, 46% were at their LDL goal, and 81% were on PI-based regimens. Nine patients had diabetes mellitus, including eight patients on PI-based regimens. Suboptimal dosing of HAART and potential to simplify medication regimens was identified in 12% and 28% of patients, respectively.
CONCLUSIONS: Treatment of HIV infection with HAART is complicated. Drug-disease state interactions and adverse effects are common issues affecting patient care. Pharmacist evaluation of pharmacotherapeutic regimens can identify important interactions and minimize adverse effects. In addition, adjustments in suboptimal dosing regimens and simplification of complicated regimens may improve adherence and patient outcomes.

Infectious Diseases

66. A national drug shortage of conventional amphotericin B redefines the role of amphotericin B lipid complex. *Erik J. Rachwalski, Pharm, D*[1], Debra A. Goff, Pharm.D.[2]; (1)Northwestern Memorial Hospital, Chicago, IL; (2)*The Ohio State University Medical Center, Westerville, OH.

PURPOSE: In May 2003, a national shortage of conventional Amphotericin B (AmB) resulted in a mandatory substitution of amphotericin B lipid complex (ABLC) for AmB as primary antifungal therapy. This study documented which patients benefited from the renal sparing effects of ABLC when given as initial therapy.
METHODS: Medical records of 101 patients receiving AmB prior to shortage (n=50) or ABLC between May-November 2003 (n=51) were reviewed. Exclusions included: BMT, hematology/oncology, or neonatal patients. Data collected: underlying diseases [diabetes, solid organ transplant (SOT), dehydration, chronic renal insufficiency (CRI), CHF, CABG, HIV], concomitant nephrotoxic medications (CNM), age, renal function, duration, length of stay (LOS), and mortality.
RESULTS: Acute renal failure (ARF) occurred in 34% (17/50) AmB (1 required dialysis), and 16% (8/51) of ABLC (p<0.05), none required dialysis. LOS was 30 and 24 days, duration of therapy 10 and 7 days, overall mortality 38% and 47%, respectively.

Underlying conditions *p<0.05	# patients	% ARF AmB	ABLC
CNM	63	37	14*
Dehydration	71	30	17
CRI	34	40	26
Diabetes	39	27	4
SOT	13	25	11

CONCLUSION: ABLC was less nephrotoxic than AmB for all underlying conditions. Patients with conditions that increase the risk of nephrotoxicity had a lower incidence of ARF with ABLC than AmB. ABLC should be considered for initial therapy in patients with normal renal function who are receiving CNM or have underlying conditions that increase the risk of ARF. This drug shortage forced us to use the more expensive agent, but important risk benefits were identified.

67E. Comparisons in gene expression between an antibiotic susceptible serotype 4 strain (TIGR4) of Streptococcus pneumoniae and a multi-drug resistant strain. *Holly L. Hoffman, Pharm.D.*, Huda J. Mussa, Ph.D., Isaac F. Mitropoulos, Pharm.D. Candidate; University of Oklahoma, Oklahoma City, OK.

Presented at the Conference on Functional Genomics of the American Society for Microbiology, Portland, OR, October 6-9, 2004.

68. Discordance between comparable *Pseudomonas aeruginosa* antibiogram susceptibilities and pharmacodynamic target attainment rates: Importance of the MIC distribution. *Brian A. Potoski, Pharm.D.*[1], Blair Capitano, Pharm.D.[1], Bonnie A. Falcione, Pharm.D.[2], David L. Paterson, M.D.[3]; (1)University of Pittsburgh School of Pharmacy, Department of Pharmacy and Therapeutics, Pittsburgh, PA; (2)Department of Pharmacy, University of Pittsburgh Medical Center, Pittsburgh, PA; (3)University of Pittsburgh Department of Medicine, Division of Infectious Diseases, Pittsburgh, PA.

PURPOSE: To evaluate the impact that similar susceptibility data yet varying MIC distributions have on pharmacodynamic target attainment (TA) rates in patients treated for nosocomial pneumonia (NP) with levofloxacin 750mg once daily.
METHODS: Three antibiograms were created, each representing a hospital's susceptibility data for *Pseudomonas aeruginosa* (PA). The PA susceptibility to levofloxacin for each set of data was 66%, yet each had a different MIC distribution: institution one (I1) mirrored national surveillance data; institution two (I2) mirrored our institution; and institution three (I3) was arbitrarily created. A 10,000 subject Monte Carlo simulation was performed. Pharmacodynamic TA values and pharmacokinetic parameters of levofloxacin 750mg in patients treated for NP were previously identified. The TA value correlated with 95% pathogen eradication was used. Fractional TA rates for each MIC were calculated, and the total TA rate was obtained for each institution.
RESULTS: Empiric TA rates in patients with NP caused by PA treated with levofloxacin in each of the three different institutions were I1 (61.2%); I2 (54.1%); and I3 (47.3%), (p<0.01). Once the organism susceptibility was confirmed, TA rates were I1 (91.8%); I2 (81.2%); and I3 (69.7%), (p<0.01).
CONCLUSIONS: As the MIC values in susceptible organisms approach interpretive criteria for resistant, a net susceptibility change may not be perceived, yet the difference in pharmacodynamic TA rates may be significant. Organism MIC distribution data should be consulted in addition to antibiogram susceptibilities when considering antibiotic therapy.

69. Empirical pharmacodynamic (PD) target attainment (TA) of fluoroquinolones (FQ) for Gram-negative aerobes (GNA) in ventilator-associated pneumonia (VAP) and nosocomial bacteremia (NB). *Kiran K. Ubhi, Pharm.D.*[1], Lawrence Friedrich, Pharm.D.[2], Roger L. White, Pharm.D.[1]; (1)Medical University of South Carolina, Charleston, SC; (2)Bristol-Myers Squibb, Charleston, SC.

PURPOSE: Monte Carlo PD analysis (MCA) is organism-specific and not directly applicable to empirical therapy. Empirical TA, based on likelihood of encountering organisms in selected infections, may be used to assess whether monotherapy or combination is indicated.
METHODS: Empirical TA for 2 infections with different distributions of 5 GNAs was evaluated (see Table). Using TA from a MCA of 5 FQ regimens (AUC/MIC>100) and the distribution of GNA in these infections, potential for monotherapy (e.g., TA>0.9) was assessed. The MCA was conducted with MICs (n=2,382) of ciprofloxacin (C), levofloxacin (L) and gatifloxacin (G) and AUCs (based on CrCl 10-120 mL/min) for 5 IV FQ regimens. Fractional TA, based on TA for each organism and its percentage in each infection, were summed to determine empirical TA and differences among regimens assessed (ANOVA).

	VAP	NB
	Data from 27 studies	Data from 5 studies
Organism	Percentage of isolates	
Acinetobacter species	20.9	5.5
Enterobacter species	10.2	29.6
Klebsiella species	8.6	35.7
Pseudomonas aeruginosa	53.6	18.1
Serratia species	6.7	11.1
Drugs	Empiric TA rates	
C400mg q12h	0.52	0.73
C400mg q8h	0.59	0.77
L500mg q24h	0.46	0.72
L750mg q24h	0.58	0.79
G400mg q24h	0.36	0.67

RESULTS: No statistical differences were noted among the regimens for VAP or NB; however, TA varied from 0.36-0.59 for VAP to 0.67-0.79 for NB (see Table).
CONCLUSIONS: Overall, TA was low (< 0.9) suggesting that empirical FQ monotherapy of these GNA may not be wise. Empirical TA was lower for VAP than NB; however, differences among FQ regimens were minimal.

70. Monte Carlo simulation versus S. pneumoniae of levofloxacin 500 mg, 750 mg and 1000 mg once daily compaired to gatifloxacin 200 mg and 400 mg once daily administered to hospitalized patients with community-acquired pneumonia (CAP). *Ayman M. Noreddin, MSc., Ph.D.*[1], Daryl Hoban, PhD[2], George G. Zhanel, Pharm.D., Ph.D.[3]; (1)College of Pharmacy, Univeristy of Minnesota, Duluth, MN; (2)International Health Management Associates, Inc., Schaumburg, IL; (3)Univeristy of Manitoba, Winnipeg, MB, Canada.

PURPOSE: This study aimed to assess the probability of Levofloxacin (Levo) compared to Gatifloxacin (Gati) achieving favorable pharmacodynamic (PD) targets for bacterial eradication and prevention of resistance development in *P.aeruginosa*. Various doses of Levo as well as Gati 400mg OD dosing were simulated and target attainment potential was estimated in critically ill patients.
CONCLUSION Previously described and validated population pharmacokinetic (PK) models of Levo and Gati in critically ill hospitalized patients were utilized to simulate Levo as well as Gati PKs. Free-drug $AUC_{0\text{-}24}$ were simulated in Plasma (P) using Levo dosing at 500mg, 750mg and 1000mg OD as well as Gati 400mg OD. Use of Monte Carlo Simulation allowed for the full variability of encountered drug clearance to be accounted. *P.aeruginosa* susceptibility data were obtained from the North American Urinary Tract Infection Surveillance Study (NAUTICA). The NAUTICA study collected 2000 outpatient and 2000 inpatient urinary isolates from all geographic regions in Canada and the US (ICAAC 2003).
RESULTS: Probability of target attainment (free $AUC_{0\text{-}24}$/MIC of 125 and 250) of Levo and Gati is shown in the following table:

Levo	125	250
500 mg	28.5%	15.4%
750 mg	39.7%	22.7%
1000 mg	45.4%	25%
Gati 400 mg	19.30%	14.90%

CONCLUSIONS: For critically ill patients, Levo 500mg, 750mg and 1000mg as well as Gati 400mg OD showed low probability for target attainment of free $AUC_{0\text{-}24}$/MIC of 125 or 250 against *P.aeruginosa*. For treatment of *P.aeruginosa* infections using the highest dose possible of fluoroquinolone in combination with another antibiotic is imperative.

71. Outcomes of patients hospitalized with community-acquired pneumonia (CAP) due to *Streptococcus pneumoniae* after failing to respond to a fluoroquinolone. *Joseph A. Paladino, Pharm.D.*[1], Michael S. Niederman, MD[2], Martin H. Adelman, PhD[1], Alan Forrest, Pharm.D.[1], Jerome J. Schentag, Pharm.D.[1]; (1)CPL Associates, Buffalo, NY; (2)Winthrop University Hospital, Mineola, NY.

PURPOSE: Numerous case reports document patients with CAP, caused by *S. pneumoniae*, who failed levofloxacin. The incidence of fluoroquinolone-resistant *S. pneumoniae* (FRSP), <3% in North America, is increasing. As the clinical implications may not be fully appreciated, a study, including all fluoroquinolones (FQ), was conducted.
METHODS: Multi-center study to characterize clinical, microbiological, and pharmacoeconomic outcomes of patients who, after failing to respond to a FQ, were then hospitalized with CAP (consistent with Phase III criteria) caused by *S. pneumoniae* (isolated from bloodstream or lungs), and to observe whether FQ failures are associated with resistant or susceptible *S. pneumoniae*. IRB approval was obtained by 18 investigators.
RESULTS: 31 patients (16 F) from 14 hospitals in 11 states were enrolled retrospectively. Mean/median age was 66/71 years (range: 27-86). Patients received the following FQs: levofloxacin (16), ciprofloxacin (12), moxifloxacin (2), gatifloxacin (1) - mean duration of treatment was 4.8 days (range 2-9). FRSP was identified in 37% and bacteremia in 40% (of which 50% was FRSP) of patients. Median length of stay (LOS) was 11 days (1.7 ICU days). Mean per patient cost was $17,593 (inlier reimbursement for DRG 90 is $2,479 and $4,632 for DRG 89).
CONCLUSIONS: Historically, 20% of patients admitted with CAP caused by *S. pneumoniae* are bacteremic. This study suggests that if patients fail to respond to a FQ, the incidence of bacteremia and FRSP are much higher than previously reported. Moreover, LOS is much greater than the DRG average for pneumonia, with a cost far in excess of reimbursement.

72. Outcomes of patients with no antifungal therapy and positive blood cultures for yeast. *Lynn Nadeau, Pharm.D.*[1], Sunshine Blain, Pharm.D., student[2], Ellie Hershberger, Pharm.D.[3], Marcus Zervos, MD[1]; (1)William Beaumont Hospital, Royal Oak, MI; (2)Wayne State University, Detroit, MI; (3)Pfizer Pharmaceuticals, Ann Arbor, MI.

PURPOSE: To evaluate the outcomes of patients with candidemia that did not receive antifungal therapy.
METHODS: All patients with positive blood cultures for Candida sp. were identified via microbiology reports over 8.5 years at a single institution. Patients with >/= 1 positive blood culture that did not receive antifungal therapy were eligible for inclusion. Charts were reviewed to assess demographic data, risk factors, outcome data and subsequent admissions for sepsis or antifungal therapy within 90 days following the positive blood culture(s).
RESULTS: Two hundred forty-nine patients with candidemia were assessed for eligibility, 25 patients met inclusion criteria. Fourteen patients survived without antifungal therapy compared to 11 patients that expired. Of these 11 patients, 3 patients expired > 72 hours after positive blood cultures and another 2 patients had negative cultures at the time of expiration. There was no difference in demographic data or number of risk factors among the patients that survived or expired. However, 91% patients that expired met >/= 2 SIRS criteria at the time of positive fungal blood cultures compared to 29% patients that survived (p=0.004). C. albicans was more prevalent among patients that expired than those that survived, 73% versus 29% patients respectively (p=0.047) and C. parapsilosis was more prevalent among patients that survived than those that expired, 43% versus 0% patients respectively (p=0.020).
CONCLUSIONS: Favorable outcomes, despite lack of antifungal therapy, were seen in patients with non-albicans candidemia and in patients that met.</= 2 SIRS criteria at the time of culture.

73. The incidence of C. difficile-associated diarrhea (CDAD) with levofloxacin compared to moxifloxacin. *Lynn Nadeau, Pharm.D.*, Sonia Gyamlani, M.D., Nisreen Khazaal, M.D., Mamtha Balasubramaniam, M.S., Marcus Zervos, M.D.; William Beaumont Hospital, Royal Oak, MI.

PURPOSE: To evaluate the incidence and outcome of C. difficile infection in patients receiving levofloxacin compared to moxifloxacin.
METHODS: July thru December 2003 and 2004 served as the levofloxacin and moxifloxacin time periods respectively. Microbiology and pharmacy records were reviewed for each time period to identify patients with both a positive C. difficile assay and exposure to either levofloxacin or moxifloxacin. Medical records of these patients were reviewed; demographic data, risk factors, antibiotic use, severity of CDAD symptoms, and clinical and microbiological outcome data was collected.
RESULTS: Eight hundred seventy one patients with positive C. difficile assays were assessed for eligibility, 50 patients met inclusion criteria in each group. The incidence of CDAD with levofloxacin or moxifloxacin use was 10.4% and 12.9% respectively (p=0.29). There was no difference among the groups with respect to demographic data or risk factors for CDAD. The duration or fluoroquinolone use prior to C. difficile infection did not differ, 9.0 +/- 10.5 days versus 8.1 +/- 10.1 days (p>0.05), between the levofloxacin and moxifloxacin groups. Furthermore, there was no difference among the groups with respect to severity of illness at time of CDAD diagnosis or complications from C. difficile infection (p>0.05). Clinical outcomes were similar between the groups, 90% versus 85% patients in the levofloxacin and moxifloxacin groups respectively, were deemed cured or presumed clinically cured (p>0.05) following therapy.
CONCLUSIONS: Despite increased anaerobic activity, hepatic metabolism/elimination, and higher concentrations in the gastrointestinal tract, moxifloxacin has a comparable incidence and outcome of CDAD compared to levofloxacin.

74E. Results of a phase 3, double-blind, safety and efficacy study comparing tigecycline with vancomycin/aztreonam to treat complicated skin and skin structure infections. Nathalie Dartois, MD[1], *Evelyn J. Ellis-Grosse, PhD*[2], Evan Loh, MD[2]; (1)Wyeth Research Paris, Paris, France; (2)Wyeth Research, Collegeville, PA.

Presented at the 44th Interscience Conference on Antimicrobial Agents and Chemotherapy, Washington D.C., October 30-November 2, 2004.

75E. Tigecycline vs imipenem/cilastatin for treatment of complicated intra-abdominal infections. Nathalie Dartois, MD[1], Martine Gioud-Paquet, MD[1], *Evelyn J. Ellis-Grosse, PhD*[2], Evan Loh, MD[2]; (1)Wyeth Research Paris, Paris, France; (2)Wyeth Research, Collegeville, PA.

Presented at the 44th Interscience Conference on Antimicrobial Agents and Chemotherapy in Washington D.C., October 30-November 2, 2004.

Managed Care

76. Optimal lipid value attainment and cardiovascular event risk in a managed care setting. *Scott L. Charland, Pharm.D.*[1], Mark J. Cziraky, Pharm.D.[2], Chaitanya Sarawate, MS[2], Vincent J Willey, Pharm.D.[2], Eric J Stanek, Pharm.D.[1]; (1)Kos Pharmaceuticals, Inc, Weston, FL; (2)HealthCore, Wilmington, DE.

PURPOSE: To evaluate the rate of combined optimal lipid value attainment and associated risk of cardiovascular events (CVE).
METHODS: Patients with a full lipid panel from 10/1/99 - 9/30/00 (index

lab), no lipid therapy, and continuous eligibility of 12 months pre and post-index lab were retrospectively identified in a 1.1 million member US managed care database. Optimal lipid values were established using NCEP ATP-III guidelines. Combined optimal lipid (LDL-C+HDL-C+TG) values were assessed at index and during follow-up. Risk status was either high-risk (age; men>45 years, women>55 years; HDL-C <40mg/dL; hypertension), or secondary prevention (pre-index cardiovascular disease or diabetes). CV diagnoses/events were determined by ICD-9 and CPT codes [CVE: acute ischemic episodes/MI, PAD, stroke/TIA, or revascularization procedure]. Odds ratios (OR) for CVE were determined by multivariate logistic regression.
RESULTS: A total of 5,955 CVE were identified in 30,348 patients over a follow-up of 27±8 months. Demographics: mean age 66±12 years, 54% male, 43% high risk and 57% secondary prevention. Lipid-altering therapy was prescribed in 30% after a delay of 7±8 months. Only 22% achieved combined optimal lipid values. Not achieving optimal lipid values was associated with a 45% increase in CVE compared to achieving optimal values (OR: 1.45; 95% CI: 1.24-1.68).
CONCLUSION: In this managed care setting, a majority of patients were not started on lipid altering therapy (70%), and did not achieve combined optimal lipid values (78%). Not achieving combined optimal lipids was associated with a significant increase in CVE.

Medication Safety

77. Acetaminophen overuse and lack of prescriber awareness in a Medicaid population. *Barbara L. Hoover, Pharm.D., BCPS*[1], Julie J. Wilkinson, Pharm.D., BCPS[2], Rex W. Force, Pharm.D., FCCP, BCPS[1], Vaughn L. Culbertson, Pharm.D.[3]; (1)Idaho State University, Department of Family Medicine, Pocatello, ID; (2)South University, Department of Pharmacy Practice, Savannah, GA; (3)Idaho State University, Department of Pharmacy Practice, Pocatello, ID.

PURPOSE: To evaluate acetaminophen use in a Medicaid population, and to evaluate prescriber and pharmacist awareness of inappropriate prescribing.
METHODS: Between April 1, 2002 and March 31, 2003, patients over age 18 were identified who, over a 90-day period, averaged greater than five grams of acetaminophen daily or two grams daily with a diagnosis of liver dysfunction or alcoholism. Providers and pharmacists involved in the cases were sent questionnaires regarding the specific cases.
RESULTS: The Medicaid database query revealed 27,603 patients received 128,426 prescriptions containing acetaminophen during the defined time period. Ninety-four patients filled prescriptions averaging over five grams of acetaminophen daily, and 103 patients with liver dysfunction or alcoholism filled prescriptions averaging over two grams of acetaminophen daily. On average, two practitioners were involved in every case (range 1-12). Seventy-eight percent of physicians and 60% of pharmacists responded. Of responses received, 91% of providers and 95% of pharmacists were aware patients should not exceed four grams of acetaminophen daily, and 83% and 88% respectively knew patients with alcoholism and/or hepatic dysfunction should not exceed two grams daily. Of the responders, 17% of practitioners and 49% of pharmacists were aware of their patient's overuse of acetaminophen. Fifty-seven percent of responding practitioners claimed this intervention would cause them to change their patient's drug regimen.
CONCLUSION: In general, healthcare providers appear well educated about acetaminophen safety limits, but this knowledge did not translate into clinical practice. Many practitioners and pharmacists were unaware of the amount of acetaminophen their patients were using.

78. B-type natriuretic peptide levels not increased in heart failure patients receiving thiazolidinediones. *Mark Granberry, Pharm.D.*[1], Sandra L. Tijerina, MS[1], Jaime Balli, Pharm.D.[2], Michael D. Evans, MD[3]; (1)The University of Texas Pan American, Edinburg, TX; (2)The University of Texas Austin, Austin, TX; (3)Heart Clinic, McAllen, TX.

PURPOSE: The thiazolidinediones (TZDs) rosiglitazone and pioglitazone are insulin-sensitizing drugs used to treat type 2 diabetes mellitus. Because they are known to cause edema, their use in heart failure patients needs further investigation. B-type natriuretic peptide (BNP) is useful in the assessment of patients with heart failure and higher levels predict worse outcomes. Thus, BNP may offer insight into the safety of TZD use in these patients. Our objective was to determine if BNP levels are increased in heart failure patients taking a TZD.
METHODS: In this cross-sectional study of patients with clinically stable New York Heart Association class I or II heart failure, we compared BNP levels in a group receiving a TZD versus a group not receiving a TZD. BNP levels were tested for a statistically significant difference with a 2 tailed t-test for independent samples. Statistical significance was defined as a p value of < 0.05.
RESULTS: A total of 16 patients have been studied (10 patients on TZD and 6 not on TZD). The 2 groups were similar in age, weight, heart failure class, blood pressure, and current medication use. The mean BNP in the TZD group was 95.5 ± 72.2 pg/mL versus 118 ± 115 pg/mL in the non-TZD group. P = 0.32
CONCLUSION: In a small sample of patients with stable, mild heart failure, TZD use was not associated with increased BNP levels. TZD use may be safe in patients with mild, stable heart failure symptoms.

79E. Baxter's colleague cx with guardian feature: the implementation and evaluation of smart infusion pump technology in the medical intensive care unit. *Christopher R. Fortier, Pharm.D.*, Joseph E. Mazur, Pharm.D., BCPS, Paul W. Bush, Pharm.D., MBA, FASHP; Medical University of South Carolina, Charleston, SC.

Presented at the Midyear Clinical Meeting of the American Society of Health-System Pharmacists, Orlando, FL, December 5-8, 2004.

80. Evaluation of the risk of therapeutic duplication upon discharge from hospitals with therapeutic substitution programs. *Martin R. Giannamore, Pharm.D., BCPS*[1], Thomas A. Wolfe, Pharm.D.[2], Stuart J. Beatty, Pharm.D.[3], Bonnie A. DeLor, Pharm.D., BCPS[4], James L. Baker, Pharm.D.[5], Angela J. Milad, RPh[6], Laura J. Stewart, RPh[7], Sharon L. Thompson, Pharm.D.[8]; (1)Pfizer Global Pharmaceuticals, Inc., Dublin, OH; (2)Pfizer Global Pharmaceuticals, Inc., Westerville, OH; (3)MedCenter Pharmacy, Pharmacotherapy Clinic, Marion, OH; (4)Pfizer Global Pharmaceuticals, Inc., Detroit, MI; (5)Med Central Health Systems Pharmacy Department, Mansfield, OH; (6)Harper University Hospital Department of Pharmacy, Detroit, MI; (7)Mount Carmel Health System, Mt Carmel East Hospital Pharmacy Department, Columbus, OH; (8)Mount Carmel Health System, St. Ann's Hospital Pharmacy Department, Columbus, OH.

PURPOSE: Drug therapy of seven commonly substituted medication classes was evaluated to: 1. estimate the risk of therapeutic duplication (TD) post discharge, and 2. determine the impact of hospital length of stay (LOS), age, and the number of co-morbidities on the risk of TD post discharge.
METHODS: A retrospective, multi-center chart review was conducted for 388 hospitalized patients who received a medication from at least one of the following classes pre-admission and at discharge: ACE inhibitor, ARB, COX-2 inhibitor, H2-antagonist, PPI, statin, or NSAID. Age, gender, LOS, number of co-morbidities, and drug therapy pre-admission, during hospitalization, and upon discharge were documented. Risk of TD was defined as the occurrence of a medication being substituted upon admission but not switched back to the pre-admission medication upon discharge. The t-test was utilized to analyze the relationship between the risk of TD vs. age, LOS, and number of co-morbidities.
RESULTS: Therapeutic substitutions were documented for 279 (47%) of all medication entries with 201 (72%) of these entries being switched back to the original medication(s) upon discharge. Sixty-six (17%) patients were at risk of TD post discharge. Only LOS was significantly different between patients at risk of TD vs. those not at risk (9.0 days vs. 6.6 days, respectively; $p < 0.05$).
CONCLUSIONS: Among the medication classes studied, there was a high likelihood of both therapeutic substitution upon admission and switching back to the pre-admission medication upon discharge. Approximately one fifth of patients were at risk of TD post discharge with higher risk among patients with a longer LOS. Future studies should expand upon this foundational analysis to improve medication safety during transitions among different health care settings.

81. Improving the safety of a statin therapeutic interchange program. *Peter Dumo, Pharm.D.*[1], Lina Saad, Pharm.D.[2], Jing Zhao, Pharm.D.[2], Ying Zhao, Pharm.D.[2], Nellie Berlie, Pharm.D.[2]; (1)Harper University Hospital, Detroit, MI; (2)Wayne State University, Detroit, MI.

PURPOSE: A therapeutic interchange (TI) policy for the statin class was implemented at our institution, with the preferred statin being simvastatin (SMV). Previous research had shown that this TI program had significantly increased patient exposure to SMV drug interactions (DI). We carried out pharmacist education and additional process improvment related to SMV TI. We report on the impact of our process-improvement efforts on statin (DI).
METHODS: Pharmacy records were reviewed for all inpatients prescribed a statin during the 3 months before TI(Pre-TI), after implementing the TI program (Post-TI), and after process-improvement (Post-PI). Patients who received any statin in combination with an agent known to produce a significant drug interaction had their inpatient chart reviewed. After the initial safety assessment, we conducted a process improvement program composed of pharmacist education and enhanced computer support.
RESULTS: A total of 2033 hospitalizations were reviewed. DI exposure was 6.1% Pre-TI, and rose to 16.1%* Post-TI. After education and process improvements, DI rate dropped to 0.5%* Post-PI. No patient suffered any adverse event secondary to DI. *$p< 0.05$ vs Pre-TI, Chi-Square
CONCLUSIONS: A pharmacy-led process improvement in a statin TI program led to a significant decrease in exposure to potential drug interactions. As such, properly-designed TI programs can serve as tools to optimize pharmacotherapy, decrease cost and improve patient safety.

82. Pictograms: a tool for enhancing health care outcomes among underserved patients in primary care? *Oralia Bazaldua, Pharm.D.*, Cindy Alford, Ph.D., Miguel Bedolla, M.D., Sarah Araujo, BS; The University of

Texas Health Science Center at San Antonio - Department of Family and Community Medicine, San Antonio, TX.

Low-literacy patients have difficulty reading prescription bottles and may not know the purpose or dosing of their medications.
PURPOSE: (1) Determine if pictograms enhance recall of medication knowledge, (2) Determine if literacy levels influence the efficacy of above intervention, (3) Determine if an increase in medication knowledge improves long-term disease outcome measures (blood pressure, HgA1c, LDL).
METHODS: Randomized, clinical trial in uninsured,Hispanic, low-literacy population. At a scheduled physician visit, patients are recruited with the following inclusion criteria: (1) three or more medications, (2) diagnosis of diabetes, hypertension, hyperlipidemia, (3) have medication bottles, (4) responsible for taking own medications, (5) has poor medication knowledge (patient not able to report ALL following items correct: name, purpose, dosing regimen).
Intervention (1) VERBAL instructions alone providing correct information (control group), OR (2) VERBAL instructions PLUS PICTOGRAMS affixed to medication bottles depicting the purpose or dosing regimen (intervention group).
Measures - (1)Demographics, (2)Medication knowledge is determined by a face-to-face evaluation at baseline, 1 month, and 3 months, (3)Disease outcome measures most proximate to their enrollment and completion date are obtained, (4)Literacy levels are measured using the abbreviated version of the Test of Functional Health Literacy in Adults (s-TOFHLA).
RESULTS: All 180 patients have been enrolled and data is currently being evaluated. Preliminary analysis revealed 70% female, 80% Hispanic, 40% Spanish-Speaking and 50% at the lowest health literacy level. Knowledge improved 22% and 21%, respectively with verbal/pictogram intervention.
CONCLUSION: Both groups improved total medication knowledge to the same extent.

83. Provider acceptance of interventions to resolve medication-related problems. *Angela B. Hoth, Pharm.D.*[1], Barry L. Carter, Pharm.D., FCCP, BCPS, FAHA[2], Anjan Bhattacharyya, MD[3], Jose Ness, MD[3], Gary E. Rosenthal, MD[3], Peter J. Kaboli, M.D., MS[3]; (1)Center for Research in the Implementation of Innovative Strategies in Practice (CRIISP), Iowa City VA Medical Center, Iowa City, IA; (2)Center for Research in the Implementation of Innovative Strategies in Practice (CRIISP), Iowa City VA Medical Center, University of Iowa College of Pharmacy, Iowa City, IA; (3)Center for Research in the Implementation of Innovative Strategies in Practice (CRIISP), Iowa City VA Medical Center, University of Iowa Hospitals & Clinics, Iowa City, IA.

PURPOSE: To describe clinician acceptance of recommendations addressing medication-related problems identified by a collaborative pharmacist-geriatrician intervention targeting elderly veterans at risk for adverse drug events (ADEs).
METHODS: 257 primary care patients > 65 years with prescriptions for > 5 scheduled medications received the intervention. The one-time intervention included a detailed medication history, review of systems, medical records review, and development of therapeutic recommendations, which were presented to patients' primary care providers (PCPs). Recommendation acceptance was determined by review of the patients' medical record.
RESULTS: Patients had a mean age of 74 years and were taking a mean of 13.1 ± 4.8 medications. The intervention generated 1,810 recommendations (mean, 7.1 ± 3.5 per patient), of which 72% were accepted by PCPs within one year. PCPs only accepted 69% of recommendations to ameliorate actual or potential ADEs (n=264) and 63% of recommendations to discontinue medications without identifiable indications (n=92). Similarly, PCPs accepted 67% of recommendations to start therapy for untreated conditions (n=142) or add additional therapy for under-treated conditions (n=148), 69% of recommendations for drug monitoring (n=143), 72% of recommendations to optimize medication doses or schedules (n=261), and 69% of recommendations addressing formulary compliance (n=100). Overall acceptance rates were lower ($p<.001$) among staff physicians (65%) than among nurse practitioners (74%) or resident physicians (80%); differences were generally consistent across individual categories of recommendations.
CONCLUSIONS: A pharmacist-geriatrician intervention identified a high incidence of medication-related problems in vulnerable elderly veterans. However, a substantial proportion of recommendations, including those to ameliorate ADEs, were not accepted.

Nephrology

84. Clinical and economic impact of a three-times weekly darbepoetin conversion protocol in hospitalized hemodialysis patients. *Elizabeth G. Cincotta, Pharm.D.*, Nikki L. Milan, Pharm.D.; Harper University Hospital, Detroit, MI.

PURPOSE: Pharmacoeconomic analysis of erythropoietin alfa (EPO) usage supported conversion to darbepoetin alfa (DARB) in January 2004. DARB dosing was modified to three-times weekly for consistency with outpatient EPO schedules. The purpose of this evaluation is to assess the clinical and economic impact of a DARB formulary conversion in hospitalized hemodialysis patients.
METHODS: Data was retrospectively collected from inpatient hemodialysis records on patients prescribed EPO over six weeks in 2003 and compared to DARB data from a similar time in 2004. Demographic information, length of stay (LOS), EPO/DARB dosage and doses prescribed, admission and discharge hemoglobin/hematocrit and iron indices were documented. Economic analysis was performed comparing actual and projected costs from EPO utilization data with current DARB expenditures.
RESULTS: A total of 128 patients received 369 EPO doses and 157 patients received 360 DARB doses. Average LOS was 9.8 days for EPO and 11.3 for DARB. Average dosage and prescribed doses per patient were 9,642 units and 2.9 doses for EPO versus 40.2 µg and 2.3 doses for DARB. The mean hemoglobin (gm/dL) from admission to discharge declined 0.6 for EPO and 1.0 for DARB. Transferrin saturation averaged 23.6% for EPO and 28.4% for DARB. Actual 2003 EPO utilization cost for the evaluated period was $38,070. The projected equivalent DARB cost was $23,906. Actual DARB utilization was $33,988.
CONCLUSIONS: Similar changes in hemoglobin were seen with EPO and DARB. Variations in DARB prescribing need further evaluation. Overall DARB cost was higher than projected; however annual extrapolated cost savings exceed $35,000.

85. Evaluation of various methods for the calculation of creatinine clearance in obese patients. *Cyrine E. Haidar, Pharm.D., BCPS.*[1], Michael A. Wynd, Pharm.D., BCPS.[2]; (1)Hackensack University Medical Center, Hackensack, NJ; (2)Ernest Mario School of Pharmacy; Rutgers, The State University of New Jersey, Hackensack, NJ.

Evaluation of Various Methods for the Calculation of Creatinine Clearance in Obese Patients
PURPOSE: To determine which of ten equations to estimate creatinine clearance (CLcr) from serum creatinine (SCr) is the most precise and least biased compared to a 24-hour urine collection for Clcr in obese patients.
METHODS: Medical records of obese patients with a 24-hour urine collection for CLcr obtained between September 2003 and March 2004 were reviewed. Hospitalized patients meeting the following criteria were included: age >18 years, stable renal function and body mass index >30 kg/m^2. Patients were excluded if the 24-hour urine collection was performed incorrectly, the total amount of urine collected was <500 mL, renal function was unstable, or the patients had conditions or received medications that interfere with the assessment of SCr or Clcr.
RESULTS: Forty-one urine collections (from 24 patients) were analyzed. When compared to the 24-hour urine collection for Clcr, correlation (via linear regression), bias (mean error), and precision (mean squared error) were r = 0.57, 1.82, 36.81 for the Modification of Diet in Renal Disease (MDRD) equation; r = 0.58, -3.55, 37.39 for the Cockcroft-Gault imputing ideal body weight (CGIBW) equation; and r = 0.62, 24.79, 57.63 for the Salazar-Corcoran equation.
CONCLUSION: Dosing of renally eliminated medication in obese patients is complicated by the difficulty of estimating Clcr. In this study, when compared to the 24-hour urine collection for Clcr, the MDRD and CGIBW equations were the most accurate prediction equations of those assessed.

86E. Functional iron deficiency in hemodialysis (HD) patients with high ferritin (HF). *Adel R. Rizkala, Pharm.D., MS*[1], Robert Kopelman, MD[2], Lorelei Smith, RN[2], Leonard Peoples, BS[2], Ronna Biesecker, PhD[1]; (1)Watson Laboratories, Inc., Morristown, NJ; (2)Bakersfield Dialysis Center, Bakersfield, CA.

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87E. Identification of infectious risk factors in maintenance hemodialysis (HD) patients: The role of intravenous iron. *Adel R. Rizkala, Pharm.D., MS*[1], Gary Sirken, MD[2], Rasib Raja, MD[2]; (1)Watson Laboratories, Inc., Morristown, NJ; (2)Albert Einstein Medical Center, Philadelphia, PA.

Published in J Am Soc Nephrol 2004;15:627A.

88E. Sodium ferric gluconate complex in sucrose (SFGC) injection improves quality of life in chronic kidney disease (CKD) patients independent of increase in hemoglobin levels. *Adel R. Rizkala, Pharm.D., MS*[1], Rajiv Agarwal, MD[2]; (1)Watson Laboratories, Inc., Morristown, NJ; (2)Indiana University School of Medicine, Indianapolis, IN.

Published in J Am Soc Nephrol 2004;15:140A.

89E. The infusion of 250 mg of sodium ferric gluconate complex (SFGC) in sucrose over 1 hour has no deleterious effects on blood pressure of the majority of patients with chronic kidney disease (CKD). *Adel R. Rizkala, Pharm.D., MS*[1], Bahar Bastani, MD[2], Marwan O. Kaskas, MD[3], Rajiv Agarwal, MD[4]; (1)Watson Laboratories, Inc., Morristown, NJ; (2)St. Louis University, St. Louis, MO; (3)Northwest Louisiana Nephrology, Shreveport, LA; (4)Indiana University School of Medicine, Indianapolis, IN.

Published in J Am Soc Nephrol 2004;15:585A.

90E. Lanthanum carbonate and bone: no adverse effects observed after 1 year of treatment in a randomized, comparator-controlled trial. Hartmut H. Malluche, MD[1], Marie-Claude Faugere, MD[1], G. Wang, MD[1], William Finn, MD[2], *Hilary Mandler, Pharm.D.*[3]; (1)Division of Nephrology, Bone and Mineral Metabolism, University of Kentucky, 800 Rose Street, Room MN-564, Lexington, KY; (2)University of North Carolina, Chapel Hill, NC; (3)Shire Pharmaceuticals, Wayne, PA.

Presented at the 37th Annual Meeting of the American Society of Nephrology, St. Louis, MO, October 29 - November 1, 2004.

91E. No evidence of osteomalacia in dialysis patients treated with lanthanum carbonate for up to 5 years. Hartmut H. Malluche, MD[1], Anthony J. Freemont, MD[2], J. Denton, MD[2], Marie-Claude Faugere, MD[1], G. Wang, MD[1], Stephen J.P. Damment, PhD[3], Isobel Webster, RN[3], *Larry Segars, Pharm.D., BCPS*[4]; (1)Division of Nephrology, Bone and Mineral Metabolism, University of Kentucky, 800 Rose Street, Room MN-564, Lexington, KY; (2)The Medical School, University of Manchester, Manchester, United Kingdom; (3)Shire Pharmaceutical Development, Ltd., Basingstoke, United Kingdom; (4)Shire Pharmaceuticals, Wayne, PA.

Presented at the 37th Annual Meeting of the American Society of Nephrology, St. Louis, MO, October 29 - November 1, 2004.

92E. Lanthanum carbonate has shown no negative effects on cognitive function compared with standard therapy: results from a 2-year study. Paul Altmann, MD[1], William Finn, MD[2], *Hilary Mandler, Pharm.D.*[3]; (1)Oxford Kidney Unit, The Churchill Hospital, Oxford Radcliffe Hospitals, Oxford, United Kingdom; (2)University of North Carolina, Chapel Hill, NC; (3)Shire Pharmaceuticals, Wayne, PA.

Presented at the 37th Annual Meeting of the American Society of Nephrology, St. Louis, MO, October 29 - November 1, 2004.

93E. Single-dose pharmacokinetics (PK) of ferric gluconate (FG) in iron-deficient pediatric hemodialysis patients. *Bradley A. Warady, MD*[1], Ferrlecit Pediatric Study Group, [2]; (1)Childrens Mercy Hospital, Kansas City, MO; (2)Watson Laboratories, Morristown, NJ.

Presented at 16th Annual Symposium on Pediatric Dialysis, Tampa, FL, February 2005.

94E. Sodium ferric gluconate complex (SFGC) therapy in children receiving hemodialysis: a randomized trial. *Bradley A. Warady, MD*[1], Ferrlecit Pediatric Study Group, [2]; (1)Childrens Mercy Hospital, Kansas City, MO; (2)Watson Laboratories, Morristown, NJ.

Published in JASN 2004;15:627A.

95E. The bone kinetics of lanthanum in dialysis patients treated with lanthanum carbonate for up to 4.5 years. Stephen J.P. Damment, PhD[1], Maggie Gill, RN[1], Scharmen Confer, MA[1], Chris Jones, BS[1], Mike Pennick, BS[1], Isobel Webster, RN[1], *Larry Segars, Pharm.D., BCPS*[2]; (1)Shire Pharmaceutical Development, Ltd., Basingstoke, United Kingdom; (2)Shire Pharmaceuticals, Wayne, PA.

Presented at the 37th Annual Meeting of the American Society of Nephrology, St. Louis, MO, October 29 - November 1, 2004.

Neurology

96E. Switching from immediate-release to extended-release carbamazepine: evaluation of safety, efficacy, and tolerability in adolescents with epilepsy. James W. Wheless, MD[1], *Sherry L. Andes, Pharm.D.*[2]; (1)Department of Neurology, University of Texas Health Science Center, Houston, TX; (2)Shire Pharmaceuticals, Wayne, PA.

Presented at the Annual Meeting of the Child Neurology Society, Ottawa, Canada, October 14, 2004.

Nutrition

97. Egg whites for protein supplementation in critically ill patients. *Timothy M. Clifford, Pharm.D.*, Barbara L. Magnuson, Pharm.D., Marjorie E. Swintosky, M.S., R.D., Lora A. Hoskins, M.S., R.D., Betty J. Tsuei, M.D.; University of Kentucky Chandler Medical Center, Lexington, KY.

PURPOSE: Often critically ill patients have increased protein needs that supercede what is available in standard high protein formulas. UKCMC has begun using commercially available egg whites to increase protein in order to attain estimated goals. This study was designed to evaluate the use of egg whites as a protein supplement in critically ill patients.
METHODS: Ten patients were selected for evaluation based on the following inclusion criteria: admission to the ICU, >7 days of egg white supplementation, and availability of prealbumin levels prior to initiation and after 7 days. Data to be reported includes prealbumin levels, degree of skin breakdown, diarrhea and nasogastric output, APACHE III score, hospital and ICU length of stay, as well as percentage of estimated calories and protein met.
RESULTS: The average APACHE III score was 59.4 (range 33-115). The mean prealbumin level prior to receiving egg whites was 10.1 mg/dL (+/-3.6). Following > 7 days of supplementation, the mean prealbumin level prior to discharge was 15.4 mg/dL (+/- 5.1). Mean length of supplementation was 13.5 days (range 8-34). Eighty percent of patients experienced skin breakdown prior to initiation of egg whites. Of these 8 patients, 75% had a decrease in Braden score prior to discharge. The remaining 25% experienced stabilization of skin breakdown.
CONCLUSIONS: There is a trend toward increased prealbumin levels and enhancement of wound healing after initiation of egg whites. A comparative trial needs to be conducted to evaluate potential benefit over traditional enteral formulas.

98. Quality of life in chronic home TPN patients. *John K. Siepler, Pharm.D.*, Reid A Nishikawa, Pharm.D., Tom Diamantidis, Pharm.D., Rod Okamoto, RpH; Nutrishare, Inc, Elk Grove, CA.

PURPOSE: Chronic home parenteral nutrition (HPN) patients have a lower quality of life (QOL) than normals. We wanted to determine if sub groups of HPN patients had a different QOL.
METHODS: A survey requesting demographics, reason for HPN, type of HPN complications and a QOL instrument (SF-36 V.2) was sent to HPN patients. Logistic regression to determine association of QOL with survey data using MiniTab V.14 was performed with statistical significance set at $p<0.05$.
RESULTS: 159 usable forms returned. Need for HPN was divided into 4 groups: short bowel associated with Inflammatory bowel disease (SBSI), short bowel associated with other causes such as mesenteric insufficiency (SBSO), pseudobstruction (PSOB), and Other (OTHR). QOL for the HPN population was lower in all domains and component summary scores than the norm. Analysis of groups found that SBSO had significantly higher scores in all domains except Role Physical (OR=2.2-4.6; 95% CI all>1). OTHR had significantly lower scores in 6/8 domains and in MCS (OR=2.5-3,1:95%CI all >1).
CONCLUSIONS: There is little research into sub-populations of HPN. Willmore reported QOL improves when patients reduce the number of days of HPN/ week, but data on indication for HPN have not been reported. The SBSO group had higher QOL scores. It is possible their underlying disease process is more stable than those with PSOB or SBSI. Further work is needed to determine QOL in sub groups of patients on HPN.

99E. Vitamin B6 deficiency: a rare cause of refractory seizures in adults. *Anthony Gerlach, Pharm.D., BCPS*, Sheela Thomas, RD, LD, M.S., Steven Steinberg, M.D.; The Ohio State University Medical Center, Columbus, OH.

Presented at the Clinical Nutrition Week of the American Society of Parenteral and Enteral Nutrition, Orlando, Fl, January 30 - February 2, 2005.

Oncology

100E. A multicentre, double-blind, randomized, phase 2 trial comparing pegfilgrastim with filgrastim as an adjunct to chemotherapy for acute myeloid leukaemia (AML). Alberto Bosi, Physician[1], Jeffrey Szer, Physician[2], Jeannine Kassis, MD[3], Jorge Sierra, Physician[4], *Claire Desborough, PhD*[5], Karen Buchanan, PhD[6]; (1)Ospedale di Careggi, Firenze, Italy; (2)Royal Melbourne Hospital, Bone Marrow Transplant Service, Melbourne, Australia; (3)HÙpital Maisonneuve-Rosemont, Montreal, QC, Canada; (4)Hospital de la Santa Creu i Sant Pau, Barcelona, Spain; (5)Amgen, MS 27-2-A, Thousand Oaks, CA; (6) Amgen Ltd. (Cambridge), Cambridge, United Kingdom.

Published in Blood 2004;104(11):A866.

101E. Comparable efficacy and safety of darbepoetin alfa 200 µg every 2 weeks (Q2W) and epoetin alfa 40,000 U weekly (QW) in patients (pts) with breast cancer: results of a randomized comparison. *Frank Senecal, MD*[1], Lee Schwartzberg, MD[2], Veena Charu, MD[3], Dianne Tomita, MPH[4], Gregory Rossi, PhD[4], Lorrin Yee, MD[1], Mark Nelson, Pham, D[1]; (1)Northwest Medical Specialties, Tacoma, WA; (2)The West Clinic, Memphis, TN; (3)Pacific Cancer Medical Center, Inc., Anaheim, CA; (4)Amgen Inc., Thousand Oaks, CA.

Presented at the 27th Annual San Antonio Breast Cancer Symposium, San Antonio, TX, December 8-11, 2004.

102. Determination of the optimal combination chemotherapy regimen for the treatment of platinum-resistant ovarian cancer in nude mouse model. *Judith A. Smith, Pharm.D., BCOP*, Jiang Yu, M.D., Jenifer M. Saucier, M.B.A., John J. Kavanagh, M.D.; The University of Texas, M.D. Anderson Cancer Center, Houston, TX.

PURPOSE: Evaluate the potential synergistic/additive activity of liposomal doxorubicin in combination with other chemotherapeutic agents such as topotecan, docetaxel, gemcitabine, capcetabine, and/or celecoxib to identify new treatment options for recurrent ovarian cancer.
METHODS: This was a five-arm study to evaluate the combination of

liposomal doxorubicin with the common chemotherapeutic agents utilized in the second-line treatment of ovarian cancer. Studies were conducted in two drug resistant human ovarian cancer nude mouse model, OVCAR-3 and ES-2. Each cell line had ten (10) mice for each treatment arm, ten (10) no treatment control mice, and ten (10) liposomal doxorubicin alone control mice = 70 mice per cell line times two cell lines equals 140 mice per experiment. Experiments were done in duplicate.
RESULTS: The percent tumor reduction ranged from 30.5 % to 43.5 % for the single agent treatment arms. Tumor reduction (response) was improved on the combination treatment arms ranging from 43.9% to 54.4%. We observed significant synergy in the liposomal doxorubicin plus topotecan arm, with a 13.5% improvement in response compared to either agent alone.
CONCLUSIONS: The addition of liposomal doxorubicin demonstrated significant synergistic cytotoxicity with topotecan. This is consistent with recent reports of enhanced activity with the combination of topoisomerase I and topoisomerase II agents. A phase I/II clinical trial will be proposed to determine the optimal dose for each of these agents in the combination regimen and to evaluate its long-term efficacy and safety for the treatment of recurrent or refractory ovarian cancer.

103. Effectiveness of darbepoetin alfa vs epoetin alfa in patients with anemia resulting from myelodysplastic syndrome (MDS): results of a retrospective cohort study. *Jeffrey F. Patton, MD*[1], Toni Sullivan, RN[1], Yong Mun, PhD[2], Joel Wallace, Pharm, D[2]; (1)Tennessee Oncology, Nashville, TN; (2)Amgen Inc., Thousand Oaks, CA.

PURPOSE: We implemented new guidelines to switch anemic patients with MDS from epoetin alfa (EA) 40,000 U weekly to darbepoetin alfa (DA) 200 µg every 2 weeks. To ensure that DA was at least as effective as EA, we performed a retrospective cohort study of the initial 263 patients.
METHODS: Patient criteria, endpoints, and methodology were prespecified. Switched (received 16 weeks of prior EA and switched to DA or EA for at least 16 weeks after guideline implementation) or naïve (received only 1 agent for at least 16 weeks from June 2001-September 2004) patients were studied. Major response (Hb change >2 g/dL from baseline [time of switch for switched group] or transfusion independence) was calculated.
RESULTS: Data from 244 records were included: 142 switched (80 DA, 62 EA) and 102 naïve (56 DA, 46 EA). Baseline demographics were generally similar between treatment cohorts. Most patients had refractory anemia. Mean (SD) baseline Hb was lower for naïve vs switched patients.

	Naïve		Switched	
	DA (n=52)[a]	EA (n=46)	DA (n=77)[a]	EA (n=60)[a]
% Major Response	24 (46%)	16 (35%)	20 (26%)	10 (17%)
Mean (95% CL) Change in Hb (g/dL)[b]	0.7 (0.3, 1.1)	0.6 (0.2,1.1)	0.2 (-0.2, 0.6)	0.03 (-0.3, 0.3)
Mean (SD) Dose	217.0 (42.1) µg/dose	48571 (10350) U/dose	228.4 (70.2) µg/dose	50990 (10086) U/dose

[a]Excludes patients with missing baseline Hb values or values within 28 days of a transfusion
[b]Last-value-carried-forward approach at week 16

CONCLUSION: Therapeutic substitution with DA for EA appears to be effective in anemic patients with MDS.

104E. Improvements in fatigue are associated with early treatment with every-3-week (Q3W) darbepoetin alfa (DA) treatment in anemic patients (pts) receiving chemotherapy (ctx). *Veena Charu, MD*[1], Bruce Saidman, MD[2], Glenn R. Justice, MD[3], Ajit S. Maniam, MD[1], Timothy Rearden, MD[4], Dianne Tomita, MPH[5], Gregory Rossi, PhD[5], Ali Ben-Jacob, MD[6]; (1)Pacific Cancer Medical Center, Anaheim, CA; (2)Medical Oncology Associates, Kingston, PA; (3)Pacific Coast Hematology/Oncology Medical, Fountain Valley, CA; (4)Hematology Oncology Consultants, Inc., St. Louis, MO; (5)Amgen Inc., Thousand Oaks, CA; (6)Cache Valley Center Treatment and Research Center, Logan, UT.

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105E. Intravenous ferric gluconate (FG) for increasing response to epoetin alfa (EPO) in patients with anemia of cancer chemotherapy: results of a multicenter, randomized trial. David H. Henry, MD[1], *Naomi V. Dahl, Pharm.D.*[2], Michael Auerbach, MD[3], N. Simon Tchekmedyian, MD[4], Leslie R. Laufman, MD[5], Ferrlecit Cancer Study Group, *[2]; (1)Joan Karnell Cancer Center, Pennsylvania Hospital, Philadelphia, PA; (2)Watson Laboratories, Morristown, NJ; (3)White Marsh Hematology/Oncology, Baltimore, M.D.; (4)Pacific Shores Medical Group, Long Beach, CA; (5)Hematology Oncology Consultants, Columbus, OH.

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106E. Pegfilgrastim alone successfully mobilizes peripheral CD34+ cells in chemotherapy-naïve subjects with solid tumors: initial results of a phase 1-2 study. Fenella Willis, Physician[1], Ruth Pettengell, MD[2], Penella J. Woll, MD[3], Claire Desborough, PhD[4], *Karen Buchanan, PhD*[5], Jose-Luis Pico, Physician[6]; (1)St George's Hospital Medical School, London, United Kingdom; (2)St George's Hospital Medical School; (3)Nottingham, City Hospital, Nottingham, United Kingdom; (4)Amgen, MS 27-2-A, Thousand Oaks, CA; (5) Amgen Ltd. (Cambridge), Cambridge, United Kingdom; (6)Amgen S.A. (Paris), Neuilly sur Seine-Cedex, France.

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107. Warfarin dose requirements in cancer and non-cancer. *Karen M. King, Pharm.D.*, Candice Wong, Pharm.D., Edith Nutescu, Pharm.D., Stacy Shifflett Shord, Pharm.D.; University of Illinois at Chicago, Chicago, IL.

PURPOSE: We propose that patients with cancer who are receiving anticoagulation with warfarin have different warfarin dose requirements compared to patients without cancer. The average weekly warfarin dose, treatment intensity, the incidence of bleeding or thromboembolism, and the frequency of clinic visits for monitoring was compared between patients with and without cancer.
METHODS: This is a retrospective medical record review of patients receiving warfarin at the University of Illinois Medical Center Antithrombosis Clinic. Twenty-four subjects who were treated for cancer while receiving warfarin (group 1), 23 subjects who completed treatment for their cancer before starting warfarin (group 2) and 32 subjects with no diagnosis of cancer (group 3) were included in the review.
RESULTS: No significant differences were observed in the average weekly warfarin dose between the three groups (group 1, 32±13 mg/week vs. group 2, 36±10 mg/week and group 3, 36±14 mg/week); but the weekly warfarin dose demonstrated higher intrapatient variability for subjects in group 1 (31±20% vs. 19±10% and 16±14%, p = 0.001). Subjects in group 1 also spent a greater percentage of time above their goal INR compared to patients in groups 2 and 3 (27+21% versus 21+16% and 15+15%, respectively, p=0.003). The incidence of minor bleeds, major bleeds and thromboembolism were similar between all three groups.
CONCLUSIONS: The results of this study suggest that subjects with cancer receiving warfarin are more difficult to manage and may spend a greater percentage of time above their goal INR.

Pediatrics

108. Clinical experience with nesiritide in a pediatric cardiac intensive care unit. *Kalen B. Porter, Pharm.D., BCPS*[1], Leticia M. Dieleman, Pharm.D.[2], Janet M. Simsic, MD[3], William T. Mahle, MD[3], Angel R. Cuadrado, MD[3]; (1)Mercer University Southern School of Pharmacy, Atlanta, GA; (2)Children's Healthcare of Atlanta, Atlanta, GA; (3)Sibley Heart Center Cardiology/ Children's Healthcare of Atlanta, Atlanta, GA.

PURPOSE: Limited information is available regarding the use of nesiritide in pediatric patients. The purpose of this case series was to evaluate the use of nesiritide plus conventional therapy in a pediatric cardiac intensive care unit (CICU).
METHODS: A retrospective chart review was conducted on patients in the CICU who received nesiritide during 7/2003-10/2004. Age, dose/duration of therapy, adverse effects, and clinical outcomes were reported.
RESULTS: Forty-five patients received nesiritide for management of decompensated heart failure (n=18) or post-operative heart failure following cardiac surgery (n=27). Average patient age: 45 ± 66 months (range 5 days-16 years). A bolus dose was used in 36 patients (mean dose: 1 µg/kg, range 0.48-1.34 µg/kg) with no change in blood pressure noted. Continuous infusions were initiated at 0.005 µg/kg/min (n=5) or 0.01 µg/kg/min (n=40), with titration to 0.02 µg/kg/min (n=5). Average length of therapy: 6 ± 6 days (range 0.8-32 days). From baseline to 24 hours, mean arterial blood pressure decreased 4% (64 ± 14 vs. 59 ± 12 mm Hg); average heart rate did not change (141 ± 24 vs. 139 ± 25 bpm). Average fluid balance (intake-output) changed from positive at baseline to negative at end of therapy (+0.6 cc/kg/hr vs.-0.5 cc/kg/hr). No significant adverse effects were noted.
CONCLUSIONS: Nesiritide was found to be safe and effective in this series of pediatric CICU patients. A prospective study is underway at our institution to evaluate safety and efficacy compared to and in combination with conventional therapy for decompensated or post-operative heart failure.

109. Effect of heliox on inhaled drug delivery in mechanically ventilated infant and child models. *Sandra S. Garner, Pharm.D.*, Donald B. Wiest, Pharm.D., Charles E. Stevens, RRT, David M. Habib, M.D.; Medical University of South Carolina, Charleston, SC.

PURPOSE: Delivery of inhaled medications in mechanically ventilated patients is poor due to drug loss along the circuit. Loss may be greater in narrow pediatric circuits due to turbulent gas flow. A low density gas such as heliox decreases turbulence potentially enhancing drug delivery. This investigation determined the effect of heliox on albuterol delivery administered by MDI in pediatric mechanically ventilated models.
METHODS: A 10kg infant and 30kg child receiving PRVC ventilation were simulated. Infant settings included: endotracheal tube=4.0mm, VT=150ml, PEEP=2cmH2O, rate=20bpm, I-time=0.7sec; child settings included: endotracheal tube=6.0mm, VT=450ml, PEEP=2cmH2O, rate=16bpm, and I-time=0.8sec. Ten albuterol MDI canisters were each actuated 1 time (1000µg)

using the Aerochamber® MV chamber. Albuterol was collected onto a filter proximal to a test lung. The filter was rinsed and concentrations determined by HPLC. For the infant model, five trials for varying heliox concentrations (50, 60, and 70%) and nitrogen were completed. For the child model, five trials of 70% heliox and nitrogen were compared. Significant differences (α=0.05) were determined by ANOVA and student's t test.
RESULTS: There was greater albuterol delivery (mean ± S.D.) with heliox vs. nitrogen in the infant model: (6.76±0.44% vs. 3.59±0.52%) (p<0.001), with no difference among the varying heliox concentrations: 50%: 6.63±0.69%, 60%: 6.85±0.69%, 70%: 6.78±0.74%. Heliox also provided greater delivery in the child model: 7.83±1.34% vs. 3.06±0.83%. (p<0.001).
CONCLUSION: These in-vitro results suggest heliox increases albuterol delivery administered by MDI. Further studies are needed to determine if the improved albuterol delivery with heliox enhances bronchodilation in ventilated infants and children.

110. Efficacy of alteplase in the management of complicated intra-cardiac thrombosis in pediatric patients: a retrospective case series. *Roaa A. Al-Gain, B.Sc.., Pharm.*, Abdulrazaq S. Al-Jazairi, Pharm.D., Zead Al-Bulbul, M.D., Avedis Kalloghuan, M.D.; King Faisal Specialist Hospital & Research Center, Riyadh, Saudi Arabia.

PURPOSES: To assess the efficacy and safety of alteplase in dissolving complicated intra-cardiac thrombus in pediatric patients.
METHODS: All pediatric patients, age < 14 years, who were treated with alteplase, from 1997 to 2004, at our tertiary care institution, were identified through our pharmacy database. Only patients who had echocardiography (ECHO) that documented intra-cardiac thrombus were included in this retrospective case review. The efficacy of the used alteplase regimen was assessed by an echocardiographer at baseline and all subsequent ECHOs. Safety data were also collected.
RESULTS: Eight patients were eligible out of the twenty who were identified. Three out of the eight were excluded for either misdiagnosis or no ECHO done. The age of the five left patients ranged from 40 days to 13 years. Central venous catheter was inserted in four patients. Moreover, sepsis was reported in 4 patients during their hospital course. Heparin was administered for all patients. Out of the three patients who received continuous alteplase infusion regimen, 0.05-0.6 mg/kg/hr for duration of 2-4 days, only one patient had semi-complete resolution and the other two did not respond to therapy and experienced major bleeding. Where, the two patients who received intermittent alteplase infusion regimen, 0.5 mg/kg/hr for 6 hours for 1 and 3 doses respectively; both showed complete resolution of the thrombus and experienced minor bleeding.
CONCLUSIONS: Based on our observation, intermittent alteplase infusion regimen appears to be effective and safe in managing complicated intra-cardiac thrombus in pediatric patients.

111E. Kawasaki disease: a 10-year experience at a children's hospital. *Nicole DeLuco, Pharm.D.student*[1], Roxane R. Carr, Pharm.D.[1], Katalin Koranyi, MD[2], Milap C. Nahata, Pharm.D., FCCP[1]; (1)The Ohio State University College of Pharmacy, Columbus, OH; (2)Children's Hospital & The Ohio State University College of Medicine, Columbus, OH.

Presented at the 8th International Kawasaki Disease Symposium of the American Heart Association, San Diego, CA, February 17-20, 2005.

112. Retention of drug delivery device technique between outpatient visits. *Paul J. Munzenberger, M.S., Pharm.D.*[1], Abdul Bahrainwala, M.D.[2]; (1)Eugene Applebaum College of Pharmacy and Health Sciences, Wayne State University, Detroit, MI; (2)Wayne State University, School of Medicine, Detroit, MI.

PURPOSE: To determine if children with asthma retain the ability to correctly use a drug delivery device between physician visits and explore if multiple device use impacts this ability.
METHODS: This was a parallel, non-randomized, open study. Group 1 used MDI devices. Group 2 used MDIs and a Diskus or Turbuhaler. At baseline, children and caregivers were taught the correct use of their devices. A checklist was used to assure completeness and between patient uniformity. At their next visit, administration techniques were observed. The checklist was used to evaluate and document techniques.
RESULTS: There were 20 and 44 patients in groups 1 and 2, respectively. The mean time from baseline to the follow-up visit for both groups was 2.7 months. Mean patient ages for groups 1 and 2 were 8.1 and 11.1 years, respectively. At the follow-up visit, 40 and 28.6 % correctly performed all MDI checklist items in groups 1 and 2, respectively. In Group 2, 31.8% correctly performed all Diskus or Turbuhaler checklist items. The % of correct checklist items for Group1, Group 2 MDI and Group 2 Diskus or Turbuhaler was 82.5, 78.1 and 85.7, respectively. Checklist items least likely to be done correctly (equal to or less than 65% correct), for both groups and all devices, were emptying lungs before inhalation and breath holding after inhalation.
CONCLUSIONS: Patients retain the ability to correctly perform most, but not all, of the maneuvers required for optimal drug delivery. The use of multiple devices did not appear to impact this ability. Pharmacists should reinforce techniques at each opportunity.

113. Retrospective comparison of lipid amphotericin B complex (ABLC) and liposomal amphotericin B (L-AMB) in the pediatric population. *Rachel B. Sykes, BSPharm*[1], Jasmine Sahni, BSPharm[1], Jennifer M. Ellis, Pharm.D.[1], Joseph L. Kuti, Pharm.D.[2]; (1)University of Connecticut School of Pharmacy, Storrs, CT; (2)Center for Anti-Infective Research and Development, Hartford Hospital, Hartford, CT.

PURPOSE: Lipid based Amphotericin B formulations are commonly used for pediatric antifungal infections in those intolerant of the traditional formulation. Published data comparing lipid amphotericin formulations in the pediatric population are sparse. Data specific to pediatric patients are imperative due to potential differences in susceptibility to adverse events. We compared the incidence of nephrotoxicity and infusion related reactions (IRR) in pediatric patients receiving ABLC and L-AMB.
METHODS: Medical records were review for children who received either lipid formulation between 1996 and 2004. A data collection tool was used to record therapy indication, formulation, dose, patient demographics, underlying conditions, renal function, electrolyte abnormalities, IRR, prevention or treatment of reactions, and clinical response (i.e., success or failure).
RESULTS: Fifty-two patients were included (31 L-AMB and 21 ABLC). Thirteen percent of the total population experienced amphotericin related nephrotoxicity (9.6% vs. 19%; p=0.42). Febrile reactions (58% vs. 47% p=0.65) and pretreatment of IRR were frequent and similar between groups (87% vs. 76%; p=0.46). Although not statistically significant, patients that received L-AMB had fewer chills/rigors (6.5% vs. 19%, p=0.2) and were less likely to require an intervention (48% vs. 66%, p=0.3). Finally, positive clinical response was high and did not different between groups (70% vs. 65%; p=0.89).
CONCLUSION: Although this small study did not demonstrate any significant differences between the two agents in the pediatric population, trends toward lower rates of nephrotoxicity and IRR were observed with L-AMB. These observations justify further evaluation in larger pediatric specific studies.

Pharmacoeconomics/Outcomes

114. Adherence and persistence with lipid-lowering pharmacotherapy: effect of the covariates copay and disease severity on probabilities of being categorized as compliant. *Joanne LaFleur, Pharm.D.*[1], Clint Thompson, M.Stat.[2], Vijay Joish, Ph.D.[1], Scott L. Charland, Pharm.D.[3], Gary M. Oderda, Pharm.D., MPH[1], Diana Brixner, Ph.D., R.Ph[1]; (1)Pharmacotherapy Outcomes Research Center, Suite #208, Salt Lake City, UT; (2)Public Health Program, 375 Chipeta Way, Salt Lake City, UT; (3)Kos Pharmaceuticals, Inc, Weston, FL.

PURPOSE: Adherence and persistence with lipid-lowering therapies (LLTs) including combination ER-niacin/lovastatin (ERNL), ER-niacin (ERN), statin (SM), and ER-niacin and statin dosage forms individually (ERN-S) were evaluated.
METHODS: Prescription claims from managed-care patients initiating therapy between 2002-2003 (n=2,389) were analyzed for adherence and persistence. Adherence and persistence, defined as medication possession ratios (MPRs) or proportions of days covered (PDCs) ≥ 0.80. Logistic regression was conducted to detect differences between groups. Covariates included age, gender, copay, and number of LLTs, surrogate for disease-severity. Cost to payer and average copays were reported.
RESULTS: ORs for adherence were 1.00 (ERNL), 1.19 (ERN-S), 0.63 (ERN), and 0.53 (SM); differences were significant for ERNL versus ERN (p=0.035) and SM (p=0.009), and for ERN-S versus ERN (p=0.001) and SM (p<0.001). ORs for persistence in the third quarter were 1.00 (ERNL), 0.76 (ERN-S), 0.57 (ERN), and 1.01 (SM); differences were significant for ERNL versus ERN (p=0.047) and ERN versus SM (p=0.008). By the fourth quarter, the ORs for persistence had changed substantially; they were 1.00 (ERNL), 0.42 (ERN-S), 0.29 (ERN), and 0.27 (SM); differences were significant for ERNL versus ERN-S (p=0.006), ERNL versus ERN (p=0.001), and ERNL versus SM (p=0.044). Average copays were $17.54 (ENRL), $22.29 (ERN-S), $13.37 (ERN), and $13.70 (SM). Average daily costs to the third-party were $1.46 (ERNL), $3.09 (ERN-S), $1.02 (ERN), and $1.90 (SM).
CONCLUSIONS: Adherence and persistence rates were higher for ERNL compared to other lipid-lowering therapies when age, gender, copay, and disease-severity were accounted for.

115E. A simulation model of the cost of treatment failure in patients hospitalized with community-acquired pneumonia (CAP) in the United States. *Rajiv Mallick, PhD*[1], Nancy Neil, PhD[2], Les Noe, PhD[2], Lance Peterson, MD[3]; (1)Wyeth Pharmaceuticals, Collegeville, PA; (2)Ovation Research Group, Highland Park, IL; (3)Evanston Northwestern Healthcare, Evanston, IL.

Presented at the Annual Meeting of the European Congress of Clinical Microbiology and Infectious Diseases, Copenhagen, Denmark, April 2-5, 2005.

116. Risk factors for prolonged hospitalization in treatment of complicated skin infections: evidence from a randomized clinical trial comparing tigecycline with vancomycin/aztreonam. *Rajiv Mallick, Ph.D.*, Stephen Solomon, Ph.D.; Wyeth Pharmaceuticals, Collegeville, PA.

PURPOSE: Despite therapeutic progress in the treatment of complicated skin and skin structure infections (cSSSI), hospitalization may be prolonged because of a variety of risk factors.
METHODS: Data were pooled from 2 double-blind, multinational, clinical trials among inpatients with cSSSI (n=1,116) randomly assigned to receive either tigecycline (initial 100 mg dose, followed by 50 mg twice a day) or vancomycin (1 g) with aztreonam (2 g) twice a day via IV administration for 5-14 days. We used a multiple regression model to examine risk factors for hospital length of stay (LOS).
RESULTS: Deep or extensive cellulitis (57.2%) and major abscess (28.8%) were the most typical infection sub-diagnoses. About 21.9% of the patients had diabetes and 7.7% had peripheral vascular disease. Among 600 patients with confirmed microbiology and hospitalization data, Staphylococcus aureus was the most common causative pathogen (~50%), while 18% of patients had a gram-negative causative pathogen, primarily Escherichia coli. About 42% of the patients were poly-microbial. Co-morbid diabetes, an infected ulcer sub-diagnosis, female sex, non-cure, concomitant medications, and ICU and non-US hospital setting for treatment initiation were identified as risk factors for significantly higher LOS. Adjusting for the above, treatment with tigecycline was associated with a 1.2-day shorter LOS, especially among patients with a causative gram-negative pathogen.
CONCLUSIONS: Several risk factors were identified as prolonging hospitalization for treatment of CSSSI. Tigecycline, the first in a new antibiotic class, the glycylcyclines, was associated with shorter LOS among patients with causative gram-negative pathogens, consistent with its expanded broad-spectrum activity.

117. Cost-effectiveness of statin monotherapy and combination therapy with ezetimibe. *Craig I. Coleman, Pharm.D.*, Effie L. Gillespie, Pharm.D., Kristen A. Gryskiewicz, Pharm.D., C. Michael White, Pharm.D.; University of Connecticut/Hartford Hospital, Hartford, CT.

PURPOSE: Although statins have been shown to reduce LDL-C and CHD risk, it is not uncommon for patients to fail to reach NCEP-ATP III goals. Some statins cannot lower LDL-C sufficiently; others cannot be titrated optimally due to drug interactions and adverse effects. Concomitant ezetimibe administration can augment LDL-C reduction over statin monotherapy; however, multidrug therapy may result in additional expense.
METHODS: We conducted a cost-effectiveness analysis from the hospital perspective including all FDA approved statins alone or the following statins plus ezetimibe: lovastatin, pravastatin, simvastatin or atorvastatin. LDL-C lowering efficacy was determined from clinical trials. Our institution's acquisition cost was used to approximate drug cost (US$2004) for each statin dose alone and with ezetimibe. To test the robustness of our results a Monte Carlo simulation was conducted varying cost of drug and percent LDL-C reduction efficacy.
RESULTS: For patients requiring <40% reduction from baseline in LDL-C, lovastatin 10mg [average cost-effectiveness ratio (ACER)/1% reduction in LDL-C]=$2.42, lovastatin 20mg (ACER=$3.04), lovastatin 40mg (ACER=$5.34), and fluvastatin 80mg (ACER=$6.17) would appear to be reasonable choices based upon both efficacy and cost data. For reductions in LDL-C in the range of >40%; simvastatin 40mg plus ezetimibe 10mg was found to be most cost-effective [incremental cost-effectiveness ratio compared to rosuvastatin 40mg=$22.80/additional 1% reduction in LDL-C) although rosuvastatin 40mg (ACER=$11.38); rosuvastatin 20mg (ACER=$11.94), and simvastatin 80mg plus ezetimibe 10mg (ACER=$14.00) appear to be reasonably cost-effective as well. These results were not found to be robust to variations in drug cost and LDL-C reduction.
CONCLUSIONS: When smaller reductions in LDL-C are required, drug cost is the variable that most significantly drives cost-effectiveness; however, when larger LDL-C reductions are required, LDL-C lowering capacity is the single most important factor in determining cost-effectiveness of the lipid-lowering therapies. The addition of ezetimibe becomes most cost-effective when larger reductions are required.

118. Idaho Medicaid prior authorization of palivizumab (Synagis). *Christopher T. Owens, Pharm.D.*, Paul S Cady, Ph.D., Vaughn L Culbertson, Pharm.D., Rex W Force, Pharm.D., Nicole Murdock, Pharm.D., Tracy K Pettinger, Pharm.D., Joseph F Steiner, Pharm.D.; Idaho State University College of Pharmacy, Pocatello, ID.

PURPOSE: Respiratory Syncytial Virus (RSV) infection is a leading cause of lower respiratory illness in infants. Palivizumab is the preferred preventative agent due to ease of administration, efficacy, and safety; however, its cost is significant. In the 2002-2003 season, Idaho Medicaid spent $2.3 million on palivizumab. To control this expense, a prior authorization (PA) program using American Academy of Pediatrics guidelines was implemented for the 2003-2004 season. The purpose of this study was to evaluate clinical and financial outcomes resulting from the PA program.
METHODS: A retrospective review of Idaho Medicaid claims data was performed (September 2003 to September 2004) for patients who were approved or denied palivizumab. Incidence of RSV diagnoses and utilization of healthcare services were compared between groups. Costs to Medicaid were also calculated.
RESULTS: Two hundred thirty-eight patients were approved and 65 were denied palivizumab therapy. Sixty-five patients (27.3%) in the approved group had at least one physician office visit for a diagnosis indicating RSV vs. fifteen (23.1%) in the denied group ($p > 0.05$). Nineteen (7.9%) in the approved group were hospitalized with an RSV diagnosis vs. three (4.6%) in the denied group ($p > 0.05$). Patients in the approved group experienced more hospitalizations and incurred greater costs independent of RSV diagnosis ($p < 0.05$). The cost of palivizumab for the 2003-2004 season decreased by $1.3 million.
CONCLUSIONS: Implementation of the PA program for palivizumab resulted in substantial cost savings with no apparent increased risk for developing RSV and/or hospitalization among patients who were denied.

119. Impact of medication access on adherence and outcomes of outpatients with heart failure. *Kimberly B. Kelly, Pharm.D., Candidate*[1], Amanda M. Ball, Pharm.D., Candidate[1], April Dawn Miller, Pharm.D., Candidate[1], W. Don Haslam Jr., Pharm.D., Candidate[1], Leslie Mangum, Pharm.D., Candidate[1], Robb Malone, Pharm.D.[2], Betsy Bryant, Pharm.D.[2], Martha Jones, Pharm.D.[3], Mollie Scott, Pharm.D.[4], Wendy Cox, Pharm.D.[5], Mary H. Parker, Pharm.D.[6], Michael Murray, Pharm.D.[1], Susan Blalock, Pharm.D.[1], Patti Adams, BSN[7], Carla Sueta, M.D., PhD[7], Jo E. Rodgers, Pharm.D.[1]; (1)UNC School of Pharmacy, Chapel Hill, NC; (2)UNC AHEC, Chapel Hill, NC; (3)Area L AHEC, Scotland Neck, NC; (4)Mountain AHEC, Asheville, NC; (5)Wake AHEC, Raleigh, NC; (6)LeBauer HeartCare, Suite 300, Greensboro, NC; (7)UNC School of Medicine, Chapel Hill, NC.

PURPOSE: Heart failure (HF) is associated with significant morbidity and mortality creating an enormous burden on the health care system, primarily due to frequent hospitalizations. Medication non-adherence is associated with an increased risk of hospitalization. The objective of this study was to investigate the impact of medication access on adherence and outcomes in outpatients with HF.
METHODS: This study enrolled 89 HF patients > 18 years of age with systolic or diastolic dysfunction from 5 outpatient clinic sites across the State of North Carolina. A questionnaire assessing medication cost, adherence and hospitalization was administered and patient characteristics obtained from the medical record. Medication costs were verified with the pharmacy.
RESULTS: A majority of patients (74%) had low annual income (<$20,000) and half were enrolled in assistance programs. Mean monthly prescription costs for assistance programs were $42, insurance $143, discount cards $168, and cash $182. Despite reduced medication costs, 66% of patients stated that paying for medications was "very" or "somewhat" difficult, and 42% ran out of medications in the last year. Hospitalizations in the last year based on cost per month were 60% ($0-19), 94% ($20-49), 60% ($50-99), 37% ($100-199), and 71% (>$200).
CONCLUSIONS: Despite assistance programs appearing to significantly reduce medication costs, patients continue to report difficulty paying for medications. This study found no relationship between medication cost and hospitalization, indicating that other factors may contribute to hospitalization. These results raise awareness of issues pertaining to medication access, which could lead to important changes in health and drug policy.

120. Impact of Walgreens Health Initiatives' Leukotriene Antagonists Step Care program on utilization and expenditures. *Shawn X. Sun, Ph.D.*, Jennifer McMurray, Pharm.D., Vanessa Jacobsen, Pharm.D., Mahesh Fuldeore, M.S., Kwan Y. Lee, Ph.D., Brandon Zagorski, M.S., Carl T. Bertram, Pharm.D.; Walgreens Health Initiatives, Deerfield, IL.

PURPOSE: Walgreens Health Initiatives' (WHI) Leukotriene Antagonists Step Care program is designed to promote the use of antihistamines or other medications indicated for allergic rhinitis as first-line treatment before Singulair is used. This study evaluated the impact of the program on the utilization and expenditures of Leukotrienes.
METHODS: Using a pre-post with control group study design, prescription records from January 1, 2003 to October 31, 2004 were obtained from WHI's pharmacy claims database. The study group included 166,719 lives from three employer groups enrolled in Leukotriene Step Care program in September 2003, and the control group included 796,783 lives from 257 clients not enrolled in this program. The number of prescriptions dispensed and total costs per member per month (PMPM) in the pre and post period were analyzed for the two groups.
RESULTS: From the pre to the post period, in the study group, the average number of prescriptions per month increased by 32.7% and the average PMPM costs increased by 19.4% (from $0.48 to $0.57). In the control group, the average number of prescriptions per month, as well as the PMPM costs increased by 78.3% and 33.4% (from $0.49 to $0.66) respectively. After comparing the trend among Leukotriene products in these two groups, it was estimated that WHI's Leukotriene Step Care resulted in $0.07 PMPM and total of $140,028 annualized cost savings for the three employer groups.
CONCLUSIONS: WHI's Leukotriene Step Care program led to PMPM total

cost savings and is an effective program for controlling prescription drug expenditures.

121. Logistics of intravenous patient-controlled analgesia administration. *Tim Forsthoefel, RPh, MBA*[1], Mingliang Zhang, PhD[1], Denise Pierce, BS[2]; (1)Ortho-McNeil Pharmaceutical, Inc, Raritan, NJ; (2)DK Pierce & Associates, Inc, Zionsville, IN.

PURPOSE: To examine the logistics of intravenous patient-controlled analgesia (IVPCA) administration in the postoperative setting by assessing resources required for IVPCA utilization.
METHODS: Tertiary care/academic medical centers and community hospitals were surveyed using a questionnaire that assessed the roles of nursing, pharmacy, anesthesiology, surgery, billing, central supply, transportation, and bioengineering in IVPCA utilization. This questionnaire was provided to chief financial officers, decision analysis groups, directors of anesthesiology and surgery, inpatient billing managers, physician billing services, pharmacy directors, surgical, post-anesthesia care unit (PACU), medical/surgical nurses, central supply managers, business office supervisors, and purchasing directors. Medicare Provider Analysis and Review (MedPar) databases and biomedical literature were also analyzed.
RESULTS: The resources required for IVPCA utilization varied greatly; however, several major steps were generally required: 1) Pumps were ordered by PACU staff, 2) Central supply prepared pumps, attached charge documentation, and delivered pumps to the PACU; some institutions utilized a separate delivery team, 3) Nursing staff ordered drug cassettes from the pharmacy that were picked up by PACU staff or delivered by pharmacy staff, 4) Nursing staff initiated pump setup and drug administration. In the case of pump failures or errors, either Bioengineering services were recruited or a new pump was ordered and set up by the nurse. Significant personnel, time, and cost were associated with effective IVPCA acquisition, setup, and administration.
CONCLUSION: The hospital staff is often unaware of the number of personnel and departments involved in IVPCA operation; therefore, hospitals may inadvertently underestimate the economic cost of IVPCA.

122. The cost-effectiveness of warfarin (Coumadin®) vs. ximelagatran (Exanta®) for the treatment of atrial fibrillation. *Samuel L. Ellis, Pharm.D.*[1], Heather C. Ulrich, Pharm.D.[1], Thomas W. Arant, MBA, M.Sc.[2], Patrick W. Sullivan, Ph.D.[1]; (1)University of Colorado Health Sciences Center, School of Pharmacy, Denver, CO; (2)George Washington University School of Medicine and Health Sciences, San Marcos, CA.

PURPOSE: To examine the cost-effectiveness of warfarin therapy versus ximelagatran based on the clinical protocol and results of the stroke prevention with the oral direct thrombin inhibitor ximelagatran compared with warfarin in patients with non-valvular atrial fibrillation (SPORTIF III) trial.
METHODS: A decision-analytic model was constructed to simulate the population of individuals enrolled in the SPORTIF III trial from the societal perspective. The benefits associated with using warfarin therapy versus ximelagatran were quantified using the quality-adjusted life year (QALY) framework. Univariate and multivariate probabilistic sensitivity analyses using Bayesian second-order Monte Carlo simulation were conducted.
RESULTS: Treatment with warfarin resulted in an expected cost $301 less than treatment with ximelagatran (889 compared with 1,190, respectively). Ximelagatran was not cost-effective (incremental cost-effectiveness ratio of $960,000 per QALY) when compared to warfarin (assuming a $1.53 cost per day of ximelagatran) and warfarin dominated treatment with ximelagatran with 84% probability. A univariate sensitivity analysis demonstrated that the cost of ximelagatran would need to be less than $0.97 per day in order for ximelagatran to be cost-effective (resulting in an ICER below $50,000 per QALY).
CONCLUSION: In evaluating the cost-effectiveness of ximelagatran versus warfarin for the treatment of atrial fibrillation, the expected cost of treatment with ximelagatran was significantly greater than warfarin. This model provides useful information on the necessary conditions for future oral direct thrombin inhibitors to be cost-effective compared to warfarin as members of this class come closer to market.

123. Using medical claims data and published literature to predict impact of formulary addition of a new anti-insomnia agent. *Ronald J. Ozminkowski, Ph.D.*[1], Greg Lenhart, MS[1], Sara Wong, PhD[1], Nadine Barry, BSN[2], Rob Rubens, MD[2], Kendyl Schaefer, MSc[2], Andrea Anderson, Pharm.D.[2], Lisa Mucha, PhD[1]; (1)Thomson Medstat, Ann Arbor, MI; (2)Sepracor Inc., Marlborough, MA.

PURPOSE: Medical claims and clinical trial data can be combined to develop budget impact models that estimate costs of adding new drugs to the formulary. A case study of eszopiclone, an anti-insomnia drug, is presented.
METHODS: A 3-step process estimated the costs of treating insomnia using eszopiclone and other insomnia agents: 1. Insomnia drug efficacy was estimated by summarizing published data on marketed drugs and eszopiclone. 2. A regression model utilizing MarketScan claims data from 85,832 insomnia patients and these efficacy data estimated a general relationship between medical expenditures and treatment efficacy. Total sleep time was the primary efficacy measure; five other metrics were also considered. 3. Expenditures for medications (premium pricing was assumed for eszopiclone) were estimated by multiplying their efficacy estimates by the regression-based estimates of expenditures obtained in step 2, accounting for the impact of other factors that influence expenditures. A budget impact model was then developed to illustrate the results of this process for any given health plan, for all six clinical sleep outcomes.
RESULTS: For a health plan with 100,000 members, the model showed that addition of eszopiclone decreased annual costs of treating all insomnia patients by $498,204, using the default efficacy endpoint, total sleep time. Results varied slightly according to the sleep endpoint selected, providing flexibility and transparency for the user.
CONCLUSIONS: This modeling approach is an alternative and potentially effective way to estimate costs for new medications. This approach demonstrated that use of eszopiclone provided substantial cost savings in the treatment of insomnia. Support for this study provided by Sepracor Inc.

Pharmacoepidemiology

124E. Global variations in infection diagnoses, etiology, comorbidities, and causative microbiology in hospitalized patients with complicated skin and skin structure infections (cSSSI): evidence from a pooled clinical database. *Rajiv Mallick, Ph.D.*, Stephen Solomon, Ph.D.; Wyeth Pharmaceuticals, Collegeville, PA.

Presented at the Annual Meeting of the European Congress of Clinical Microbiology and Infectious Diseases, Copenhagen, Denmark, April 2-5, 2005.

125. Impact of isolated rural pharmacy closure on Medicaid patients' healthcare utilization. *Rex W. Force, Pharm.D.*, Vaughn L. Culbertson, Pharm.D., Paul S. Cady, Ph.D.; Idaho State University, Pocatello, ID.

PURPOSE: To determine the impact of closure of an isolated rural pharmacy on Medicaid patient healthcare expenditures.
METHODS: On July 29, 2003 the only pharmacy in Cambridge, Idaho (population: 360) closed, requiring patients to travel a minimum of 25 miles to fill prescriptions. We utilized a Medicaid claims database to examine the impact of pharmacy closure on healthcare utilization in patients living in this isolated rural area. All Medicaid patients receiving prescriptions at the pharmacy in the 6 months pre-closure were evaluated for number and cost of prescriptions, and all other healthcare costs. Post-closure utilization comparisons were made in the same cohort.
RESULTS: 207 Medicaid patients filled 2342 prescriptions (1.89 rx/pt/mo) at the pharmacy from 1/29/03-7/29/03 resulting in drug costs of $115.89 per pt/mo. In the 6 months after closure, 152/207 patients filled 2214 prescriptions (2.43 rx/pt/mo) at distant pharmacies resulting in drug costs of $154.45 per pt/mo. Total Medicaid expenditures increased from $388.23 per pt/mo to $402.09 per pt/mo. Of the remaining 55 patients who did not receive a prescription post-closure, 38 remained on Medicaid, 16 left Medicaid, and 1 died. Those remaining on Medicaid while not using pharmacy services post-closure were younger and filled fewer prescriptions in the pre-closure period.
CONCLUSIONS: Per patient prescriptions, drug costs, and overall healthcare costs increased in a small cohort of Medicaid patients who lost local pharmacy services. Further study is required to determine whether the reasons for these cost increases might include access issues, worsening illness, declining treatment adherence, or other factors.

126. Innapropriate medications prescribing in elderly outpatients in a leading hospital in Saudi Arabia based on the BEERS criteria. *Ahmed H. Aljedai, Pharm.D., M.B.A.*[1], Mohammed S. Alsultan, Pharm.D., Ph.D.[2]; (1)King Faisal Specialist Hospital and Research Centre, Riyadh, Saudi Arabia; (2)King Saud University, College of Pharmacy, Riyadh, Saudi Arabia.

PURPOSE: to determine the prevalence of inappropriate medication prescribing in patients aged 65 years and older who are treated in ambulatory care settings at a tertiary care hospital based on the Beers criteria for potentially inappropriate medication use in older adults.
METHODS: A retrospective, cross-sectional, descriptive study of the frequency of inappropriate medications prescribing has been conducted. Using outpatient pharmacy computer system, only medications that should be generally avoided in elderly patients independent of their diagnosis or condition were included due to data limitation. The primary endpoint was the prevalence of inappropriate prescribing of medications. Using logistic regression, predictors and cost related to such practice were identified.
RESULTS: A total of 112,385 prescriptions (1,551 patients) have been identified form the outpatient pharmacy records from which around 5.2% were considered inappropriate according to the Beers criteria. Total number of males who received inappropriately prescribed drugs based on the Beers criteria was 883 while the number of females was only 666. The most common inappropriately prescribed drugs were (digoxin>0.125mg) (24.2%), ferrous sulphate > 325mg (11.4%), and bisacodyl (long term use) (9.8%). Total cost of inappropriately prescribed drugs was around $33,581. Gender,

total number of prescription per visit, physicians' specialty, number of visit per patient and certain drugs were identified as possible predictors for inappropriate medications prescribing.
CONCLUSIONS: Inappropriate medications prescribing patterns in ambulatory care settings in Saudi Arabia is consistent with previously published studies from the USA and Europe. Many factors could be identified as predictors for this practice.

127. Incidence of drug-related problems among Medicaid high utilizers as identified by clinically-trained pharmacist reviewers. *Joanne LaFleur, Pharm.D.*, Melissa A Fowler, Pharm.D. Candidate, CarrieAnn McBeth, Pharm.D., Lynda Oderda, Pharm.D., Karen Gunning, Pharm.D., Carin Steinvoort, Pharm.D., William Stockdale, MBA, Gary M Oderda, Pharm.D., M.P.H.; Pharmacotherapy Outcomes Research Center, Suite #208, Salt Lake City, UT.

PURPOSE: Drug-related problems (DRPs) were identified by clinical pharmacists for Utah Medicaid patients who exceeded a seven-prescription per month limit in 2003. The purpose of this study was to estimate the incidence of DRPs among these high utilizers of Medicaid prescription benefits.
METHODS: Clinical pharmacists retrospectively reviewed prescription claims for Medicaid patients who exceeded the limit of seven prescriptions per month. These pharmacists identified clinically important DRPs in any of several predetermined categories such as: therapeutic duplication, drug-drug interaction, treatment without indication, and others. Pharmacists also identified potential ëcost-savings' opportunities categorized as: brand-name dispensed, consider a therapeutic alternative, or drug available over-the-counter. Data from these reviews were collected, and the frequencies and incidences of clinically important DRPs and ëcost-savings' recommendations were calculated.
RESULTS: A total of 1,935 reviews were conducted for 1,860 Medicaid patients who had received medications during 2003. Of the reviewed patients, at least one clinically important DRP category was identified in 1,502 patients (80.8%). Multiple DRP categories were identified in 895 patients (48.1%). The most common categories of DRPs were therapeutic duplication (57.6% of patients), the need for streamlined therapy (32.6% of patients), and the need to coordinate care among providers (25.3% of patients). In addition, at least one ëcost-savings' recommendation was made for 1,490 patients (80.1%).
CONCLUSIONS: The large majority of high-utilizers of prescription Medicaid benefits had at least one DRP identified by a clinical pharmacist.

128. Narrow therapeutic range drug monitoring in ambulatory care. *Marsha A. Raebel, Pharm.D.*[1], Nikki M. Carroll, MS[1], Susan E. Andrade, ScD[2], K. Arnold Chan, M.D., ScD[3], Elizabeth A. Chester, Pharm.D.[1], Robert L. Davis, M.D., MPH[4], Adrianne Feldstein, M.D., MS[5], Margaret J. Gunter, PhD[6], Jennifer Elston Lafata, PhD[7], Steven R. Simon, M.D., MPH[3], Richard Platt, M.D., MS[3]; (1)Kaiser Permanente, Denver, CO; (2)Meyers Primary Care Institute, Worcester, MA; (3)Harvard Medical School, Boston, MA; (4)Centers for Disease Control and Prevention, Atlanta, GA; (5)Kaiser Permanente Northwest Center for Health Research, Portland, OR; (6)Lovelace Clinic Foundation, Albuquerque, NM; (7)Henry Ford Health System, Detroit, MI.

PURPOSE: Serum concentration monitoring is important for drugs with narrow therapeutic ranges. Limited information exists about monitoring in ambulatory patients. This study was therefore designed to describe serum concentration monitoring within a one-year period among ambulatory patients dispensed narrow therapeutic range medications. Additionally, this study was designed to describe laboratory monitoring variations by age, sex, drug, chronic disease, health plan, diagnosis, and clinic/hospital visits.
METHODS: This retrospective cohort study included members of ten health maintenance organizations receiving a medication for which drug serum concentration monitoring was recommended. Univariate and bivariate statistics were computed to describe the population and its prescription dispensings. Logistic regression analysis was used to identify predictors of lack of monitoring.
RESULTS: Overall, 7749 of 18,821 (41%) patients did not receive drug serum concentration monitoring. Patients who did not have serum concentration monitoring were older than patients who were monitored (median 66 versus 60 years)($p<0.0001$). The percentage of patients without monitoring varied by age from 23% (age 0-17) to 47% (age 60-69)($p<0.0001$). Proportions of all patients without monitoring varied by drug from 14% (cyclosporine) to 74% (primidone). Other drugs where 50% or more of patients not monitored included digoxin (50%), procainamide (59%), theophylline (59%), and quinidine (60%). There was intersite monitoring variation (range across sites 28% to 62% of patients were not monitored)($p<0.0001$). Predictors of lack of monitoring will be presented for carbamazepine, digoxin, theophylline, lithium, divalproex, and/or phenytoin.
CONCLUSIONS: Opportunity exists to improve laboratory monitoring of drugs with narrow therapeutic ranges. This study emphasizes the need for research to identify the clinical implications of not monitoring, barriers to monitoring, and methods to improve practice.

129. Presence and independence of data safety monitoring and executive committees in industry-sponsored clinical trials. *B. Daniel Lucas Jr., Pharm.D.*, Bernardo Reyes, M.D., Abdul-Karim Elhabyan, M.D., Holly Blackwood, B.S.N., Jonathan Lipton, M.D., Edwin Brewer, Pharm.D.; CAMC Health Education and Research Institute, Charleston, WV.

Recent reports from major news outlets such as the Wall Street Journal article entitled "Study Says Failure to Follow Guidelines on Independence Puts Participants at Risk," likely alarmed the public more than merited by the underlying publication by Schulman (N Engl J Med 2002;347:1337-41) condemning the research enterprise's process for protecting human subjects safety in clinical trials. They concluded that only 2% and 1% of studies have independent executive committees (ECs) and data and safety monitoring boards (DSMBs), respectively. This conclusion was based on evaluation of clinical study agreements or contracts and not on a combined review to include respective study protocols. The research contract is an abbreviated legal document contractually linked to the protocol, making omission of oversight committee language in the contract not surprising.
PURPOSE: The aims of this study were to determine the frequency and independence of ECs and DSMBs in industry-sponsored clinical trials.
METHODS: We randomly selected ten research contracts and protocols (five drug-studies and five device-studies) from approximately sixty ongoing industry-sponsored studies at our clinical research site. We reviewed these documents to determine the frequency and independence of ECs and DSMBs.
RESULTS: None of the contracts mentioned ECs or DSMBs. However, ECs and DSMBs were detailed in eight and nine of the protocols, respectively. Independence was clearly declared by two of the ECs and seven of the DSMBs.
CONCLUSION: The majority of industry-sponsored clinical trials have independent ECs and DSMBs. Future evaluation should include study protocols and contracts to accurately represent the current status, and should not exaggerate or misrepresent claims of deficiency.

130. Trends in antimicrobial resistance documented at www.armprogram.com. *John G. Gums, Pharm.D.*; University of Florida, Gainesville, FL.

PURPOSE: This study documents institution participation in the Antimicrobial Resistance Management Program (ARMP), begun in 1997 to compare antibiotic use and resistance rates, and demonstrates how the data collected from these institutions, available at www.armprogram.com, can be used to create custom reports on susceptibility of specific organisms to antibiotics over time.
METHODS: Institutions are enrolled in ARMP at no cost. Each provides a minimum of 3 years of antibiogram/sensitivity report data which, in a HIPAA-compliant non-identifying format, comprise a national aggregate database. At the ARMP Web site, the database was interrogated to determine whether an association existed between fluoroquinolone resistance and ESBL production.
RESULTS: As of November 2004, ARMP has enrolled 353 institutions, 281 (80%) teaching and 72 (20%) nonteaching, and collected 27.7 million isolates detailing 48 antibiotics and 19 organisms, including *Escherichia coli* (11,277,077 isolates), *Staphylococcus aureus* (4,777,965), *Pseudomonas aeruginosa* (2,663,502) *Klebsiella pneumoniae* (2,676,684), and *Proteus mirabilis* (1,718,441). Each institution receives an analysis of antimicrobial susceptibility trends on an organism-by-organism basis, benchmarked against national, regional, and state comparators. The aggregate data suggest that between 1997 and 2003 nationally, *E coli* isolates became less susceptible to the fluoroquinolones as a class: ciprofloxacin susceptibility declined from 98.1% to 86.3%; ofloxacin, 97.6% to 84.4%; levofloxacin, 96.5% to 87.2%; gatifloxacin from 90% (2000) to 88.8%; moxifloxacin was 79.9% for 2003. Susceptibility to extended-spectrum cephalosporin antibiotics also decreased slightly: cefotaxime, 99.2% to 99.0%; ceftriaxone, 99.6% to 97.9%; and cefepime, 100% to 98.9%. Similar results were noted for *K pneumoniae* and *P mirabilis*.
CONCLUSIONS: ARMP allows institutions to document trends in antimicrobial susceptibility before they become significant, allowing selection/modification of agents. The Web-based aggregate database enables users to create custom reports demonstrating, as in the example above, low level ESBL activity appears to be occurring, indicating fluoroquinolone resistance should be monitored.

Pharmacogenomics

131. A global view of cytochrome P450 2C9 pharmacogenetics. *Sara L. Lanfear, Pharm.D.*[1], Derek J Van Booven, B.S.[2], Howard L. McLeod, Pharm., D.[2]; (1)St. Louis College of Pharmacy, St. Louis, MO; (2)Washington University School of Medicine, St. Louis, MO.

PURPOSE: Cytochrome P450 (CYP) 2C9 ranks amongst the most important drug metabolizing enzymes in humans. It is involved in the metabolism of many drugs, including the narrow therapeutic index agents warfarin and phenytoin, and other compounds such as losartan, glipizide and various NSAIDs. Numerous studies have demonstrated that individuals possessing at least one variant allele exhibit significant reductions in both CYP2C9 metabolic activity and dosing requirements of certain CYP2C9 substrates. These polymorphisms may underlie differences in the metabolism of CYP2C9 substrates among various ethnic groups. This study documents frequency of variant CYP2C9 alleles to better understand the clinical implications of CYP2C9 genetic polymorphisms around the world.

METHODS: Textmining of PubMed identified journal articles that detailed variant allele frequencies of the 2C9 gene, including 2C9*1, 2C9*2, and 2C9*3 in 7,474 adult subjects from twenty-six different populations in twenty-four countries on five continents.
RESULTS: There was a great range in the frequency of variant alleles (0%-30.5%). The highest variant allele frequencies were found in Spain and other predominantly Caucasian populations. The lowest frequencies were observed in Asia, Africa and among the Native American Inuits. The 2C9*2 allele was not observed in Asian populations, but was found in 10%-15% of Caucasians. The 2C9*3 allele was found in 1-3% of the Asian and African populations and in 6%-8% of the Caucasian populations.
CONCLUSIONS: Significant geographic variation in CYP2C9 genotype exists. This has important implications for the future study of dosing, safety and efficacy of drugs such as phenytoin and warfarin in various world populations.

132. eNOS polymorphism is associated with early inflammation in normocholesterolemic patients. *Issam Zineh, Pharm.D.*[1], Taimour Y. Langaee, Ph.D., MSPH[1], Gregory J. Welder, .[1], Xiaoping Luo, MD[2], Christopher B. Arant, MD[3], Timothy R. Wessel, MD[3], Richard S. Schofield, MD[3], Nasser Chegini, PhD[2]; (1)Department of Pharmacy Practice, University of Florida College of Pharmacy, Gainesville, FL; (2)Department of Obstetrics and Gynecology, University of Florida College of Medicine, Gainesville, FL; (3)Division of Cardiovascular Medicine, University of Florida College of Medicine, Gainesville, FL.

PURPOSE: Early stages of atherosclerosis via endothelial dysfunction and inflammation can begin prior to development of hypercholesterolemia. The endothelial nitric oxide synthase (eNOS) Glu298Asp polymorphism has been linked to increased risk of angiographic coronary artery disease (CAD) and other pathological phenotypes. We investigated whether this polymorphism contributes to early inflammation in normocholesterolemic patients.
METHODS: Subjects at least 18 years of age without hypercholesterolemia, CAD, or CAD risk equivalents were studied if they were not on lipid-lowering or chronic anti-inflammatory agents. Subjects underwent screening laboratories and fasting lipid profiles. Whole blood was collected, and peripheral blood mononuclear cells were cultured for 24 hours. Culture media were collected and cytokines and chemokines were measured in duplicate by Luminex 100IS. eNOS genotypes were determined by pyrosequencing. Gene effect was assessed by comparing five individuals who were homozygous for either the wild-type (Glu298) or variant (Asp298) alleles.
RESULTS: Average age, total cholesterol, LDL, HDL, and triglycerides were 30±14 years, 190±51 mg/dl, 102±42 mg/dl, 70±24 mg/dl, and 91±31 mg/dl, respectively. Patients with the variant Asp298Asp genotype had 1.5-fold and 3-fold higher concentrations of the inflammatory chemokine RANTES and IL-6 than those with the Glu298Glu genotype. This corresponded to RANTES concentrations of 3196±778 pg/ml vs. 2111±551 pg/ml (p=0.03) and IL-6 concentrations of 11.5±3.4 pg/ml vs. 3.6±0.2 pg/ml (p=0.002) among variant homozygotes vs. wild-type homozygotes.
CONCLUSIONS: The eNOS Glu298Asp polymorphism was associated with variable concentrations of inflammatory mediators. This polymorphism may be important in identifying individuals with pro-inflammatory profiles prior to the development of overt hypercholesterolemia.

Pharmacokinetics/Pharmacodynamics/Drug Metabolism/Drug Delivery

133. Evaluation of a seven-year experience using a vancomycin dosing nomogram without routine vancomycin serum concentration monitoring. *Beata M. Domagala, Pharm.D.*[1], Michael J. Rybak, Pharm.D.[2], Peggy S. McKinnon, Pharm.D.[3]; (1)Spectrum Health, Grand Rapids, MI; (2)Anti-Infective Research Laboratory, Eugene Applebaum College of Pharmacy & Health Sciences, Wayne State University, Detroit, MI; (3)Barnes-Jewish Hospital, St. Louis, MO.

PURPOSE: Debate continues over necessity of routine vancomycin (VANC) monitoring. Data is lacking to support specific VANC concentrations relate to outcomes. We previously reported equivalent outcomes using a VANC nomogram (VNM) developed at Detroit Medical Center (DMC) [CrCl >30ml/min; Wt >50kg- targeting trough concentrations of 5-20µg/ml] with minimal trough level monitoring (VNM-Tr) vs pharmacokinetic dosing (PK). This study evaluates the impact of not routinely monitoring VANC levels on patient outcomes.
METHODS: Patients who received VANC for > 72 hr from 1996-2003 were identified. Demographics, antibiotic therapy, and clinical outcomes were collected. All outcome measures assessed for the present practice of not monitoring routine VANC levels (VNM-NL) were compared to historical PK and VNM-Tr groups.
RESULTS: 1219 patients were dosed by VNM. Complete outcomes data was evaluated for 365 pts (VNM-NL) and compared to historical PK (n=120) and VNM-Tr (n=120). No differences were noted in demographics. CrCl was lowest in VNM-Tr (73 ml/min) vs PK and VNM-NL (85 and 86 ml/min, respectively, p<0.05). Total nephrotoxicity was lowest for VNM-NL (5.8%) vs PK and VNM-TR (16.2% and 24.3%, respectively, p<0.0001). Concomitant aminoglycoside use was lowest in the VNM-NL group. Multivariate analysis identified baseline CrCl and aminoglycoside use as independent predictors of nephrotoxicity. All clinical and microbiological outcomes were similar among groups.
CONCLUSIONS: The DMC nomogram is safe and effective for use without routine VANC serum concentration monitoring. Monitoring may be useful in patients who do not meet nomogram criteria [Stable CrCl>30 ml/min, Wt >50kg], those who are on prolonged therapy, or receiving concomitant aminoglycosides.

134. Monte Carlo analysis (MCA) of the pharmacodynamic (PD) profile of fluoroquinolone (FQ) regimens against Gram-negative aerobes (GNA). *Kiran K. Ubhi, Pharm.D.*[1], Lawrence Friedrich, Pharm.D.[2], Roger L. White, Pharm.D.[1]; (1)Medical University of South Carolina, Charleston, SC; (2)Bristol-Myers Squibb, Charleston, SC.

PURPOSE: MCA is used to assess population PD profiles. For FQ, AUC_{24hr}/MIC>100 are associated with good outcome for GNA (>150 may be needed to prevent resistance).
METHODS: MICs of ciprofloxacin (C), levofloxacin (L), and gatifloxacin (G) were determined for 6 GNA (see Table). Unbound AUCs for 5 IV FQ regimens were calculated (CrCl 10-120 mL/min) and MCA performed [All and susceptible-only (S) MICs].
RESULTS: Target attainment (TA) rates for AUC_{24hr}/MIC>100 were:

		C400mg q12h		C400mg q8h		L500mg q24h		L750mg q24h		G400mg q24h	
Organism	# isolates	All	S	All	S	All	S	All	S	All	S
E.cloacae(EC)	300	0.84	0.91	0.87	0.94	0.86	0.92	0.90	0.95	0.85	0.90
K.pneumoniae(KP)	643	0.81	0.86	0.84	0.89	0.83	0.86	0.87	0.90	0.82	0.85
S.marcescens (SM)	240	0.80	0.84	0.84	0.88	0.85	0.88	0.90	0.93	0.72	0.76
A.baumannii(AB)	114	0.25	0.61	0.34	0.83	0.41	0.96	0.41	0.98	0.41	0.94
P.aeruginosa(PA)	870	0.49	0.67	0.56	0.78	0.30	0.42	0.50	0.70	0.13	0.19
S.maltophilia(Smal)	115	0.02	0.05	0.03	0.07	0.21	0.24	0.42	0.48	0.28	0.33

AUC_{24hr}/MIC>150 TA was 2-15% lower (All and S). TA rates were similar for all regimens for EC, KP and SM (0.72-0.90); but much lower for AB (0.25-0.41), PA (0.13-0.56) and Smal (0.02-0.42). Although higher with S isolates, TA was frequently suboptimal (AUC/MIC<100) [0.02-0.39 (AB), 0.22-0.81 (PA), 0.52-0.95 (Smal)].
CONCLUSIONS: No FQ displayed a superior PD profile against all organisms; however L750mg q24h was highest for most of the organisms. Many regimens with S only isolates displayed suboptimal PD profiles.

135. Monte carlo simulation of bactericidal activity versus P. aeruginosa of levofloxacin 500 mg, 750 mg and 1000 mg once daily compared to gatifloxacin 400 mg once daily administered to critically ill patients. *Ayman M. Noreddin, MSc., Ph.D.*[1], Daryl Hoban, PhD[2], George G. Zhanel, Pharm.D., Ph.D.[2]; (1)College of Pharmacy, Univeristy of Minnesota, Duluth, MN; (2)Univeristy of Manitoba, Winnipeg, MB, Canada.

PURPOSE: This study aimed to assess the probability of Levofloxacin (Levo) compared to Gatifloxacin (Gati) achieving favorable pharmacodynamic (PD) targets for bacterial eradication and prevention of resistance development in *S.pneumoniae* in both elderly (>65 years) and younger (<65 years) patients with CAP.
METHODS: As part of an ongoing study comparing the clinical outcome of Levo vs. cefuroxime + erythromycin in hospitalized patients with CAP, demographics including age, weight, gender, race and renal function were gathered and analyzed from 263 elderly (>65 years) and 48 younger patients (<65 years). Previously described and validated population pharmacokinetic (PK) models of Levo and Gati in patients with CAP were utilized. Free-drug $AUC_{0\text{-}24}$ were simulated in Plasma (P) using Levo dosing at 500mg, 750mg and 1000mg OD as well as Gati 200mg and 400mg OD. Use of Monte Carlo Simulation allowed for the full variability of encountered drug clearance to be accounted. *S.pneumoniae* susceptibility data were obtained from the Canadian Respiratory Organism Susceptibility Study (CROSS) study (an annual, national, ongoing surveillance study which has collected 8014 isolates from 1997-2004).
RESULTS: Probability of target attainment (free $AUC_{0\text{-}24}$/MIC of 30) of Levo and Gati, respectively, is shown in the following tables:

Target Free-Drug $AUC_{0\text{-}24}/MIC_{all}$		30
All Patients	500mg	92.3%
	750mg	97.8%
	1000mg	98.3%
Elderly Patients	500mg	95.5%
	750mg	98.5%
	1000mg	99.2%

Target Free-Drug $AUC_{0\text{-}24}/MIC_{all}$		30
All Patients	400mg	96.6%
	200mg	87.7%
Elderly Patients	400mg	97.7%
	200mg	91.4%

CONCLUSIONS: For all patients and for elderly hospitalized patients with CAP, Levo 750mg and Gati 400mg showed high probability for target attainment of free AUC_{0-24}/MIC of 30.

136. Pharmacodynamic modeling of telithromycin and azithromycin vs. genotypically characterized (mefA and ermB) macrolide resistant strains of Streptococcus pneumoniae simulating free serum and free epithelial lining fluid concentrations. *Ayman M. Noreddin, MSc., Ph.D.*[1], Daryl Hoban, PhD[2], George G. Zhanel, Pharm.D., Ph.D.[2]; (1)College of Pharmacy, Univeristy of Minnesota, Duluth, MN; (2)Univeristy of Manitoba, Winnipeg, MB, Canada.

PURPOSE: The purpose of this study was to compare the pharmacodynamics (PD) of Teli and azithromycin (Azi) versus macrolide-resistant SPN simulating free serum (S) and free epithelial lining fluid (ELF) concentrations in an in vitro model.
METHODS: Five PCR-positive mefA, one PCR-positive ermB and a control PCR-negative mefA, ermB strain of SPN were studied. A one compartment in vitro pharmacodynamic model was used with starting inocula 1x106 CFU/ml. Teli was added to the model simulating a dosage of 800mg PO OD and Azi was added simulating a dosage of 500mg/250mg PO OD (S: free drug Cpmax 0.2µg/ml, t1/2 68 hr, free AUC ~2; ELF: free drug Cmax 1µg/ml, t1/2 68 hr, free AUC ~10). Samples were obtained over 24 hours to assess viable growth and selection of resistance.
RESULTS: Both S and ELF Teli concentrations eradicated (lowered inoculum below level of detection) all PCR-positive mefA, ermB and wild type SPN from the model within 6 hours. No difference in the rate or extent of killing (≥3 log10 reduction) occurred between the test and control strains or between S and ELF concentrations. Azi S and ELF concentrations eradicated macrolide-susceptible SPN but did not eradicate macrolide-resistant SPN regardless of resistance phenotype.
CONCLUSION: Both Teli and Azi eradicated macrolide-susceptible SPN. Teli but not Azi, completely eradicated both mefA and ermB SPN from the model with no regrowth over 24 hour. Teli offers promise for the management of respiratory infections caused by macrolide-resistant SPN.

137. Pharmacokinetic interaction between eszopiclone and ketoconazole in healthy volunteers at steady state. *Andrea J. Anderson, Pharm.D.*, Gary Maier, Ph.D., Susan M. Skolly, Pharm.D.; Sepracor Inc., Marlborough, MA.

PURPOSE: To evaluate the pharmacokinetic interaction of multiple oral doses of eszopiclone 3 mg and ketoconazole 400 mg, a potent inhibitor of P450 CYP3A4.
METHODS: Single-center, randomized, three-way crossover, daytime administration, inpatient, multiple dose, open-label study with between dose washout in 18 healthy volunteers (21-64 years) who received eszopiclone 3 mg alone, ketoconazole 400 mg alone, and a combination of the drugs.
RESULTS: Eszopiclone AUC(0-t), Cmax, and t1/2 were increased by 2.2 fold, 1.4 fold, and 1.3 fold respectively when given with ketoconazole compared with eszopiclone given alone. AUC(0-t) was augmented by 125% and Cmax by 43%. For eszopiclone, AUC(0-t) and Cmax were outside the 80-125% confidence interval (CI), indicating drug interaction. Median tmax was unaffected by combination treatment. For ketoconazole AUC(0-t) and Cmax were decreased by 12% and 18% respectively when coadministered. Although the lower limit of the CI was outside the 80-125% range, these changes were not considered clinically relevant. Median tmax was unchanged by the combination (p=0.6392).
CONCLUSIONS: In this study of healthy volunteers, concomitant administration of eszopiclone and ketoconazole resulted in the expected pharmacokinetic interaction. A reduction in eszopiclone dose is recommended when co-administered with ketoconazole, a potent inhibitor of P450 CYP3A4. However, ketoconazole plasma levels were not significantly affected by co-administration of eszopiclone. Ezopiclone 3 mg was safe and well tolerated when administered alone or concomitantly with ketoconazole.

138. Pharmacokinetics of fentanyl delivered by a patient-controlled transdermal analgesic system (PCTS): effects of patient demographics and multiple-day dosing schedules. *Chris M. Herndon, Pharm.D., BCPS*[1], Gayatri Sathyan, PhD[2], Suneel Gupta, PhD[2]; (1)Clinical Affairs, Ortho-McNeil, New Baden, IL; (2)ALZA Corporation, Mountain View, CA.

PURPOSE: A new, noninvasive, iontophoretic, fentanyl HCl patient-controlled transdermal system (PCTS) is currently under development for acute postoperative pain management. Two clinical studies evaluated the effects of patient demographics (Study I) and multiple-day dosing schedules (Study II) on the pharmacokinetics of fentanyl delivered by the PCTS.
METHODS: In a multicenter study (Study I), healthy subjects (assigned to demographic groups according to age, body mass, and race) received 3 consecutive 40-µg fentanyl doses from the PCTS during the first 30 minutes of each hour for 3 hours. Following a 5-10 day washout period, a reference treatment of intravenous fentanyl (120 µg) was infused over 30 minutes hourly for 3 hours. In an open-label crossover study (Study II), subjects received two 40-µg doses from the PCTS every 4 hours for 20 hours. Following a 24-hour washout, subjects received the same dose of fentanyl from the PCTS every 4 hours for 68 hours. Pharmacokinetic parameters (maximum serum concentration [Cmax], terminal half-life [t1/2], and area under the serum concentration-time curve [AUC]) were compared using ANOVA. Safety and tolerability were also assessed.
RESULTS: Fentanyl pharmacokinetics in Study I (N=70) were similar between demographic groups of age (P=0.328), race (P=0.848), body mass (P=0.377), and gender (P=0.450). In Study II (N=28), dose-normalized AUC values were similar for the 1-day and 3-day treatments (0.40 µg/L and 0.54 µg/L, respectively; P=0.133). No serious adverse events were reported.
CONCLUSION: The pharmacokinetics of fentanyl delivered by the PCTS were not significantly affected by demographic factors or by multiple-day dosing schedules.

Psychiatry

139. Depression screening in primary care. *Patricia L. Canales, Pharm.D.*; University of Texas-Pan American and the University of Texas at Austin, Edinburg, TX.

PURPOSE: This study aimed to identify the rate of depression in an indigent Hispanic primary care population, identify patient factors that correlate to the occurrence of depression, and compare depression primary care services before and after the initiation of depression self-screening. The main hypothesis was that depression screening will be associated with an increase in depression diagnoses, new orders for antidepressants, and/or counseling referrals.
METHODS: Medical charts and medication records were reviewed retrospectively for the 6 months prior to the initiation of depression screening services and the 6 months following the initiation of depression screening services. All patients 18 years or older presenting to the clinic site for general medical care underwent screening with the Quick Inventory for Depressive Symptoms-Self-Rated (QIDS-SR). Depression primary care services under evaluation included documentation by the provider indicating awareness of screening results, documentation of further assessment, counseling referrals made, initiation of antidepressant medication, drug selection and dosing, and duration of treatment.
RESULTS: Preliminary findings show that 31% of patients (N=134) who underwent screening scored a 12 or greater, consistent with moderate depressive symptoms. One-third of this 31% scored a 21 or greater, consistent with severe symptoms. Of those who scored a 12 or greater, only one was started on antidepressant therapy. Acknowledgement of the screening score by the provider was noted in progress notes of only two patients.
CONCLUSIONS: While data analysis is pending, it is evident that depression screening has improved depression detection but has not influenced depression management by primary care providers.

140. Inreased risk of extrapyramidal side effect treatment associated with atypical antipsychotic polytherapy. *Ryan M. Carnahan, Pharm.D., M.S.*[1], Brian C. Lund, Pharm.D., M.S.[2], Paul J. Perry, Ph.D.[3], Elizabeth A. Chrischilles, Ph.D.[4]; (1)University of Oklahoma College of Pharmacy, Tulsa, OK; (2)Laureate Psychiatric Research Center, Tulsa, OK; (3)University of Iowa Colleges of Pharmacy and Medicine, Iowa City, IA; (4)University of Iowa College of Public Health, Iowa City, IA.

PURPOSE: Atypical antipsychotic polytherapy is becoming more common. The risk-benefit ratio of this practice is unclear. To determine whether atypical antipsychotic polytherapy is a risk factor for receiving a drug used to treat extrapyramidal side effects (EPS) and whether the risk can be attributed solely to the cumulative dose of antipsychotic received.
METHODS: The sample included all persons 18-64 years of age continuously eligible for Iowa Medicaid prescription drug benefits during fiscal year 2001. Active drug lists for January 1st, 2001, were determined. An active atypical antipsychotic was required for inclusion. Individuals with an active conventional antipsychotic were excluded. The unadjusted association of atypical antipsychotic polytherapy with the use of drugs that treat EPS was first determined. Multiple logistic regression was then utilized to adjust for covariates in two separate models. The first model adjusted for age, sex and the individual antipsychotic agent(s) prescribed, while the second also adjusted for antipsychotic doses expressed in standard daily dosage units.
RESULTS: The final analysis included 4,400 people. The unadjusted odds of having an active drug used to treat EPS were increased two-fold among polytherapy users. Polytherapy remained a risk factor in the first multiple logistic regression model (O.R. 1.5, 95% CI 1.1-2.0). After adjusting for antipsychotic doses, polytherapy was no longer a risk factor (O.R. 1.0, 95% C.I. 0.7-1.4).
CONCLUSION: Atypical antipsychotic polytherapy is associated with an increased risk of receiving drugs to treat EPS. This effect appears to be mediated by the higher cumulative doses utilized in polytherapy.

141E. Safety and efficacy of Adderall XR in Adolescents with ADHD. Stephen Grcevich, MD[1], Stephanie C. Read, MS[2], Daniel Sea, BA[2], David A. Mays, Pharm.D.[2], Simon J. Tulloch, MD[2], *Chris Paap, Pharm.D.*[3]; (1)Case Western Reserve University School of Medicine, Cleveland, OH; (2)Shire Pharmaceutical Development, Inc., Rockville, M.D.; (3)Shire Pharmaceuticals, Wayne, PA.

PURPOSE: The primary objectives of this study were to assess the safety and

efficacy of Adderall XR (10-40 mg/day) compared with placebo in adolescents, aged 13-17 years and weighing < or = 75 kg, with ADHD. Secondary objectives included assessing safety and efficacy independent of weight-based cohorts for ~ 6 months in an open-label extension study and evaluating higher doses of Adderall XR (50-60 mg/day) in subjects > 75 kg.
METHODS: This study was a multicenter, randomized, double-blind, placebo-controlled, parallel-group, forced-dose escalation phase III trial. Subjects had a 1 week washout, or up to 28 days if applicable, of previous ADHD medication before randomization. Subjects were randomized in a 1:1:1:1:1 ratio to receive Adderall XR 10, 20, 30, or 40 mg or placebo once daily for 4 weeks. Subjects > 75 kg were randomized 1:1:1 to either 50 or 60 mg Adderall XR or placebo once daily for 4 weeks. Subjects in the open-label extension received Adderall XR 10 mg/day during the first week and the dose was increased or decreased in 10 or 20 mg increments up to a maximum of 60 mg/day for 6 months. Efficacy variables included the ADHD-RS and CGI-Severity and Improvement Scales.
RESULTS: Mean ADHD-RS total scores for subjects receiving 10-40 mg were signficantly improved compared to placebo (p <0.0001). For subjects > 75 kg, results were similar to those receiving 10-40 mg for absolute improvement in ADHD-RS total scores from baseline to endpoint. For subjects in the open-label extension, efficacy variables significantly improved compared with baseline. Most adverse events (AEs) were mild or moderate and drug-related AEs reported during the long-term study were similar to what has been previously reported for Adderall XR.
CONCLUSIONS: During short-term and long-term treatment, Adderall XR is an effective and well-tolerated once-daily treatment option for adolescents with ADHD. Doses of Adderall XR > 40 mg/day may be warranted in older or heavier adolescents weighing > 75 kg.
Presented at the 51st Annual Meeting of the American Academy of Child and Adolescent Psychiatry, Washington, D.C., October 20, 2004.

Substance Abuse/Toxicology

142. Effect of activated charcoal temperature in simulated overdose. Anand Bansal, B.S.[1], Joseph A. Barone, Pharm.D., FCCP[2], *Donald K. Woodward, Pharm.D.*[2]; (1)University of Medicine and Dentistry of New Jersey, Stratford, NJ; (2)Ernest Mario School of Pharmacy, Piscataway, NJ.

BACKGROUND: Activated charcoal (AC) is routinely used in overdose management. *In-vitro* data suggest an inverse relationship between AC temperature and drug binding.
PURPOSE: To determine if chilled AC increases the efficacy of binding compared to room temperature AC in a simulated aspirin overdose.
METHODS: Eight normal males were given 1.944 gm. of baby aspirin and were then randomized into one of three treatment groups: 1) no further treatment (control), 2) 50 gm. AC at room temperature 1 hour after aspirin ingestion, 3) 50 gm. AC chilled to 5∞C given 1 hour after aspirin ingestion. Subjects crossed-over to the two remaining treatments, separated by 14 day wash-out periods. Serum salicylate concentration was measured at 0.5, 1, 1.5, 2, 3, 4, 6, 8, 10, 12, and 24 hours. Pharmacokinetic parameters were compared using ANOVA with repeated measures: area under the concentration-time curve (AUC), maximum concentration (Cmax), time to reach Cmax (tmax), and elimination half-life ($t_{1/2}$).
RESULTS:

	AUC (mg•hr/dL)	Cmax (mg/dl)	tmax (hr)	$t_{1/2}$ (hr)
Control	155.4 ± 41.1	16.5 ± 3.7	3.0 ± 1.2	7.1 ± 2.3
Room Temp. AC	115.3 ± 76.9	12.9 ± 4.6	1.4 ± 0.4[a]	6.2 ± 1.7
Chilled AC	104.8 ± 39.7[a]	14.0 ± 4.5	1.8 ± 0.5	6.1 ± 1.7

Mean ± S.D., [a]significant difference vs. control (p<0.05).

CONCLUSION: In contrast to *in-vitro* data, chilled AC was equivalent and not superior to room temperature AC in binding aspirin based on the lack of changes in pharmacokinetic parameters. The low aspirin dose relative to AC dose necessitated by simulation in volunteers and high efficacy of AC limits this study and may partially explain this contradictory result.

Transplant/Immunology

143. A unique 6-week course of oral valganciclovir for CMV infection in adult renal transplant recipients. *Lonnie D. Smith, Pharm.D.*[1], Patricia Aggers, Pharm.D.[2], Fuad Shihab, MD[1]; (1)University of Utah Hospitals and Clinics, Salt Lake City, UT; (2)St. Alphonsus Hospital, Boise, ID.

PURPOSE: Despite advances in anti-viral therapy for CMV prophylaxis, CMV infection represents a significant source of morbidity in renal transplant recipients. Valganciclovir(VGC) an oral prodrug of GCV with a 10-fold higher bioavailability and IV equivalent plasma concentrations (900mg = 5mg/kg), offers an alternative therapy.
METHODS: Between 11/01 and 3/04 pts were screened for CMV viremia as clinically indicated. Pts diagnosed with CMV viremia were treated with VGC 900 mg BID x 1 week, 450 mg BID x 2 weeks, 450 mg QD for 3 weeks. Baseline induction therapy was either thymoglobulin or basiliximab. Maintenance immunosuppression consisted of TAC or CsA and MMF ± prednisone.
RESULTS: 102 adult renal transplant pts were evaluated. Fourteen (14%) patients were diagnosed with CMV viremia (high risk 5/21, 24% and moderate risk 9/81, 11%). 12/14 (86%) of the patients were treated with a our six week outpatient course of VGC. No major side effects of VGC were noted. One pt had recurrence of CMV viremia requiring a second six week course, no patients developed invasive CMV disease and none required hospital admission. Clinical symptoms of CMV infection resolved in all pts with oral VGC therapy.
CONCLUSION: A 6 week outpatient course of oral VGC 900 mg BID x 1 week, 450 mg BID x 2 weeks and 450 mg QD x 3 weeks offers IV GCV equivalent dosing in an efficacious and cost effective regimen for treatment of CMV viremia in adult renal transplant recipients.

144. Effect of long-term tacrolimus immunosuppression on renal function in liver transplant recipients. *Shelby L. Corman, Pharm.D.*[1], Kim C. Coley, Pharm.D.[2], Kristine E. Schonder, Pharm.D.[1]; (1)University of Pittsburgh Medical Center, Pittsburgh, PA; (2)University of Pittsburgh School of Pharmacy, Pittsburgh, PA.

PURPOSE: To describe changes in glomerular filtration rate (GFR) occurring after long-term treatment with tacrolimus in liver transplant recipients, and to identify risk factors for chronic nephrotoxicity.
METHODS: This retrospective cohort study included patients who received their first liver transplant at the University of Pittsburgh Medical Center between 1/01/1996 and 12/31/2000. All patients were treated with tacrolimus. Patients receiving multi-organ transplants were excluded. Outcomes measured were change in mean GFR over five years, proportion of patients with a decline in GFR >40 ml/min/1.73m^2, and proportion of patients with normal baseline renal function who developed chronic kidney disease (CKD). Logistic regression and Cox hazards models were used and adjusted for demographics, comorbidities, baseline GFR, mean tacrolimus level, and length of stay (LOS).
RESULTS: There were 432 patients that met study criteria. Mean GFR declined over the study period from 67.7 ± 25.6 to 58.4 ± 26.5 ml/min/1.73 m^2 (p<0.001). Sixty patients (13.9%) experienced a decline in GFR of >40 ml/min/1.73 m^2. Increased LOS (p=0.04), presence of hypertension (p=0.006), and higher baseline GFR (p<0.001) were predictors of this outcome. Of the 245 patients with a baseline GFR of 60 ml/min/1.73 m^2 or more, 182 (74.3%) developed CKD. The time from transplant to the development of CKD was inversely proportional to the patient's baseline GFR (p<0.001).
CONCLUSIONS: In liver transplant recipients receiving long-term tacrolimus, decline in mean GFR was statistically significant but probably not clinically important. Certain patient factors such as hypertension predicted a decline in GFR, however tacrolimus concentrations did not.

145E. Foamy macrophages in bronchoalveolar lavage fluid from lung transplant recipients receiving aerosolized amphotericin B preparations. *Jason C. Gallagher, Pharm.D.*[1], Elizabeth S. Dodds Ashley, Pharm.D.[2], David Howell, Ph.D.[2], Scott Palmer, MD[2], John R. Perfect, M.D.[2], Richard H. Drew, Pharm.D., M.S.[2]; (1)Temple University School of Pharmacy, Philadelphia, PA; (2)Duke University Medical Center, Durham, NC.

Presented at the Annual Interscience Conference on Antimicrobial Agents and Chemotherapy, Washington, D.C., October 30-November 2, 2004.

146. Impact of different sirolimus combination regimens on lipid profile in kidney transplant recipients. Hakeam A. Hakeam, BS., Pharm., *Ahmed H. Aljedai, Pharm.D., M.B.A.*; King Faisal Specialist Hospital and Research Centre, Riyadh, Saudi Arabia.

PURPOSE: The purpose of this study is to determine if the magnitude of dyslipidemia associated with sirolimus is independent adverse effect that is not potentiated by a concomitant tacrolimus administration in Kidney transplant patients.
METHODS: A retrospective, observational, cohort, 9-months study was performed. Sixteen patients in each group were included: group (A) received prednisone, sirolimus, and mycophenolate mofetil, and group (B) received prednisone, sirolimus, MMF and tacrolimus. Lipid profile was recorded pre-transplantation then after one, three, four, six, and nine months after initiation of sirolimus therapy.
RESULTS: There was a marked increase in lipid profile in both groups after 1 month from starting sirolimus. Mean triglycerides level rose from 1.8 mmol/L in both groups to 2.7 mmol/L in group (A) and 4 mmol/L in group (B) (p=0.77). By month (9) mean triglycerides levels were 3.69 and 4.08 mmol/L for group (A) and (B); respectively (p=0.8). Mean LDL-C rose from 2.7 mmol/L to 3.8 and 3.3 mmol/L after 1 and 9 months respectively for group (A) and 2.6 mmol/L to 3.2 and 3.6 after 1 and 9 months (p=0.1, p=0.81); respectively for group two. By month (9) the need for lipid-lowering agents was 75% for group (A) and 53% in group (B); (p=0.1).
CONCLUSION: Our study suggests that elevation in LDL-C and TG levels secondary to sirolimus is independent from concomitant calcineurin inhibitor use. The introduction of lipid-lowering agents should be considered during

early months of initiation of sirolimus therapy.

147. Influence of a steroid withdrawal protocol on cardiovascular disease risk and rejection. *Jill A. Allard, Pharm.D.*, Lonnie D. Smith, Pharm.D., Fuad Shihab, M.D.; University of Utah Hospitals and Clinics, Salt Lake City, UT.

PURPOSE: Cardiovascular disease (CVD) is the leading cause of morbidity/mortality in renal transplant recipients. Steroid use contributes to CVD evidenced by negative effects on blood pressure, cholesterol, and blood glucose.
METHODS: In January 2003 a 7-day steroid taper became standard of care in primary renal transplant patients at our institution. Immunosuppression consisted of thymoglobulin induction, tacrolimus and mycophenolate mofetil. A comparable group of patients prior to January 2003 were included as an historical control group.
RESULTS: The steroid withdrawal group (SWG) and the control group (CG) consisted of 60 patients. In SWG 91.7%, 13.3%, and 40% of patients required pretransplant antihypertensive, oral hypoglycemic, and antihyperlipidemic medications, respectively, compared to 83%, 13.3%, and 26.7% of CG patients. At 12 months posttransplant 60%, 12.5%, and 45% of SWG patients required antihypertensive, oral hypoglycemic, and antihyperlipidemic medications, respectively, compared to 80%, 16.7%, and 48.3% of CG patients. 10.9% of SWG compared to 44% of CG had an increased requirement for antihypertensive medications posttransplant. 5.8% of SWG patients and 15.4% of CG patients who did not require oral hypoglycemic medications pretransplant did posttransplant. 37.5% of SWG patients and 12.5% of CG patients who required pretransplant antihyperlipidemic medications had decreased requirements posttransplant. The average BMD posttransplant in SWG was -0.92 compared to -1.54 in CG. 5 patients in each group experienced acute rejection. Two of the rejection episodes were attributed to noncompliance.
CONCLUSIONS: The use of our steroid withdrawal protocol shows positive results on patient and graft survival as well as decreasing cardiovascular disease risk.

148. Predictors of cardiovascular disease in renal transplant patients. *Adele H. Rike, Pharm., D.*, Rita R. Alloway, Pharm. D., BCPS, Prabir Roy-Chaudhury, M.D., E Steve Woodle, M.D., Tiffany E. Kaiser, Pharm. D., Kimi Ueda, Pharm. D., Gautham Mogilishetty, M.D.; University of Cincinnati, Cincinnati, OH.

PURPOSE: Cardiovascular disease (CVD) is the leading cause of death with a functioning graft in renal transplant patients (pts). Framingham risk score (FRS) has underestimated cardiovascular (CV) risk. Incorporation of anemia, metabolic syndrome (MS), left ventricular hypertrophy (LVH), congestive heart failure (CHF), and chronic kidney disease (CKD) may negate this underestimation. The purpose of this study was to determine which factors best predict actual occurrence of post transplant (PTx) CV events (CVE).
METHODS: FRS was calculated at baseline, 6, 12 and 24 months on 407 pts. MS was defined by ATP III criteria with substitution of BMI for waist circumference. Anemia defined as Hgb<10 or Hct<30. LVH defined by EKG or Echo. CKD defined by MDRD < 50 at 6 months or 1 year. CHF defined by ejection fraction < 40% or shortness of breath with pulmonary edema. CV events included sudden death, MI, angina, or CVA/TIA. A multivariate analysis (MVA) and univariate analyses (UVA) were completed using repeat measure logistic regression.
RESULTS: 54 CVE occurred in 407 pts. Demographics included: 56% males, 74% Caucasians, mean age 46.5 years. In the MVA, FRS (p=0.04) and LVH (p=0.03) significantly correlated with CVE. UVA showed that FRS (p=0.03), MS (p=0.03), LVH (p=0.0.0002), CHF (p=<0.001) and CKD (p=0.04) significantly correlated with CVE.
CONCLUSIONS: FRS and LVH are the best predictors of CV risk. Other factors that may increase CV risk include M.S., CHF, and CKD. Incorporating these into FRS may better predict CV risk in renal transplant pts and negate underestimation of FRS alone.

149E. Racial comparison of T-lymphocyte populations and T-regulatory cell pharmacodynamics during chronic immunosuppression. *Kathryn Gillis, Pharm.D.*[1], Kiran Dole, Pharm.D.[2], Nicholae Lecca, M.D.[2], Samir Yassa, M.D.[2], Rocco Venuto, M.D.[2], Kathleen Tornatore, Pharm, D.[2]; (1)University at Buffalo, Buffalo, NY; (2)University at Buffalo, Pharmacy Practice, School of Pharmacy, Buffalo, NY.

Presented at the Annual Meeting of the American Society of Nephrology, Saint Louis, MO, October 27, 2004.

Women's Health

150. Comparison of the Achilles Express® ultrasonometer to dual-energy X-ray absorptiometry (DEXA). *Darren W. Grabe, Pharm.D.*[1], Jennifer Cerulli, Pharm.D.[1], Jeffrey Stroup, Pharm.D.[2], Michael P. Kane, Pharm.D.[1]; (1)Albany College of Pharmacy, Albany, NY; (2)University of Oklahoma College of Pharmacy, Tulsa, OK.

PURPOSE: The Achilles Express® is a FDA approved quantitative ultrasound (QUS) device used in conjunction with clinical risk factors, to provide a comprehensive skeletal assessment. This device may provide the means for pharmacists to screen for osteopenia and osteoporosis in an ambulatory setting. However, there are no data correlating the Achilles Express® to the gold standard, DXA. Therefore this study was to compare the Achilles Express® to DXA.
METHODS: Both healthy, non-pregnant Caucasian women age 25 - 35 years of age and postmenopausal Caucasian women 45 years or older were recruited. The DXA BMD assessments were performed of the non-dominant wrist and hip (neck, trochanter) and the spine (L1-L4), by a certified technician. The QUS BMD assessments were performed three times in each ankle by one investigator. Correlation coefficients were determined between DXA and the QUS device. Sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) were calculated for device's ability to detect osteopenia (T-score < -1) in post-menopausal women.
RESULTS: Fifty three women were recruited with an average age of 44.5 ± 18. There were significant correlations of T-scores between the QUS of the non-dominant heel and the hip DXA ($r = 66\%$, $p < 0.01$) and QUS of the non-dominant heel and the spine DXA ($r = 65\%$, $p < 0.01$). Sensitivity and specificity, in post-menopausal women, of QUS compared to hip DXA were 92% and 63% (PPV = 61%; NPV = 92%), respectively. Sensitivity and specificity, in post-menopausal women, of QUS compared to spine DXA were 79% and 59% (PPV = 61%; NPV = 77%), respectively.
CONCLUSIONS: The Achilles Express® ultrasonometer significantly correlated with DXA and is a reasonable screening tool for osteopenia since it had a low rate of false negatives.

CLINICAL PHARMACY FORUM

These abstracts describe the delivery, development, justification, or documentation of innovative clinical pharmacy services; they may be descriptive only and need not contain an evaluative component.

151. A systematic approach to improve reporting and analysis of adverse drug events. *Jenester P. Mostella, Pharm.D.*, Pamela K. Throgmorton, Pharm.D., Richard L. Cramer, Pharm.D.; Huntsville Hospital, Huntsville, AL.

PURPOSE: Reporting of adverse drug events (ADEs) was historically lower than desired at this 901 bed acute tertiary care facility. In an effort to increase reporting and more accurately trend ADEs, we restructured existing reporting and documentation methods and developed educational programs to enhance patient safety. This initiative correlates well with national regulatory guidelines.
METHODS: ADE reporting and documentation mechanisms were revised based on the results of a random practitioners' survey. A computerized documentation system was implemented to standardize reporting, facilitate data entry, and allow for customized data retrieval and analysis. Pyxis® tracer drug reports were developed and used by pharmacists to identify ADEs. A more efficient ADE reporting method was implemented for nurses, using the existing electronic quality review report system. Additionally, multidisciplinary, multi-media educational interventions were developed. These focused on recognition, classification, reporting, and prevention of ADEs.
RESULTS: The number of ADEs increased from 162 to 317 over the one year time period following implementation. Based on the reports year-to-date, we expect reported ADEs to approach 500 by the end of 2004. This near doubling of reported ADEs in the first year has contributed to an increased focus on medication safety and approval of a medication safety pharmacist position by hospital administration.
CONCLUSION: Developing a structured approach to ADE reporting has resulted in an efficient and accessible reporting process, more thorough documentation, and heightened awareness by practitioners and administrators. Our systematic approach enables the pharmacy department to better evaluate drug related safety issues and institute specific improvement plans.

152. Interventions to improve management of dyslipidemia in hospitalized patients with diabetes. *Erin C. Rachmiel, Pharm.D., BCPS*[1], Richard M. Reichley, R.Ph.[2], Terry L. Seaton, Pharm.D., BCPS, FCCP[3], Daniel S. Longyhore, Pharm.D.[3], Laura A. Noirot, B.S.[2], Thomas C. Bailey, M.D.[4]; (1)Barnes-Jewish Hospital, St. Louis, MO; (2)BJC HealthCare, St. Louis, MO; (3)St. Louis College of Pharmacy, St. Louis, MO; (4)Washington University School of Medicine, St. Louis, MO.

PURPOSE: This study measured the impact of an administrative policy change on the adherence to National Cholesterol Education Program, Adult Treatment Panel III (ATP-III) guidelines for dyslipidemia management in hospitalized patients with diabetes.
METHODS: In June of 2004, we implemented an intervention to automatically perform LDL-C analysis on all diabetic patients unless there was documentation of an LDL-C < 100 mg/dL within the past 6 months or > 100 mg/dL within the past 3 months.
RESULTS: During the 25-day baseline period, 628 patients met eligibility criteria. Of these, 208 (33%) had an LDL-C performed within the above guidelines, and 210 (33%) were prescribed a statin at discharge. The LDL-C was > 100mg/dL in 68 of 208 patients (33%). Of these, 41/68 (60%) were

prescribed a statin at discharge. In the 25 days after the policy change, 725 patients were identified with 608 (84%) having an LDL-C performed within the described guidelines (P<0.0001), 219/725 (30%) were prescribed a statin at discharge (P=0.202), 187/608 (31%) had an LDL-C result > 100 mg/dL (P =0.603), and of these 63/187 (34%) were prescribed a statin at discharge (P=0.0001).
CONCLUSIONS: Despite publication of ATP-III guidelines, many diabetic patients admitted to a university hospital had suboptimal management of dyslipidemia. In the hospital setting, compliance with monitoring LDL-C levels can be improved by an administrative policy change. Improvements in the prescription rate of statins and LDL-C goal attainment will require further interventions.

153E. Outcome of activated protein C utilization: three years experience in a tertiary care teaching hospital. *Roy Guharoy, Pharm.D.*, William Darko, Pharm.D., Joseph Medicis, Pharm.D.; SUNY-Upstate Medical University, syracuse, NY.

Presented at the Clinical Midyear Meeting of the American Society of Health-System Pharmacists, Orlando, FL, December 5-9, 2004.

154. Strict glycemic control in a heterogeneous critically ill population. *Tulasi Ramu, RPh*, Arpita Patel, Pharm. D. BCPS, Jennifer Rais, Pharm. D., Paru Patel, Pharm. D., Kanella Tsilimingras, RPh; Sinai Grace Hospital, Detroit, MI.

PURPOSE: Tight glycemic control with continuous insulin infusion has been shown to decrease morbidity and mortality in critically ill patients. A multidisciplinary team developed a nurse-driven Intensive Insulin Protocol (IIP) in November 2003 for implementation in medical, surgical, and cardiac ICU patients with a target glucose of 80-110. A retrospective chart review was conducted to evaluate hypoglycemic events and time to target glucose from 11/03-06/04. The incidence of hypoglycemic events post-implementation prompted the development of a revised protocol with a target glucose of 80-140. The purpose of this study is to evaluate the events of hypoglycemia and time to target glycemic control with the revised protocol.
METHODS: A three month prospective chart review of patients initiated on the revised IIP will be conducted. The number of hypoglycemic events (glucose < 80 mg/dl) and time to 2 consecutive target glucose levels will be collected. Statistical analysis will be performed to compare the incidence of hypoglycemia and time to glycemic control before and after implementation of revised protocol.
CONCLUSION: A revised, less aggressive IIP applied to a heterogeneous ICU patient population may decrease hypoglycemic events, while still providing strict glycemic control in a timely manner.

155. Doctor of pharmacy student impact on patient care in the critical care units. *Amy N. Thompson, Student*[1], Tracie S. Osgood, BS, Pharm.D.[2]; (1)Medical University of South Carolina, Charleston, SC; (2)Ralph H. Johnson VA Medical Center, Charleston, SC.

PURPOSE: The objective of this project was to determine the impact of pharmacy student participation as active members of the intensive care unit (ICU) multidisciplinary teams. The second objective was to determine the types of interventions documented and the number of suggestions accepted.
METHODS: All assigned patients were assessed for venous thrombo-embolism and stress ulcer prophylaxis. Each prescribed medication was assessed for appropriate indication(s) and dosing. Laboratory data were reviewed for all patients. Monitoring parameters were suggested for each prescribed medication. Patients were interviewed regarding over-the-counter (OTC), herbal, alternative, and outside prescription medications. Patients also received discharge medication counseling. All activities were reviewed and cosigned by the preceptor.
RESULTS: Data was collected for the time period July 1 - October 30, 2004. The students had a total of 56 patient care days. A total of 135 notes were written and cosigned in the patient chart: 16 pharmacokinetic consults, 10 warfarin notes, 2 parenteral nutrition notes, 2 drug information consults, and 105 medication review notes. Sixty-six patients were interviewed and 21 (32%) of these patients reported medications not previously documented in the patient chart. Discharge medication counseling was provided for 24 patients. A total of 391 suggestions were documented in the chart and 213 (55%) suggestions were accepted.
CONCLUSION: Student documentation and participation on the multi-disciplinary ICU teams resulted in patient care interventions. This project highlights the importance of pharmacy student involvement as an active member of the ICU team.

156. A diabetes education and monitoring service for indigent patients referred by a safety net provider. *June F. Johnson, Pharm.D.*; Drake University, Des Moines, IA.

PURPOSE: Improve health and self-care outcomes for indigent diabetic patients referred for education and monitoring to a centralized Community Access Pharmacy (CAP) by a safety net provider network.
METHODS: Fifty patients > 18 years old with Type 2 diabetes receiving routine medical care from a safety net provider, Primary Health Care Inc. (PHC), are being referred for diabetes education at CAP. Inclusion criteria are: 1) Previously diagnosed but poorly controlled diabetes (A1c > 8%), 2) Newly diagnosed, 3) Newly diagnosed or poorly controlled diabetes not enrolled in the federal Chronic Diabetes Collaborative through PHC. All patients receive Contour meter training, a free meter and supplies, and agree to return to the CAP for five monthly follow-up visits at CAP. Contour meters will be downloaded at the monthly visits and findings discussed with patients and providers. Providers may also refer patients for education sessions on the fundamentals of diabetes, nutrition basics, or insulin administration. Separate sessions are scheduled for English- and Spanish-speaking patients, and interpreters are scheduled for Hispanic patients. Education on meter training, fundamentals, and insulin injection is provided by CAP pharmacists having specialized training in diabetes and a Drake pharmacy faculty member. Education on nutrition basics is provided by a nutritionist affiliated with PHC. Project outcomes are documented by Outcomes Pharmaceutical Health Care, Inc. using their web-based documentation system. During monthly follow-up at CAP, the following outcomes will be monitored, documented, and communicated to providers: A1c, frequency of blood glucose monitoring, nutrition and exercise choices, self-care knowledge. Patient and provider satisfaction will be measured at three and six months after the initial referral visit.
RESULTS: Pending.
CONCLUSIONS: It is hoped that demonstration of improved outcomes will enable CAP to sustain these services and provide a basis for other disease-management services for this vulnerable population.

157. A pharmacist-managed diabetic dyslipidemia clinic for veterans. *Erika Kleppinger, Pharm.D., BCPS*; Auburn University, Auburn, AL.

PURPOSE: In order to improve the care of veterans with diabetes in central Alabama, an interdisciplinary diabetes team was created at the Central Alabama Veterans Health Care System (CAVHCS) in 2003. One component of this team is the pharmacist-managed diabetic dyslipidemia clinic.
METHODS: At CAVHCS, four clinical pharmacists have prescriptive authority in the diabetic dyslipidemia clinic. Patients with diabetes and elevated cholesterol are enrolled in this clinic by electronic referral from their primary care provider or by participation in an interdisciplinary diabetes class. Medications, laboratory data, and dietary history are reviewed during each appointment, then medication adjustments are made and interventions are discussed with the patient. After their initial appointment, patients are scheduled for follow-up visits every 2 to 6 months.
RESULTS: A total of 320 patients have been evaluated between January 2003 and November 2004 with 43.4% (139 patients) having at least 2 follow-up visits. Most patients evaluated were male (96%) with an average age of 62.3 years (36-84 years). At their initial visit 30.6% of patients were at their LDL goal <100 (average LDL 124.1 mg/dL) and 25.9% of patients had an A1C <6.5% (average A1C 7.2%). At their second follow-up visit 38.1% of patients achieved an LDL <100 (average LDL 112.0 mg/dL) and 33.1% had an A1C <6.5% (average A1C 7.16%).
CONCLUSIONS: Even though only a moderate increase in the percentage of patients at therapeutic goal for diabetes and cholesterol was seen, patients are coming closer to these goals because of the interventions made by clinical pharmacists.

158. Clinical pharmacist collaboration with an orthopedic department to improve the identification and treatment of post-fracture osteoporosis patients. *Susyn L. Plushner, Pharm.D., BCPS*; Kaiser Permanente, Colorado Region, Wheat Ridge, CO.

PURPOSE: The literature is replete with documentation of low rates of testing and treatment for osteoporosis following a fracture. The objective of this study was to evaluate a clinical pharmacist-directed program designed to increase primary care providers' initiation of osteoporosis screening and treatment for patients with fractures.
MEHODS: Fracture patients seen in an orthopedic department in a group-model health maintenance organization from 07/14/04 to 10/14/04 were identified as candidates for intervention. All candidate visit notes were forwarded to a clinical pharmacy specialist. The pharmacist reviewed the patient's complete medical record and, if indicated, forwarded specific recommendations for bone mineral density (BMD) screening or pharmacotherapy to the patient's primary care provider. Descriptive statistics outlining the screening or medication initiated were performed.
RESULTS: Charts from fifty-seven patients who previously may not have been assessed for osteoporosis risk were sent to clinical pharmacy specialists for review. Thirty patients (53%) required no intervention due to low risk, prior osteopenic BMD, receiving appropriate pharmacotherapy (e.g., alendronate, pamidronate, raloxifene), or not a treatment candidate. Eight patients (14%) were started on appropriate pharmacotherapy with no further work-up. BMD screening was recommended for the remaining 19 (33%) patients. Six and seven of these patients were identified with osteopenia and osteoporosis (resulting in pharmacotherapy initiation), respectively and one normal BMD was recorded. Patients were non-compliant with five of the ordered screenings. An orthopedic task force review recommended that this program be continued indefinitely.

CONCLUSIONS: A clinical pharmacy specialist-directed collaboration with an orthopedic department resulted in increased osteoporosis screening and treatment.

159. Development of a standardized assessment tool and treatment algorithm for painful diabetic neuropathy. *Ann M. Rule, BS, Pharm, D*[1], Andjela Drincic, MD[2], Joseph R. Ineck, Pharm, D[3], Joyce B. Wilson, M.S., APRN, CDE[2]; (1)Creighton University, 2500 California Plaza, Boyne 144A, Omaha, NE; (2)Creighton University Diabetes and Endocrinology, Omaha, NE; (3)Creighton University, Omaha, NE.

PURPOSE: Three million of the 14 million patients with diabetes mellitus in America suffer from painful diabetic neuropathy (PDN) resulting in significant morbidity and decreased quality of life. Treatment is suboptimal and often not managed because of multiple health issues. An assessment tool and evidence-based treatment algorithm for PDN were developed for use in a physician supervised, pharmacist managed PDN clinic within an ambulatory endocrinology clinic to improve care for these patients.
METHODS: All clinicians screen for peripheral neuropathy during regular clinic visits. Patients identified with PDN are referred to the pharmacist for further care. The pharmacist obtains a medication history, performs a thorough pain assessment and reviews the patient's diabetic control. The patient's level of diabetes knowledge, therapeutic goals, smoking cessation and foot care are assessed. A comprehensive treatment plan is developed as part of a collaborative drug therapy management arrangement utilizing the treatment algorithm. Management includes patient education, preventive foot care and symptomatic pain relief. The pharmacist provides patient education and makes medication dosage changes as indicated. Patients are referred to podiatrists for foot care as necessary.
Baseline and periodic assessment of patients' reported pain score, pain relief score, Neuropathic Pain Scale, 36-item Medical Outcomes Study Short Form questionnaire (SF-36), HbA1c, and therapeutic goals are obtained. Monthly follow up is scheduled; patients are monitored closely for efficacy of the treatment plan, adverse effects, drug interactions, and progress toward therapeutic goals.
RESULTS: Outcomes describing the impact of this health services program and translation to general practice will be discussed.

160. Evaluation of diabetic care in a multidisciplinary diabetes management clinic at a veterans affair medical center. *Day M. Scott, Pharm.D.*[1], Julie A. Chapman, Pharm.D., CDE[2], Cherylyn Filipelli, Pharm.D.[3]; (1)Palm Beach Atlantic University, West Palm Beach, FL; (2)Veterans Affair Medical Center, West Palm Beach, FL; (3)NOVA Southeastern University, West Palm Beach, FL.

OBJECTIVE: The primary goal of the Diabetes Management Clinic at theVeterans Affairs Medical Center is to provide diabetic management to prevent complications through improvement of diabetic control and education. This study assessed diabetic outcomes of patients managed in this clinic; in addition, evaluated a multidisciplinary approach to diabetes management in order to identify and improve upon practice patterns in the clinic.
DESIGN AND METHODS: The study consisted of a retrospective evaluation of patients seen in the Diabetes Management Clinic from January 1, 2001 through January 1, 2003. The study assessed diabetes control based on change in HbA_{1c}. Data was also collected on incidence of hospital admissions secondary to diabetes-related complications, change in cardiac risk factors (cholesterol, LDL, and blood pressure), and documented education received while enrolled in clinic. Outcomes were compared using student paired t-test and descriptive statistics.
RESULTS: Seventy-three patients that met inclusion criteria were reviewed. In these patients, the average HbA_{1c} was significantly decreased from baseline average of 9.1% to 8.3% at 3-6 month visit ($p<0.001$) and 7.7% at most recent visit ($p<0.0001$). Education was documented in greater than 95% of the patients reviewed; including foot care, nutrition/BMI, routine ophthalmic care, and smoking cessation. Anti-platelet therapy education was documented in approximately 80% of patients.
CONCLUSION: The Diabetes Management Clinic at West Palm Beach VAMC was successful in significantly lowering the HbA_{1c} in this veteran population. Also, quality assurance indicators including risk factor modification and education were achieved by the clinic.

161. Expanded role for clinical pharmacist in a VA diabetes service. *Whitney A. Shaffer, Pharm, D.*; Dayton Veterans Administration Medical Center, Dayton, OH.

The Diabetes Service at the Dayton VAMC has reformulated the traditional support role of the Clinical Pharmacist attached to this specialty service.
PURPOSE: The Dayton VAMC is a 120 bed teaching hospital associated with the Wright State University School of Medicine (WSUSOM). No Diabetes Service existed prior to 2004 but a clinical endocrinologist was available. The administration of the facility did not feel that the diabetic targets were being met. A full time Diabetologist was hired in 12/03. A Clinical Pharmacist was assigned to the service with intention of providing both clinical and administrative support.
METHODS: The Clinical Pharmacist provided many traditional roles including pharmaco-therapeutics and counseling, patient and staff education, and pharmacy-diabetes service liaison. Non-traditional roles developed out of both practical needs and pharmacist driven and physician sponsored broadening of the pharmacist's scope of practice. These included multiple inpatient and outpatient responsibilities including 1.) Diagnosis: proper classification of consultative services in diabetes. 2.) Requests for consultative advice from other specialty clinics and support services, 3.) Independent therapeutic decision making in diabetes, hypertension and hyperlipidemia 4.) Leadership and organization of inpatient diabetic teaching service 5.) Research author and co-author 6.) Faculty member WSUSOM 7.) Originator and coordinator of diabetic data registry 8.) Nutrition counseling, patient educator in life style management 9.) Group clinic originator and leader 10.) Diabetic Support Group Originator.
CONCLUSION: Clinical Pharmacists (Pharm.D.'s) are well suited by their training to expand and adapt their clinical and administrative responsibilities to meet the changing demands of a specialized diabetes service.

162E. Acceptance and value of consultant pharmacists' interventions in long term care facilities. *James D. Hoehns, Pharm.D.*, Linsey A. Blau, Pharm.D.; University of Iowa College of Pharmacy/Northeast Iowa Family Practice Center, Waterloo, IA.

Presented at the Annual Meeting of the Iowa Pharmacy Association, Dubuque, IA, June 11-13, 2004.

163. Community physician acceptance and implementation of pharmacy recommendations generated by a multidisciplinary geriatric assessment clinic. *George A. DeMaagd, Pharm.D.*, Jeanette A. Meyer, M.D., Phil M. Green, M.D.; Ferris State University and Unified Geriatric Assessment Clinic, Kalamazoo, MI.

Our multi-disciplinary geriatric assessment clinic provides comprehensive patient evaluations with a focus on memory disorders in a community setting. Our team consists of an internist, neurologist, pharmacist, social workers, psychiatrists and occupational therapists. In addition, medical residents and students from various disciplines are extensively involved in patient evaluations. We describe a follow-up project that evaluated the acceptance and implementation of our pharmacy recommendations, generated by our pharmacy reports. Patients are referred to our clinic from community practitioners (97%) and comprehensive evaluations of both cognition, psychiatric and medical problems are performed. Although the focus of our assessment is memory disorders many patients have complicated medical histories and are on multiple medications. Doctor of Pharmacy students play a significant role in the clinic through their developing a medical history data base and conducting a medication history interview on each patient. Comprehensive pharmacotherapy plans are developed for each patient with detailed recommendations and considerations for each medical problem. The plan also focuses on the elimination of unnecessary, duplicate and potentially harmful medications. Our pharmacotherapy plan is a separate report that is reviewed by the attending physician, and provided to the referring physician. Although, this present project only looked at acceptance and implementation, future projects may include evaluation of outcomes.

164. Acceptability of a service-oriented academic detailing service for primary care physicians in Fayette County, Kentucky. *Lisa M. Hart, Pharm.D.*, Deidra M. Simpson, Pharm.D., BCPS, Frank W. May, MAppSci (Pharmacy); University of Kentucky, Lexington, KY.

PURPOSE: Academic detailing is a proven methodology for translating evidence into primary care practice. This project was undertaken to explore primary care physician uptake and retention rates in a service-oriented academic detailing program delivered by clinical pharmacists in Fayette County, Kentucky.
METHODS: Beginning in February 2003, all primary care physicians in Fayette County were offered visiting services by the Drug and Therapeutics Information Service (DATIS). These visits consisted of one-to-one interactions between the visitor and physician, covering topics of clinical interest and concern to primary care providers. Key messages were distilled from evidence assembled by the visitors after a comprehensive review of primary literature. After discussion with local opinion leaders, the review was published and given as a gift of value at visits. At the conclusion of visits, post-interview review forms were completed by the visitor recording objective and subjective data including visit duration, perceived level of interest in the topic and DATIS services, and willingness to schedule further visits.
RESULTS: To date, 68% of primary care providers in the Fayette County, Kentucky area have received DATIS visits. Of these, 100% have invited DATIS visitors for further visits.
CONCLUSION: The DATIS service-oriented approach to academic detailing is a highly acceptable means to deliver unbiased, evidence-based therapeutic information and advice to primary care physicians in their clinical practice setting.

165. Intermountain project on antimicrobial resistance and therapy (IMPART): pilot project investigating the ability of community pharmacists to decrease broad-spectrum antibiotic use in upper respiratory infections(URI). *Karl J. Madaras-Kelly, Pharm, D*[1], Lee Hannah, DVM, MPH[2],

Kim Bateman, MD[3], Matthew Samore, MD[2]; (1)College of Pharmacy, Idaho State University, Boise, ID; (2)Division of Clinical Epidemiology, School of Medicine, University of Utah, Salt Lake City, UT; (3)HealthInsight, Salt Lake City, UT.

PURPOSE: To test a community pharmacy protocol to decrease antibiotic use by recommending symptomatic therapies (both non-prescription and OTC) and substitution of narrow-spectrum antibiotics.
METHODS: Rural community pharmacy patients presenting with prescriptions for broad-spectrum (BS) antibiotics were screened for URI. Control: Pharmacists obtained consent and collected patient symptom, treatment, and attitude data related to antibiotic and OTC use on a PDA. Prescribed treatment was compared to protocol recommendations (based upon IMPART decision support software). Patients with divergent therapies were asked to participate further. Intervention: Pharmacists obtained consent, FAXED provider a copy of symptom and treatment data, and contacted provider to discuss recommendations. Prescriptions were dispensed as written if patients or provider declined intervention. Pharmacist time, antibiotic/OTC use, and provider and patient attitudes were recorded.
RESULTS: Control Phase: 59 patients consented. Average time to collect patient data was <3 minutes. IMPART software classified URIs as: acute bronchitis (44%), sinusitis (32%), pneumonia (10%), and pharyngitis (5%). Most patients reported self-treatment with OTC (90%). Fewer reported provider recommending symptomatic treatment (30%). Although many said they knew which OTC to use (60-75%), 90% wanted more education about self-treatment. A mean 0.30 OTC/patient, but no symptomatic prescription treatments were sold. Intervention: Only 4 patients agreed. Three providers were contacted and two changed prescription to IMPART recommendation without further complication.
CONCLUSION: Patients will discuss illness with pharmacists, but were reluctant to have provider contacted to change prescription. Providers contacted were willing to change prescriptions. Further investigation of this concept as a work-flow process may be warranted.

166. A pharmacist-run initiative to improve venous thromboembolic prophylaxis rates in medically ill patients. *Brenda T. Hoang, Student*, Jennifer E. Stark, Pharm.D., BCPS, Kimi S. Vesta, Pharm.D., BCPS; University of Oklahoma College of Pharmacy, Oklahoma City, OK.

PURPOSE: Based on a recent retrospective chart review, the rate of venous thromboembolism (VTE) prophylaxis in medically ill patients was suboptimal at our hospital. A formal screening method by pharmacists for VTE prophylaxis in medically ill patients was implemented to improve prophylaxis rates in order to decrease VTE incidence and increase awareness of risk factors and appropriate prophylactic regimens.
METHODS: Pharmacy & Therapeutics Committee and Institutional Review Board approval was obtained. Consecutive patients admitted to the medicine service were screened over a six-month period using a standardized form. VTE risk factors, bleeding risk factors, and recommendations for pharmacologic prophylaxis were based on current clinical trial evidence and consensus guidelines. Monthly in-services were provided to medicine teams and recommendations for VTE prophylaxis were made to teams in person. Patients were followed until discharge from the hospital to confirm continued appropriateness of recommendations.
RESULTS: Approximately 500 patients were screened, and 107 had indications for VTE pharmacologic prophylaxis. It is estimated to have taken one hour to screen fifteen patients. Before screening, only 37% of appropriate candidates received prophylaxis while 29% on prophylaxis had at least one documented bleeding risk factor. After screening and recommendations, 85% of appropriate candidates received prophylaxis, and no patients with any bleeding risk factors received prophylaxis.
CONCLUSION: A pharmacist-run screening program can yield significant improvements in VTE prophylaxis rates with minimal time investment.

167. Improvements in enoxaparin prescribing secondary to optimization of computerized physician order entry (CPOE) and implementation of a pharmacist directed dosing protocol. *Toby Trujillo, Pharm.D., BCPS*; Boston Medical Center, Boston, MA.

PURPOSE: Low-molecular weight heparins (LMWHs) are effective anticoagulants that improve outcomes in various arterial and venous thromboembolic disorders. Despite their value, LMWHs are also considered high-risk medications and can lead to serious adverse events if they are used improperly. A review of enoxaparin utilization in May 2003 revealed a need to improve prescribing habits within our institution.
METHODS: To address inappropriate use of enoxaparin, changes were made in the ordering process at our institution. Previously, physicians ordered enoxaparin by drug name and were free to choose any dose they wanted. Since April 2004 for DVT prophylaxis, physicians now order by specific indication with the resulting dose defaulted in the system. Pharmacists are responsible for verifying the indication and evaluating renal function. For treatment indications, physicians now order enoxaparin via a pharmacist dosing protocol. The pharmacist first determines if the indication is appropriate according to institution guidelines. If appropriate, the pharmacist then obtains relevant patient information, assesses renal function, then orders the appropriate dose (and dosage form) for the patient. We conducted a follow-up analysis in October 2004 to assess the affect of these changes on appropriateness of enoxaparin therapy in our institution.
RESULTS: After implementation, the number of patients receiving enoxaparin who had a contraindication to enoxaparin therapy decreased from 11% to 5% (p = 0.11, chi-squared). In addition, the number of patients receiving an inappropriate dose decreased from 30% to 12% (p = 0.001, chi-squared). Lastly, the number of patients who did not have an appropriate indication for enoxaparin decreased from 25% to 15% (p = 0.07, chi-squared).
CONCLUSIONS: A greater percentage of enoxaparin usage was appropriate in our institution subsequent to changes made in our CPOE system and implementation of a pharmacist dosing protocol. However, further interventions may be needed to further optimize enoxaparin usage.

168. A pharmacist-managed medication adherence program to improve antiretroviral therapy adherence and clinical outcomes in HIV/AIDS-infected adults and children. *Allison M. Chung, Pharm.D.*[1], Mary Mancao, M.D.[2]; (1)Auburn University, Department of Pharmacy Practice; University of South Alabama, Department of Pediatrics, Mobile, AL; (2)University of South Alabama, Department of Pediatrics, Mobile, AL.

PURPOSE: Antiretroviral therapy (ART) is an integral factor for decreasing mortality in HIV/AIDS patients. However, ART has several limitations including significant toxicities and complicated regimens. Although adherence to ART is extremely challenging, strict adherence to ART is a positive predictor of effective virologic suppression and subsequent immunologic recovery.
METHODS: A pharmacist-managed individualized medication adherence program has been initiated to improve adherence in our clinic population of HIV/AIDS infected women and children. Each patient on medications receives an individual pharmacotherapy consultation during their regularly scheduled clinic visit. Motivational interviewing skills are utilized to assess each patient's beliefs about the benefits of taking their medications, barriers to adherence, readiness to control their illness, and lifestyle conditions. After baseline adherence has been assessed, individualized and collaborative agreements are made to improve adherence. Pillboxes, calendars, rewards/incentives, and follow-up phone calls are utilized as necessary for each patient. Adherence documentation is conducted on a routine basis at each visit. Clinical outcomes such as viral load (VL) and CD4 counts are obtained at each visit.
RESULTS: Since implementation of the medication adherence program, data has been collected. There are a total of 69 HIV/AIDS positive women and 20 HIV/AIDS positive children actively involved in our clinic. One hundred twenty-seven adherence encounters were conducted over the past year. In general, VL and CD4 counts of the overall patient population have improved and patients have expressed satisfaction with the program.
CONCLUSION: A formal, individualized medication adherence program is beneficial to the HIV/AIDS patients and can improve clinical outcomes.

169. Collaborative HIV disease state management in a community health center. *Kelly Hester, Pharm.D., BCPS*; Auburn University Harrison School of Pharmacy, Auburn, AL.

PURPOSE: To describe development of pharmacy services and a collaborative HIV disease state management program with an HIV pharmacist specialist and a primary care physician to patients receiving care through a community health center in Alabama.
METHODS: Pharmacy services were initiated to provide interim medication adherence assessments between clinic appointments, medication counseling, adherence counseling, disease state education, medication histories, and therapeutic drug review. A pharmacy consult service was developed to provide general drug information and offer therapeutic management recommendations regarding development of patient-specific antiretroviral drug therapy regimens and to address complications of antiretroviral therapy.
RESULTS: Innovative pharmacy services included consults for recommendations for development of highly active antiretroviral therapy regimens for treatment-naïve, treatment-experienced, and non-adherent patients in collaboration with the primary care physician. Other pharmacy consult services included antiretroviral drug dosing, evaluation of genotypic resistance results for drug therapy recommendations, evaluation of adverse drug reactions, and recommendations for management.
CONCLUSIONS: Initiation of HIV pharmacy services in a community health center developed into a pharmacy consult service and collaborative HIV disease state management program. The challenges and complexity of treating HIV offer significant opportunities to provide pharmaceutical care to patients and guidance to primary care providers treating HIV-infected patients.

170. The implementation and impact of an interdisciplinary antibiotic management program. *Brian A. Potoski, Pharm.D.*[1], Blair Capitano, Pharm.D.[1], Susan J. Skledar, B.S.(Pharm), M.P.H.[1], Robert J. Weber, M.Sc.(Pharm), FASHP[1], David L. Paterson, M.D.[2]; (1)University of Pittsburgh School of Pharmacy, Department of Pharmacy and Therapeutics, Pittsburgh, PA; (2)University of Pittsburgh Department of Medicine, Division of Infectious Diseases, Pittsburgh, PA.

PURPOSE: To promote appropriate antibiotic use, impact resistance, decrease antibiotic associated *C. difficile* disease (CDD), and decrease antimicrobial expenditure.
BACKGROUND: Antimicrobial resistance rates, particularly *P. aeruginosa* (PA) to quinolones, were higher than the national average and antibiotic associated CDD and antimicrobial expenditures continued to increase at our institution.
METHODS: The Departments of Pharmacy and Therapeutics collaboratively created an Antibiotic Management Program (AMP) to address these issues. The AMP core team (two Infectious Diseases (ID) Clinical Pharmacists and an ID attending Physician) implemented the program in five phases: Assessment; Education; Small and Large Scale Direct Intervention; Expansion and Re-Assessment. Target antimicrobials subject to direct intervention were identified through the initial assessment phase. Prospective interventions were employed, including a 24 hour telephone approval service, for use of restricted agents and review of daily antimicrobial use and culture/susceptibility reports to aid in antimicrobial streamlining.
RESULTS: Total antibiotic use, measured as defined daily dose (DDD)/1000 patient days, decreased from 15,162 to 14,710 as compared to baseline. Use of agents associated with CDD decreased from 1,980 to 957 DDD and remain stable. The incidence of CDD has declined from 8 to 4.8 cases/1000 patient discharges and stabilized. PA susceptibility to levofloxacin has increased by 6%. Antimicrobial cost savings were approximately $380,000 comparing the first 12 months after implementation to the following 12 months.
CONCLUSION: Successful implementation of a collaborative AMP at our institution positively impacted not only antimicrobial expenditures, but pathogen susceptibility rates and the incidence of CDD as well.

171. Pharmacist-managed immunization program in a rural community hospital. *Kimberly L. Tackett, Pharm.D.*, Sheila K. Stephens, R.Ph., Felix S. Smith, Pharm.D., Imants A. Ceips, R.Ph., Elizabeth A. Nobles, R.Ph.; Beaufort Memorial Hospital, Beaufort, SC.

PURPOSE: This program was initiated to increase the awareness of high-risk patients in our community of their susceptibility to pneumonia and influenza through clinical pharmacist initiated screening and vaccination.
METHODS: Patients admitted to Beaufort Memorial Hospital are screened by nursing for their immunization history, and the information is then recorded into a nursing database. Clinical pharmacists generate a report daily of the immunization history from this database to identify patients that meet the criteria for pneumococcal and influenza vaccinations. The clinical pharmacist then counsel the patients about their risk for development of pneumonia and/or influenza in order to gain patient approval for receipt of the vaccination. Upon approval by the patient the clinical pharmacist initiates an standing order approved by the hospital Medical Executive Committee for pneumococcal and influenza vaccines.
RESULTS: In the previous year, prior to implementation of this vaccination program, only two pneumococcal vaccines and four influenza vaccines had been dispensed to admitted patients. Within the fist month of initiating the program 52 pneumococcal vaccinations, a 94% increase, had been dispensed due to the identification of high-risk individuals by a clinical pharmacist. A total of 1221 patients have been screened to date with 372 of these patients identified as high-risk patients. To date the clinical pharmacists had received certification through the state chapter of the American Pharmaceutical Association to administer vaccinations to assist nursing, but approval to administer is pending per the hospital Medical Executive Committee.
CONCLUSION: Clinical pharmacist screening of patients admitted to the hospital for appropriateness to receive the pneumococcal and influenza vaccines has increased the awareness of high risk patients.

172. 2004 National Surgical Infection Advisory Statement: **antimicrobial use compliance in a teriary care teaching hospital.** *Roy Guharoy, Pharm.D.*, Anita Shankar, Pharm.D., Haroon Khan, M.D., Donald Blair, M.D.; SUNY-Upstate Medical University, syracuse, NY.

PURPOSE: The Medicare National Surgical Infection Project recently concluded that the first antimicrobial dose should begin within 60 min before surgical incision and prophylactic antimicrobials should be discontinued within 24 h after the end of surgery. The objective of our retrospective study was to evaluate the compliance on use of prophylactic antimicrobials in clean surgery cases.
METHODS: 75 consequential cases were identified via the hospital medical record database. Patient charts were reviewed for type of procedure, pre-op antimicrobial, % of patients receiving prophylaxis, time of administration related to incision time, area of administration, documentation of time of administration and duration of prophylaxis.
RESULTS: Two patients received post-op dose, but did not get any pre-op dose. Cefazolin was used in 90% of cases. 52% patients received pre-op dose 60 minutes before incision. Time and place of administration was not documented in 18% of cases. Average time between pre-op dose and incision was 46 minutes. Average duration of therapy was 5.7 doses.
CONCLUSION: Documentation of time and location of administration needs to be improved. Duration of antimicrobials should be shortened to a maximum of 24 hour coverage. Pre-op dose must be administered within 60 minutes of incision. Pharmacists must play a major role in improving the compliance.

173. Antibiotic cost containment with "on-call" infectious diseases pharmacists as a side effect to enhanced patient care. *Marc H. Scheetz, Pharm., D.*, Michael J. Postelnick, R.Ph., Kimberly K. Scarsi, Pharm., D., Lana Gerzenshtein, Pharm.D., Michael A. Fotis, R.Ph., Maureen K. Bolon, M.D., M.S., Gary A. Noskin, M.D.; Northwestern Memorial Hospital, Chicago, IL.

PURPOSE: Utilization of antimicrobials outside of clinical guidelines may lead to increased costs, adverse patient outcomes, and widespread antimicrobial resistance. Antimicrobial Utilization Teams (AUTs) are thought to minimize these outcomes. The effect of increasing the availability of AUT pharmacists was studied.
METHODS: AUT pharmacist availability was extended through the means of a pager system during evening and weekend hours. An analysis was performed with previously collected patient data. Cost savings realized through pharmacist intervention was calculated with average wholesale prices (AWPs). A sensitivity analysis with varying treatment durations was employed to best estimate the range of potential savings. Treatment length estimation was based on previous utilization of the medication.
RESULTS: Between 5/1/04 and 8/31/04, the on-call pharmacist received 104 pages. Twenty-three calls were categorized as informational, and 81 calls were regarding restricted antibiotics. The pharmacist spent a total of 821 minutes during 123 days on-call for an average of 6.7 minutes on call per night. The extended availability of the AUT pharmacist resulted in a median savings of $13,558.40 in four months. This represents a savings of $990.87 per hour of time spent on call by the pharmacist. Improvements in clinical outcomes were noted but not quantified in this assessment.
CONCLUSION: Extending the availability of the infectious diseases pharmacist likely results in more appropriate care with anti-infectives. Cost containment through evidence-based use of antimicrobials is relatively simple to calculate and shows a financial benefit; however, a larger benefit may be recognized through the decrease of adverse events associated with inappropriate use. Future studies quantifying these interventions will likely give further support for the necessity of input by infectious disease pharmacists and will provide justification for compensation.

174. Implementation of a pharmacist-managed pneumococcal vaccine evaluation program. *Kazumi Morita, Pharm.D.*, Daniel Lewis, Pharm.D., Craig Martin, Pharm.D.; University of Kentucky Chandler Medical Center, Lexington, KY.

PURPOSE: Pneumococcal disease and influenza account for significant vaccine-preventable morbidity and mortality. Previously, our institution had no active system in place to consistently identify vaccine candidates. We report the initial results of a pharmacist-managed vaccine evaluation program for inpatients.
METHODS: We developed a standing order protocol for pneumococcal and influenza vaccination and instituted a vaccine evaluation program in October 2004. Influenza vaccination was suspended for this season, due to vaccine shortages. Patients >18 years of age admitted to the internal medicine and family medicine services at our hospital were eligible for inclusion in the protocol. Patients meeting Advisory Committee on Immunization Practices (ACIP) criteria for vaccination were offered the vaccine.
RESULTS: Two hundred sixty three (263) patients were admitted to eligible services between October 11, 2004 and November 12, 2004. A pharmacist evaluated 107 of these patients (41%). Ninety patients met vaccination criteria, of whom 54 (60%) received the vaccine. The remaining 36 patients did not receive the vaccine due to previous immunization, 67%; patient refusal, 28 %; or physician order not to vaccinate, 5.6%.
CONCLUSION: Implementation of a pharmacist-managed vaccine evaluation program allows identification of many vaccine-eligible patients. Expanding the protocol to all patients would require significant workload increases on pharmacists. Integrating evaluation protocols into medication history interviews, computerized physician order entry programs, or other automated systems would assist expansion of the program hospital-wide.

175. Cost consequences of applying appropriate use criteria to dermatologic immunomodulators: **a pre- /post-comparative analysis.** *Donna M. Chiefari, BS, Pharmacy*; NMHCrx, Latham, NY.

PURPOSE: To determine the economic impact of appropriate use criteria placed on dermatologic immunomodulators for an HMO client.
METHOD: On 7/1/04, Pimecrolimus Cream and Tacrolimus Ointment, were designated as formulary, prior authorization required for a 600,000 life Commercial HMO and criteria requiring a trial of topical corticosteroids for patients more than 5 years of age was implemented in an effort to increase appropriate drug use while reducing costs. Clinical literature justified the criteria and the process allowed for special use considerations on a case by case basis. Pharmacy claims data were used to evaluate the effect of the intervention by identifying the number of prescriptions filled, the number of members filling these prescriptions, the total plan cost and the average cost per prescription for the 4 month Pre (3/1/04 to 6/30/04) and Post (7/1/04-10/31/04) time frames.

RESULTS: The total number of prescriptions filled for the agents was 1561, representing 1308 members Pre vs. 883 prescriptions representing 757 members Post with total plan costs of $ 114,451 Pre vs. $73,535 Post. The blended average cost per prescription was $73.32 Pre and $ 83.28 Post. The total cost avoidance achieved was nearly $41,000 for 4 months with a projected annualized cost avoidance of $123,000.
CONCLUSION: Clinically based appropriate use criteria administered by the Pharmacy Benefits Manager can achieve significant cost avoidance outcomes for HMO clients.

176. Outcomes of collaboration between clinical pharmacists and a clinical pharmacy call center to review indications for continuation of osteoporosis drugs for new health maintenance organization (HMO) members. *Susyn L. Plushner, Pharm.D., BCPS*; Kaiser Permanente, Colorado Region, Wheat Ridge, CO.

PURPOSE: The purpose of this study was to describe the outcomes of an initiative to assess the need for continued osteoporosis treatment in members new to a group-model HMO
METHODS: The initiative was conducted from 02/01/2003 to 08/31/2004 in the Kaiser Permanente Colorado Region. Upon enrollment, new members were provided information to telephone the pharmacy call center to facilitate medication refills. During a call, a clinical pharmacist obtained a full drug history and inquired about prior bone mineral density (BMD) results. New members identified as being on an osteoporosis drug were referred to a clinical pharmacy specialist (CPS) to determine if continued treatment was justified, based on fracture risks and presence of osteopenia or osteoporosis. Drug discontinuation was recommended for patients without a history of fracture and with BMD's of -2.0 or greater. The CPS discussed recommendations with the member's physician and implemented those approved. Descriptive statistics outlining the number of new members intervened, rationales for treatment discontinuations, and financial impact of the initiative were performed.
RESULTS: Thirty-eight new members on osteoporosis medications were identified and their charts were sent to a CPS. Seventeen (44%) were considered candidates for drug discontinuation. This included six and four patients on prevention (e.g., 5 mg/day and 35 mg/week) and treatment doses (e.g., 70 mg/week) doses of alendronate, respectively, five patients on raloxifene 60 mg/day, and two patients on nasal calcitonin. The estimated annual cost-avoidance was $9400.
CONCLUSION: This initiative resulted in the discontinuation of osteoporosis medication in new members without an indication clearly supported by the available clinical evidence and resulted in substantial cost-avoidance.

177E. Rounding clinical pharmacist's discharge medication review reduces errors. *Tracey L. Mersfelder, Pharm.D.*[1], Troy W. Ahlstrom, MD[2], Mark T. Spoolstra, MD[2], Bryan E. Hull, MD[2]; (1)University of Rhode Island, Providence, RI; (2)Grand Rapids Medical Education and Research Center - Michigan State University, Grand Rapids, MI.

Presented at the ASIM Michigan Chaper Scientific Meeting of the American College of Physicians, Traverse City, MI, September 2004.

178E. Classification and cost impact of pharmacists' interventions in an obstetrics and gynecological (O&G) setting. *Malar Subramaniam, BScPharm*; KK Women's and Children's Hospital, Singapore, Singapore.

Presented at the Singhealth Scientific Meeting, Singapore, October 15-17, 2004.

179. Enoxaparin injection intervention for patients with severe renal impairment. *Manuel M. Horvitz, Pharm.D.*, Chetak Jain, Pharm. D.; New York University Hospital Center, New York, NY.

PURPOSE: Enoxaparin product labeling was revised March 31, 2004 to list by indication dosage regimens for patients with severe renal impairment (CrCl<30mL/min).Orders for enoxaparin were reviewed by pharmacy and interventions made if necessary.
METHODS: New York University Hospital Center "Drug Study Lists" between April 8 and August 5, 2004 were reviewed by pharmacy for patients receiving enoxaparin. The Cockroft DW and Gault MH approximation method was used to identify patients with CrCl<30mL/min. Prescriber interventions were made if patients were dosed higher than the revised product labeling.
RESULTS: There were 38 patients with CrCl< 30mL/min and correspondingly 38 interventions. For 34 of 38 patients (89.5%) the daily dose was either changed or reduced (31 patients), discontinued (1 patient), or changed to heparin (2 patients).The average CrCl for the 34 patients equaled 22.7 mL/min. For 4 patients (10.5%) with no daily dose change or reduction, discontinuation, or change to heparin the CrCl equaled 29.8, 29.0, 29.6, and 28.0mL/min. There was an average of 61 patients per day receiving Enoxaparin and an average of 16 new patients per day.
CONCLUSION: Enoxaparin orders for patients with severe renal impairment are reviewed by pharmacy to check that the dosage regimen is per revised product labeling. For the period reviewed 38 interventions were made. For 34 orders the daily dose was either changed or reduced, discontinued, or changed to heparin.

180. Evaluation of a medication review program by pharmacists in senior community housing centers. *Jill S. Burkiewicz, Pharm.D., BCPS*, Brooke L. Sweeney, Pharm.D.; Midwestern University Chicago College of Pharmacy, Downers Grove, IL.

PURPOSE: To provide pharmacist-managed medication reviews and patient education in urban senior community housing centers and to document the frequency and types of drug therapy problems identified during medication reviews.
METHODS: As a community outreach project, pharmacists and pharmacy students organized and participated in a medication review program. The medication review is a systematic assessment of all medications, including over-the counter (OTC) and herbal medications, for drug therapy problems. Residents at senior community housing centers were invited to bring their medications for review by a pharmacist at an event in their senior center. The number and types of drug therapy problems identified were prospectively documented.
RESULTS: To date in six reviews, the prescription and OTC medications of 23 participants have been reviewed. The majority of participants were female (82.6%) with a mean age of 75.1±8.5 years. One hundred and nineteen drug-related problems (DRPs) were identified (mean 5.17 DRPs/patient). The average number of medications per patient was 7.7. The most commonly identified problems were monitoring parameters (25.2%), inappropriate compliance (24.4%), unnecessary drug therapy (15.1%) and need for additional drug therapy (10.9%). Over half of participants (56.5%) were referred to another health care professional to resolve DRPs.
CONCLUSIONS: In urban senior community housing centers, a medication review program by pharmacists is a means to identify drug-related problems. Medication review programs may be considered as a potential method of service that pharmacists can provide to the community.

181. Standardized timing of the first antithrombotic injection after orthopedic surgery. *Bob L. Lobo, Pharm.D.*; Methodist University Hospital, Memphis, TN.

PURPOSE: Appropriate timing of the first post-operative injection of low-molecular weight heparin (LMWH) or fondaparinux is very important following major orthopedic surgery. If the first dose is administered earlier than recommended the risk of major bleeding is increased; however, efficacy may be reduced if prophylaxis is initiated later than recommended.
METHODS: A retrospective chart review of 28 patients who underwent hip or knee replacement or hip fracture repair and who received injectable antithrombotic prophylaxis was performed during May and June, 2004. Patients receiving non-injectable thromboprophylaxis and those with contraindications to anticoagulation were excluded. The wording of the prophylaxis orders and the time to administer the first post-operative injection was recorded. Initiation of prophylaxis was classified as too early if the first enoxaparin dose was administered sooner than 12 hours post-operatively or if the first fondaparinux dose was administered sooner than 6 hours post-operatively. Initiation of prophylaxis was classified as too late if the first dose of enoxaparin or fondaparinux was administered more than 24 hours post-operatively.
RESULTS: The first post-operative injection was administered too early in 7% (2/28) of patients and too late in 18% (5/28) of cases. Prophylaxis orders were usually (20/28) written to begin a specific number of hours post-operatively (eg. "begin 12 hours post-op"). When orders were written in this manner the first dose was administered in the recommended time frame less often than when the order specified to begin the morning after surgery (25% vs. 100%; P=0.0004).
CONCLUSIONS: Administration of the first post-operative dose of LMWH and fondaparinux the morning after surgery reduces the likelihood that patients will receive the dose too early or too late. We standardized the timing of the first prophylaxis injection in order to reduce the risk for error.

182. Proactive approach in anemia management for adult hemodialysis patients results in significant financial advantages and patient satisfaction. *Timothy V. Nguyen, Pharm.D.*, Russ J. Lazzaro, M.S., RPh, Suzanne Juliano, R.N., CNN, Robert Rigolosi, M.D.; Holy Name Hospital's Regional Dialysis Center, Teaneck, NJ.

HNH's RDC serves over 200 End Stage Renal Disease patients required acute and chronic hemodialysis weekly. HNH spent over 2 million dollars in 2003 on epoetin alfa (EA). The rising cost of EA and stagnant reimbursement left HNH facing over $120,000 loss annually. Recently, the Center for Medicare & Medicaid Services issued a temporary reimbursement rate more favorable for darbepoetin alfa (DA) versus EA, an efficacious equivalent.
Through collaborative multidisciplinary efforts, Pharmacy and Nursing recognized that a monetary loss on EA and a potential gain with DA were significant. DA was carefully introduced to about a 1/3 of our patients in April of 2004, and the clinical outcomes were closely monitored. Patients responded favorably to DA, as they had previously with EA. As a result, all patients switched over in July.
Additional benefits realized from the conversion included fewer administrations due to DA's longer half-life. This allows more time for nurses

to focus on patient care; patient satisfaction also increased due to less frequent injections. DA is available in prefilled syringes, therefore, the costs of labor and supplies associated with the preparation of EA is no longer necessary. HNH estimates an annual saving of approximately $700,000, plus a positive reimbursement gain of almost $650,000 by converting to DA.

183E. Development of a pharmacy seamless care strategy and tool for chronic renal failure patients. *Annemarie Cesta, B.Sc..Phm*[1], Stephanie Ong, B.Sc..Phm[1], Olavo Fernandes, Pharm.D.[1], Marisa Battistella, Pharm.D.[1], Jana Bajcar, MSc.Phm, EdD, FCSHP[2]; (1)University Health Network, Toronto, ON, Canada; (2)Faculty of Pharmacy, University of Toronto, Toronto, ON, Canada.

Presented at the 36th Annual Professional Practice Conference of the Canadian Society of Hospital Pharmacists, Toronto, ON, Canada, February 5-9, 2005.

184. Development and implementation of a unique parenteral nutrition program. *Astrid Cook, RPh*, Ruth Perkins, Pharm.D., Maryanne Davis, RPh, MBA; Saratoga Hospital, Department of Pharmacy, Saratoga Springs, NY.

In the spring of 2004, a new parenteral nutrition (PN) process was developed in collaboration with physicians, pharmacy, nutrition, and nursing. The new physician order form is weight based, and follows guidelines from the American Society for Parenteral and Enteral Nutrition (ASPEN) for protein, carbohydrate, lipid, and electrolyte requirements. An Excel™ program was written for order entry and verification of the PN formula. The program is patient specific, and allows entry of the patient's most recent height, weight, serum electrolytes, albumin, creatinine, and blood pH. This Excelô program also screens for propofol and the presence of diabetes. These patient specific parameters are automatically compared to the ordered formula in the Excelô program. Upper and lower ranges of fluids, calories, dextrose, amino acids (balancing chloride and acetate for pH), fats, and electrolytes are calculated. If the PN formula falls outside of these ranges it alerts the pharmacist to make recommendations to the prescriber. In addition, the mixing process incorporates several double checks including the expected versus actual weight of the bag (using specific gravities). The compounding sheet lists additives in the correct order for mixing (e.g., separating phosphate from calcium). The PN label not only includes the ordered formula, but information on the total amounts of all electrolytes and total calories (protein and non-protein) per 24 hours. Our new PN process follows ASPEN guidelines, alerts pharmacists to out of range formulas, and gives guidance for changes to the nutrition formula. This new process provides a superior PN service to our patients.

185. Implementation of a methotrexate pharmacokinetic dosing service. *Claire Saadeh, Pharm.D.*[1], Susan M. Vendemelio, Pharm.D.[2]; (1)Ferris State University College of Pharmacy, Lansing, MI; (2)Sparrow Health System, Dept of Pharmacy, Lansing, MI.

PURPOSE: To establish and evaluate the impact of a formalized pharmacy based methotrexate pharmacokinetic dosing service in an in-patient pediatric oncology unit.
METHODS: Prior to implementation of the dosing service, patients receiving high dose methotrexate (dose > 1000 mg/m^2) were retrospectively identified from a computer generated database. Primary outcomes included appropriate timing of methotrexate levels, identification of patients at high risk of toxicity, appropriateness of leucovorin dosage adjustments, toxicities, and length of stay. Implementation of the dosing service was established after approval of a formal policy and procedure. Educational in-services were provided to pediatric oncology nursing staff and oncologists. Clinical pharmacists received training on an individual basis. Prospective data collection is on-going and will be compared.
RESULTS: In the one year preceding implementation of the pharmacokinetic dosing service, there were 18 pediatric patients (age 5 - 25 years) identified who had received high dose methotrexate. The majority of patients (61%) were identified as being at high risk of methotrexate toxicity. Methotrexate levels were drawn at the appropriate times in all patients, however initial leucovorin doses were inappropriate in 33% of patients and leucovorin dosage adjustments inappropriate in 66% of patients. Two patients experienced neutropenia and mucositis and subsequently an increased length of stay.
CONCLUSIONS: Traditionally, methotrexate level monitoring and subsequent leucovorin dosage adjustments were performed by medical residents in an in-patient pediatric oncology unit. Establishment of a formalized methotrexate pharmacokinetic dosing service is a unique opportunity for pharmacists to further expand their clinical services and improve quality of care.

186. Providing clinical pharmacy services for a children's rehabilitation facility. *Marcia L. Buck, Pharm.D., FCCP*, Clara Jane Snipes, R.Ph., William Boothe, Pharm.D.; University of Virginia Children's Hospital, Charlottesville, VA.

PURPOSE: While the clinical pharmacy needs of adults in rehabilitation facilities have been well documented, there is no information on the unique needs of children after serious injury. This project describes the clinical pharmacy services provided at the Kluge Children's Rehabilitation Center (KCRC).
METHODS: The KCRC is a 19-bed accredited pediatric rehabilitation facility with approximately 200 admissions/year. Patients range from neonates to 21 years of age. The most frequent diagnosis is acquired brain and/or spinal cord injury. In addition to our routine services, interventions made by pharmacists over a 6-month period were evaluated to identify common activities.
RESULTS: Services for the KCRC include daily profile review and medication consultations, participation in multidisciplinary rounds twice monthly, lectures on psychotropic medications, assistance with guideline development, and participation in research. A total of 295 interventions were evaluated. The majority of interventions (76%) involved therapeutic drug monitoring (TDM). Common TDM drugs included phenobarbital, phenytoin, and vancomycin. Other interventions included therapeutic recommendations (18%), cost savings (5%), and documentation of adverse reactions (1%). Therapeutic recommendations commonly involved the use of antispasmodics, antidepressants, antipsychotics, and stimulants in children. A pocket guide was developed for these common medications for the pharmacy staff and medical residents.
CONCLUSIONS: There is a significant role for pharmacists in the care of children undergoing rehabilitative services after serious injury.

187E. Pharmacy interventions for computerized neonatal parenteral nutrition orders. *Sheila A. Pedigo, Pharm.D.*, Gary R. Gutcher, M.D., Carol Matsy, R.Ph., Erika Delph, R.Ph.; Virginia Commonwealth University Medical Center, Richmond, VA.

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188. Innovative approaches to uncontrolled diabetes management in an urban primacy care health center serving the indigent population of a large metropolitan area. *Santhi Masilamani, BS, Pharm, Pharm.D., CDE*, Jose Bayona, M.D., Larry Butcher, M.D., Mihir Parikh, M.D.; Harris County Hospital District, Houston, TX.

PURPOSE: Studies have shown that patients with prolonged uncontrolled diabetes benefit from support services that can focus on the underlying factors for poor control. The Harris County Hospital District in Houston, TX, created a multidisciplinary diabetes care team that would meet on a regular basis to discuss these factors and create a plan of action for such patients.
METHODS: A multidisciplinary team developed guidelines for the treatment of diabetes and associated cardiovascular risk factors. These guidelines included the creation of a Diabetes Care Team that included key support services such as the psychology counselor, the clinical pharmacy specialist, the social worker, the nutritionist and the referring physician. Referral criteria established for the care team conference included A1C > 2.5% of baseline, LDL > 160 mg/dl or BP > 30 mmHg above goal for more than three visits. A referral form that served as the Care Team progress note was created for recording conference action plans. Group visits that offered support for these patients were also set up on a monthly basis to deal with special issues such as insulin fears, family issues, nutrition support, weight loss support etc.
RESULTS: It is expected that the Care Team conferences along with the group visits will help bring these uncontrolled patients with diabetes to goal. Outcomes tracked are statistically significant decreases in weight, A1C, blood pressure, lipids in 6 months, decreased use of triage visits in 6 months for acute high or low blood sugar if applicable, and increased physician/provider satisfaction.

189. Management of epoetin alpha use in the intensive care units. *Robert A. Quercia, M.S., R.Ph.*, Elizabeth Udeh, Pharm.D., Kevin P. Keating, M.D., Bradford Sherburne, M.D., Monica C. Goldman, Pharm.D.; Hartford Hospital, Hartford, CT.

BACKGROUND: From October 2002 through September 2003, $112,067 was spent on epoetin alpha for transfusion reduction in our intensive care units (ICUs). This non-FDA approved use represented 58% of epoetin alpha used in all ICUs.
PURPOSE: To evaluate the appropriateness of utilizing epoetin alpha to reduce RBC transfusions in the ICUs.
METHODS: The Drug Information Center (DIC) conducted a review of the literature evaluating the safety, efficacy and clinical outcomes in ICU patients receiving epoetin alpha for reduction of RBC transfusions and the current safety of RBC transfusions. The cost implications of epoetin alpha versus RBC transfusions were also determined.
RESULTS: The literature review showed no difference in any clinical outcomes between epoetin alpha and RBC transfusions and the overall risk of RBC transfusions was minimal. Based primarily on these findings and the high cost of epoetin alpha the therapeutics committee approved a protocol restricting epoetin alpha use in the ICUs to FDA approved anemia therapy. RBC transfusions were used in patients requiring an increase in hemoglobin who did not meet the protocol criteria. Forty weeks into the program compliance to the protocol is >90% with an estimated annualized cost avoidance of $100,094. There was no blood supply shortage and no reported adverse events with the use of RBC transfusions.
CONCLUSION: From a critical review of the literature it was determined that the use of epoetin alpha to reduce RBC transfusions in ICUs is an

expensive therapeutic modality with no proven clinical outcomes and should not be the standard of practice.

190E. Outcomes assessment of pharmacists' clinical interventions at a university hospital. *T. Aaron Jones, Pharm.D.*[1], Michael D. Bradley, Pharm.D.[2]; (1)University of Alabama Hospital, Birmingham, AL; (2)University of Arkansas, Little Rock, AR.

Presented at the 39th Midyear Clinical Meeting of the American Society of Health-System Pharmacists, Orlando, FL, December 8, 2004.

191E. Pharmaceutical outcomes management program: an interdisciplinary approach to cost-effective therapy. *Christopher R. Fortier, Pharm.D.*, Paul W. Bush, Pharm.D., MBA, FASHP, Lynn A. Uber, Pharm.D.; Medical University of South Carolina, Charleston, SC.

Presented at the Midyear Clinical Meeting of the American Society of Health-System Pharmacists, Orlando, FL, December 5-8, 2004.

192. Pharmacist involvement in medication therapy management services in an adult asthma clinic. *Leigh Ann Ramsey, Pharm.D., BCPS, CDE*, Lisa M. Murphey, Pharm.D., BCPS, Margaret B. Pitcock, Pharm.D., Carol Hope, Pharm.D.; University of Mississippi School of Pharmacy, Jackson, MS.

PURPOSE: To assess improvement in medication use and lung function through disease-specific pharmacist medication therapy management services.
METHODS: Retrospective study of patients followed for 12 months. Outcomes included metered-dose inhaler (MDI) and spacer techniques, peak flow (PF) rates as a percent of predicted and actual values, and smoking status. Assessments were by pharmacist observation and patient reports. Data were retrieved from disease modules completed at each visit.
RESULTS: Thirty-two patients enrolled. MDI technique on initial visit (IV): 3 (9%) rated "poor," 11 (34%) "fair," 17 (53%) "correct." On final visit, none rated "poor," 1 (3%) "fair," and 31 (97%) "correct." MDI/spacer technique on IV: 3 rated "poor," 14 "fair," and 15 "good." On final visit (FV), 2 rated "poor," 4 "fair," and 26 "good." The percent of predicted PF on IV was <60% for 7 (22%), >60-<80% for 11 (34%), >80% for 14 (44%). The percent of predicted PF on FV was <60% for 2 (6%), >60-<80% 11 (34%), >80% for 19 (59%). Average actual PF on IV was 303, increasing to 327 on FV. On IV, 26 out of 31 (84%) reported no current smoking and at FV, 27 (87%) reported no current smoking. The average number of clinic visits was 6.9.
CONCLUSION: This study evaluates important components of pharmacist asthma management: appropriate use of medications/spacers and PF monitoring. This demonstrates improvement in both medication use techniques and lung function per PF readings. Study limitations include differences in pharmacists' assessments of patient technique and self-reported patient data. These results will support implementation of a larger, prospective evaluation of services in this clinic.

193. Implementation of a clotting factor billing and reimbursement process. *Jennifer B. Jastrzembski, Pharm.D.*, Kerry R. Gasperson, BS, Paul W. Bush, Pharm.D., MBA, FASHP, Lynn A. Uber, Pharm.D.; Medical University of South Carolina, Charleston, SC.

PURPOSE: The current standard for in-patient billing is by diagnosis-related group via International Classification of Diseases, 9th revision, Clinical Modification codes. Clotting factors have been eligible for additional reimbursement since 1999; however, our in-patient billing system is not designed to bill for this additional reimbursement. In 2003, Novoseven® Coagulation Factor VIIa (Recombinant) was added to the list of eligible clotting factors. Our institution spends over $600,000 on clotting factors per year. At 95% average wholesale price, additional reimbursement could be as high as $1,800,000. This project aims to define a system for billing and reimbursement of clotting factors via the current Medicare regulations.
METHODS: A billing and reimbursement task force was created to review the current billing/revenue process. Identification of a process for addition of detailed drug codes to the in-patient bill was defined and will be followed by in-servicing of the billing/revenue staff. The process will be implemented, reimbursement tracked for fiscal year 2005, and adjustments made if necessary.
RESULTS: Since Medicare allows "back billing", a retrospective review of those patients receiving clotting factors in 2004 were identified and re-billed to recoup lost revenue. We found over $500,000 in additional reimbursement. A prospective analysis of the process will occur in January 2005.
CONCLUSION: The pharmacist's knowledge of billing and reimbursement are essential to sustaining their institution's financial viability.

194. Development, implementation, and impact of a standardized clinical pharmacy productivity measurement system. *Heath R. Jennings, Pharm.D.*[1], Kelly J. Martin, Pharm.D.[2], Hanan M. Shaban, Pharm.D.[3], Missy Wilson, Pharm.D.[4], Tricia Killingsworth, BSPharm[5], George Hill, BSPharm[6]; (1)Saint Joseph HealthCare, Lexington, KY; (2)Franciscan Health System, Tacoma, WA; (3)Littleton Adventist Hospital, Littleton, CO; (4)St. John's Regional Medical Center, Joplin, MO; (5)Catholic Health Initiatives, Denver, CO; (6)Catholic Health Initiatives, Erlanger, KY.

PURPOSE: As healthcare organizations grow more cost conscious, pharmacists rely on productivity measurement systems to evaluate performance and benchmark productivity. Conventional systems emphasize drug distribution and have yet to incorporate clinical pharmaceutical care services. Consequently, the complete spectrum of pharmacy services may not be represented thus stifling the growth of clinical pharmacy programs. As the profession continues to evolve clinically, the importance of quantifying non-drug distribution activities intensifies.
METHODS: A multi-disciplinary group within Catholic Health Initiatives (CHI), a national non-profit healthcare organization, developed an evidenced-based system for standardized documentation and measurement of clinical pharmacy activities that could be used nationally by the 68 member market-based organizations (MBOs). Institutions from various regions of the United States combined three MBO-specific clinical documentation systems into a single integrated system that collects and measures thirty-one non-drug distribution activities. With the assistance of corporate finance leaders and an internal peer-review process, the primary literature and hospital specific data were used to derive standard cost savings and time values for each activity.
RESULTS: As a pilot, two MBOs began using the integrated system in July 2004 and combined to document over 15,000 interventions and $2,000,000 in savings during the initial four months. To facilitate national spread of the integrated system, pharmacists from pilot facilities and CHI leaders from Pharmacy, Finance, and Decision Support are currently working to educate member institutions.
CONCLUSIONS: National acceptance and adoption of an evidenced-based integrated system for clinical pharmacy documentation could redefine pharmacy productivity measurements and promote growth of clinical pharmacy programs.

195. Epoetin dose standardization protocol. *Sylvia Martin Stone, Pharm.D., BCPS*, Rita Shane, Pharm.D., FASHP, Emmanuel Saltiel, Pharm.D., FASHP, Mia Kim, Pharm.D., Angela Hirai-Yang, Pharm.D.; Cedars-Sinai Medical Center, Los Angeles, CA.

PURPOSE: In response to steadily increasing annual expenditures nearing $1.8 million dollars, several multidisciplinary task forces were convened in 2003 to address the overutilization of epoetin in the acute care setting. The purpose of these physician/pharmacist task forces was to evaluate current prescribing practices in light of the available evidence in the medical literature with the goal of developing guidelines for the inpatient use of epoetin.
METHODS: With representation from nephrology, oncology, internal medicine and surgery, guidelines specifying appropriate indications, doses and frequency of dose escalation were developed. Task force recommendations concluded that due to the chronic nature of epoetin therapy, short courses during an inpatient admission were unlikely to result in improved outcomes. Similar to the Medicare guidelines governing the reimbursement of epoetin, the following indications were determined to be appropriate in the acute care setting: anemia related to systemic lupus erythematosis and rheumatoid arthritis, chronic kidney disease or dialysis dependence, chemotherapy related anemia, anemia in the HIV+ population, and pre-operative regimens initiated in the outpatient setting. The maximum dose for indications other than oncology was established as 100 units/kg three times weekly; for oncological indications, the maximum dose was established as 150 units/kg three times weekly. Additionally, dose escalations were limited to no greater than 25% at intervals no less than 2 weeks. With the approval of the Pharmacy and Therapeutics Committee, the Department of Pharmacy Services initiated a dose standardization protocol for all epoetin orders allowing pharmacists to hold orders for unsubstantiated indications or standardize doses to approved maximums.
RESULTS: The dose standardization protocol has resulted in a reversal of the average 15% annual increase. Additionally, actual fiscal year 2005 savings of $90,000 are anticipated.
CONCLUSION: A pharmacist initiated epoetin protocol is an effective method for encouraging evidence-based inpatient epoetin therapy.

196. Results of a pharmacist-run smoking cessation clinic in a family medicine practice. Peter G. Koval, Pharm, D[1], *Kimberly Fuquay, 2005, Pharm., D., Candidate*[2]; (1)Moses Cone Family Practice Center, Greensboro, NC; (2)UNC School of Pharmacy, Elon, NC.

PURPOSE: Limited publications on the success of a pharmacist-run smoking cessation clinic have been reported. This study reviewed documented medication use and quit status of patients seen in a pharmacist-run smoking cessation clinic to 1) determine smoking cessation success rates and 2) evaluate efficacy of various smoking cessation products.
METHODS: We reviewed medical records of patients seen during the past eight years (1997- 2004) in a pharmacist-run smoking cessation clinic. The medical records were analyzed to determine successful quit attempt (quit greater than six months), smoking cessation product(s) used, and current smoking status.
RESULTS: Over the eight-year period, a total of 226 patients were seen in the pharmacist-run smoking cessation clinic. One hundred and eighty one charts were found and analyzed. A successful quit attempt of six months was

documented in thirty-six patients (22%). Assessing the "current smoking status", found forty-one patients (25%) were currently smoke free. The most commonly used agents include bupropion (17%), nicotine patch (14%), and nicotine inhaler (14%).
CONCLUSION: A pharmacist-run smoking cessation clinic in a Family Medicine Practice has a positive effect on smoking cessation.

197. Therapeutic Interchange Practice 2004: preliminary results of a national survey. *Roy Guharoy, Pharm.D.*[1], John Noviasky, Pharm.D.[2]; (1)SUNY-Upstate Medical University, syracuse, NY; (2)St Elizabeth Medical Center, Utica, NY.

PURPOSE: The increasing complexity of pharmacotherapy, the associated increase in the number of therapeutically equivalent "me-too" agents and escalating drug costs have resulted in the utilization of therapeutic interchange (TI) practice. The objective of the study was to evaluate the prevalence and cost savings of TI among teaching and nonteaching hospitals in the US.
METHODS: A survey was sent to all directors of pharmacy at hospitals listed in the 2004 American Hospital Association directory as having more than 100 beds; 337 hospitals responded. The survey elicited data about hospital demographics, the policies and personnel involved in TI, and estimated cost savings incurrred by the use of TI.
RESULTS: Preliminary analysis of information from 142 hospitals demonstrated that 100% of teaching and 98% of non-teaching hospitals have established TI policies and procedures. The most commonly substituted medication classes were antimicrobials, antihistamines, oral inhalers, low molecular weight heparins, vitamins, potassium supplements, insulin, cardiac agents, antacids, histamine H-2 receptor antagonists and proton pump inhibitors. The annual dollar savings was estimated by 81% of teaching and 61% of non-teaching hospitals. Significant variation in cost savings occurred when hospitals attempted to estimate the annual dollar savings, as no adequate software exists to perform this task.
CONCLUSION: TI is a common practice in the U.S.

198. Clinical pharmacy self-leadership: a template for professional growth. *Eric W. Weber, Pharm.D., BCPS*, Michael Russum, Pharm.D, Randy Koontz, R.Ph., MBA, MHA; Carl T. Hayden VA Medical Center, Phoenix, AZ.

PURPOSE: To develop and implement a professional team self-leadership program that facilitates individual involvement, decision-making and satisfaction for service line clinical pharmacists and clinical technicians.
METHODS: In an attempt to develop a team-based leadership structure to attenuate management challenges and support individual and team growth for a large clinical section, a pillar program was initiated in primary care in April 2003. This program was then integrated within a 54-member clinical pharmacy section in April 2004. The pillar structure was designed around five pillars, each representing the service foundations felt most relevant for team success - Teamwork, Communication/Marketing, Research/Clinical Outcomes, Education, and Leadership/Mentoring. Each pillar includes members from the four pharmacy service lines, with one chair and management leadership liaison. Mission statements and strategic plans were developed for each pillar.
RESULTS: Although challenges were inherent, the pillar teams have achieved their self-defined goals and are now pursuing new endeavors. Professional satisfaction remains high and the outpatient pharmacy costs per unique veteran are among the lowest nationally in VHA. Program results will be discussed in more detail at the poster presentation.
CONCLUSIONS: There are a myriad number of advantages to a large clinical team. Conversely, there are also distinct challenges associated with operational management, performance oversight, education and communication. Self-leadership pillar teams have provided the framework for professional satisfaction and goal achievement. Mission unity, procedural continuity, communication, marketing successes, competency development, pharmacy outcome analyses and esprit de corps are a few of the goals that have been achieved within this progressive structure.

199E. Development of dose-based guidelines of psychotropics in children. *Wendy M. Bullington, Pharm.D.*, Amy VandenBerg, Pharm.D., Hope Kapetanekos, RPh; Medical University of South Carolina, Charleston, SC.

Presented at the Southeastern Residency Conference, Athens, GA, May 11-23, 2004.

200E. The impact of a multi-disciplinary asthma management program on asthma-related health care utilization, patient outcomes, and patient satisfaction measures. *Brian H. Bach, BS-Pharmacy*, Marlis M. O'Brien, RRT; Franciscan Skemp Healthcare, La Crosse, WI.

Presented at the 50th International Respiratory Congress of the American Association of Respiratory Care, New Orleans, LA, December 4-7, 2004.

201. Smoking cessation program in a public health primary care clinic. *Roger D. Lander, Pharm.D., FCCP, BCPS*[1], Michael D. Hogue, Pharm.D.[1], Daniel M. Kyle, M.D.[2]; (1)McWhorter School of Pharmacy, Birmingham, AL; (2)Jefferson County Department of Health, Bessemer, AL.

Nicotine addiction is a major public health problem (with societal costs estimated to be in excess of $7.50/pack of cigarettes) and causes more than 450,000 deaths/year in the U.S. This translates to a total annual societal cost of greater than $175 billion in the U.S. alone. In our own state, 26% of adults currently use tobacco products. The two pharmacy faculty attended the "Rx for Change" training program last summer and instituted a smoking cessation program in the health department clinic, with enrollment beginning October 1, 2004. All students who complete their ambulatory care rotation at this site are trained in the "Rx for Change" program and assist in this clinic activity. We will present data regarding the development, administration, and management of a pharmacist run clinic in a public health environment. We will also present the initial six months data in terms of patient enrollment, follow - up rates, pharmacotherapy utilized in assisting quit efforts, as well as the three and six month quit rates available at the time of presentation. Recommendations for methods to get more pharmacy practitioners involved in smoking cessation will be made.

202. The Toxic Exposure Surveillance System (TESS): public health and chemical/bioterrorism surveillance with poison center cases. *William A. Watson, Pharm.D.*, Nicole E Reid, M.S., Toby L Litovitz, M.D.; American Association of Poison Control Centers, Washington, DC.

Since 1985 TESS has compiled more than 37 million poison exposures managed by US poison control centers (PCCs). These poison exposures include therapeutic errors, adverse drug reactions, product contamination/ tampering, drug misuse and abuse, potential chem/bioterrorism and other poisonings and overdoses. TESS provides a unique public health evaluation of drug and product toxicity. Analysis of information calls, where no exposure has occurred, showcases public responses to events such as drug recalls and media reports. Continuous upload of cases to a centralized database enables real-time surveillance. Variables include age, gender, location, reason, clinical effects, level of care, treatment and outcome. Surveillance processes currently evaluate national and regional case volume spikes, surveillance case definitions, clinical effect frequency, and geographical case distribution. Events such as the anthrax exposures in 2001, arsenic-contaminated coffee in New Sweden, Maine, and numerous chem/bioterrorism emergency preparedness exercises demonstrate the role of poison centers in chem/ bioterrorism events and the ability of surveillance to rapidly detect events. Federal agencies, drug and product manufacturers utilize TESS for safety and regulatory evaluations, including mandatory fatality reporting. The increase in exposures and information calls reported to PCCs after a new compound is marketed provides an evolving picture of its clinical toxicity. Preliminary data mining and dose-response studies suggest additional potential for TESS in supporting pharmaceutical safety.

203. Motivating tobacco users to quit: an effective pharmacist-managed program. *Larry A. Dent, Pharm.D., BCPS*, Jean T. Carter, Ph.D.; University of Montana, School of Pharmacy and Allied Health Sciences, Missoula, MT.

PURPOSE: To determine effectiveness of three versions of a pharmacist-managed tobacco cessation program.
METHODS: The program began in November 1999, consisting of five-sessions for all referred patients (version one). In March 2001, it was revised to three-sessions (version two). In September 2003, the program incorporated the Transtheoretical Model for Change (TMC), two-week spacing of classes, prescreening of individuals using motivational scale, and bupropion immediate-release to replace bupropion sustained-release (version three). Only patients at appropriate stage of change were enrolled; others received other interventions. All versions consisted of approximately six hours of classes. Enrollment, sessions attended, and abstinence rates were collected from medical records and phone surveys. The study period covers November 1999 through April 2004. Abstinence meant no tobacco use for more than three months.
RESULTS: In version one, 58 patients were enrolled; 23 (40%) completed all sessions. Of the 16 completers contacted, seven were abstinent (7/16 or 44%). In version two, 43 patients enrolled; 18 completed all sessions (42%). Of the 16 completers contacted, three were abstinent (3/16 or 19%). In version three, 77 were enrolled patients, of which 50 completed all sessions (65%). Of the 46 completers contacted, 24 were abstinent (24/46 or 52%). Chi square analysis showed a significant relationship between program completion and abstinence rates. (χ^2=12.538, df=5, p=0.0281)
CONCLUSION: Increases in abstinence rate appear to be related to increases in completion rates. The program that employed TMC to identify patients ready for change, achieved highest rates of abstinence because it achieved highest rates of program completion.

204. Development of a drug therapy management protocol for pharmacists practicing on a liver transplant service. *Sharon L. Wilson, Pharm.D.*, Teresa Direnzo, Pharm.D., Nneka Ezekwueche, Pharm.D., Tamra Arnold, Pharm.D., Benjamin Philosophe, M.D., Ph.D..; University of Maryland Medical Center, Baltimore, M.D.

PURPOSE: The objective of this study was to document the effectiveness of a drug therapy management protocol for pharmacists working on a liver transplant service. The primary goals were to: 1) Reduce adverse drug events

through early detection, 2) Reduce delays in modifying drug regimens and 3) Decrease overall drug cost.
METHODS: Transplant protocols were developed through collaboration with physicians and pharmacists and implemented into practice. Pharmacists modified drug regimens per protocol and documented all clinical interventions 5-days per week from July to October 2004. Interventions associated with super-therapeutic serum drug levels or high drug doses in organ dysfunction were documented as potential adverse events. Adjustments to the medication plan (dose changes, drug/lab additions) occurring later than 24 hours from onset of occurrence were considered a delay in therapy. IV to PO conversions, discontinuation of inappropriate therapy and renal dose adjustments were used to calculate cost savings based on average length of stay (7-27 days).
RESULTS: 168 interventions were documented during the study period. 85% of the documented interventions resulted in modifying drug plans within 24hrs or less. Fifteen percent of interventions were defined as preventative for an adverse drug event. The final drug cost savings for the study was $7,790 to $26,290 dollars, which would be extrapolated to $31,159 to $105,161 dollars annually.
CONCLUSIONS: A drug therapy management protocol was successful in improving patient care by preventing adverse events, reducing delays in modifying drug regimens and decreasing overall drug cost for patients on a liver transplant service.

STUDENT, RESIDENT, FELLOW RESEARCH IN PROGRESS

These papers describe original research by students, residents, and fellows in therapeutics, pharmacokinetics, pharmacodynamics, pharmacoeconomics, and pharmacoepidemiology in which the research effort is still on-going. The abstract title and authors are published in *Pharmacotherapy*; the full abstract will be published in the meeting program book.

205. A comparison of event rates for patients receiving drug-eluting stents versus bare metal stents. *Molly A. Mullin, Pharm.D.*, Sara D. Brouse, Pharm.D.; Texas Tech University Health Sciences Center School of Pharmacy/Dallas VA Medical Center, Dallas, TX.

206. Comparison of use of NSAIDs versus COX-2 inhibitors on the rate of hospitalization in congestive heart failure patients. *Ellen E. Keyes, Pharm.D.*, Julie M. Koehler, Pharm.D.; Clarian Health Partners, Indianapolis, IN.

207. Implementation of a pharmacy directed, multidisciplinary practice to improve compliance with published guidelines and quality indicators in post coronary artery bypass graft patients. *Felix K. Yam, Pharm.D.*, Kelly Smith, Pharm.D., Wendell S. Akers, Pharm.D., Ph.D., Phillip C. Camp, M.D., Jeremy Flynn, Pharm.D.; University of Kentucky Chandler Medical Center, Lexington, KY.

208. A retrospective review of bivalirudin versus glycoprotein IIb/IIIa inhbitors plus heparin for percutaneous coronary intervention. *Danielle M. Blais, Pharm.D.*, Kerry K. Pickworth, Pharm.D.; Ohio State University Medical Center, Columbus, OH.

209. Evaluation of an insulin infusion protocol in a surgical-transplant intensive care unit. *Jamie L. Nelsen, Pharm.D.*[1], Curtis E. Haas, Pharm.D., BCPS[1], David C. Kaufman, MD[2]; (1)Univerisity at Buffalo, Buffalo, NY; (2)School of Medicine and Dentistry, University of Rochester Medical Center, Rochester, NY.

210. Evaluation of documented vaccinations in an internal medicine clinic. *Cori M. Brock, Pharm.D.*[1], Margaret B. Pitcock, Pharm.D.[2], Lisa M. Murphey, Pharm.D., BCPS[2], Dena W. Jackson, MD[3]; (1)University of Mississippi Medical Center, Jackson, M.S.; (2)University of Mississippi School of Pharmacy, Jackson, M.S.; (3)University of Mississippi School of Medicine, Jackson, M.S.

211. Pharmacy practice residents' perceptions of internal medicine specialty residency training. *Brandy M. Causey, Pharm.D.*, Anne P. Spencer, Pharm.D., BCPS; Medical University of South Carolina, Charleston.

212. The effect of "net carbs" on plasma glucose and insulin in diabetic subjects. *Tracy K. Pettinger, Pharm.D.*, Cara Lawless-Liday, Pharm.D.; Idaho State University, Pocatello, ID.

213. A retrospective review of the treatment of heparin-induced thrombocytopenia at a university hospital. *James E. Cox, Pharm.D.*[1], Pamela R Maxwell, Pharm.D.[1], James S Lewis, Pharm.D.[1], John Olson, M.D., Ph.D.[1], Robert L. Talbert, Pharm.D.[2], Henry I. Bussey, Pharm.D.[3]; (1)University Health System, San Antonio, TX; (2)University of Texas at Austin, Austin, TX; (3)University of Texas HSC, San Antonio, TX.

214. Analysis of linezolid use in a large academic teaching institution. *Nathan Wirick, Pharm.D.*, Debra A. Goff, Pharm.D.; The Ohio State University Medical Center, Columbus, OH.

215. In vitro activities of quinupristin/dalfopristin (QD), daptomycin (DAP), and linezolid (LZD) against Gram-positive bacterial isolates from a large cancer center. *Abayomi B. Ogundele, Pharm.D.*[1], Brent M. Booker, Pharm.D.[1], Pamela A. Kelchin, A.Sc[2], Patrick F. Smith, Pharm.D.[1]; (1)University at Buffalo/Roswell Park Cancer Institute, Buffalo, NY; (2)University at Buffalo, Buffalo, NY.

216. Is obesity a risk factor for the development of surgical site infections? *Justin S. Hooper, Pharm.D.*[1], Ronald G. Hall, Pharm.D.[1], Anthony J. Busti, Pharm.D.[1], M. Shahbaz Hasan, MD[2], Kathleen Hartless, MN[3]; (1)VA North Texas Health Care System/ Texas Tech University Health Sciences Center, Dallas, TX; (2)VA North Texas Health Care System/The University of Texas Southwestern Medical Center, Dallas, TX; (3)VA North Texas Health Care System, Dallas, TX.

217. Evaluation of hypoglycemic episodes in hospitalized end-stage renal disease patients on glargine. *Holli A. Winters, Pharm.D.*, Shiv K. Seth, Ph.D., R.Ph.; The Ohio State University Medical Center, Columbus, OH.

218. Frequency of hyperkalemia in hemodialysis patients on angiotensin-converting enzyme inhibitor (ACE-I) and angiotensin receptor blocker (ARB) therapy. *Isela M. Martinez, Pharm., D.*, Amy Barton Pai, Pharm. D.; University of New Mexico, Albuquerque, NM.

219. Factors influencing migraineur physician-consulting behavior in a university population. *Monica L. Skomo, B.S., Pharm.D.*, Hildegarde J. Berdine, B.S., Pharm.D., BCPS, Shane P. Desselle, R.Ph., Ph.D., Christine K. O'Neil, B.S., Pharm.D., BCPS, FCCP; Duquesne University, Pittsburgh, PA.

220. National survey on the use of steroids in adults with bacterial meningitis (ABM). *Xi Liu, Pharm.D.*[1], Raymond Cha, Pharm.D.[1], George Delgado Jr., Pharm.D.[2], Dennis Parker, Pharm.D.[1], Denise Rhoney, Pharm.D.[1]; (1)Wayne State University, Detroit, MI; (2)Detroit Receiving Hospital, Detroit, MI.

221. Efficacy of low compared to standard dose rasburicase in adults. *Shanna A. Stetz, Pharm.D.*, Jerry Siegel, Pharm.D., Robert M. McNulty, Pharm.D.; The Ohio State University Medical Center - James Cancer Hospital, Columbus, OH.

222. Effects of insulin glargine on hemoglobin A1C (HbA1C) in patients previously prescribed other antidiabetic regimens. *Jeffrey J. Neigh, Pharm.D.*[1], John Catoe, Pharm.D.[2], Shana K. Trice, Pharm.D., BCPS[3]; (1)Brooke Army Medical Center, Fort Sam Houston, TX; (2)Wilford Hall Medical Center, 2200 Bergquist Drive Suite #1, Lackland AFB, TX; (3)DoD Pharmacoeconomic Center, Fort Sam Houston, TX.

223. Determining the influence of self-reported pharmaceutical industry interaction on the intraclass medication choice of Medicaid prescribers. *Nicole Murdock, Pharm.D.*, Rex W. Force, Pharm.D., William M. Woodhouse, M.D.; Idaho State University, Pocatello, ID.

224. Population pharmacokinetics and optimal sampling of IV busulfan in bone marrow transplant patients (BMT). *Abayomi B. Ogundele, Pharm.D.*[1], Julie M. Bullock, Pharm.D.[1], Brent M. Booker, Pharm.D.[1], Philip McCarthy, M.D.[2], Leslie Shaw, Ph.D.[3], Alan Forrest, Pharm.D.[4], Patrick F. Smith, Pharm.D.[1]; (1)University at Buffalo/Roswell Park Cancer Institute, Buffalo, NY; (2)Roswell Park Cancer Institute, Buffalo, NY; (3)University of Pennsylvania Medical Center, Pittsburg, PA; (4)University at Buffalo, Buffalo, NY.

225. Evaluation of falls secondary to the use of atypical antipsychotics. *Niren Jasutkar, Pharm.D.*, Kim Walsh, RPh, Robert Adamson, Pharm.D.; Saint Barnabas Behavioral Health Center, Toms River, NJ.

226. Evaluation of rofecoxib use in a family medicine clinic. *Jennifer Carnell, Pharm.D., Candidate*, Jennifer B. Dahl, Pharm.D. Candidate, Laura Hansen, Pharm.D., Joseph Saseen, Pharm.D.; University of Colorado Health Sciences Center, Denver, CO.

227. Drug abuse and dependence information in product labeling. *Lisa B. Phipps, B.S.*, Cynthia K. Kirkwood, Pharm.D., Patricia W. Slattum, Pharm.D., Ph.D., Robert L. Balster, Ph.D.; Virginia Commonwealth University School of Pharmacy, Richmond, VA.

228. Efficacy of low-dose prophylactic granisetron versus ondansetron for prevention of postoperative nausea and vomiting. *Matthew Dormarunno, B.S., Pharm.D.candidate*, Jim Curtis, Pharm.D., BCPS; Borgess Medical Center, Kalamazoo, MI.

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